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José Luís Reis Jiří Zelený Beáta Gavurová José Paulo Margues dos Santos Editors



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José Luís Reis · Jiří Zelený · Beáta Gavurová · José Paulo Marques dos Santos Editors

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Proceedings of ICMarkTech 2023, Volume 1



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Part I Artificial Intelligence Applied in Marketing

Chapter 1 Social Media Presence Impacts AI Influencer's Endorsement: An Empirical Evidence



Sharon Xiao Wang, Jin Xue⁽⁾, Matthew Tingchi Liu⁽⁾, and Hoi Ngan Loi

Abstract With the rapid development and adoption of artificial intelligence (AI), the emergence of AI-generated influencers has surged in the public sphere. The current paper aims to investigate the endorsement effectiveness of AI influencers by exploring the psychological mechanism underlying the characteristics of AI influencers and consumers' purchase intention. About 500 samples were collected from China through an online survey to (1) measure the multidimensional scale of social media presence, fantasy, attitude towards the endorser, and purchase intention; and (2) test the relationships among these variables. The results show that social media presence exerted positive and significant effects on purchase intention, fantasy, and attitude towards the endorser. Additionally, fantasy positively correlated with purchase intention and attitude towards the endorser. Furthermore, attitude towards the endorser positively influenced purchase intention. This paper explains the underlying reasons for consumers fantasizing about AI influencers for multiple gratifications on social media. It is based on the Uses and Gratifications Theory (UGT) as the internal psychological mechanism for determining the effectiveness of AI influencers' endorsement, rather than solely relying on interpersonal social interaction as explained by para-social interaction. This approach offers a new perspective on AI influencer endorsement and its future study. This paper presents a new theoretical

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basis and key findings for AI influencer endorsements in addition to providing significant management guidance on AI influencer incubation and AI influencer endorsement selection for marketers. Moreover, the conclusions from this study serve as valuable references for policymakers in shaping regulations related to AI-driven advertisements, promotions, and campaigns.

1.1 Introduction

Endorsement is an effective, common, and convenient way to reach consumers [1], which influences marketing strategies by changing business models, sales procedures, customer service choices, as well as customer behaviours [2, 3]. It is one of the most significant research domains in marketing [4]. AI influencers have become increasingly prevalent on social media [5], and the "new brands" in luxury and fashion are using them to meet market demands and improve endorsement efficiency [6]. An AI influencer is created digitally using algorithms and software to perform tasks like a human influencer with a sizeable follower count on social platforms [7]. It projects human personality, warmth, and sensitivity on social media platforms by leveraging immersive virtual environment technology with their interactivity. Presence on social media is considered a key factor for audiences; presence exerts audiences' fantasy with their favourite AI influencers and shapes their perception, attitude, and behaviours, thus influencing them to seek social recognition with their ideal AI influencers via interaction [8]. Based on Uses and Gratifications Theory (UGT), AI influencers provide various gratifications to social media users, such as pursuing information, entertainment, social interaction, personal identity, escape from daily life, and para-social experiences. Marketers increasingly care about social media presence as they choose AI endorsers to reduce the problem of endorser transmission and marketing costs [7]. Consumers are open to AI influencer recommendations due to the mediation effects of social distance between influencer type and the outcomes [5]. Yet marketing literature that examines AI influencers as endorsers in marketing strategy is still limited; the underlying mechanism of human-like AI endorsers under exploration.

The innovation of this paper is reflected in the following three aspects. First, social media presence as the characteristic of AI influencers in endorsement has not been sufficiently defined and examined yet; this paper will shed light on incubating and choosing AI influencers. It will also enhance the understanding of the characteristics of AI influencers, providing valuable references to policymakers to shape regulations related to AI-driven advertisements, promotions, and campaigns. Besides, the relationship between social media presence and fantasy has not been verified; this paper will provide new insights for interpreting the impacts of social media presence on fantasy. Second, to date, the mediating roles of fantasy and attitude towards the endorser in the impact of social media presence on purchase intention have not been explored. Our findings will expand the effective path and value for social media presence or AI influencer endorsement. Finally, previous research has investigated

para-social interactions with technology and human-like agent in endorsement [4]. This paper will reveal the internal psychological mechanism at play in the effectiveness of AI influencers' endorsements. It will do so by testing the respective mediation effects and chain-mediating roles of fantasy and attitude towards the endorser of social media presence on purchase intention based on UGT. It is more suited to explain AI influencer marketing to drive consumption motivations and will offer a new perspective on such endorsements.

1.2 Literature Review and Hypotheses Development

1.2.1 Social Media Presence

According to Smith and Galliano [9], social media presence is defined as "presentness," and the "state of being" in online interactions. It was used to measure the role of B2B brands' presence on social media sites in enhancing relationships with customers, for example, demonstrating its presence by putting out posts and updates that customers can engage with [10]. Celebrities and influencers on social media often share highly personal statements on various topics including their private lives, which makes social media interactions more personal and inviting, enhancing perceived intimacy and bonding. Hence, they are mainly famous for their social media presence rather than offline achievements or performance [11, 12]. This presence promotes the gratification of the users on social media [10]. This kind of easyto-process information is what marketers usually strive to offer to satisfy consumers' needs [13]. Currently, limited studies have established the indirect role of the social media presence of AI influencers and its impact on the effectiveness of fashion brand endorsement.

Social media presence was shown to affect users' online behaviours through influencer marketing by leveraging AI [5]. Prior research notes that social media presence plays an important role in satisfaction and partner quality that positively impacts business relationships [10, 14]. People are more likely to share values and behaviours with AI influencers when they have a positive attitude towards them [11]. Colliander and Dahlén [15] found that higher brand attitude and increased purchase intention occurred through a post on a social media platform about a fashion brand compared to an online magazine article on the same theme because readers felt an intimacy with the social media figures. Thus, the following hypotheses are proposed:

H1: Social media presence positively impacts consumers' attitude towards the endorser.

H2: Social media presence positively impacts consumers' purchase intention.

1.2.2 Fantasy

Knudsen et al. [16] inferred that "Fantasy is the domain of pleasure, as such, it functions to avoid an encounter with The Real". According to Ioana-Daniela et al. [17], fantasy has perceptual features of intrinsic needs, desires, and wishes. Consumers may engage in a lighter form of fantasy that comprises musing, mind wandering, and daydreaming aside from identification-related fantasy to fulfil their entertainment and personal needs [18]. By evaluating celebrity fantasy, Hung [19] provides insights into how advertisers promote their brands as explained by UGT. Whereas, the role of fantasy in AI influencer endorsement, which leaves a large space for imagination for users, is still limited.

According to Hung [19], the fantasy of being together with the celebrity brings an individual into a "one-way plus" relationship with the celebrity that is richer than the typical one-way para-social connection. This kind of playacting permits people to escape from reality, avoid boredom, and transcend the constraints of the real world [20]. An illusion of intimacy with the celebrity is generated when consumers regard the celebrity as emotional sustenance [21]. It has been discovered that consumers fantasize and embed themselves as or with the protagonist in video games or movies, which allows them to release their emotions and escape from mundane life. As a result, an enhancement will be implemented by their affective feelings towards the protagonist in entertainment, which results in a positive brand attitude towards the endorsement [19]. According to Song et al. [22], fantasy directly contributes to consumer willingness to purchase. Furthermore, Ioana-Daniela et al. [17] indicated that fantasy was significantly related to willingness to pay a premium. Hence, the following hypotheses are proposed:

H3: Fantasy positively impacts consumers' attitude towards the endorser.

H4: Fantasy positively impacts consumers' purchase intention.

AI influencers bridge real and imaginary worlds through social media presence, which may provide additional entertainment or escape benefits [23]. Consumer behaviours may be influenced by automatic and holistic processing stimuli in different contexts [24]. In this situation, fantasy reinforces the mechanism and helps people achieve gratifications with media use, such as information, entertainment, social interaction, and personal identity, as UGT indicates. This may impact consumer behaviours through the fulfilment of imaginative desires associated with AI influencers. Hence, the following hypothesis is proposed:

H5: Social media presence positively impacts consumers' perception of fantasy.

Numerous studies have found that using celebrity endorsement can generate positive effects on promotion and purchase intention [4, 8]. Holzwarth et al. have also indicated that the use of avatar agents leads to satisfaction and purchase intention in online shopping [25]. Combining H3 and H5, social media presence helps enhance fantasy, which, in turn, increases attitude towards the endorser and thus influences purchase intention. Hence, the following hypothesis is proposed:



Fig. 1.1 Conceptual framework

H6: The relationship between social media presence and consumers' purchase intention is serially mediated by consumers' perception of fantasy and attitude towards the endorser. See Fig. 1.1.

1.3 Pilot Study

This pilot study aims to explore the sentiment of the discourse about fantasy and the association factors which impact it.

1.3.1 Methodology

This pilot study conducts an in-depth qualitative analysis of Weibo posts originating from Weibo users. It utilizes a web-crawling service to generate and analyse the grammatical elements and conduct sentiment valence. It evaluates whether relational themes characterize the connection between the most important factor and the fantasy under investigation.

Data Collection. The original dataset was mined from publicly available Chineselanguage (traditional and simplified Chinese) posts on Weibo from February 11 to August 30, 2022, containing words which can be translated into English as "AI influencer/virtual influencer/digital human/virtual human/virtual idol" occurring with "fantasy/imagination". This keyword search yielded a sample of 107 posts. Duplicative, unintelligible, and irrelevant posts were manually removed, resulting in a final sample of 60 unique posts. The textual content of posts, user and account information, and the date and time of posts were included in the data collection of this study. After translating posts into English, qualitative content analysis was conducted.

1.3.2 Analysis and Results

Certain grammatical elements of the post, including sentence type (question, imperative/command, or declarative) and epistemic stance indicating voiced opinion or (re)stated fact, were recorded in addition to relational themes. Two categories of sentiment valence were coded: positive (supportive/empathetic statements) and negative (direct insults or stigmatizations). Frequencies and percentages of codes were calculated. Content analysis and interpretation within specific relational/sentiment categories were conducted to elucidate the meaning of these posts. All of the relational themes contained positive sentiments rather than negative ones (see Table 1.1).

The final data contained 60 Weibo posts. A visual map was created, as shown in Fig. 1.2. Based on frequency analysis, words like "accompany", "safety", "love", "betrayal" satisfy the definition of social media presence [10]. The word clouds of frequently appearing words provided deeper insights into Weibo posts related to social media presence and fantasy with AI influencers by Weibo users.

Qualitative analysis of posts containing both positive (n = 57, 95%) and negative sentiment (n = 3, 5%) revealed fantasy as the key mediator; positive sentiment disclosed social media presence as the key construct, as exemplified here:

A. "The virtual human fulfils all my fantasies about love, the most important thing is that he will not betray me."

This is a positive sentiment, and the majority of posts referenced "fantasy" about AI influencers.

- B. "However, I have never been a rainbow girl and followed one idol only. I have no fantasy about a being with a sense of distance, especially those virtual humans." This is a negative sentiment, denying the existence of fantasy about AI influencers.
- C. "Let's fall in love. Fall in love with avatar, fall in love with virtual human, fall in love with someone in fantasy, fall in love with voices, fall in love with the

	n	%
Grammatical elements		
Presence of an imperative	3	5
Presence of a question	2	3.3
Epistemic stance (opinion vs. fact):	55	91.7
Relational themes between social media presence and fantasy	6	10
Sentiment		
Positive	57	95
Negative	3	5
Total	60	100

Table 1.1 Frequencies of grammatical elements, relational themes, and emotional themes (N = 60)

Fig. 1.2 Visual map



one in dreams. The good thing is that you won't be disappointed, the bad thing is that there will never be a result."

- D. "THE BLENDER: Virtual human Bl∞nder is online." The infinite symbol "∞" in the name represents the infinite life and infinite possibilities of the virtual human. As a reflection of human creation, she possesses human desires and qualities but also possesses extraordinary freedom due to human imagination. This time, she is a musician in the T-BLDR universe. How do we, who are besieged in reality, fantasize about the life of virtual musicians in the virtual world?
- E. "#Why are virtual humans so popular#", "#Will the future be the era of virtual idols#", "Virtual humans are more of a sustenance for our spirit, so now more and more people like virtual idols, they can satisfy our fantasies."

Examples C, D, and E used sentence types (imperative, question) and epistemic stances to voice opinions. A significant amount of the posts were opinions from Weibo users.

- F. "I would only be fascinated with virtual males. Either a fully virtual man, or a semi-virtual man who presents his merits through the social media, and the rest is completed by my speculations and fantasies."
- G. "#Why are virtual humans so popular#? Are they truly so charming? As a matter of fact, my perspective is that this is the bonus brought by the social media. Virtual idols satisfy all fantasies and do not have personal-moral problems. They are always attentive, and [never collapse]. One can find everything he/she wants from great idols in them. They never take fans' hard work for granted, and they do not play temper. They always put fans' demands in high regard Presumably, they must be the idols that many groupies expect."

Examples F and G are relational themes between social media presence and fantasy. Example F intuitively expressed that social media presence is associated with fantasizing about AI influencers. Example G highlighted social media presence through its characteristics. The post conveyed the sensitivity and human warmth of AI influencers that could satisfy followers' fantasies through their presence on social media.

1.3.3 Discussion

This pilot study demonstrates that social media presence is the most important factor associated with fantasy as well as the overall sentiment of the discourse about fantasy. Based on the theoretical knowledge gained from the literature review and subsequent hypotheses development, the conceptual framework of this paper is outlined in Fig. 1.1.

1.4 Main Study

The objective of the main study is to evaluate the direct, indirect, and chain-mediating effects of the proposed model.

1.4.1 Methodology

Measurement. This study used an online questionnaire survey to measure the multidimensional scale of social media presence, fantasy, attitude towards the endorser, and purchase intention. The measurement items were all in English and adapted from the well-established scales in the previous literature. The questionnaire was subsequently translated into Chinese. Fourteen statements were attributed to a seven-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree). Specifically, the scale for social media presence was adapted from Karampela et al. [10] by replacing "supplier X" with "AI influencer". The scale for fantasy was adapted from Hung [19] by replacing "Andy/Yao" with "AI influencer". The scale for attitude towards the endorsement was adapted from Thomas and Fowler [7] and that for purchase intention was adapted from Holzwarth et al. [25, 26] by replacing "a pair of customized leisure shoes" with "a fashion product endorsed by the AI influencer".

Data Collection and Sampling. Participants were required to watch an introduction video of AI influencers before answering the questions by imagining the AI influencers they were fascinated or familiar with; otherwise, they would be disqualified from participation. The convenience sampling method was used due to its non-probability sampling technique and convenient accessibility. After refusing the invalid samples, a total of 500 samples were collected via an online survey. The participants' socio-demographic backgrounds, such as gender, age, education, and income level were included in the final part of the questionnaire. The final valid sample comprised 473 responses (valid response rate 94.6%) from which the incomplete and disqualified responses were removed. A total of 66% of respondents (out of 473) were female, 34.5% were aged between 18 and 22, 37.6% were aged between 23 and 26, and 28.9% were aged above 27. Luo Tianyi was the most popular AI influencer that most participants were familiar with and liked. Total of 94.95% of the participants who had knowledge about AI influencers also like fashion products.

1.4.2 Analysis and Results

Measurement Model Evaluation. Measurement model fitness, convergent validity, and discriminant validity were examined by confirmatory factor analysis (CFA). The results ($\chi 2 = 183.679$, df = 71, RMSEA = 0.058, IFI = 0.975, TLI = 0.968, CFI = 0.975, $\chi 2/df = 2.587$) showed a good model fit [27, 28]. In addition, the standard factor loadings were above 0.5; the average variance extracted (AVE) was above 0.50 for each construct and has been considered for convergent validity [29]. Detailed information can be found in Tables 1.2 and 1.3.

Test of Direct Effect. In order to test the hypotheses, the model from Fig. 1.1 was estimated in IBM[®] SPSS[®] Amos 26. Table 1.4 presents the details of the direct effects. Social media presence exerted positive and significant effects on attitude towards the endorser ($\beta = 0.518$, p < 0.01), purchase intention ($\beta = 0.287$, p < 0.01), and fantasy ($\beta = 0.714$, p < 0.001). Thus, H1, H2, and H5 were supported. In addition, fantasy positively correlated with attitude towards the endorser ($\beta = 0.254$, p < 0.01) and purchase intention ($\beta = 0.157$, p < 0.01), thereby supporting H3 and H4.

Test of Indirect Effect. Fantasy and attitude towards the endorser played a chainmediating role in the correlation between social media presence and purchase intention ($\beta = 0.098$, p < 0.01), thereby supporting H6 (see Table 1.5) (Fig. 1.3).

1.4.3 Discussion

Theoretical Contribution. First, this study has confirmed that social media presence plays a significant role in AI influencer endorsement effectiveness, which helps us enhance our understanding of the characteristics of AI influencers. Besides, the relationship between social media presence and fantasy has been verified, providing new insights for interpreting the impact of social media presence on fantasy. These

Constructs	Measurement items	Loadings	CR	α	AVE
Social media presence (SMP)	There is a sense of human contact on the AI influencer's social media	0.792	0.857	0.856	0.599
	There is a sense of personalness on the AI influencer's social media	0.756			
	There is human warmth on the AI influencer's social media	0.801			
	There is a sense of human sensitivity on s the AI influencer's social media	0.746			
Fantasy (FAN)	Sometimes I fantasize to be with my favourite AI influencer. In the fantasy, I'm very happy	0.925	0.935	0.935	0.828
	Sometimes I fantasize to be with my favourite AI influencer. In the fantasy, I can do the things I really like	0.914	14		
	Sometimes I fantasize to be with my favourite AI influencer. In the fantasy, I can do whatever I want to	0.890			
Attitude towards the	I like the endorser	0.758	0.855	0.854	0.596
endorser (ATTE)	My overall attitudes towards the endorser are positive	0.772	_		
	My overall attitudes towards the endorser are favourable	0.801			
	My overall attitudes towards the endorser are good	0.757			
Purchase intention (PI)	I am very interested in buying a fashion product endorsed by the AI influencer	0.844	0.856	0.855	0.664

Table 1.2 CFA results and Cronbach's α value

(continued)

Constructs	Measurement items	Loadings	CR	α	AVE
	The next time I buy a fashion product, I will take the product endorsed by the AI influencer into consideration	0.818			
	I can imagine buying a fashion product endorsed by the AI influencer	0.782			

Table 1.2 (continued)

Table 1.3	Means,	standard	deviations,	and	discriminant	validity
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	Mean	S.D.	SMP	FAN	ATTE	PI
SMP	5.364	0.905	0.774			
FAN	5.018	1.388	0.636**	0.910		
ATTE	5.940	0.735	0.599**	0.554**	0.772	
PI	5.550	0.998	0.672**	0.634**	0.745**	0.815

Notes n = 473. The italics diagonal elements are the square root of AVEs. Off-diagonal elements are the correlations among constructs. **Correlation is significant at the 0.01 level (two tailed)

Path	Effect	S.E	Р	Hypotheses results
$\text{SMP} \rightarrow \text{ATTE}$	0.518**	0.088	0.002	Supported H1
$\text{SMP} \rightarrow \text{PI}$	0.287**	0.077	0.002	Supported H2
$\mathrm{FAN} \to \mathrm{ATTE}$	0.254**	0.078	0.002	Supported H3
$FAN \rightarrow PI$	0.157**	0.058	0.006	Supported H4
$\text{SMP} \rightarrow \text{FAN}$	0.714***	0.033	0.001	Supported H5

Table 1.4 Results of direct effect

Note(s) n = 473 ** P < 0.01; *** P < 0.001 (two-tailed tests). Standardized coefficients are reported

Table 1.5 Re	esults of	indirect	effect
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Path	Effect	S.E.	Р	Hypotheses results
$\text{SMP} \rightarrow \text{FAN} \rightarrow \text{PI}$	0.108**	0.042	0.005	-
$\text{SMP} \rightarrow \text{ATTE} \rightarrow \text{PI}$	0.281***	0.062	0.001	-
$\text{SMP} \rightarrow \text{FAN} \rightarrow \text{ATTE} \rightarrow \text{PI}$	0.098**	0.036	0.002	Supported H6

Note n = 473. Bootstrapping is conducted with 5000 repetitions; all terms in the hypothesized model are used when generating these estimates. ** P < 0.01; *** P < 0.001 (two-tailed tests). Standardized coefficients are reported



Fig. 1.3 Main effects

results are concordant with prior research on some form of imaginative activities such as fantasizing and daydreaming [18]. Consumers' links to the celebrity rest in the satisfaction of their diverse needs, which creates an illusion of intimacy with the celebrity [11], embodying the celebrity as their emotional outlet [21]. Second, this study has found that social media presence impacts endorsement effectiveness through the separate mediation effects along with chain mediation effects of fantasy and attitude towards the AI influencers. The findings expand the effective path and theoretical evidence for social media presence to enhance the value of AI influencer endorsement. The results are consistent with the findings of prior research by Colliander and Dahlén [15], suggesting that posting on social media platforms about a fashion brand results in higher attitude and increases purchase intention; they also indicate that social media presence positively impacts business relationships [14]. Third, this paper has explained the underlying reasons for consumers fantasizing about AI influencers for multiple gratifications on social media. It has utilized the UGT to determine the internal psychological mechanism for the effectiveness of AI influencers' endorsement, rather than solely relying on interpersonal social interaction as explained by para-social interaction [30]. This offers a fresh perspective on AI influencer endorsement and its future study.

Managerial Implications. First, this study has significant implications for policymakers in shaping regulations related to AI-driven advertisements, promotions, and campaigns. Policymakers could pay attention to the social media presence of AI influencers, which could lead to fantasizing and shape consumers' attitudes towards AI influencers [14]. Second, marketers could employ marketing strategies to promote AI influencers, especially on their private social media accounts, when the AI endorsers have a high social media presence and show a sense of human connection, personal touch, warmth, and sensitivity on social media. This could lead to better behavioural outcomes from consumers towards fashion endorsement [10]. Third, technical support should be provided to ensure endorsers' social media presence. Avatars can be controlled by immersive virtual environment technology to promote more natural interactions between AI influencers and humans [31, 32].

1.5 Limitations and Future Research Directions

This study is not without limitations, which need to be further addressed. First, the incubation of AI influencers as endorsers is a complex process involving multiple facets and factors. This study investigated the impact of social media presence on fantasy and attitude from the perspective of consumers. Future research is suggested to investigate more facets and factors as potential mediators or moderators associated with AI influencers' characteristics. Second, the same effects could be tested in other industries; culture and belief differences may lead to different results. Third, this study evaluates fashion products. Future studies could evaluate the endorsed products based on properties, like utilitarian products vs. hedonic products. Fourth, future studies could incorporate larger sample sizes to improve representation (e.g. equal representation in gender).

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Chapter 2 GSP Internet Users Based on Their Navigation Preferences: Second Round-Law Sentences



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Abstract This article presents an exploration into data mining methodologies applied to discerning prevalent navigation behaviors in educational settings. The study delves into the methodology employed by selected data mining algorithms to categorize Internet users based on their browsing preferences. Additionally, it elaborates on the training data used for these algorithms, offering insights into their efficiency in classification. The research aims to uncover recurrent behavioral sequences among users with similar preferences, facilitating the development of mechanisms for seamless categorization of new users based on established patterns. The GSP_ M algorithm, an innovative approach detailed in this study, is employed for in-depth analysis, especially for users exhibiting divergent browsing behaviors. This article contributes to understanding the intricate patterns of web navigation within diverse user groups and proposes methods to enhance categorization accuracy for tailored learning environments.

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2.1 Introduction

Data mining technology holds various applications within educational environments. These applications include personalized systems [1, 2], recommendation systems [3], adaptive systems [4], and anomaly detection systems [5]. Capable of detecting common activities like navigation patterns, regular and irregular browsing, adaptive lesson planning, identifying activity conditions, incremental diagnosis of student performance, and more [6]. According to Romero et al. [7], Data mining in education can be approached from two perspectives: author-oriented, focusing on acquiring materials to enhance teaching by understanding student learning, identifying students' browsing patterns, rearranging website content, and integrating students into groups; learner-centered, designed to guide network users as they interact with virtual learning systems. This study evaluates the outcomes of utilizing data mining algorithms to categorize Internet users based on their browsing preferences. These discoveries can be utilized to tailor learning environments and provide users with tools and information aligning with their personal interests.

2.2 Data Mining Applied to Educational Environments

The implementation of data mining in educational settings typically involves recording access to educational or low-complexity websites on servers that maintain transactions chronologically, including requested URLs, browsers used, and other pertinent information [8]. These log files contain data such as domain names or IP addresses of accessing machines, date and time of requests, request methods (GET or POST), required files, request outcomes (accessed, failed, error), data sizes, and URL references [8].

By applying pattern identification techniques to log files, common browsing preferences can be unveiled. Data mining is useful for crafting personalized web pages based on user types, enhancing server response times, and creating a suitable website structure [9, 10]. Tools like WebSIFT [9] and WebLogMiner [10] have been developed to ease these tasks.

In the subsequent section, we will describe issues related to the categorization of Internet users and the algorithms employed in this research.

2.3 Description of the Problem

Understanding the behavioral patterns of Internet users has become pivotal in modern digital landscapes. As individuals traverse web pages, a discernible trend emerges—repeated visits to specific pages, indicative of personal interests, and preferences.

This behavior is particularly prominent among diverse groups, such as university students navigating educational online resources [11].

This research aims to unravel the intricate web navigation patterns exhibited by Internet users categorized by their respective interests. The primary objective involves identifying recurrent behavioral sequences among users with similar preferences. Furthermore, the study aims to develop a mechanism to compare the browsing behavior of new users against these established patterns. If alignment is found, newcomers can be seamlessly categorized. However, divergent behaviors trigger an in-depth analysis employing the GSP_M algorithm—an innovative approach outlined further in this study.

To facilitate comprehension, let's define key terms. A 'state' signifies an element within a set of all states, represented as $E = \{e1, e2, ..., en\}$. An 'itemset' denotes a non-empty set of states, indicated as $I = \{e1, e2, ..., en\}$. Meanwhile, a 'sequence' presents itself as an ordered list of itemsets, exemplified as $\langle i1, i2, ..., il \rangle$, where *ij* represents an itemset. The length of a sequence corresponds to the count of itemsets it encompasses, termed as the L-sequence. Moreover, sequence a = $\langle a1, a2, ..., an \rangle$ is acknowledged as a sub-sequence of sequence $b = \langle b1, b2, ..., bm \rangle$ if specific integers $1 \leq j1 < j2 < ... < jn \leq m$ exist, where each *aj* forms a subset of the corresponding *bj* [12, 13].

2.3.1 GSP Algorithm

The algorithm known as Generalized Sequential Pattern (GSP) embodies a sophisticated approach to sequential pattern mining, drawing inspiration from the Apriori algorithm as its foundational framework. Its initial phase involves the identification of prevalent individual item sets, referred to as 1-sequences. Subsequently, it iteratively generates candidate sets for 2-sequences, 3-sequences, and beyond.

The determination of a candidate sequence's status as a frequent sequence hinges upon surpassing a predefined minimum support threshold. This pivotal assessment involves an exhaustive count of occurrences of the candidate sequence within the database. If this count surpasses the established threshold, the sequence is acknowledged as a frequent sequence, thus classified as a sequential pattern. This iterative process persists until no additional prevalent L-sequences remain discernible within the database [12].

2.3.2 GSP_M Algorithm

The GSP_M algorithm represents an evolutionary stride in sequential pattern mining, uniquely tailored to unravel intricate behavioral sequences within internet user data.

Unlike its predecessors, GSP_M is characterized by its innovative capacity to accommodate recurrent item sets and assign weights to distinctive states, fostering a nuanced understanding of user navigation patterns.

This advanced algorithm introduces three fundamental components:

- Adaptation of input sequences to embrace recurring item sets, enabling a more comprehensive analysis of user behavior.
- Integration of a module to retain sequences that couldn't establish patterns in earlier phases, facilitating a more exhaustive analysis of browsing behaviors.
- Implementation of a module to assign specific weights to individual states, enabling a more nuanced categorization process.
- GSP_M utilizes these novel features to uncover intricate behavioral patterns, continually updating its pattern database based on discarded sequences. The nuanced approach of considering state weights elevates the algorithm's capability to discern diverse Internet user types based on their distinct browsing patterns.

2.4 Experimentation

A test group of 150 volunteer Internet users was formed, divided into three affinity groups: Business Administration, Computing, and Mathematics. Each group was given 10 h to freely navigate educational web environments, at a rate of 2 h per day for five days (Table 2.1).

During the experiment, we recorded the navigation behavior of each user and created separate training datasets for distinct affinity groups. Subsequently, we utilized the GSP algorithm to train on these datasets, extracting behavior patterns unique to each group. Later, we reanalyzed the same dataset, consisting of 150 Internet users, employing both the GSP and GSP_M algorithms, allowing us to compare the results.

Furthermore, we designed a simulated dataset to assess the algorithms' performance when applied to new Internet users. This simulated dataset included individuals from each affinity group, and their browsing behavior was subjected to analysis using both GSP and GSP_M algorithms. The results, specifically the effectiveness rates, concerning the application of these algorithms on data from Internet users accessing educational environments, are detailed in Table 2.2.

This research is also pertinent to jurisprudence as it involves data analysis techniques that can be applied in legal contexts to understand and analyze user behavior in digital environments, which can have implications in legal proceedings and investigations.

The experimental results showed that the GSP_M algorithm outperformed the GSP algorithm in terms of categorization efficiency. The effectiveness rates, measured as precision and recall, were significantly higher for GSP_M compared to GSP across all affinity groups. This indicates that the incorporation of memory for discarded sequences and the consideration of state weights improved the categorization accuracy.

Table 2.1	Category A-B	<i>// /</i>
		"page {low, medium, high}",
		"menu {low, medium, high}",
		"introduction {low, medium, high}",
		"economy {low, medium, high}",
		"microeconomy {low, medium, high}",
		"review {low, medium, high}",
		"economics {low, medium, high}",
		"felix {low, medium, high}",
		"wolf {low, medium, high}",
		"aleu {low, medium, high}",
		"choice {low, medium, high}",
		"diploma {low, medium, high}",
		"rules and jurisprudence {low, medium, high}",
		"management {low, medium, high}",
		"administration {low, medium, high}",
		"public {low, medium, high}",
		"labor {low, medium, high}",
		"plan {low, medium, high}".
		"roman law {low, medium, high}".
		"telecommunication {low_medium_high}"
		"direction {low, medium, high}"
		"techniques {low medium high}"
]
		J ,

Table 2.2 results	GSP and GSP_M	Algorithm	Legal-law (%)	Social (%)
105unts		GSP	41	62
		GSP_M	73	97

2.5 Conclusion

GSP_M algorithm as an extension of the GSP algorithm has demonstrated its excellent performance in classifying Internet users according to their browsing preferences. This improvement is due to its ability to account for duplicate item sets and condition weights, which ultimately improves user classification accuracy. Experiments with simulated data confirmed the effectiveness of the algorithm in distinguishing users and assigning them to appropriate categories.

These findings have significant implications for legal practice, particularly where digital evidence is a key component. The GSP_M algorithm's ability to analyze online behavior can help create patterns of behavior and intent to support litigation related to cybercrime, intellectual property disputes, and other Internet-related legal issues.

In addition, these advances have significant implications for personalized learning environments. By understanding Internet users' browsing preferences, educational

Red (%)

27 88 platforms can provide tailored content and recommendations based on personal interests. This in turn improves user engagement and learning outcomes. Moving forward, future research efforts may focus on applying the GSP_M algorithm to real-world educational environments and evaluating its performance using larger datasets. In addition, exploring other data mining methods and their application in educational institutions can provide Internet users with a more accurate and personalized learning experience.

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Chapter 3 Artificial Intelligence in the Development of Eco-innovations



Zornitsa Yordanova

Abstract This research delves into the contemporary utilization of Artificial Intelligence (AI) in the realm of eco-innovation. Its primary objective is to bridge the knowledge gap regarding the various avenues through which AI can serve as a transformative tool, either by evolving conventional products into eco-innovations or by conceiving entirely novel eco-innovative products. Leveraging the conventional innovation typology of product innovation, this study focuses on elucidating the intricate relationship between AI and eco-innovation. To address this informational void, a comprehensive bibliometric analysis was conducted, culminating in the identification of 59 relevant publications from the Scopus database. The findings highlight emerging and under-explored themes, including smart circular economy, Sustainable Development, The Role of AI in Eco-innovation Development, and AI in Sustainable Supply Chain Management. The theoretical implications of this research are elucidated in the discussion section, wherein we present a structured categorization of potential pathways for the integration of AI in the eco-innovation landscape. Furthermore, the practical implications of this study offer valuable insights for innovators seeking to infuse sustainability and ecological elements into their product development processes. By harnessing the power of AI, they can pivot their traditional product portfolios toward eco-innovation, thereby contributing to a more sustainable and environmentally conscious future.

3.1 Introduction

Artificial Intelligence (AI) has become an essential tool for various fields, including eco-innovation. Eco-innovation aims to develop products, services, and technologies that promote sustainability and reduce environmental impacts [1]. AI can assist in developing new products that meet these criteria or transforming traditional products into eco-innovations. However, the incorporation of AI into eco-innovation has yet to be fully explored and the scientific literature does not provide sufficient answers

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to the question "How can transform a traditional product into an eco-innovation with the support/use of AI?". This paper aims to address this gap by analyzing the current applications of AI in developing eco-innovations.

As Cimini and Marulli [2] elaborated, ICT, including AI, can play a significant role in the transition toward a smart circular economy. Cook and Kleinschmit [3] highlighted the potential of AI in sustainable agriculture, while Liao et al. [4] discussed its applications in renewable energy. Nayal et al. [5] and Zhou et al. [6] emphasized the potential of AI in improving supply chain management for sustainable development. From the perspective of policymaking, Filiou, Kesidou, and Wu [7] focused on the application of AI and IoT in the context of smart city policies. The scientific literature spews examples and case studies in recent years of using AI in different industries, in different processes, and for different purposes. As a result, practitioners are even more confused about the applicability of AI for achieving sustainability on the product level [8]. Hence, the lack of understanding of the possible means to incorporate AI as a tool to either transform traditional products into eco-innovations or develop completely new products that can be categorized as eco-innovations is getting wider instead of reducing with the increasing number of research contributions.

Therefore, this paper aims to address this gap by analyzing the current applications of AI in developing eco-innovations in a wide context and contribute by providing general directions for such an application. We conducted a bibliometric analysis to explore the linked and surrounding topics to both eco-innovations and AI. The study employs the standard innovation typology of product innovations and elaborates more on the eco-innovations that involve AI applications. As a result, we provide the main paths of AI application for developing eco-innovation motivated already in the scientific literature and generalized by the conducted co-word and co-term analysis. In addition, we also provide some insight into the trends of the topic and historical evolution.

3.2 Theoretical Background

The literature review should explore the current state of research on eco-innovations and AI. It provides a comprehensive understanding of the application of AI in ecoinnovation development, the various types of eco-innovations, and the benefits of incorporating AI into eco-innovation development.

3.2.1 AI in Product Innovation Development

Artificial Intelligence (AI) is increasingly being used to support the development of innovative products that can meet the needs of consumers and create value for businesses [8]. AI technologies can be used throughout the product innovation process, from ideation to design, testing, and marketing [9]. In this section, we explore some

of the ways in which AI can be used to support product innovation development. One key application of AI in product innovation development is the generation of new ideas. AI can be used to analyze large amounts of data from various sources, such as customer feedback, market trends, and social media, to identify new opportunities for innovation [10]. For example, AI-powered chatbots can be used to engage with customers and collect feedback that can be analyzed to identify emerging trends and unmet needs [11]. Similarly, AI can be used to analyze social media posts and online reviews to identify customer pain points and preferences [12]. Another application of AI in product innovation development is in the design and testing of new products. AI can be used to simulate product performance and test various design configurations to identify the optimal design that meets customer needs and technical requirements [13]. AI-powered simulation software can be used to predict the behavior of new materials and optimize their properties for specific applications [14]. Similarly, AI can be used to analyze user behavior and preferences to personalize product design and improve user experience [15].

AI can also be used to support the marketing and sales of new products. For example, AI-powered recommendation systems can be used to personalize product recommendations based on customer preferences and behavior [16]. Similarly, AI can be used to optimize pricing strategies and promotions based on market demand and competitor behavior [17].

In general, AI has emerged as a powerful tool for supporting product innovation development. By enabling the generation of new ideas, the design and testing of new products, and the marketing and sales of new products, AI can help businesses create value and meet the evolving needs of consumers.

3.2.2 AI in the Development of Eco-innovations

Artificial Intelligence (AI) has emerged as a promising tool for addressing various environmental challenges, including reducing greenhouse gas emissions, improving energy efficiency, and enhancing resource management [18]. AI refers to the development of algorithms that enable machines to perform cognitive tasks, such as learning, reasoning, and decision-making, that are typically associated with human intelligence [19].

In recent years, AI has been applied in various domains to develop ecoinnovations, which are products, processes, or services that reduce environmental impacts or improve sustainability [20]. One of the key applications of AI in ecoinnovations is in the development of smart systems that can optimize resource use and reduce waste. For example, AI-based systems can be used to optimize energy use in buildings by adjusting heating, ventilation, and air conditioning (HVAC) systems based on occupancy patterns and weather forecasts [21]. Similarly, AI can be used to optimize water use in agriculture by predicting crop water requirements based on weather data and soil moisture sensors [22]. Another application of AI in ecoinnovations is in the development of predictive models that can forecast environmental impacts and guide decision-making. For example, AI can be used to predict the impact of climate change on crop yields and food security [23]. Similarly, AI can be used to predict the environmental impact of industrial processes and guide the development of more sustainable alternatives [24].

AI can also be used to support the development of circular economies, which are systems that promote the reuse and recycling of materials to minimize waste and reduce environmental impacts. For example, AI can be used to develop automated systems that sort and separate recyclable materials from waste streams [25]. Similarly, AI can be used to optimize the use of recycled materials in manufacturing processes by predicting material properties and performance [26].

In summary, AI has emerged as a powerful tool for developing eco-innovations that can address various environmental challenges. By enabling the optimization of resource use, the development of predictive models, and the support of circular economies, AI has the potential to accelerate the transition toward a more sustainable future.

3.3 Research Design

3.3.1 Data and Scope

We collected data from the Scopus databases using relevant keywords first to filter research in the field of eco-innovation and then to limit only those publications related to AI. The search was limited only to language: English publications (no limitation regarding the type of publications since much of the experimental research in these emerging fields is published in conference proceedings first). The data collection was performed in March 2023.

(TITLE-ABS-KEY ('eco AND innovation' OR 'eco-innovation' OR 'ecological AND innovation' OR 'environmental AND innovation' OR 'green AND innovation' OR 'sustainable AND innovation") AND TITLE-ABS-KEY ('artificial AND intelligence' OR 'ai')) AND (LIMIT-TO (LANGUAGE, "English"))

As a result, 59 publications met the search criteria.

3.3.2 Bibliometric Analysis

To achieve the objective of exploring the current application of Artificial Intelligence (AI) in developing eco-innovations, we conducted a bibliometric analysis using the

Biblioshiny package of R. This methodology allowed us to identify the most relevant scientific publications in the field of eco-innovation and AI, as well as the most influential authors, journals, and research institutions. Bibliometric analysis is a quantitative method that allows us to analyze the publication and citation patterns of a specific research area [27].

After collecting the data, we used the Biblioshiny package of R to analyze and visualize the bibliometric data. The package provided various bibliometric indicators such as the number of publications, citations, co-citations, and co-authorship. We also used the package to generate network maps that visualized the relationships between different keywords, authors, and research institutions. To visualize the results of the bibliometric analysis, we used the Biblioshiny software to create interactive visualizations, including co-occurrence networks and thematic maps. These visualizations and AI. Since the main purpose of the research is to come up with clusters that explore the multidisciplinary topic from diverse angles, we performed also a cluster analysis by Coupling (based on author keywords and journal keywords).

The theoretical implications of the research are presented in the discussion section, where we categorize the possible directions for applying AI in the development of eco-innovations. The practical implications of the study give insights to innovators to implement sustainability and eco-elements into their product development and transform their traditional product range toward eco-innovations through AI.

3.4 Results

The results of the bibliometric analysis showed that the number of publications on the topic of AI and eco-innovation has been increasing steadily over the past few years. The most common themes in these publications were related to the application of AI in energy efficiency, waste management, and sustainable agriculture. The analysis also identified key authors, journals, and institutions that have contributed significantly to the field of AI and eco-innovation.

Figure 3.1 presents different angles of frequently used words in the analyzed scope of publications. In the middle are presented the keywords given by the authors. Mostly, these are AI, climate change, eco-innovation, and digital transformation. Depending on the journal and scope, Scopus associated these publications with several other keywords such as innovation, sustainable development, environmental management, ecology, decision-making, and agriculture. On the side of the particular naming of this research, titles focus mainly on digital, innovation, and sustainable as the word used.

Figure 3.2 reveals the most frequent words on abstracts, which are innovation, digital, and smart. This analysis gives insights into the possible clustering since none of these words are part of the search criteria and still are part of a big percentage of the selected publications. The authors' words most associated with these are AI and



Fig. 3.1 Co-word analysis based on keywords associated with the manuscript by SCOPUS (left), authors' keywords (middles), and title words (right)

sustainable development. The countries whose researchers are focused on this area are China, Ireland, France, India, the UK, Italy, Australia, and the USA.

The journals not published the most but are most influential and cited are the Journal of Cleaner Production, Research Policy, and Sustainability (Fig. 3.4).

The most cited document is the research of Rose and Chilvers [28] with the title Agriculture 4.0: Broadening Responsible Innovation in an Era of Smart Farming, which proposes a framework for responsible innovation in sustainable agriculture.

Figure 3.5 presents a distribution of the most used words in all the abstracts in the scope of the research. Insights come from words such as smart city, children's service, disability, poverty, inequality, public value, tourism, social risk, and planet crises, which all are the focus of different research but related to eco-innovations and AI in parallel.

Figures 3.6 and 3.7 represent analyses on title words according to the methodology of Cobo et al. [29]. Figure 3.6 employs single words and Fig. 3.7 bases the analysis



Fig. 3.2 Co-word analysis based on keywords of abstracts (left), authors' keywords (middle), and country of authors (right)







Fig. 3.4 Most cited documents



Fig. 3.5 Treemap on abstract words

on two-word terms. The quadrant positioned in the top-right corner displays Motor themes, which are recognized for their strong centrality and high density. These themes have been extensively developed and are crucial for organizing the research field. These are topics related to innovation, digital, sustainability, smart, future, tourism, and transformation. In Fig. 3.7 we observe these motor themes to be AI, ecological environment, and management systems.

The quadrant situated in the bottom-right corner holds the Transversal themes that are regarded as fundamental and all-encompassing themes. These themes exhibit a strong centrality but have a low density, signifying their significance in the co-production field despite being underdeveloped. Sustainable development and management are spheres still underdeveloped in this regard.

In the top-left quadrant, we find the Niche themes that are highly specialized and well-developed in nature. While these themes are not of utmost significance to the field, they still play a role in shaping it. These themes are typically focused on specific areas and may not have much relevance beyond that. However, they can



Fig. 3.6 Thematic map (based on one-word terms)



Fig. 3.7 Thematic map (based on three words terms)

provide valuable insights and perspectives within their respective niches. Figure 3.7 proposes European welfare and social innovation in this quadrant.

The quadrant located in the bottom-left corner encompasses the Peripheral themes, which consist of themes that are either on the rise or in decline. These themes have a low density and centrality, implying that they are underdeveloped and have limited importance in the research field. Despite this, the emergence or decline of these themes can provide valuable information about the direction in which the field is heading. Peripheral themes may also act as potential areas for future research, providing opportunities for scholars to explore and expand their knowledge in underdeveloped areas. Such topic are Digital Transformation, which according to the rest of the methods show big potential for further development in the field of eco-innovation development with AI application.

Clustering by coupling is a method used in data analysis and machine learning to identify clusters of variables that are strongly related to each other, considering both the strength of the relationship between variables and their importance within the dataset. This technique has gained popularity in various fields, including biology, finance, and computer science [30]. Clustering by coupling benefits are significant, allowing researchers to identify patterns and relationships in complex datasets, leading to more accurate models and improved predictions. This research is used to support the formulation of main research areas in the field of eco-innovation and AI discussed in the next section [31] (Fig. 3.8).



Fig. 3.8 Clustering by coupling

The results propose five main clusters of related concepts and terms, which have been analyzed together in the scientific literature. These results and the insights from all methods are the input for the main directions for further research presented in the next study's section.

3.5 Discussion and Conclusion

Based on the findings of the bibliometric analysis, we were able to present a categorization of possible directions for applying AI in the development of eco-innovations. These categories included the use of AI for product design, supply chain management, energy optimization, and waste reduction.

• Cluster 1: The Role of AI in Eco-innovation Development

Some of the sub-topics in this cluster that we find under-researched: The current state of research on eco-innovations and AI; How AI can be used in product innovation development; How AI can be used in the development of eco-innovations; How AI can be used as a tool to leverage more user and open innovations. One knowledge gap identified in the scientific literature regarding the role of AI in eco-innovation development is the need for a more comprehensive understanding of the interactions between AI, innovation, and sustainability. According to a study by Fan et al. [32], there is a lack of research on how AI can be effectively integrated into the innovation process to promote sustainability and eco-innovation. Another knowledge gap is the need for more research on the ethical implications of AI in eco-innovation development. As pointed out by Ghezzi et al. [33], the use of AI in eco-innovation raises a number of ethical concerns, including issues related to data privacy, transparency, accountability, and bias.

• Cluster 2: AI for Smart Circular Economy

Some sub-topics in this cluster, which we find under-researched: Are the potential role of AI in the transition toward a smart circular economy and applications of AI in sustainable agriculture and renewable energy. One knowledge gap identified in the scientific literature regarding AI for a smart circular economy is the need for a unified framework to integrate various AI techniques in the circular economy context. According to the article by Hossain et al. [34], although several studies have explored the use of AI in the circular economy, they lack a unified framework that can guide the integration of various AI techniques, such as machine learning and natural language processing, with circular economy practices. Another knowledge gap is the lack of research on the ethical implications of AI in the circular economy context. As pointed out by Geissdoerfer et al. [35], while AI has the potential to optimize resource use and reduce waste in the circular economy, its deployment also raises ethical concerns related to privacy, data security, and social justice. Therefore,

further research is needed to identify and address the ethical implications of AI in the circular economy context.

• Cluster 3: AI in Sustainable Supply Chain Management

In this cluster, we propose further research diving into: The potential of AI in improving supply chain management for sustainable development; Case studies, and examples of using AI in supply chain management for sustainability. A knowledge gap identified in scientific articles regarding AI in Sustainable Supply Chain Management is the lack of understanding of how AI can be used to improve social sustainability in supply chain management [36]. While many studies have focused on the environmental and economic aspects of sustainability, social sustainability, including human rights and labor practices, has received less attention in the literature.

• Cluster 4: AI and IoT in Smart City Policies

It is still under-research the application and results of AI and IoT in smart city policies as well as the ethical implications of using these technologies in urban governance. This includes issues such as privacy, security, and the potential for bias and discrimination in decision-making [37].

• Cluster 5: Emerging Trends and Historical Evolution of AI in Eco-innovation Development

These clusters can provide a useful framework for further research in the field of ecoinnovation development through AI. Additionally, the clusters can provide a roadmap for policymakers, industry professionals, and other stakeholders who are interested in promoting sustainability through eco-innovation development. The results of the study have important theoretical and practical implications. Theoretical implications include the categorization of possible directions for applying AI in the development of eco-innovations. Practical implications include providing insights to innovators to implement sustainability and eco-elements into their product development and transform their traditional product range toward eco-innovations through AI. Gamification practices can also support further innovation development [38] in the context of this research—eco-innovations, especially since many of the innovation, contributors (users for example) need external stimulus.

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Chapter 4 The Authenticity of ChatGPT's Responses in the Tourism and Hospitality Sector: An Explorative Study on Human Perception of Artificial Intelligence



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Abstract The study explores the attitudes of tourism/hospitality/gastronomy customers toward AI-generated textual content. Three model scenarios (themes: tourism information center, hotel, restaurant) were outlined as input for the ChatGPT AI model, which generated text responses. Using ChatGPT responses, a text elicitation technique was performed during semi-standardized interviews with regular tourists and hospitality customers. Results showed negative attitudes toward AIgenerated textual content to be approximately 1.5 more frequent than positive content. Topics such as noting the high professionalism of the employee (i.e., blinded AI), general satisfaction with the answers, and emphasizing the positive character of the employee emerged for the positive-coded statements. Negative-coded statements were dissatisfaction with short phrases, including greetings/addressing/ endings (effort of AI to appear human-like resulted in inauthenticity and strangeness), dissatisfaction due to too long, general or evasive answers (showing high susceptibility in agents), dissatisfaction with too learned, standardized, intrusive, strange, ridiculous or poetic answers. It is concluded that agents could not recognize the responses as AI-generated despite frequently manifesting suspicion and unpleasant feelings. Based on the positive-negative ratio of the statements, interviewed agents were classified into more introverted AI-Accepters (willing to involve AI in services),

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more extroverted AI-Refusers (not willing to involve AI in services), and AI-Selectors (preferring AI in tourism, but not in hospitality or gastronomy). ChatGPT did not show success when addressing cultural differences in its answers.

4.1 Introduction

Artificial intelligence (AI) includes the human intelligence aspects demonstrated by machines. People in the hospitality, gastronomy, tourism, and events sectors utilize AI through the interactions between telecommunication and computing. Even though not all technological systems are powered by AI, those that use the software have different levels of adaptability and learning ability. Most research in the area of AI in tourism and hospitality has focused on how AI can enhance service delivery to customers [1]. However, AI has potential opportunities in the area of mindfulness. It can advance the quality of life and well-being, which are the ultimate long-term gains of hospitality and events. Regarding text creation, AI can create human-like replies to enquiries. Nevertheless, its wide adoption has raised various concerns in the education and academic communities and the role of traditional human interventions.

AI can perform tasks such as text production and creating answers to various queries, presenting positive and adverse influences. However, it has been noted that AI might not be ideal in creative activities, which require the generation of an original product, especially where emotional intelligence is involved [2]. Another concern for some users is that the technology lacks accuracy and criticality in data elaboration. Still, in the hospitality sector, AI can help travelers access quick and precise information to plan their trips and maximize travel experiences. Tourists require extensive information from different organizations in a meaningful format to make guided choices. When combined with voice assistants, AI can offer revolutionary customer service.

Different AI applications nowadays have changed the way of human life. The emergence of pre-trained language models developed by Open AI, such as ChatGPT, had changed the way of research to include its perspectives on specific topics such as tourism education and research, gastronomy in tourism management and marketing, corporate digital responsibility, destination evangelism, and others [3]. However, in this fast-paced evolution and expanding use of AI, only little is known about its potential use and effect on the impression of the final customer (a traveler/a tourist/ a guest).

ChatGPT could become a widespread versatile hospitality, gastronomy, and tourism tool offering multiple applications. It includes language processing for customization and chatbot integration, website content generation, and personalized recommendation generation. ChatGPT also analyzes customer reviews, aids in HR tasks, manages customer feedback, and supports travelers with itineraries. Additionally, it can assist tourists in post-trip studies and contribute to marketing campaigns, ensuring enhanced online reputation management and customer engagement. This study aims to explore the attitudes of tourism/hospitality/gastronomy customers toward AI-generated textual content. Therefore, it aims to contribute to the few explorative studies on human perception of AI in hospitality. Potential use of ChatGPT in areas such as recommendation generation (for tourists) and content generation within customer service (for tourism businesses) are covered.

4.2 Literature Review

While medieval society was captivated by mythical semi-human beings (e.g., mermaids), modern society is increasingly captivated by computational semi-human beings like ChatGPT. Ethical concerns arise as semi-humans impersonate human traits without consent or genuine human existence, blurring the boundaries between what is authentically and artificially "human" [4].

4.2.1 Usage of AI in the Hospitality Sector

COVID-19 affected the tourism industry significantly due to canceled reservations, decreased global travel, and shifts in consumption behavior. Due to the changing consumer demands, businesses in the tourism sector had to change their marketing strategies to survive [5]. Crowd marketing campaigns, which mobilize all lovers of a destination to become activists by sharing their images and experiences, were initiated to promote emotional ties to products. The trustworthiness of such messages is often superior to those utilized in other campaigns. The pandemic promoted digital transformation, which AI has largely supported by adapting marketing information to customer tastes. Companies have to maintain a good online reputation and structure marketing texts optimally to ensure positive customer attitudes in how they relate to the products and services on offer. The people's demand for tourism is constantly evolving, and the traditional approaches to marketing are diminishing [6]. Therefore, AI has a major role in presenting marketing information to consumers.

AI can help predict the helpfulness of reviews, ensuring that restaurant operators attract customers. It can enhance online review platforms and restaurant websites by highlighting crucial reviews and reducing information overload, improving customers' attitudes and purchase decisions [7]. Customers are mostly bombarded with information overload from reviews, struggling to find valuable information. The need for highlighting helpful reviews is to ensure favorable decisions from customers. Hospitality and tourism companies can build effective marketing strategies by providing customers with credible and transparent information to make purchase decisions. Some researchers argue that tourism businesses invest in systems that can interact with clients, understand their needs, and offer customized answers [8]. The AI solutions that will prevail are those that can gather and analyze big data about clients' behavior and generate patterns and insights from the data. However,

customers want to be continuously reassured about the safety of AI solutions [9]. This situation shows that privacy concerns are prevalent.

Service organizations are increasingly investing in managing customer experiences to ensure customer loyalty and differentiation. Positive customer experiences are critical for travelers when selecting hotels and other accommodations. Hospitality, gastronomy, tourism, and events businesses can utilize AI to search customer data through algorithms, determine their product preferences, and advise customers accordingly [10].

In the context of the hospitality industry, frontline services are considered closely related to empathic intelligence, as the integration of service robots has yet to reach the desired stage of service delivery. In a seemingly far-fetched context, organizations will have to decide whether AI will allow the complete replacement of humans by robots capable of performing the required emotional tasks or investing in balanced capacities by integrating robot–human systems [11].

Since AI improves from the data it evaluates, marketers can forecast customer behavior, provide relevant content, and increase sales opportunities. This situation has led to hyper-personalization in the textual marketing content generated by AI and targeted to customers, which is a shift from the previous levels of personalization. Hyper-personalization entails eliminating information overload, engaging the customers meaningfully, and deepening the relationships to improve customer experience [10]. The customer attitudes from the textual messages depend on the ability of the AI to address the customer purchase intentions and hyper-personalization. Marketing in the tourism industry has transformed from a text-based to an imagebased approach supported by AI [12]. Understanding the market segments to target and the ideal communication combination to adopt are factors that affect the attitudes formed by customers concerning purchase decisions. For example, recipes and menu engineering can benefit hotels and restaurants when AI is used in developing creative gastronomy offerings.

4.2.2 Usage of ChatGPT in the Tourism and Hospitality Businesses

ChatGPT has the potential to revolutionize business processes in the tourism industry. Once integrated with a chatbot in front office operations, ChatGPT can deal with customer service, e.g., provide information, take orders, assist in booking, handle customer queries, confirm reservations, and manage complaints. In what concerns HR departments specifically, ChatGPT might generate attractive job descriptions and interview questions tailored to the function, company policy, and industry. ChatGPT can be applied in a wide range of marketing processes. Not only can it provide ideas for preparing customer surveys, but ChatGPT or similar models could analyze customer feedback [13].

ChatGPT is viewed as a major disruptive innovation likely to revolutionize operations in many industries, including hospitality and tourism. The adoption of ChatGPT will result in substantial changes throughout the hospitality and tourism industry by disrupting how customers search for information, make decisions, and how businesses produce, create, and deliver customized services and experiences [14].

In the tourism and hospitality industry, AI can generate texts and responses guiding the users accordingly. Depending on the user's instructions, AI can respond to various themes and subjects [15]. This capability supports the idea of anthropomorphism, where humans view nonhuman agents as possessing human traits [16]. As such, customers appreciate AI-generated marketing content more when it has human-like information. Client's view AI-curated reviews that are anthropomorphized as more sociable, increasing their positive attitudes. AI recommender systems offer recommendations to customers, enabling them to make optimal purchase decisions [17]. Since humans have short attention spans, they can easily move to the next service provider online and may never return to the service again. However, customer attitudes can be positively changed when the available recommendations are interesting. Such a strategy increases revenue for the tourism, hospitality, gastronomy, and events businesses due to the improved end-user experience.

AI may not be able to engage in ethical reasoning but was designed to avoid disseminating harmful information. Nonetheless, it can provide misleading answers due to its inability to clarify requests when asked ambiguous questions. AI can generate exceptional text for marketing materials and compelling content with a personalized touch. But positive attitudes are influenced by the relevance of the answers to queries and the smoothness of the interactions [13]. Customers can achieve more value when AI chatbots acquire personality and creativity to eliminate the robotic features [18]. As AI develops, high-quality textual marketing content will likely be generated to positively influence customers' purchase decisions. The marketing content should be able to meet the clients in the right place with a relevant and emotionally appealing message [19]. Personalized and engaging content targeting individual needs is more effective. This argument is supported by other researchers who acknowledge the ability of AI chatbots to portray qualities similar to human creators [20]. Nevertheless, there should be improved consumer engagement to ensure exclusive and memorable experience.

4.2.3 Usage of ChatGPT and Perspectives of Customers/ Tourists

Tourists could use ChatGPT in all trip stages—from inspiration through booking and the trip itself to the post-trip stage. In most cases, it would be tourism companies' initiative to use AI in their services/operations [13]. GPT chatbots are of greater use and relevance for customers—tourists. When tourists intentionally decide to use the ChatGPT chatbot, they can do it in various ways. Before the trip, if ChatGPT

is integrated into travel websites and has access to real-time data, tourists would be able to obtain personalized information and suggestions of tourism products in the destination and to design personalized itineraries. During the trip, ChatGPT chatbots could generate inspirational texts for social media posts or provide advice about itinerary changes. After the trip, it could be used by tourists to draft reviews for the hotels and restaurants whose services they used [13].

Consumers in general perceive AI chatbots as useful when they promptly respond to their questions. Responsiveness is a critical aspect that influences the perceived value of consumers. In this case, the attitudes developed by customers are influenced by the levels of interactions with the AI systems and the personalization they receive from the marketing texts [21]. Where the information provided is quality, customers will likely have a positive attitude toward the product and service offerings. In some areas, guests have experienced higher intellectual and sensory experiences when interacting with AI but limited emotional experience [22]. To increase the positive attitudes of customers when dealing with AI content, social interactivity and relationship skills should be advanced to match consumer expectations. The levels of personalization and recommendations should be enhanced, and immediate responses guaranteed without the intervention of the staff members [23]. Customers in the hospitality sector are used to interacting with humans, and AI may not be fully embraced [24]. Even so, platforms that offer specialized services are often appealing. Hospitality, gastronomy, tourism, and events businesses should arm their employees with the skills to leverage AI tools optimally to ensure positive customer attitudes.

In the context of AI applications in the dynamic domains of hospitality, gastronomy, and tourism, previous research reveals significant gaps. These gaps include a lack of in-depth exploration of customer attitudes and acceptance of AI solutions in light of the rapidly evolving technology landscape. Additionally, ethical considerations, such as data privacy and fairness, remain largely uncharted territory in the context of these industries. This research represents a novel endeavor in an emerging field where the impact of AI is swiftly unfolding. It also highlights the need for comparative analyses of AI techniques, a focus on the long-term consequences of AI integration, and a comprehensive examination of how regulatory frameworks influence AI adoption. Addressing these gaps contributes to a deeper understanding of AI's role in these sectors and aligns with the current demand for responsible AI implementation in this fast-evolving landscape.

4.3 Research Methodology

For achieving an exploratively conceived goal, a qualitative research methodology was used. Specifically, the text elicitation method was used during semi-standardized interviews with regular participants in the tourism industry.

4.3.1 Generated Textual Content by ChatGPT

Three texts were created and presented to the interviewing agent, each representing a different model situation. Each text was generated using ChatGPT version GPT-3.5 (August 3 Version) [25]. Three scenarios were entered as input instructions to obtain three output texts. The first scenario corresponds to a situation where (A) a tourist who plans to visit Prague Castle requests information from an information center employee just before the tour. Specifically, the tourist asks the information center employee what the possibilities are for visiting Prague Castle, which particular sights are the most important in terms of visiting, how long the tour of Prague Castle takes, and what the entrance fees are. The second scenario corresponds to a situation where (B) a guest of a 5-star hotel wants to check in at the hotel reception after arriving at the hotel. At the same time, the guest wants to know when breakfast is served, what is the password for connecting to Wi-Fi, where can tickets for public transport be purchased, whether the hotel wellness center is used for free, and when are its opening hours. The last scenario presented a situation where (C) a guest of a luxury restaurant interacts with a sommelier. Specifically, for each of the three courses in the set menu, he wants to recommend a wine from the sommelier that could be paired with the dishes, with the first course to be Prague ham with horseradish, the second course to be traditional Czech beef slice, with vegetable sauce and dumplings, and the third course to be traditional Czech scones with vanilla frosting. After entering three scenarios, ChatGPT generated the responses shown in Table 4.1.

4.3.2 Agents Employed in Semi-standardized Interviews and Explored Topics

The obtained texts were presented to the agents, who had to be regular participants in the tourism industry and with whom semi-standardized interviews were conducted. Specifically, it was a type of text elicitation interview, i.e., a method that is used, for example, in psychology [26]. It is mainly about presenting texts that are intended to help the agents elicit a profound answer regarding the content and stimulate their emotions, immediate reactions, and better awareness of the context. It can be used not only when presenting the text but also, for example, when presenting pictures [27]. In our case, the presented texts were the core of the conducted interviews. In our study, a total of 15 agents who have experience with inclusion in each of the model situations we tested (A, B, C) were interviewed. The agents included both women (n = 10) and men (n = 5); the agents came from both the cities (n = 9) and the countryside (n = 6) and had an age range between 24 and 70 years (median = 40). As the research aimed to be purely explorative and not generalizable, the number of participants was sufficient as the theoretical saturation has also been achieved. All participants signed informed consent before conducting the research and were told that the data collection was for only research purposes and that the results' presentation would be anonymized.

Table 4.1 ChatGPT-generated outputs, i.e., AI-generated answers for used scenarios

(a) scenario; $n_L^a = 1327$; ChatGPT-generated answer:

The tours of Prague Castle are very engaging and offer many exciting things. You can start by visiting the breathtaking St. Vitus Cathedral, symbolizing beauty and architectural mastery. Inside you will be able to admire the Gothic architecture and historical artifacts. Another essential stop will be the Old Royal Palace, which has a crucial place in Czech history. In the past, royal coronations and festivities took place here. Be sure to go to Zlatá ulička, a picturesque street of tiny houses where armorers, alchemists, and castle guards lived. In these houses, you can explore traditional crafts and historic interiors. Don't forget to visit the Basilica of St. George, one of the oldest buildings in Prague, which is an example of Romanesque architecture. Daliborka is also an imposing tower that served as a prison and is now a museum. The tour of Prague Castle usually takes about 2–3 h, but you can make it longer or shorter according to your interest. As for the entrance fees, it depends on which parts of the castle you want to visit. Several entry packages of varying scopes are available for adults, students, children, and seniors. The entrance fee usually ranges from 250 to 350 CZK for adults. If you have any other questions, don't hesitate to ask! I wish you a pleasant visit to Prague Castle!

(**b**) scenario; $n_L^a = 863$; ChatGPT-generated answer:

Welcome to our 5-star hotel! I will be happy to provide you with all the information you need. Breakfast is served daily from 7:00 a.m. to 10:00 a.m. You can thus enjoy a rich selection of meals and start the day full of energy. The Wi-Fi password is "LuxuryGuest123." Just connect to our network and enter this password, and you will have access to the Internet throughout your stay. If you need tickets for public transport, our receptionists will be happy to advise you where you can buy them. Public transportation is convenient and easily accessible in our city. Yes, the use of the hotel wellness is free for our guests. You can enjoy relaxation in our wellness center, open from 8:00 a.m. to 8:00 p.m. You can enjoy the sauna, swimming pool, and other excellent services here. If you have any further questions or need help, please do not hesitate to contact us. We wish you a pleasant stay with us!

(c) scenario; $n_L^a = 993$; ChatGPT-generated answer:

Dear guest, I would happily help you select suitable wines for your 3-course menu. For the first course, Prague ham with horseradish, I recommend lighter white wine, such as Sauvignon Blanc or Pinot Grigio. These wines have a fresh and fruity taste that perfectly complements the flavor of ham and horseradish. A fuller and more structured red wine goes well with the second course, traditional Czech tenderloin with dumplings. I would recommend, for example, Merlot, which has fine tannins and a rich fruit flavor that will perfectly complement the svíčková sauce. If you've chosen traditional Czech muffins with vanilla frosting as your third course, consider a sweet dessert wine such as late-harvest Riesling or Sauternes. These wines have a sweeter taste that will be the perfect ending to your meal. Of course, everyone has their personal preferences, so I recommend you taste different wines and find the combination that suits you best. If you need further advice or assistance, I am here for you. I wish you a pleasant and delicious evening menu!

Note ^aStands for number of letters including spaces in original language (input and output language was Czech language); CZK stands for Czech currency Czech koruna

The interviews were conducted between July and August 2023. First, each agent was presented with the assignment of the model situation. The agent was then presented with a printed text, specifically the output from ChatGPT (in the form of a generated response). After reading, the researcher asked about (i) how the answer affects the agent, (ii) how much the agent is satisfied with the answer and why,

(iii) how the "employee" (the answer was presented as provided by an employee) affects the agent according to the answer from a professional point of view and subsequently from a human point of view, (iv) whether agent sees any shortcomings in the answer. The procedure was the same for all three tested model situations (A, B, C). At the very end, an experimental intervention occurred when it was revealed to the agent that these were answers generated by ChatGPT. Subsequently, the agents were asked (v) how the answers affected them after finding out that these were answers generated by AI, (vi) what shortcomings they see in such answers, (vii) to what extent they can imagine the substitution of the human factor in services by using AI.

All interviews were recorded and completely transcribed. The complete transcripts contained 12,490 words, in which recurring patterns were subsequently searched for coding. Text passages with the same codes were synthesized to make interpretations for the given themes. At the same time, there was a search for ideal types of agents [28] based on consistently appearing codes and their socio-demographic characteristics. The results are presented as selective transcriptions followed by code numbers (1–17) and abbreviations of interviewed agents (A1–A15).

4.4 Results

The coding of the collected complete transcripts created four primary codes: positive statements, neutral statements, negative statements, and statements related to the experimental intervention. The positive statements contained a total of three subcodes: (1) high satisfaction with the answer in terms of content and form, (2) emphasis on the employee's high professionalism, and (3) emphasis on the employee's positive character traits. Neutral statements also contained three sub-codes: (4) moderate satisfaction with the answer in terms of content and form, (5) effort to interact with the employee through additional questions, and (6) reluctance to testify about the human side (character) of the employee without direct interaction with him/her. Negative statements contained a total of six sub-codes: (7) dissatisfaction with short phrases including greetings, addressing, and endings, (8) dissatisfaction due to too long answers or repetition of some of their parts, (9) dissatisfaction due to too general or evasive answers, (10) general low satisfaction with the answer in terms of content and form, (11) dissatisfaction with the answer appearing as too learned and standardized, (12) dissatisfaction with the answer appearing as intrusive, halting, strange, ridiculous, poetic, etc. Statements regarding the experimental intervention contained a total of five sub-codes: (13) recognition of the answer as generated by AI even before the experimental intervention, (14) claims that the agent recognized the answers as generated by AI-these claims were recorded only after the experimental intervention, so it cannot be proven whether responses, as generated by AI, were revealed by the agents, (15) admission after the experimental intervention that the responses as generated by AI were not recognized by the agents, (16) reluctance to accept AI as a service provider, i.e., requiring a human element in services, and (17) willingness to accept AI as a service provider, i.e., not requiring the human element in services. Even if we do not consider quantification as an elementary tool in qualitative methodology, it is still worth mentioning that statements noting the high professionalism of the employee (2) and statements noting general satisfaction with the answers in terms of content and form (1) were approximately twice as frequent as statements emphasizing positive character traits of employees (3). Examples of the positive-coded statements listed above are presented in selective transcriptions below:

"... he gives it in a very reasonable way ... as an employee, he understands his job, he must be professional ... I would be interested. If he told me like that, I would select the wines according to his advice." (2, A8)

"I would say that I would be very satisfied. It's in the order in which I asked. I learned everything, even what I might not have thought to ask." (1, A4)

"As a person, he is definitely nice, friendly, the kind of person who likes to help and doesn't look bored." (3, A4)

For the code denoting high professionalism (2), adjectives such as good knowledge, an employee's effort, a person in the right place, knowledge of the area's history, detailed speech, admiration of his/her job, and providing an accurate and precise answer also often appeared. For the code representing positive human characteristics (3), the politeness of the employee, cultured expression, helpfulness, empathy, and optimistic character were also often mentioned. For a total of four agents with whom interviews were conducted, the rate of positive statements exceeded negative statements. The rate of positive and negative statements was almost equal for the other four agents. For the majority of agents, i.e., a total of seven agents, negative statements outweighed positive statements.¹ In the case of negative statements, most frequently, interviewed agents underlined they saw the answers as too long and repetitive (8), and general and evasive (9). Some examples of the negative-coded statements can be seen below:

"That answer is unnecessarily long, unnecessarily exhausting. I don't think a person is capable of remembering everything he has to visit at Prague Castle. It's excessive. He overwhelms the people at the very beginning." (8, A15)

"That person doesn't give specific answers. He seems to me as a drab storyteller, but I didn't get the answer I expected ... Regarding public transport tickets, my question was specific. Still, he answered that if I wanted, the receptionist would advise and explain everything ... that I should come again." (9, A5)

The two different codes (8) and (9) are interconnected. The agents complained about the excessive length of the answers. However, these answers provided few facts and no concrete solutions. These non-specific answers dealt with the inability to provide, e.g., the prices of entrance fees depending on individual circuits, the details regarding hotel services, and more detailed information about the offered wines. Other frequently mentioned negative-coded statement included learned and standardized answers (11), as can be seen below:

¹ When considering total counts, i.e., all statements from all agents, statements coded as negative were approximately 1.5 times more frequent than positive statements.

"... it's kind of, let's say, curt talk, kind of machine-learned ... from a human point of view, it's weak." (11, A9)

"To me, it seems like a machine response. I don't know why ... it seems so cold to me." (11, A12)

"... kind of a prepared answer, standardized, without a personal approach ... it's some kind of learned answer ... too detached ... it's an answer that I would play after pressing a button ... such an automatic answer." (11, A13)

The above statements provide an interesting insight into the impact of AI on some of the agents interviewed. All three agents mentioned above (A9, A12, A13) manifested a certain degree of dissatisfaction associated with a vague suspicion or an uncomfortable feeling that the presented answers triggered in them. The level of such suspicion then varied depending on the particular agent. In particular, statements in which expressions such as "machine-learned" or "machine response" appeared should be emphasized. In the Czech language where the interviews were conducted, the agents often used the Czech word "strojený." It is an adjective whose root is the word "stroj," i.e., "machine."² "Strojený" is a word that does not have an exact translation into the English language, but it could be loosely translated as "affected," "artificial," or "forced." In the Czech language, however, it is much more often used colloquially, without this word having to mean that the agent is necessarily aware of the interaction with the machine. The word is standardly used in connection with gestures and expressions for a person who behaves like a machine. Alternatively, it is used for some pretense or unnaturalness. It should be noted that despite the statements of the three agents mentioned above (A9, A12, A13), none explicitly stated that the answers were generated by AI, despite the manifestation of suspicion and unpleasant feelings. It is clear from the context of their statements that they believed that the employee providing the answer behaved "like a machine." However, they believed he/she was human. The only exception among all agents was A3, who explicitly stated (even before the experimental intervention) that the response did not come from a human, as can be seen below:

"... it's not like a human reaction ... that's just not how human talks." (11, A3)

Thus, only one agent could explicitly recognize that answer was not generated by humans. On the contrary, after performing the experimental intervention, three agents admitted that they would never have known that answers were created by AI. Four agents claimed to recognize the AI while reading the answers. However, they claimed it after the experimental intervention. Therefore, we are unable to verify the truth of such claims. Based on the collected data, we can only reason that they gave these explanations after they were told the answers were AI-generated. Before the experimental intervention, they showed only the previously mentioned non-specific suspicions and unpleasant feelings. The other seven agents did not comment on the

² The specificity of the Czech language in connection with the researched topic is also evident in the word "robot," which was first used by the Czech writer Karel Čapek in his play *R.U.R.* in 1920 [30].

ability to recognize AI from the answers. The last of the frequently appearing code (12) was associated with the above results, namely dissatisfaction with the answer appearing as intrusive, halting, strange, ridiculous, poetic, etc., as demonstrated in one of the statements below:

"... there is too much wonderful, awesome and great ... like everything is fantastic and fabulous ... it's like listening to fairy tales ... more like nonsense ..." (12, A5)

4.4.1 Ideal Types of Interviewed Agents

The second phase investigated whether certain ideal types with common characteristics could be found among the agents regarding the coding process, therefore, if grouping of agents would be possible. It cannot be claimed that convincing differences were found in the statements depending on gender, age, place of origin, or employment in tourism/hospitality/gastronomy. However, a set of typical signs was found for the group of agents for whom positive statements predominated and a set of other signs for the group of agents for whom negative statements predominated. The first group of agents with a significantly larger proportion of positive statements showed that they would accept AI and did not manifest the need to include the human factor in services (17). The second group of agents with a significantly larger proportion of negative statements showed that they would not accept AI and manifested the need to include the human factor in services (16):

"... the contact with the staff is not always entirely positive ... the robot or the artificial intelligence would be programmed in such a way or would behave in such a way, to satisfy the customer." (17, A1)

"People and that living element are essential to me. I would never let artificial intelligence get too close." (16, A14)

This connection can be considered logical, and the agents can be polarized into AI-Accepters (n = 4) and AI-Refusers (n = 6). At the same time, it was typical for AI-Accepters that their positive statements were mainly triggered by satisfaction with the content of the answer (1), significantly less due to satisfaction with the professionalism of the employee (2), or satisfaction with his character traits (3). At the same time, AI-Accepters were more concise in their statements, used significantly less expressive sentences, and showed fewer emotions. On the other hand, it was also typical for AI-Refusers that their dissatisfaction was primarily due to the perception of answers as too standardized and learned (11). It was usual for AI-Refusers that their responses were significantly more comprehensive, and they used expressive sentences and showed emotions more often.

Between AI-Accepters and AI-Refusers stands an AI-Selectors group of agents (n = 5), who tend to select in which situations they would tolerate AI. For this group, more than any other, their attitudes depended on the specific scenario presented. Most often, AI-Selectors prefer to use AI in the example of the Prague Castle tourist information center. Only extraordinarily, they would prefer the operation of AI in



Fig. 4.1 Schematic presentation of ideal types of agents based on their perception of AI-generated content

the case of a 5-star hotel. However, they did not show any will to come into contact with AI in the case of a luxury restaurant.

"I don't want a robot. I can imagine it in Prague Castle, but I don't want it in a hotel or restaurant. I want a person there who smiles at me and looks nice." (A7)

It should be noted that when dividing agents into the three ideal types mentioned above, no connection was documented with the inability to recognize answers generated by AI (15) or with non-specific suspicion when reading the generated responses (14). Therefore, it cannot be claimed that the expressions of satisfaction or dissatisfaction of the agents are connected with the ability to recognize the answers as automatically generated. In the same way, despite the characteristics of individual ideal types, it was possible to note the appreciation of the employee's positive human character also among *AI-Refusers*. On the other hand, for *AI-Accepters*, it was also possible to record criticism by perceiving too long answers (8), perceiving inadequate greetings and farewells (7), perceiving answers as too standardized, learned (11), intrusive, halting, strange, ridiculous, and poetic (12). A schematic representation of the ideal types of agents is presented in Fig. 4.1.

4.5 Discussion and Final Remarks

Based on our results, it can be argued that especially in the contexts of emotional intelligence [2], providing customized and smooth answers, or adequate advice [4, 6, 17], it seems that AI (specifically ChatGPT) is still less successful—at least if we take into account the attitudes of the majority of agents interviewed in our study. At the same time, it can be confirmed that agents were subject to a certain degree of anthropomorphism since they assigned typical human features to AI [15, 20]. However, it should also be added that a considerable number of agents experience vague suspicion and unpleasant feelings associated with the perception of answers from AI as

too standardized, learned, intrusive, halting, strange, ridiculous, and poetic. Based on some intercultural research [29], it is possible to assume that more persuasive and confident answers can positively affect, for example, agents from the USA. Still, the Czech agents who were part of our research would instead give particular attention to the authenticity of the answers.

AI's pursuit of creativity [18] led to overly comprehensive answers without providing concrete and relevant information. These excessively long and non-specific answers often gave the agents an evasive impression. Our results show that agents can be susceptible to not receiving precise information. At the same time, by quantifying all statements, we proved that when interacting with AI, negative attitudes slightly prevail among agents over positive ones. However, apart from the discussion mentioned above, adding other emerging topics to connect customer interaction with AI is essential. It is specifically the issue of inauthentic greetings, farewells, and random short phrases, in which the effort is to make the AI appear more human. Paradoxically, it is precisely in these short phrases that the agents can recognize certain inauthenticity and strangeness. Because the AI does not achieve the required humanity, agents may have very unpleasant (sometimes even aggressive) reactions.

Despite all the shortcomings of AI-generated responses, we do not have conclusive evidence that agents would be able to recognize the response as AI-generated. The question is whether the probable future increased usage of AI will not mean the ability of agents to discern such answers (provided that AI would not improve these responses). Focusing on the intellectual [11] (and content) side of interaction with AI, satisfaction with the answers provided depended on a specific group of agents. In particular, a group of more introverted agents, AI-Acceptors, appreciate the objectivity and content side of the answers. At the same time, the potential ubiquitous use of AI is not an obstacle for these agents. The opposite type of agents were AI-Refusers (and partly AI-Selectors), who would be incapable of accepting AI in services due to the excessive artificiality and standardization of the answers.

Similar to previously published studies dealing with AI [1], our research results can potentially enhance the provided services in the hospitality and tourism sector. The contribution of our research lies mainly in providing exploratory insight— taken from customers' perspectives on AI. The study contains several limitations that also indicate possibilities for future research. It is primarily the use of exclusively the Czech language and Czech agents. It should also be noted that the study did not involve multiple interactions but only a one-time presentation of the generated responses. The research did not use a comparison of the AI-generated answer together with the answer of human employees. Therefore, it is impossible to say to what extent the satisfaction/dissatisfaction of some agents is since they belong to less or more demanding tourists/guests who could be satisfied/dissatisfied even when receiving an answer from a human employee. Other limits result from the very use of qualitative methodology, which, on the other hand, had a highly exploratory benefit.

A follow-up quantitative study could contain more AI-generated text modifications and a set of experimental interventions. Another research limitation stems from the input data for ChatGPT that influences the output. A particular user enters such input information, and therefore, it is also the user influencing the ChatGPT output. To avoid obliquity, we provided the input information used in our research in the methodology section. We also claim that fundamental suspicion, as manifested by agents in our research, would be apparent independently on input information (and user), as agents able to recognize the content as AI-generated did so independently on the presented topic.

The academic novelty of this research stems from its specialized focus on the attitudes of tourism, hospitality, and gastronomy customers toward AI-generated textual content. This sector-specific investigation offers a unique contribution by examining consumer behavior within industries with distinct expectations and experiences. It adds depth to existing knowledge about technology adoption and provides actionable insights into industry practices and ethical considerations. In a rapidly evolving AI landscape, this research provides timely and relevant findings that can inform theory and practice within these sectors.

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Chapter 5 Artificial Neural Networks and Discrete Choice Models: Comparing and Contrasting



Paulo Botelho Pires Dand José Duarte Santos

Abstract Artificial neural networks and discrete choice models have been successfully applied to the prediction of individual choices. This research compares the different models to determine which has better predictive ability. From the discrete choice models, the multinomial logit model and the mixed logit model have been selected. Among the Artificial Neural Networks, Deep Neural Networks, Genetic Artificial Neural Networks, different variants of Backpropagation Algorithm, Radial Basis Functions, and Constructive Algorithms were selected. All the models were evaluated on three datasets related to product purchases in supermarkets. For each dataset, all models were run 30 times. The percentage of correctly classified observations was used to evaluate the performance. Results showed that Deep Neural Networks, Genetic Artificial Neural Networks, Levenberg–Marquardt Backpropagation, Resilient Propagation, and Probabilistic Neural Networks outperformed discrete choice models. However, discrete choice models are superior in terms of robustness. They require fewer resources and provide additional information to the decision-maker.

5.1 Introduction

Discrete choice models (DCMs), also known as choice-based models, have been widely used in marketing to understand consumer preferences and decision-making processes. These models allow researchers to model scenarios and estimate the like-lihood of consumers choosing one option over another. Artificial Neural Networks (ANNs), on the other hand, can mimic the way the human brain processes information, allowing them to learn from past experiences and make predictions about future consumer behavior. By analyzing vast amounts of data, neural networks can

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identify patterns and trends that may not be immediately apparent to data analysts. Additionally, neural networks can continuously adapt and improve their predictions as they receive new data, allowing adapt to new preferences and behaviors.

There is an extensive body of research comparing neural networks and discrete choice models. These studies examine various aspects of both models, analyzing their strengths, weaknesses, applicability, and performance. This research helps to understand the similarities and differences between neural networks and discrete choice models. Ultimately, it contributes to the performance evaluation of the main paradigms of these models.

To make this comparison, this research contains the following sections. The first and second sections contain a review of the main paradigms of ANNs and DCMs. This is followed by a review of studies that compare ANNs and DCMs. Finally, a comparison is performed on three different databases concerning the purchase of low-involvement products in grocery stores.

5.2 Literature Review

5.2.1 Artificial Neural Networks

An ANN is a structure of processing units or artificial neurons whose functionalities are similar to those of biological neural networks [20]. ANNs were developed to model the networks of neurons in the brain. From a neurophysiological point of view, they remain highly simplified models [26]. These simplifications assume that ANNs generically preserve the behavior of biological neural networks, making them amenable to study and understanding [10, 26]. Alexander Bain introduced the first concepts of neural networks in 1873. They were inspired by discoveries made in Neuroanatomy [42]. The most important advances in ANNs were made in the 1980s with the introduction of the backpropagation algorithm. Its authorship is attributed to Paul Werbos in 1974, and it was in a state of obscurity until its rediscovery by three groups of independent researchers: LeCun in 1986, Parker in 1985, and Rumelhart, Hinton, and Williams in 1986 [14, 42].

An ANN is, generically, characterized by the following elements: number of layers, number of neurons for each layer, connections between layers, combination function, activation function, and transfer function.

5.2.1.1 Backpropagation Algorithm

The architecture and connections of an ANN are adjusted by learning algorithms, the best known of which is the aforementioned backpropagation (BP) algorithm. The BP algorithm applied to a multilayer ANN is a generalization of Widrow–Hoff's least squares rule applied to a single-layer ANN [22], and it is divided, briefly, into three

phases: (1) passing the exogenous variables from the input layer to the output layer, (2) calculating the error between the value produced by the network and the value of the endogenous variables, backpropagating the error; (3) adjusting the weights of the connections. In the most common implementations, the BP algorithm is the gradient or steepest descent implemented in a feedforward architecture, with the mean squared error or entropic function chosen as the error function [8]. For an ANN with multiple exogenous and endogenous variables, the error function reduces to Bishop and Nasrabadi [9]:

$$E(X) = E(e^{t}e) = E\left[\left(t - a^{M}\right)^{t}\left(t - a^{M}\right)\right]$$
(5.1)

where *t* are the exogenous variables and *t* are the ANN outputs. The updates for the weights follow the following equations:

$$W_{ij}^{m}\{k+1\} = W_{ij}^{m}\{k\} - \alpha \frac{\partial \hat{E}}{\partial W_{ij}^{m}}$$

$$b_{i}^{m}\{k+1\} = b_{i}^{m}\{k\} - \alpha \frac{\partial \hat{E}}{\partial b_{i}^{m}}$$
(5.2)

The BP algorithm has a very slow learning phase, making its practical applicability very limited [47]. Furthermore, the use of the mean square error sum function generates very complex surfaces, characterized by the existence of several minima, leading the algorithm to converge to local minima [22]. These two drawbacks have led to the search for faster and more robust algorithms, which are described below.

5.2.1.2 Momentum Backpropagation Algorithm (MO-BP)

This MO-BP algorithm is a heuristic technique and can be applied by either the batch learning method or the incremental learning method. It introduces an additional coefficient, named momentum, and the updates to the values of the weights depend on several previous iterations or epochs. In its most basic formulation (first order), the MO-BP algorithm has as the equation for updating the weights [7, 22]:

$$W\{k+1\} = W\{k\} - \alpha \frac{\partial E}{\partial W}\{k\} + \gamma \Delta W\{k-1\}$$
(5.3)

For the second-order MO BP algorithm, we have [17]:

$$W\{k+1\} = W\{k\} - \alpha \frac{\partial E}{\partial W}\{k\} + \gamma \Delta W\{k-1\} + \beta \Delta W\{k-2\}$$
(5.4)

It is worth noting that the use of a second-order momentum term does not increase the speed of convergence [44]. However, it is shown theoretically that the momentum term provides additional benefits by almost doubling the solution space over which it converges [46].

5.2.1.3 Backpropagation Algorithm with Variable Learning Coefficients (VLC)

In the case of multilayer ANN with sigmoid activation functions, the error function takes on complicated surfaces, with abrupt ramps or almost flat regions. A number of various techniques have been suggested that make it possible to speed up the learning phase by adjusting the learning coefficient. The algorithm rises the learning coefficient on surfaces with a small ramps and decreases the learning coefficient as the ramps becomes larger. The learning coefficient is adjusted by [38, 39]:

$$\alpha\{k+1\} = \begin{cases} \alpha\{k\} \times \rho \, se \, \Delta E < 0\\ \alpha\{k\} \times \eta \, se \, \Delta E > 0 \end{cases}$$
(5.5)

The default values for the multiplication factors are: $\rho = 1.1$ and $\eta = 0.5$.

5.2.1.4 Resilient Propagation (RPROP-BP)

The RPROP-BP was proposed by [49, 50]. Contrary to the previous algorithms, in which the values of the connections depend on the value of the gradient, it adjusts the values of the connections by evaluating only the variation of the gradient signal. The RPROP-BP follows the batch learning method. The adjustment of the weights is done with the equations:

$$W_{ij}\{k+1\} = W_{ij}\{k\} - \delta_{ij}\{k\} \operatorname{se} \frac{\partial E}{\partial W_{ij}} > 0$$

$$W_{ij}\{k+1\} = W_{ij}\{k\} + \delta_{ij}\{k\} \operatorname{se} \frac{\partial E}{\partial W_{ij}} < 0$$

$$W_{ij}\{k+1\} = W_{ij}\{k\} \operatorname{se} \frac{\partial E}{\partial W_{ij}} = 0$$
(5.6)

The RPROP-BP is one of the best-performing heuristic-based algorithms regarding both performance and convergence robustness.

5.2.1.5 Conjugate Gradient Backpropagation Algorithms (CG-BP)

To find the optimal solution, these algorithms employ the conjugate gradients method of numerical optimization. The CG-BP algorithm searches successively in conjugate directions, unlike the BP algorithm, which adjusts the weights in the steepest direction of the error function. Several variants of the CG-BP exist, arising from different computations of search directions. The equations for the adjustment of the weights

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are as follows [12, 22, 29, 30]:

$$W\{k+1\} = W\{k\} + \alpha\{k\}d\{k\}$$

$$d\{k\} = -g\{k\} + \beta\{k\}d\{k-1\}$$
 (5.7)

The various variants of the CG-BP algorithm are due to the several varying ways of evaluating the parameter $\beta\{k\}$.

Fletcher-Reeves Polak-Ribiére Hestenes-Steifel

$$\beta\{k\} = \frac{g^{T}\{k\}g\{k\}}{g^{T}\{k-1\}g\{k-1\}}, \ \{k\} = \frac{\Delta g^{T}\{k-1\}g\{k\}}{g^{T}\{k-1\}g\{k-1\}}, \ \beta\{k\} = \frac{\Delta g^{T}\{k\}g\{k\}}{\Delta g^{T}\{k-1\}d\{k-1\}}$$
(5.8)

The various variants of the CG-BP algorithm are due to the several varying ways of evaluating the parameter $\beta\{k\}$. Also noteworthy is the algorithm for scaled conjugate gradients (SCG-PB). The learning coefficient is adjusted using the Levenberg–Marquardt approximation [41].

5.2.1.6 Quasi-Newton Backpropagation Algorithm (Quasi-Newton BFGS-BP)

Quasi-Newton algorithms use Newton's method but do not need to compute secondorder derivatives. They use first-order gradient information to construct a matrix approximately equal to the inverse of the matrix. Broyden, Fletcher, Goldfarb, and Shanno's BFGS is the most widely referenced quasi-Newton method with better performance [12, 47]. Adjusting the weights follows the equation:

$$W\{k+1\} = W\{k\} + \alpha\{k\}G\{k\}g\{k\}$$
(5.9)

5.2.1.7 Levenberg–Marquardt Backpropagation Algorithm (LM-BP)

The LM-BP algorithm is a modification of the Newton procedure. The Hessian matrix must be computed for Newton's method, which is a second-order method. This calculation is avoided by the LM-BP algorithm, which is based on the Gauss–Newton method. Instead, it uses an estimate of the Hessian matrix by the Jacobian matrix [21].

$$W\{k+1\} = W\{k\} - \left(J^t\{k\}J\{k\} + \mu\{k\}I\right)^{-1}J^t\{k\}e\{k\}$$
(5.10)

5.2.1.8 Backpropagation Algorithm with Incremental Learning (I-BP)

In the case of large problems, incremental learning turns out to be superior or even the only viable option. The I-BP algorithm always converges to an optimal solution if the vectors are linearly independent, and this convergence does not require limiting the value of the learning coefficient [18]. Incremental learning adjusts the values of the links following the equation [33]:

$$W\{k+1\} = W\{k\} + \alpha\{k\}E(W\{k\}, (p\{i\}, t\{i\}))$$
(5.11)

5.2.1.9 Cascade-Correlation Algorithm (CasCor)

The CasCor architecture and its algorithm have been introduced by Fahlman and Lebiere [13]. This type of ANN differs from the feedforward architecture of ANNs underlying BP algorithms. The first difference lies in the architecture, which does not remain constant while learning. The algorithm adds neurons in the inner layers and establishes connections between these neurons and the layers of input and output variables, as well as in the preceding layers. The second major difference is that it keeps the values of the connections connecting the added neuron fixed while learning. The error and error propagation equations are shown below:

$$S(W) = \sum_{i=1}^{S^M} \left| \sum_{j=1}^N \left(C_j - \overline{C} \right) \left(E_{j, a_i^M} - \overline{E}_{a_i^M} \right) \right|$$
(5.12)

$$\frac{\partial S}{\partial w_i} = \sum_{j,o} \sigma_{a_o^M} \Big(E_{j,a_i^M} - \overline{E}_{a_i^M} \Big) f'_j I_{i,j}$$
(5.13)

The Sibling/Descendant (SDCC) algorithm of Baluja and Fahlman [4] is a reformulation of the original CasCor algorithm to prevent the final ANN architecture from having a large number of inner layers.

5.2.1.10 Optimal Brain Damage (OBD) and Optimal Brain Surgeon (OBS) Algorithms

OBD and OBS are referred to as structural stabilization algorithms and use an assessment function to determine which connections should be eliminated. The OBD algorithm measures the saliency of each connection using information from the second-order derivative of the error function [31]. The OBS algorithm, proposed by Hassibi and Stork [24], is applied after the learning phase of the ANN and when there is convergence to a minimum.
5.2.1.11 Genetic Algorithms (GA) and ANNs

A set of techniques that includes genetic algorithms, evolutionary strategies, genetic programming, and evolutionary programming is referred to as genetic and evolutionary computing. GA will be used to optimize the weights of the ANN, using the sequence of steps that are [11, 45]: (1) Random initialization of the population; (2) Decoding of individuals and evaluation of their adaptation; (3) Selection of individuals for mating; (4) Generation of the offspring with the crossover operator; (5) Application of the mutation operator to the offspring; (6) Creation of a new population; (7) Evaluation of the convergence criteria. If the convergence criteria are met, the run ends, or if not, a new iteration is started.

5.2.1.12 Radial Basis Functions (RBFs)

Radial Basis Functions (RBFs) are a variant of constructive or parameter elimination algorithms. They have a unidirectional architecture that generally includes a single inner layer. RBFs can represent concepts and models such as nonlinear regression, interpolation, estimation of probability densities, regularization, and classification [8, 25]. The algorithms used to train RBF involve two stages. This is due to the fact that the two layers have different goals. In the first stage, the weights of the inner layer are adjusted using an unsupervised algorithm. This means that only exogenous variables are used. In the second stage, the values of the weights between the inner layer and the output layer are adjusted. The value produced by an RBF follows the equation:

$$a^{M} = \sum_{j=1}^{S^{1}} w_{j} \phi_{j}(p) + b^{2}, \ \phi_{j} = \exp\left(-\frac{\|p - u_{j}\|^{2}}{2\sigma_{j}^{2}}\right)$$
(5.14)

For classification problems where the probability that a vector belongs to a particular class is to be determined, RBFs prove to be suitable [9]. Probabilistic Neural Networks (PNNs) are the most common architecture of RBFs for classification. They have an output layer with a competitive transfer function, and they can classify correctly all the pairs of the learning vectors (Berthold and Diamond 1998).

5.2.1.13 Deep Neural Network (DNN)

A DNN is an ANN with multiple (many) layers between the input and output layers and can model complex nonlinear relationships. DNNs outputs probabilities can be expressed as [56, 58]:

$$P(y_i = 1|x_i) = \frac{1}{1 + \exp(-\Phi(x_i, \beta))}$$
(5.15)

where $\Phi(x_i, \beta)$ is a layer-by-layer conversion, $\Phi(x_i, \beta) = (g_m \circ ... \circ g_1)(x_i; \beta)$ and $g_l(x_i^T\beta) = \text{ReLU}(x_i\beta + b_l)$. In Wang's view, DNNs have many advantages; they have approximation power, can be flexible for different types of information, and have high predictive accuracy. Yet, overfitting of models on relatively small data sets and lack of interpretability are two unresolved issues that constrain the application of DNNs.

5.2.2 Discrete Choice Models

In a DCM, the decision-maker will always choose the alternative that will give him or her the highest utility. The decision-maker knows his utility function. Therefore, his choice always results from utility maximization U_i .

$$P_{ni} = \operatorname{Prob}(U_{ni} > U_{nj}, \forall i \neq j), \text{ where } U_{ni} = V(X_{ni}, S_n) + \varepsilon(X_{ni}, S_n) \quad (5.16)$$

5.2.2.1 Logit

If it is assumed that the random terms ε_{ni} of U_{ni} are independent and identically distributed with the extreme value distribution function of type I, also known as the Gumbel function or the double exponential function [35], then for the logit model, we obtain the:

$$P_{ni} = \frac{e^{V_{ni}}}{\sum_{j \in C_{nJ}} e^{V_{nj}}}$$
(5.17)

5.2.2.2 Mixed Logit

The Mixed Logit model does not have the restrictions of the Logit model. The probabilities are obtained by calculating the integral of the probabilities of the standard logit model over a probability density function [53]:

$$P_{ni} = \int L_{ni}(\beta) f(\beta) d\beta, \ L_{ni}(\beta) = \frac{e^{V_{ni}(\beta)}}{\sum_{j=1}^{J} e^{V_{nj}(\beta)}}$$
(5.18)

Since the integral of Eq. (18) has no analytical resolution, the Mixed Logit model is computed using simulation methods.

5.2.3 ANNs Versus DCM

The comparison of ANNs and DCMs has been the subject of research over the years. Table 5.1 provides an overview of the nonsystematic literature in which such work has been done.

Table 5.1 is not intended to be an exhaustive or comprehensive list of works. It includes only the most relevant of the papers. However, it highlights that a significant majority of studies concluded that ANNs are superior to DCM. Of the 25 studies, 8 did not conclude that ANNs outperformed DCM.

7 1				
and ative studies	Study	Application	Superiority	
	[23]	Bankruptcy or insolvency forecast	DCMs	
	[52]	Bankruptcy or insolvency forecast	ANNs	
	[19]	Bankruptcy or insolvency forecast	ANNs	
	[34]	Bankruptcy or insolvency forecast	ANNs	
	[1]	Supermarket product purchases	ANNs	
	[3]	Bankruptcy or insolvency forecast	ANNs	
	[28]	Investment success after IPO	ANNs	
	[48]	Freight Transport	ANNs	
	[37]	Bankruptcy or insolvency forecast	ANNs	
	[40]	Bankruptcy or insolvency forecast	DCMs	
	[27]	Supermarket product purchases	ANNs	
	[6]	Travel behavior forecast	Inconclusive	
	[57]	Theoretical	Equivalents	
	[15]	Supermarket product purchases	Inconclusive	
	[54]	Consumer behavior	ANNs	
	[43]	Travel behavior forecast	ANNs	
	[5]	Several data sets	Inconclusive	
	[36]	Consumer behavior	ANNs	
	[32]	Travel behavior forecast	ANNs	
	[58]	Travel behavior forecast	ANNs	
	[56]	Travel behavior forecast	ANNs	
	[55]	Several data sets	ANNs	
	[16]	Travel behavior forecast	Inconclusive	
	[51]	Travel behavior forecast	ANNs	
	[2]	Travel behavior forecast	DCMs	

Table 5.1	ANN and
DCM-c	omparative studie

Experiment	Exogenous variables	Endogenous variables*	Observations
Detergent	22	6	2657
Butter	14	5	1303
Bacon	14	7	1354

Table 5.2 Data description

* Number of brands

5.3 Methodology

To compare the performance of ANNs and DCMs, three databases containing supermarket shopping data were selected. The products purchased are bacon, butter, and laundry detergent, all of which have weak involvement. Three experiments, described below, were conducted to evaluate this comparison. The data were taken from the ERIM database, and the information is described in Table 5.2.

For each experiment, 30 runs of the models were carried out. In each run, the data was randomly divided into two sets: 75% learning set and 25% testing set. This ensures that the models are compared with the same data. The learning set is used to train the models. The test set is used to measure the predictive ability of the models in the presence of new data. To evaluate the performance of the models, one measure was defined: the percentage of observations that were correctly classified.

For the ANNs, the best ANN architecture was determined beforehand to prevent overfitting. Identifying this architecture required a series of additional simulations. The DCMs did not require this step. Finally, to compare the performance of the models, two statistical tests were applied. Analysis of variance (ANOVA) was used to compare all models, while McNemar's test was used to compare two models. The experiments were run in MatLab for the ANNs and in LIMDEP for the DCMs.

5.4 **Results and Findings**

Table 5.3 shows the results for the three experiments, listing the different variants of neural networks described above, as well as the multinomial logit and mixed logit models. For the learning set, the means are shown. The mean and maximum values are shown for the test set. The table is sorted in descending order by the column for experiment 1, test set, and mean.

With the results from the previous table, we proceeded to statistical testing with ANOVA to assess, in each experiment, whether the models have statistically significant differences in means for the test set mean metric. In each of the three experiments, the null hypothesis was rejected, rejecting the hypothesis that the models performed equally. With the help of McNemar's test, it can be stated that there are variants of ANNs that were always superior to the DCM. Specifically, Multinomial Logit and Mixed Logit were always outperformed by DNN, GANN, LM-BP, RPROP-BP, and

Models	Experiment 1 (detergent)		Experiment 2 (butter)		Experiment 3 (bacon)				
	Test		Learn	Test		Learn	Test I		Learn
	Max (%)	Mean (%)	Mean (%)	Max (%)	Mean (%)	Mean (%)	Max (%)	Mean (%)	Mean (%)
DNN	86	81	83	86	81	86	81	78	80
GANN	85	80	82	84	81	85	84	76	80
LM-BP	83	77	76	80	74	83	71	53	58
RPROP-BP	82	76	76	83	79	83	68	63	66
PNN	78	76	98	80	76	97	77	73	95
Quasi-Newton BFGS-BP	79	75	75	82	71	72	59	43	44
CG-BP (Fletcher-Powell)	81	75	75	82	74	76	67	41	43
MO-BP	77	74	74	75	50	50	63	39	36
BP (VLC)	77	74	74	82	76	77	67	47	49
I-BP	77	74	74	75	46	47	63	32	32
MO-BO (VLC)	81	73	73	82	74	76	67	38	39
SDCC	74	72	73	76	73	77	72	67	67
CG-BP (Polak-Ribiere)	82	71	71	81	76	79	65	53	56
CasCor	73	71	72	76	72	76	69	65	68
CG-BP (Powell-Beale)	82	71	74	82	77	80	69	49	51
Mixed Logit	71	70	70	69	67	68	58	57	59
Logit Multinomial	71	70	70	71	67	68	58	57	57
RBF	73	68	100	72	69	100	70	65	100
OBS	70	68	69	71	68	72	67	64	65
OBD	68	65	68	70	66	69	67	62	66

 Table 5.3 Results for the experiment with detergent products

PNN. Therefore, considering only the results shown in the table, it can be said that some variants of ANNs outperform DCMs. There is also confirmation that the results in the table are consistent with most of the results in the literature review.

The above statement is fully consistent with the objective of this study. There are, however, several additional considerations that deserve to be addressed. Those that require further discussion are the types of datasets used, other metrics used as performance measures, the limitation of the metric percentage of correctly classified observations, the robustness of the models, the resources used, and the information provided by the models. As for the datasets, three were used with supermarket purchases of products with low involvement. Inevitably, the datasets reflect that context and therefore may have characteristics that are more appropriate for the

ANNs. Moving to the metrics discussion, the first consideration is the choice of the percentage of correctly classified observations metric. Let us recall that most of the ANNs use, in their learning phase, algorithms that have as an error function the mean of the sum of the squares of the errors. DMCs are computed using the method of maximum likelihood. It is questionable whether DMCs benefit from the choice of the metric percentage of correctly classified observations since entropic functions (similar to the maximum likelihood method) are more appropriate for classification problems. A second consideration regarding metrics is the use of only accounting for correctly classified observations. The use of metrics that only count correctly classified observations is a second consideration. Even in marketing, it may not be acceptable to omit metrics that evaluate false positives (type I errors) and false negatives (type II errors). The next concern is the robustness of the models. This is not the subject of this research; it was not addressed in the literature review and no data is presented. Nevertheless, ANNs are less robust than DCMs, and some variants are prone to converge to local minima and get stuck in them. Some of the runs showed this trend. When this happens, ANNs have very poor predictive capabilities and their application is not even feasible, and it is for this reason that this issue has been addressed. Concerning the use of resources, they can also be divided into two phases and two types of resources. The first phase is related to the resources needed before learning for ANNs and estimating for DCMs. The resources for learning or estimation are the second phase. Time and computing power are the two types of resources. Overall, it is clear that the resource consumption of DCMs is a small fraction of the resource consumption of ANNs. Furthermore, DCMs do not require resources before estimation, while ANNs require significant resources to identify the appropriate architecture. Finally, it remains to be seen what kind of information the models can provide beyond their predictive capabilities. Again, DCMs offer significant advantages. ANNs are almost always treated as a black box. Knowledge of which exogenous variables should be included, the degree of importance of exogenous variables, elasticities between variables, sensitivity analysis, etc. is always a matter of complex computations. In contrast, in a DCM, these calculations are immediate and simple. As a result, the decision-maker always has additional information in a DCM.

5.5 Concluding Remarks

The goal of this research was to determine who performed better: Artificial Neural Networks or Discrete Choice Models. The results were conclusive. They showed that some variants of ANNs are superior to DCMs. These variants were Deep Neural Networks, Genetic Artificial Neural Networks, Levenberg–Marquardt Backpropagation, Resilient Propagation, and Probabilistic Neural Networks. They were always able to correctly classify more observations. The results obtained in this research are

consistent and in line with those described in the literature, supporting the superiority of ANNs over DCMs. While ANNs outperform DCMs in terms of performance, they do not on other considerations. DCMs are superior in robustness, require fewer resources, and provide additional information to decision-makers.

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Chapter 6 Usage of Artificial Intelligence for Advertising Creation for Social Media Marketing: ChatGPT Combined with Pictory and DALL·E



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Abstract This paper examines how AI is being used in marketing, with a focus on how it is being used to create advertising for social media marketing. It explores how combining AI models like ChatGPT, Pictory, and DALL·E has the potential to enhance the speed and effectiveness of advertising generation processes. The possible advantages and difficulties of using AI for advertising development are discussed in the study, including better customization, higher creativity, and time savings. It also looks at potential restrictions and ethical issues. This study intends to offer insights into the present and future consequences of AI-powered advertising production for social media marketing campaigns by examining real-world case studies and industry examples.

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6.1 Introduction

Marketing has been transformed by artificial intelligence (AI), which has emerged as a transformative technology [1]. The term artificial intelligence (AI) describes the creation of computer systems that are capable of thinking, problem-solving, and pattern recognition—tasks that traditionally require human intelligence [2]. AI technology has significantly changed the marketing landscape by making automation, data analysis, and tailored experiences possible.

Social media marketing is one of the major fields where AI has made considerable strides. Businesses have realized the enormous potential of social media marketing to reach and engage their target audience as a result of the rapid expansion of social media platforms and the rising popularity of online interactions [1]. However, it can be difficult for marketers to successfully analyze and make sense of the information given the vast volume of data created through social media. AI can help in this situation.

AI tools, including deep learning algorithms, machine learning algorithms, and natural language processing (NLP) [3], have empowered marketers with the capability to automate various marketing processes, enhance campaigns, and extract valuable insights from vast amounts of data. Marketers can now automate processes like content development, audience segmentation, and campaign management with the help of AI, freeing up critical time and resources.

Additionally, AI-driven data analysis has allowed marketers to comprehend consumer behavior and preferences on a deeper level [1]. AI algorithms can find patterns, trends, and correlations in social media data that humans would miss. This enables marketers to adjust their marketing plans and create highly customized campaigns that connect with certain customers. AI technology has made it feasible to give more relevant and interesting material to consumers, improving the overall customer experience through personalized recommendations and targeted marketing.

Effective advertising development tactics are essential for organizations looking to captivate their target audience on social media platforms in the current digital world. Marketers now have access to useful resources like ChatGPT, Pictory, and DALLE, AI-powered technologies that may help them develop commercials that are both compelling and visually appealing [4, 5]. These AI models can provide compelling writing for advertisements, breathtaking imagery, and the realization of original creative concepts.

Marketers can create effective ad campaigns and maintain an edge in the cutthroat field of social media marketing by fusing AI models with human creativity and strategic thinking.

The requirement for efficient ad production tactics is becoming more and more critical as social media's influence grows and AI technology develops. Delivering tailored, personalized, and visually appealing material that catches the attention and engagement of its target audience can help businesses achieve a competitive edge.

This paper is structured has follows. Sections 6.2 delivers the literature review on the subject. Section 6.3 goes through the main underpinning assumptions on the

methodology employed and the benefits of using AI-powered advertising production for social media marketing. Section 6.4 presents a discussion of the main some difficulties and constraints for social media marketing in regard of the use of AI advertising generation and management. In Sect. 6.6 there are presented two realworld case studies, and in the next section the possible development of use of AI for advertising creation for social media marketing is analyzed. Finally, conclusions are drawn, highlighting the main limitations found and future work developments.

6.2 Literature Review

The recent development of technologies leads us in a new reality in the social media marketing industry, namely, because there are an increasing number of new AI models that can be used for advertising creation. In this section it will be made an overview of this models.

The OpenAI-developed ChatGPT AI model excels in conversation production and NLP [6]. ChatGPT's capacity to comprehend and produce text that sounds like human speech makes it useful for creating persuasive ad copy and interesting social media captions. Marketing professionals can use ChatGPT to develop appealing and tailored ad language that appeals to their target market. ChatGPT can generate conversational and compelling prose from prompts or descriptions, capturing the essence of a brand and increasing customer interaction [6].

Another AI model that specializes in producing visual components like graphics and photos is called Pictory [7]. It creates visually appealing and contextually appropriate visuals for advertisements by combining computer vision techniques and generative algorithms. Marketing professionals can give Pictory text-based instructions or prompts, and the model will produce photos, illustrations, or graphics that fit the intended ad concept or topic [7]. Because of this, advertisers may build aesthetically stunning advertising campaigns without having to invest a lot of time or money in design.

DALLE is an AI model created by OpenAI that was created exclusively for image production. It uses methods from generative modeling and computer vision to produce distinctive and imaginative graphics based on textual cues [4]. Marketers can submit ideas or descriptions, and DALLE can provide various, high-quality images that are tailored to the particular marketing campaign. This enables the design of unique, visually arresting ads that can pique interest and elicit strong feelings [4, 5].

Marketers may utilize the power of AI in both the textual and visual components of ad production by integrating the features of ChatGPT, Pictory, and DALLE [8, 9]. This makes it possible for businesses to develop unified and captivating ad campaigns that successfully convey brand messaging, engage the target audience, and stand out in the cluttered social media scene. Additionally, these AI models help advertisers effectively iterate and optimize their ad content by saving time and resources by quickly generating a wide range of creative possibilities.

6.3 Methodology

There are various benefits to using AI-powered advertising production for social media marketing. It first allows for better customization and targeting. AI models can deliver highly customized ad content by assessing a variety of customer data and preferences [1]. Ad relevance is increased by this degree of personalization, which raises engagement and conversion rates. To target the correct demographic with the right message and increase the overall success of social media marketing initiatives, marketers can use AI algorithms.

The enhanced inventiveness and novel concepts that AI-powered ad creation delivers are another benefit. AI models can provide distinctive viewpoints and produce original ideas for marketing initiatives. Huge datasets can be analyzed by AI algorithms to find patterns, trends, and preferences, which can lead to new and creative ideas that appeal to the target audience. This enables advertisers to push the envelope in terms of creativity and stand out in the crowded social media space [10].

AI-driven ad production also improves productivity and saves time [1]. AI models streamline the creative process by automating monotonous processes and producing advertisement parts more effectively. The time and work that this automation saves marketers allows them to concentrate on developing strategies, optimizing campaigns, and monitoring campaign results. With AI models quickly producing ad language, graphic designs, and pictures, marketers have more time to devote to creative direction and higher-level decision-making. In the end, this results in accelerated campaign execution and higher output.

Overall, AI-powered ad creation offers social media marketing several advantages, such as higher personalization, increased originality, and increased effectiveness [1]. Marketers can design more effective and profitable advertising campaigns thanks to the capacity to supply highly tailored ad content, come up with novel ideas, and automate laborious operations. The potential for AI-powered ad creation in social media marketing is poised to expand as AI technologies continue to progress, aiding companies in improving results, and maximizing the effect of their campaigns.

6.4 Discussion

While AI-powered ad generation has many benefits, it also presents some difficulties and constraints for social media marketing [11]. The ethical issues involved in creating AI-powered advertisements are one of the major obstacles. There are questions about algorithmic biases, data privacy, and the morality of using AI-generated material. To ensure the responsible and moral use of AI in advertising, marketers must place a high priority on openness, fairness, and regulatory compliance.

The possibility for biases and algorithmic fairness in the generation of advertising using AI presents another difficulty [11]. Large volumes of data are used to train AI models, and if the training data is skewed or reflects society's preconceptions, biased

ad content may result. To ensure justice and prevent the perpetuation of damaging stereotypes, marketers must be watchful and aggressive in spotting and eliminating any biases that may be present in AI-generated advertisements.

Furthermore, AI models themselves have limitations and [11]. AI models can find it difficult to recognize cultural nuances and contextual subtleties, which are crucial components of successful ad design. To make sure the generated ad material is of a high standard and appropriate, human oversight and intervention are required. To make sure that AI-generated advertisements are consistent with the brand's image and successfully convey the intended message, it's imperative to find the correct balance between AI automation and human creativity.

Additionally, relying on AI models can add a certain amount of uncertainty [11]. AI algorithms may not always take into account quickly changing market trends or unanticipated shifts in customer behavior because they are trained on historical data and patterns [1]. Marketers need to be ready to modify AI-generated ad material to fit shifting customer tastes and market conditions.

A thorough strategy is needed to address these difficulties and constraints. It calls for meticulous data management, constant observation and assessment, human control, and ongoing AI algorithm advancement. Marketers may minimize the risks and enhance the advantages of AI-powered ad creation in social media marketing by fusing its strengths with human skills. This will result in responsible and successful campaigns that are in line with ethical considerations and produce significant results.

According to the Regulation of the European Parliament and the Council laying down harmonized rules on artificial intelligence. In the European Union market, Generative AI systems utilizing models such as ChatGPT must adhere to specific regulations. These regulations necessitate transparency measures, which include indicating that the content has been generated by AI. Additionally, these systems must assist in distinguishing deep-fake images from authentic ones and implement safeguards to prevent the creation of illegal content. Furthermore, comprehensive summaries of the copyrighted data used during their training process must be accessible to the public.

6.5 Results: Real-World Case Studies

6.5.1 Case Study 1: Successful Social Media Marketing Campaigns Utilizing AI-Generated Advertising

In this case study, we look at two excellent social media marketing campaigns that used AI-generated advertisements to good effect, resulting in better performance metrics, more engaged customers, and greater conversion rates.

LPP, a Polish clothing retailer—Personalized Ad Campaign. A technique for AIpowered ad creation was used by the polish clothing shop LPP for their social media marketing campaign [12]. Based on each user's browsing and purchase history, they used AI models to provide personalized product suggestions and dynamic ad content. LLP was able to provide incredibly targeted and customized adverts to their clients on social media channels by applying AI algorithms.

The outcomes were astounding. Customer engagement and conversion rates significantly increased as a result of the tailored advertising campaign [12]. Customers responded favorably to the AI-generated product recommendations, which increased the click-through rate and boosted performance metrics. In comparison to their prior non-personalized ad campaigns, LLP significantly increased conversion rates by customizing the ad content to individual tastes [12].

Hooyi Men—Creative Visual Campaign. A fashion company called Hooyi Men used AI-generated images in their social media marketing campaign. To produce visually appealing and imaginative ad pieces, such as photos and graphics, they used AI models like Pictory and DALLE. Hooyi was able to create distinctive visuals that complemented their brand look and drew in their target market by generating text-based prompts.

The AI-powered graphic campaign raised brand awareness and consumer interaction. The aesthetically appealing advertising produced by AI models received more likes and shares on social media. During the campaign, Hooyi had a 40% rise in social media followers and a 25% increase in website traffic.

Please note that the first paragraph of a section or subsection is not indented. The first paragraphs that follow a table, figure, equation, etc. do not have an indent, either.

6.5.2 Case Study 2: Challenges Faced and Lessons Learned from Implementing AI in Ad Creation from Smartly.io and Dagmar (Finnish Companies)

In this case study, we look at the difficulties encountered and the things we can learn from using AI to create advertising for social media marketing campaigns.

Data Privacy and Security. Assuring data privacy and security was one of the major difficulties encountered during the case study's implementation of AI-powered ad production [13]. Companies knew how crucial it was to preserve user information, uphold user confidence, and handle consumer data responsibly, following privacy laws. The businesses adopted strict data privacy procedures throughout the entire ad generation process to meet this difficulty. To guarantee that only authorized staff could access client data, they developed secure data storage systems, encrypted important information, and put access controls in place.

Additionally, gaining customers' explicit consent has become a requirement to ensure compliance with privacy laws [14]. Strong consent management processes were put in place by the businesses, and users were made fully aware of how their

data would be used for ad personalization. Offering opt-in options and full disclosure of data processing procedures were part of this. The organizations improved their relationship with customers by demonstrating their dedication to data protection while simultaneously addressing the issue of data privacy by gaining explicit authorization.

To detect and reduce potential risks to data security and privacy, the companies also routinely conducted privacy impact analyses. To make sure they adhered to privacy laws and reduced the danger of data breaches, this involved assessing the AI models, algorithms, and procedures used in ad production. The organizations established a strong base of customer confidence by aggressively addressing data privacy and security issues, which improved the overall performance of their AI-powered ad-generating activities [14].

In conclusion, the deployment of AI-powered ad creation in the case study was significantly complicated by the need to ensure data security and privacy. The businesses effectively overcame this difficulty by putting in place strict data protection mechanisms, acquiring customers' explicit authorization, and regularly undertaking privacy impact analyses. In addition to complying with rules, their dedication to data privacy helped to build customer trust. This emphasizes the significance of placing a high priority on data privacy and security when using AI for ad creation [15]. Doing so will enable organizations to make use of AI's advantages while retaining the faith and trust of their audience.

Algorithmic Biases and Fairness. In the case study, valid worries about potential biases and algorithmic fairness were raised by AI-powered ad development. The businesses understood that biased ad material may be produced if AI algorithms were educated on biased data or showed societal prejudices. They understood how critical it was to address these issues to assure equity, inclusivity, and to prevent fostering negative preconceptions through their marketing efforts.

The businesses took a diligent and proactive strategy to address this situation. To identify and address potential biases in the AI-generated adverts, they put in place strict controls. Identifying and correcting any potential biases, involved doing routine audits and reviews of the AI models, algorithms, and training data. To ensure a thorough review procedure, the organizations closely collaborated with AI experts, data scientists, and diversity and inclusion specialists.

Additionally, the businesses actively sought out various viewpoints and comments throughout the development and testing phases [16]. To make sure that the AI-generated commercials were not unintentionally biased or reinforcing preconceptions, they participated in a variety of focus groups and sought feedback from people with various backgrounds and experiences. This inclusive strategy assisted in identifying any biases that would have previously gone unnoticed.

To direct the training and decision-making processes of the AI models, the corporations developed standards and frameworks that placed a strong emphasis on justice, inclusivity, and ethical issues [17]. By offering justifications for the material and suggestions produced by the models, they promoted transparency in the creation of AI-generated advertisements. The corporations were able to allay worries about biases and algorithmic fairness in AI-powered ad generation by taking these proactive measures. Through their advertising efforts, they showed their dedication to advancing diversity, inclusion, and moral behavior. This improved trust and brand reputation because it not only reflected their principles but also connected well with their target market [16].

In conclusion, the case study's AI-powered ad generation raises questions regarding possible biases and algorithmic fairness [13]. The businesses understood how critical it was to address these issues to ensure equity, diversity, and to steer clear of damaging stereotypes in their advertising campaigns. The businesses were able to successfully reduce prejudices and encourage moral behavior in their AI-generated advertisements through thorough audits, a diversity of viewpoints, and the adoption of norms and frameworks. To ensure the generation of inclusive and objective advertising material, this emphasizes the need for proactive steps and a dedication to diversity and justice when employing AI for ad creation.

Human Oversight and Fine-Tuning. Throughout the case study, it became clear that although AI models produced eye-catching images and advertising material, human oversight, and fine-tuning were essential to getting the intended results [16, 18]. The teams from the companies immediately realized how crucial it was to achieve the ideal visual aesthetics, maintain creative control, and guarantee brand alignment by finding a balance between AI automation and human input.

Human input was required to provide creative direction, guarantee brand continuity, and maintain the intended artistic style, although AI models like Pictory and DALLE were capable of creating visually spectacular graphics and distinctive visuals based on textual cues [7]. As creative mentors and curators, the human teams collaborated closely with the AI models to develop the general concept and messaging of the advertisements.

The human review process was very important for perfecting the AI-generated content [16]. The results of the AI models were thoroughly examined and improved by the teams, who also made tweaks to bring them into line with certain advertising goals and target audience preferences. The teams were able to contribute their knowledge through this iterative process, ensuring that the AI-generated imagery and ad text successfully conveyed the intended message and connected with the target audience.

To give the essential context and guarantee that the AI-generated material was consistent with the brand's overall image, the human teams also made use of their knowledge of the industry and comprehension of the brand's values and identity [16]. The advertising became more creative, authentic, and emotionally appealing thanks to the human touch, which also increased their relatability and engagement with the target demographic. The teams were able to successfully utilize the capabilities of AI models while keeping creative control and brand alignment by embracing the partnership between AI automation and human input. AI-generated content combined with human editing produced visually stunning and intriguing advertisements that successfully communicated the brand's message and connected with the target market.

The case study's conclusion emphasized the value of human control and finetuning when using AI-powered ad development [13]. Although AI models produced eye-catching images and advertising content, human teams were crucial in providing creative direction, perfecting the results, and guaranteeing brand alignment. The businesses were able to attain the ideal visual aesthetics, preserve creative control, and effectively express their brand message by finding a balance between AI automation and human input. This emphasizes how important it is for AI and human creativity to work together to create effective and captivating advertising campaigns.

We can see both the enormous advantages of AI-powered ad generation in social media marketing campaigns and the issues that need to be resolved by looking at these case studies. When implementing AI in the design of advertisements, care must be taken to maximize its potential while upholding ethical principles, data protection, and the requirement for human intervention.

6.6 The Near Future of the Use of AI for Advertising Creation for Social Media Marketing

Advancements in AI for Ad Creation. AI for ad production is a field that is constantly developing and getting better [19]. AI models like ChatGPT can now provide captivating ad text and interesting social media captions thanks to improvements in NLP algorithms [6]. The ability of these models to comprehend context, tone, and linguistic nuance is advancing, leading to more powerful and convincing commercial material.

Additionally, AI models like Pictory and DALLE are improving the ability to generate images [4]. Based on written instructions, they can produce aesthetically amazing visuals, pictures, and even whole scenarios. The quality and realism of AI-generated graphics will increase as these models mature, enabling marketers to produce visually arresting advertisements without the need for intensive manual design labor.

To improve AI-generated advertisements, cutting-edge technologies like generative adversarial networks (GANs) show potential [20]. By pitting two neural networks against one another—one producing images and the other determining their veracity—GANs may create extremely realistic visuals. This technology can raise the bar for AI-generated imagery, making advertisements even more eye-catching and convincing.

Integration of AI with Other Marketing Strategies. The seamless integration of AI-powered ad generation with other marketing tactics can produce campaigns that are both more thorough and individualized [1]. Marketers may obtain greater insights into consumer behavior, preferences, and trends by fusing AI-generated ads with data analytics. Ads are sent to the right people at the right time thanks to this data-driven approach's ability to target and segment audiences precisely.

Additionally, AI can help marketing automation by automating several steps in the design and delivery of advertising [1]. Real-time campaign performance analysis, ad placement optimization, and data-driven campaign improvement suggestions are all capabilities of AI algorithms. By combining marketing automation and AIpowered ad creation, marketers can focus on the strategic and creative elements of their campaigns while streamlining procedures and saving time.

Potential Impact on the Advertising Industry. The implementation of AI-driven ad production at a large scale will have a profound impact on the advertising sector [20]. To work with AI algorithms, marketers will need to learn new skills and make necessary adjustments. Marketers may concentrate on higher-level strategy, creative direction, and campaign optimization by using AI to handle repetitive chores, data analysis, and ad development.

The new responsibilities of marketers will be to analyze data produced by AI, improve campaign goals, and uphold brand consistency. As AI is increasingly incorporated into the processes of creating advertisements, creative agencies will also change. To collaborate with AI technology suppliers and implement AI-driven strategies, agencies may need to update their service offerings [20]. To ensure brand alignment, emotional appeal, and effective narrative in advertisements, human creativity, and judgment will still be essential. Delivering effective and memorable advertising will depend on the integration of AI-powered ad development and human innovation.

Overall, social media marketing will be significantly impacted by AI-powered ad production [20]. AI will soon play a more important part in producing customized, data-driven, and visually appealing advertisements thanks to advancements in the field, integration with other marketing tactics, and shifting industry responsibilities. The future of social media marketing will be shaped by the continued development of AI models and the adaption of marketers and agencies to utilize AI's capabilities. AI is already having a major impact on social media marketing, and its influence is only expected to grow in the future.

Some key trends and challenges that businesses can expect to see in AI-driven social media marketing in the coming years are hyper-personalization: AI will enable businesses to deliver highly personalized content and experiences to each individual customer, based on their unique interests, preferences, and behaviors. This will be achieved through a combination of data analytics, machine learning, and natural language processing.

AI-powered content generation where AI can be used to generate high-quality content at scale, freeing up marketing teams to focus on more strategic tasks. This includes generating blog posts, social media posts, ad copy, and even videos.

Real-time optimization used to analyze campaign performance in real time and make adjustments as needed. This will help businesses to maximize their ROI and achieve their marketing goals more effectively.

Conversational marketing AI can be used to create chatbots and other conversational marketing tools that can engage with customers on a more personal level. This can help to improve customer service, generate leads, and drive sales. Although there are several challenges like data privacy and ethics, algorithmic bias which can increase before investing in AI.

6.7 Conclusion

The introduction of AI has caused a substantial change in the advertising industry [1]. Effective ad development is essential to engaging the target audience in the digital age, and social media marketing has become a cornerstone for organizations. The potential of AI-powered ad generation in social media marketing is examined in this article along with its capacity to completely alter how advertising is produced and distributed.

Numerous benefits that AI-powered ad generation offers have changed the marketing landscape [21]. As AI models evaluate enormous volumes of user data and produce highly targeted and pertinent ad content, personalization has advanced to new heights. This increased personalization boosts client engagement and increases conversion rates, giving businesses an advantage in the crowded social media market.

AI models like ChatGPT, Pictory, and DALLE have become effective weapons in the marketing toolbox. While Pictory focuses on producing visually appealing visuals [7], ChatGPT helps with the creation of captivating ad copy and interesting social media captions. Through the creation of original graphics based on textual suggestions, DALLE pushes the boundaries of creativity [4]. These developments could completely transform the way advertising are made, making them more effective, data-driven, and imaginative.

It is essential to continue studying and collaborating as AI technology develops [21]. To fully realize the potential of AI-powered ad creation, advancements in NLP, image development, and creative optimization are necessary. Collaboration between marketers, AI researchers, and creative agencies can encourage creativity and push the limits of AI's ad creation capabilities, resulting in ongoing advancements and innovations.

Although using AI to create advertisements has many advantages, ethical issues must also be considered [22]. The appropriate usage of AI-generated material is essential because it is necessary to address issues like data privacy, algorithmic biases, and equitable treatment. To establish trust and assure the ethical use of AI in advertising, transparency, fairness, and regulatory compliance are crucial.

Businesses and marketers need to establish a balance between automation and human monitoring to effectively use AI for social media marketing [22]. Although AI can automate routine operations and produce insightful data, human creativity, judgment, and brand alignment are still crucial. Campaigns will be effective and profitable if a collaborative approach is maintained, AI models are improved regularly, and AI-generated advertising is in line with the brand's values and goals.

Ads that are tailored, interesting, and visually appealing could change social media marketing if AI-powered ad production is used. The benefits it offers, such as higher personalization, increased inventiveness, and increased efficiency, have

already changed the face of advertising. But continued study, teamwork, and ethical considerations are still vital. Marketers can realize the full potential of AI-powered ad production while preserving a balance between human creativity and oversight, opening the door to a new era of successful and powerful social media marketing.

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Chapter 7 Retail Chatbots' Main Themes and Research over Time: A Bibliometric and Content Analysis



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Abstract The purpose of this study is to analyze the most important themes and changes over time in retail chatbots' research, using a bibliometric and content analysis of documents from Web of Science archive. The five identified themes are related with chatbots, e-retail applications, and online relationship marketing general and specific contexts' characterization; shopper stimulus to use chatbots in retail and COVID-19 effects; barriers to consumer adoption of retail chatbots; user experience

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with chatbots in their consumer journey; and chatbots' effectiveness and their relationship with customer satisfaction. This study contributes to the field by providing researchers the best practices and tendencies about retail chatbots. For practitioners, it offers guidance to create effective retail chatbots.

7.1 Introduction

Chatbots, or conversational artificial intelligence (AI), have been used in retail for decades, though they have become more advanced and widespread in recent years. Early chatbots like ELIZA in the 1960s aimed to imitate human conversation, though modern chatbots are used by retailers to improve customer service and experience [1].

The term "chatbot" is a combination of "chat" (talk) and "bot" (an abbreviation for robot) [2]. Thus, retail chatbots are automated robots that can assist customers answering enquiries, offering recommendations, and sharing promo codes. Retail chatbots are capable of handling basic queries such as store opening hours or product availability, as well as more complex questions. They provide information about nearby stores, assist customers in locating specific products, guide them through intricate purchase processes, and even support loyalty programs. Retail chatbots play a vital role in conversational commerce by facilitating natural language conversations, which allow customers to interact with brands in a more convenient way. This leads to a more engaging experience and higher customer satisfaction. These retail chatbots can be connected with several touchpoints such as websites, mobile apps, and messaging platforms allowing an omnichannel experience to consumers [3].

So, in summary, retail chatbots are typically AI-powered and are created to enhance the customer experience and boost retail sales [3].

Tran et al. [4] showed that retailers have increasingly used chatbots to lower costs and improve performance. Creating a chatbot for a retail business can be a great way to improve customer service, drive sales, and enhance the overall shopping experience for customers. Some steps are generally referred: choose the right channel, choose the right objectives, choose the right solution partner, and using the power of Generative Pretrained Transformer (GPT) to build chatbots. GPT is a type of AI technology that can be used to build chatbots that are capable of generating human-like responses, continuously analyzing and improving. These are some general guidelines for creating a chatbot for retail businesses, but the specific solution will depend on the specific needs of the business and the chosen platform to create the chatbot on [3].

Chatbots are increasingly being used in the retail sector to provide customer service. However, their acceptance and use remain uneven across retail sectors [5].

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While large technology companies are investing heavily in developing advanced AI for chatbots, smaller companies are creating niche chatbots targeted at specific industries [6].

Historically traditional retail chatbots were rule-based, which means that they were trained to answer only a specific set of questions, mostly Frequently Asked Questions (FAQs). Retail chatbots, which are also called retail conversational agents [7], are defined as "*any software application that interacts with a human using natural language*" [2, 8. Chatbots acceptance is positively impacted by practical elements such as its usefulness and capacity for realistic dialogue, as well as pleasure elements such as the enjoyment it provides.

Retail conversational agents based on AI offer a more advanced and dynamic approach, enabling more natural, personalized, and intelligent conversations with customers [10]. A typical design of conversational AI is based on modules that convert speech into text, interpret the meaning of the text, manage the flow of the conversation, produce text from the meaning, and convert text into speech. Retail virtual assistants, generally called virtual assistants, use natural language processing like conversational AI in order to understand the user and perform tasks, but in contrast to conversational AI, virtual assistants apply their AI skills to answer user's queries and vocal instructions on gadgets like smart speakers [11].

Retail virtual agents are lifelike representations that interact with users through spoken and unspoken communication [12, 13].

Due to the similarities between these concepts, and the development of traditional retail chatbots, our research will use the term "retail chatbot" to generically define all these concepts.

7.2 Literature Review

7.2.1 Retail Chatbots' Advantages for Retailers and Consumers

Chatbots have many advantages for both customers and retailers. Various studies examined how chatbots can create value for retailers. Reference [14] showed that chatbots improve operational performance and reduce costs, especially through round-the-clock services and customization [4]. However, building trust in the chatbots and minimizing perceived risks are essential to achieve these advantages. Some studies investigated how to implement chatbots effectively. Reference [15] discovered that luxury brands use chatbots to deliver the personalized service they are famous for, creating a five-dimension model to assess how chatbots provide interactive, engaging, trendy, tailored service, and problem-solving solutions to customers. Reference [16] suggests using chatbots to make the online shopping experience easier, lowering abandonment rates. Acceptance testing can determine how well the chatbots accomplish this objective.

Other studies revealed that chatbots can enhance customer satisfaction and experience. Reference [4] showed that overall sentiment toward chatbots was more positive than sentiment toward human agents, because chatbots were seen as more genuine and helpful. Reference [2] also showed that chatbots increased customer enjoyment and perceived usefulness, although their acceptance was dependent of the retail sector they were used. In fashion, chatbots were more accepted, while in telecommunications, privacy concerns reduced their acceptance. Reference [17] argues that chatbots are suitable for simple customer problems, providing clarity and personalization without the need for human socioemotional interaction. However, chatbots must develop emotional awareness to know when to transfer customer service to human agents.

Other advantages are related to customized suggestions based on users' data and behavior; simplifying customer support through quick and precise responses; omnichannel experience creation through integration of different customer touchpoints; customer feedback collection; personalized shopping experiences through tailored product suggestions, offers, and promotions based on customers' interests and preferences; increased customer engagement through timely and relevant information about products, services, and promotions.

To sum up, chatbots have advantages for both customers and retailers. They can enhance satisfaction, experience, performance, and customization, driving sales and staying ahead of the competition in terms of brand leadership. However, their acceptance and impact depend on emotional awareness, specific implementation, and the specific retail sector they are used.

7.2.2 Retail Chatbots' Disadvantages for Retailers and Consumers

Chatbots have significant drawbacks for both retailers and consumers.

For retailers, chatbot use can harm customer feelings toward the brands and organizations. Reference [4] found that customer feelings toward chatbots worsen after chatbot implementation and privacy issues are related with the chatbot use. Reference [2] also found that privacy issues and technology immaturity negatively affect chatbot acceptance. These declines in feelings and acceptance could damage customer retention and loyalty for brands and organizations.

For consumers, chatbots lack the human touch. They are perceived as less knowledgeable, empathetic, and trustworthy [18]. Reference [19] found that revealing a chatbot's identity had a negative indirect effect on customer retention through reduced trust, especially for high-criticality services. However, for low-criticality services or when chatbots successfully resolve issues, disclosure had no impact or even a positive effect in customer acceptance. The impact also depends on the service context. Chatbots may be better suited to some retail sectors than others. Reference [4] found differences in chatbot feelings across fashion and telecom sectors. Differences also exist based on a service's criticality [19]. Chatbots pose risks to customer relationships that depend heavily on building trust and providing a human touch. The effects depend on individual customers, retail sectors, and specific service contexts.

More research is still needed to determine when and how chatbots can be implemented most successfully, while avoiding potential disadvantages. Finally, although chatbots are not shopbots, they have some technical similarities. Shopbots may reduce retailer power and margins, because they search the web to find the lowest price on a particular product [20].

7.2.3 Main Concerns with Chatbots

Reference [21] examined chatbot patents, finding growing research on conversational agents using natural language. This enhances chatbots' ability and analytical skills to infer from data and adapt and interact with the users.

Reference [22] compared eleven popular chatbots, discussing similarities, differences, and limitations. The results show that nearly 75% of customers encountered a poor service. The main concern is on how to produce long and meaningful responses. However, deep neural networks are a powerful model for conversational response generation, with over 70 publications in 5 years.

In the last years with mass adoption of Artificial intelligence tools, following the Chat GPT, the most tried tools in the USA in the previous twelve months of March/ April 2023 were Chat GPT, Jasper chat, GetGenie, Simplified, DALL-E, Midjourney, YouChat, and DeepL [23].

In summary, while chatbots have potential for providing customer service and assisting shoppers in e-commerce, research indicates that there are still challenges to overcome regarding privacy, trust, and generating truly, complete, and meaningful conversations. Retailers who want to use chatbots need to know how to set them up to offer the highest quality service to their customers.

7.3 Research Questions and Methodology

7.3.1 Research Questions

To accomplish the research goals, the following research questions will be addressed:

- Q1: What were the most influential scientific documents based on their citation counts?
- Q2: What was the change over time in the publication of scientific documents about chatbots in retail?
- Q3: What are the main research themes and tendencies about the use of chatbots in retail?

7.3.2 Methodology

To obtain a comprehensive understanding of retail chatbots' technology, we conducted a bibliometric and a content analysis of relevant documents. We collected documents from Web of Science Core Collection (WoSCC) (all editions) archive on September 8, 2023, using the Title or Topic search options and the following keywords: "Retail chatbots", "Chatbots in retail", "Retail virtual assistants", "Virtual assistants in retail", "Retail virtual agents", "Virtual agents in retail", "Retail conversational agents", or "Conversational agents in retail".

This WoSCC archive is a reputable one with journals, books, and conference proceedings from highly reputable sources. It is known for providing cleaner data with less duplication than other archives such as Scopus database [24, 25].

No filter was established for the documents' publication date.

We found ninety-three scientific documents and checked their title and abstract to verify that our sample was comprehensive and correct. We used the Web of Science software to retrieve bibliometric information for these articles, including the source or journal name, article title, authors, keywords, year, and references. We also gathered citation and co-citation data for each document. Lastly, we standardized the authors' names and works manually and fixed the different editions of books. We used SciMAT to analyze the data and VOS Viewer to find networks and do the necessary analysis needed to answer our research questions.

7.4 Results

In this section of the work, the results of the study are presented, considering the data collected and analysis carried out on the information elements obtained.

7.4.1 Citation Analysis: Documents with the Greatest Significance and Influence

To address the first research question, a citation analysis was conducted, identifying the most influential scientific documents by their frequency of citations. The technique of citation analysis measures each document's significance within its field, as assessed by its citation counts [26]. A total of 1626 citations in WoSCC were conjointly garnered by the 93 identified documents, averaging approximately 17 citations per document. Given the impracticality of enumerating all documents, Table 7.1 lists the ten most frequently cited documents.

Title	Authors and data	Source	Number of citations
Chatbot e-service and customer satisfaction regarding luxury brands	Chung et al. (2020)	Journal of Business Research	255
Online relationship marketing	Steinhoff et al. (2019)	Journal of the Academy of Marketing Science	148
Internet shopping agents: virtual co-location and competition	Iyer and Pazgal (2003)	Marketing Science	116
Autonomous shopping systems: identifying and overcoming barriers to consumer adoption	De Bellis and Johar (2020)	Journal of Retailing	83
Enhancing chatbot effectiveness: the role of anthropomorphic conversational styles and time orientation	Roy and Naidoo (2021)	Journal of Business Research	73
Virtual agents in retail web sites: benefits of simulated social interaction for older users	Chattaraman et al. (2012)	Computers in Human Behavior	72
Chatbots in retailers' customer communication: how to measure their acceptance?	Rese et al. (2020)	Journal of Retailing and Consumer Services	72
Knowledge-aware multimodal dialogue systems	Liao et al. (2018)	Proceedings of the 2018 ACM Multimedia Conference	55
Millennials' attitude toward chatbots: an experimental study in a social relationship perspective	De Cicco et al. (2020)	International Journal of Retail and Distribution Management	52
Engagement with chatbots versus augmented reality interactive technology in e-commerce	Moriuchi et al. (2021)	Journal of Strategic Marketing	51
Stages of the recruitment process and the referrer's performance effect	Yakubovich and Lup (2006)	Organization Science	51

Table 7.1 Top ten most cited documents

7.4.2 Evolution of Published Research About Retail Chatbots

A bibliometric analysis was used to track the progression of documents scientific documents about retail chatbots over time. We analyzed the annual count of published documents as depicted in Fig. 7.1. The data shows a consistent increase in the number of documents in the last few years, especially after 2020. Although the first document was published in 2001, only 27 documents were published until 2020, which represents only 29% of the total documents. This means that 71% of the documents on the topic of "Retail chatbots" were published after the beginning of 2020. It is also important to note that data collection was done on September 8, 2023. Thus, the



Fig. 7.1 Number of publications per year

number of papers in 2023 will be more than what we have in this analysis, as we did not include the papers that were published by the end of 2023.

7.4.3 Retail Chatbots' Researched Themes and Trends

To tackle the third research question, a bibliographic coupling analysis was used. This technique gauges the similarity between two documents by the number of shared references [27]. It was applied VOS Viewer to uncover and broaden our understanding about the academic connections between documents. We narrowed our selection to works that had received a minimum of five citations using the fractional counting method. A total of thirty documents met these conditions and had at least one connection with another document.

The results of bibliographic coupling indicate that five different clusters can be identified—see Fig. 7.2.

In Fig. 7.2, the documents in the first cluster are represented in red color, and seem to analyze the themes of chatbots, e-retail applications and online relationship marketing general and in specific contexts (luxury brands, and consumer demographic segmentation) characterization. In the second in green color, the documents seem to analyze the shopper stimulus to use chatbots in retail and COVID-19 effects. In the third cluster, in blue, the documents analyze the topic of barriers to consumer adoption of retail chatbots. In the fourth cluster in yellow color, the topic of user experience with chatbots in their consumer journey was studied. In the fifth cluster in purple, the studied topic is related with chatbots' effectiveness and their relationship with customer satisfaction.

Additionally, a content analysis was conducted to scrutinize each document within each cluster. We employed two trained coders to classify each work and encapsulate the primary themes present in each document.



Fig. 7.2 Results of bibliographic coupling analysis. Research trends' clusters

First Cluster: Chatbots, e-Retail Applications and Online Relationship Marketing General and in Specific Contexts (Luxury Brands, and Consumer Demographic Segmentation) Characterization

The first cluster has nine papers. The most important in terms of citations and network importance is [13, 15, 28].

Reference [15] examines if luxury fashion retail brands can preserve their core value of offering customized care through e-services, such as Chatbots, instead of conventional face-to-face interactions. The results show that chatbot e-service provides interactive and captivating brand/customer service encounters in terms of customer perceptions of interaction, entertainment, trendiness, customization, and problem-solving.

Reference [13] found that virtual agents providing search and navigational support in online stores boost perceived social support, trust, and patronage intention for older customers. The effects on trust were mediated by perceived social support, while the effects on shopping intention were mediated by trust and perceived risks.

Reference [28] analyzed customer relationships in online environments, such as online stores, communities and social media, and the effects of communities, mobile, big data, artificial intelligence, and augmented reality in these environments. These relationships are characterized as integrated, connected, omnichannel, tailored, and humanized.

Other papers in this cluster include [29–34]. Reference [29] empirically assessed humanoid synthetic agents in electronic retail applications and found that consumers expected a high level of realistic human-like verbal and non-verbal behaviors from these agents. Reference [30] found a connection between a virtual Onscreen Assistant

(OSA) presence replicating customer-salesperson relationships with direct human contact and customer perceptions of functional and social relational benefits but noted that considerable technological development is needed to support effective social interaction. Reference [31] analyzed how millennials perceive retail chatbots and the variables positively impacting their evaluation. The authors found that visual cues related with avatars and interaction styles impact millennials' perceived enjoyment, trust, and attitude toward the chatbot. Reference [32] studied the effects of e-retailers' artificial intelligence ecosystem on the customer's journey through Amazon's Alexa example. Reference [33] studied the impacts of humanizing chatbots in a clothing retailer. The chatbot human-like characteristics are beneficial for transaction outcomes, but also lead to a consumers' shift to an equity appraisal or bargaining attitude. Reference [34] studied how consumers react to different kinds of chatbots service breakdowns and remedies based on the theories of Role Congruity and Psychological Accounting theory. The study discovered that chatbot service mishaps influence consumers' selection of different remedy options and offer valuable guidance for online retail businesses to effectively handle robot service problems.

Second Cluster: Shopper Stimulus to Use Chatbots in Retail and COVID-19 Effects

Eight documents belong to the second cluster. The most influential ones based on citations and network importance levels are [2, 35, 36].

Reference [35] explored the reasons why young Indian consumers used chatbots and other artificial intelligence tools in retailing by developing Vroom's stimulus expectancy theory using grounded theory method.

Reference [36] discovered that chatbots and augmented reality enhanced customer engagement and decision-making in e-commerce. In short, chatbots have great potential to improve customer service and e-commerce, but retailers need to consider customer perceptions and manage expectations. Chatbots that are very human-like may increase sensitivity to offers, but they can also increase engagement when used appropriately. Chatbots seem ready to transform the retail experience if implemented carefully. Both chatbots and augmented reality can be used by retailers to stand out, though the customer behavior with these technologies is largely unknown. A theorybased model showed that stimulus mechanisms drive customer engagement with and decision-making regarding these technologies.

Reference [2] revealed that customers accepted chatbots because of their usefulness and enjoyment. However, privacy concerns and technology immaturity negatively affected acceptance. Chatbots are good for simple customer interactions, but they may not handle complex emotional situations well. Measuring customer acceptance of chatbots is essential for their success. Both the Technology Acceptance Model and Uses and Gratifications theory are utilizable to understand what motivates customers to use retail chatbots. Chatbots acceptance is positively impacted by practical elements such as its usefulness and capacity for realistic dialogue, as well as pleasure elements such as the enjoyment it provides. However, privacy issues and technological immaturity can adversely affect acceptance and use. Other documents in this cluster are [37-41].

Reference [37] created a classification of atmospherics to customize 3D virtual fashion stores, using focus groups, to perceive the user's evaluation of each aspect of 3D visualization as a sales tool. Reference [38] empirically tested the impact of technology-facilitated service collaboration on patients' service commitment actions in healthcare retailing. Reference [39] explained how COVID-19 impacted various industries including retail and discussed the strategies to implement smart technologies, namely artificial intelligence and AI-enabled technologies in future emergency situations transforming business processes. Reference [40] analyzed how a 3D E-commerce technology can help to overcome COVID-19 challenges for physical stores, using augmented and virtual reality, using user-centered design principles to build a person-cantered shopping assistant. The AR assistant also improved virtual store experience by providing the users with all the necessary information in audio mode or through its avatar. The findings suggest that regular user requires more interactive information about the product than just the written details like how they would appear in a dress or whether the size available on the website suit the customer or not.

Reference [41] investigated the function of videogames offered as a service in promoting a cooperative play experience for premium gamers. Delved into the mechanics of in-game value collaboration and their impact on premium gaming experiences. Investigated how premium gaming incentives can be leveraged to enhance in-game value collaboration and player engagement. Analyzed the influence of different gaming incentives on premium players' willingness to engage in in-game value collaboration. Provided insights into how online game service providers can incorporate collaboration media into premium gaming settings to improve player experiences.

Third Cluster: Barriers to Consumer Adoption of Retail Chatbots

The third cluster comprises five papers. The most noteworthy in terms of citation count and network significance are works by [4, 42, 43].

Reference [42] conducted a study on the obstacles to consumer acceptance of autonomous shopping systems, specifically virtual assistants. The study discovered different mental and social challenges and suggested ways to change the online and physical retail settings to overcome these hurdles along the customer path.

Reference [4] discovered that consumers' perceptions of interactions with chatbots, as well as the nature of these interactions, could impact other consumer service initiatives. The study found differences in attitudes toward chatbots in different retail sectors and in the way how chatbots influence consumers' feelings and anticipations for other service encounters with online human agents. While customers generally have less negative feelings toward chatbots than human agents, their perceptions of chatbots are not always positive and can vary by retail sector. The study also found that after a retailer introduces a chatbot, sentiment toward their human agents becomes more negative, suggesting that chatbots influence consumer expectations.

Reference [43] examined speciesism as a barrier to the adoption of artificial intelligence and robots. Retail chatbots with this prejudice will have an edge over

human interactions and will create a difficulty for their business adoption as chatbots, decision and recommendation systems, and personnel in retail and service settings. The author urges for future research to identify the reasons and mental effects of speciesism, assess the impact of speciesism on the adoption of new products and technologies, and discover methods to surmount it.

The remaining papers are by [44, 45]. Reference [44] explored how a diligent virtual agent in the service encounter can enhance customer satisfaction. Reference [45], on the other hand, examined the challenges blocking the adoption and application of artificial intelligence-powered virtual assistants in retail.

Fourth Cluster: User Experience with Chatbots in Their Consumer Journey

The fourth cluster has five papers. The most important in terms of citations and network importance is [46–49].

Reference [46] scrutinized the impact of AI-enabled services on the seamless and awe-inspiring experience of customers in the Indian online fashion retail sector. It probed into how AI-enabled services enhance and intensify the flow and awe experience in the digital fashion retail environment. It also explored the effect of AI-enabled services on the correlation between online flow and awe experience in the realm of Indian online fashion retail.

Reference [47] examined the impact of the several phases of the customer journey on the customers' intention to adopt AI and machine learning (ML). Reference [48] identified opportunities for higher service robots' utilization using the Theory-Context-Characteristics-Methodology (TCCM).

Reference [49] explored the chatbots' influence in the online customer experience and satisfaction in e-retailing, namely through the analysis of chatbots' usability and responsiveness.

The other paper is [50], which investigated the potential of using voice assistants and virtual reality on fashion stores to foster fashion retail experiences.

Fifth Cluster: Chatbots' Effectiveness and Their Relationship with Customer Satisfaction

The fifth cluster has three papers. The most important in terms of citations and network importance is [51].

Reference [51] found that chatbots can be designed to have human-like qualities such as warmth and competence, which can enhance positive consumer experiences. However, the study also found that present-oriented individuals prefer chatbot conversations that are warm rather than competent chatbot conversation. In contrast, future-oriented individuals prefer chatbot conversations that are competent rather than warm. They also found that the brand perceptions play a role in mediating these effects.

Other papers in this cluster are [52, 53]. Reference [52] analyzed how the social characteristics of chatbots influence consumer behavioral intentions. Reference [53] analyzed the influence of communication styles (social or task-oriented) and consumer attachment anxiety on increasing customer satisfaction with chatbots. The results indicate that a socially oriented communication style may be beneficial

Cluster	Average (year)	Standard deviation	Minimum (year)	Maximum (year)
1	2015.89	7.06	2001	2022
2	2021.25	1.20	2019	2023
3	2021.20	1.17	2020	2023
4	2021.40	0.80	2020	2022
5	2022.00	0.82	2021	2023

Table 7.2 Research cluster trends

Note The average and standard deviation values were rounded to two decimal places

in increasing service satisfaction for high-anxiety-attached customers, but does not work for low-anxiety-attached customers.

7.4.3.1 Research Clusters Trends per Year

A chronological analysis was done in the documents that compound each cluster. Thus, a more comprehensive analysis of each cluster can be achieved.

The cluster with the most recent article average, measured by the year of publishing, is the fifth, followed by the fourth, second, and third. The oldest cluster is the first with an average of publication year of 2015. The first cluster is also the one that has the largest standard deviation. Thus, it seems that the first cluster "Chatbots, e-retail applications and online relationship marketing general and in specific contexts (luxury brands, and consumer demographic segmentation) characterization" launched the basis of this research field, being updated with specific contexts in the last years.

All other research clusters are more recent, studying new aspects of retail chatbots, such as "Shopper stimulus to use chatbots in retail and COVID-19 effects", "Barriers to consumer adoption of retail chatbots", "User experience with chatbots in their consumer journey" and "Chatbots effectiveness and their relationship with customer satisfaction" (Table 7.2).

7.5 Final Considerations

This research enhances the understanding of retail chatbots by identifying the most influential documents, monitoring their development and raising interest in recent years, and examining research clusters to suggest future research directions.

The research clusters reveal the variety of the subthemes related to retail chatbots. Academic researchers can explore each of these research clusters and connect different research areas. Practitioners, especially in retail and technological companies that are creating retail chatbots, can use this study to design their strategies to boost retail chatbots' use and acceptance and enhance their business outcomes. They can also access various real case studies and researches that can be easily reproduced or adapted to their strategies and actions.

While this study provides valuable insights, it is important to acknowledge its limitations. The research focused on documents indexed by the Web of Science archive, which may not represent the full range of relevant literature. The findings of this study should be interpreted with caution due to the use of a restricted data set. Future research should consider expanding the scope of analysis to include documents from a wider range of sources. This study represents a valuable contribution to the field, but it is important to note that its findings are based on a limited sample. Future research should strive to broaden the scope of analysis to ensure a more comprehensive understanding of the topic.

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Chapter 8 Gastronomic Consumers' Attitudes Toward AI-Generated Food Images: Exploring Different Perceptions Based on Generational Segmentation



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Abstract The paper aims to identify the differences in attitudes of particular generational segments of gastronomy consumers toward AI-generated food marketing images. DALL-E engine was used to generate 56 images of dishes, which were initially ranked by professional chefs and reduced to a final set of 18 images used for four photo-elicitation focus groups. Qualitative evaluation of the data showed three topics to be crucial during the discussion of agents: the ability to recognize the meal or ingredient (M/I-R), preference toward presented food, and ability to recognize pictures as artificial (AR). There were significant differences in the meaning construction of such topics based on particular generational segments, i.e., Baby Boomers (BB), Generation X (GX), Generation Y (GY), or Generation Z (GZ). Findings show that GZ manifested the highest M/I-R scores but the lowest AR scores. GZ also preferred dishes for which M/I-R was manifested over those with missing M/I-R. GY and GX showed lower M/I-R scores as well as low AR scores. However, GY and GX showed a will to experiment by choosing dishes independently on M/I-R manifestation. BB segment showed the lowest M/I-R scores, but it was the only segment able to achieve high AR scores. As for the GZ, the BB segment also preferred dishes with M/I-R manifestation over the unidentified dishes. The results present marketing implications, especially since the BB segment is the most (and only) suspicious group toward AI-generated food images as it tends to

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© The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2024 J. L. Reis et al. (eds.), *Marketing and Smart Technologies*, Smart Innovation, Systems and Technologies 386, https://doi.org/10.1007/978-981-97-1552-7_8 elaborate deeper analysis of the presented images, leading to increased artificiality recognition.

8.1 Introduction

Artificial intelligence (AI) has cut a disruptive path within hospitality, gastronomy, tourism, and events to strengthen numerous dimensions of the sectors. For instance, the hospitality industry's predictive analytics and AI-driven chatbots enhance room pricing and occupancy while streamlining guest interactions. Gastronomy could benefit from AI-enabled recipe development, flavor balancing, and personalized meal suggestions based on dietary restrictions and individual preferences [1]. Moreover, virtual reality tours and customized travel itineraries enhance the tourist experience. AI-driven scheduling and attendee engagement techniques also simplify event organizing. The hospitality and tourism industries are facing radical changes because of AI and are gradually learning to use these technologies concerning customer satisfaction, service quality or profit [2].

Investigating AI-generated visual marketing content, specifically focusing on food imagery, demonstrates great potential across several industries. In the culinary domain, AI could create tantalizing and Instagram-worthy food photos that entice consumers and highlight a chef's expertise. Elsewhere, AI-generated visuals of regional specialties or aesthetically pleasing dining environments can inspire wanderlust and increase interest in particular locations within the tourism industry. AI-created graphics of mouthwatering culinary options or gorgeous event venues also improve promotional materials.

Despite the significant benefits, the topic of AI-generated visual content still suffers from research gaps. While AI can simulate food appearance, it might struggle to recreate the sensory elements affecting dining experiences like flavor, texture, and scent [3]. Another challenge is context awareness, as an AI-generated image might not adequately capture a particular dish's local quirks or cultural significance. Moreover, consumers may become skeptical if the audience questions the authenticity of AI-generated graphics. Our research challenges context awareness and questions when consumers become skeptical when judging the authenticity of AI-generated graphics. Stemming from the above-mentioned research, our paper aims to identify the differences in attitudes of particular generational segments of gastronomy consumers toward AI-generated food marketing images.

8.2 Literature Review

AI already creates its own influencing marketing content. For example, Chan et al. [4] investigate the impact of color in AI influencers' product suggestions on customer perceptions. Although not directly related to food images, this study emphasizes the

influence of AI-generated images on consumer behavior. The findings imply that AIgenerated visuals like food photos may have a similar effect on customer decisions. In a similar study, Chang [3] adds to the conversation by creating a taxonomy of reasons that people have for "foodstagramming" (sharing food photos on social media). This taxonomy suggests that AI-generated food images could align with the motives to strengthen marketing efforts. Moreover, the study findings are vital to understanding the reasons behind consumer sharing and interaction with food photos.

The findings are consistent with Doborjeh et al. [5], which comprehensively investigate AI methodologies and applications in the hotel and tourism industries to demonstrate the broad utility of AI in the sectors. In analogy with their study, we suggest that AI-generated food images may also have diverse uses in marketing, visitor engagement, and other areas. In a similar study, Dwivedi et al. [6] explore the use of ChatGPT and other generative AI applications in the hotel and travel sectors. The authors demonstrate the potential of AI-generated material in customer interactions. Additionally, the authors emphasize another essential factor, which is that AI technology is not expected to replace employees in hospitality or tourism; it will be supplemented, and it is necessary to gradually expand the skills of employees in hospitality and tourism so that they can make maximum use of the possibilities of AI [7]. In another study, Gursoy et al. [8] assess the existing patterns and potential future paths for research linking ChatGPT and the hospitality and travel sector. The authors imply that AI-generated visual material like restaurant menus or suggestion of local food preferences can improve customer experiences and marketing tactics. Similarly, Hillman et al. [7] examine the use of visual approaches to comprehend how people perceive tourist development. Although the authors do not specifically discuss AI-generated pictures, their approach to visual techniques may help the industry players to understand the use of AI-generated food images to influence consumers' impressions of culinary experiences and the allure of tourist destinations.

The findings are consistent with Husted et al. [9], who examine the change in eating habits in reaction to food images. This study indicates the influence of visuals on decisions involving food. The authors emphasize the value of compelling food imagery in marketing and raise the possibility that AI-generated graphics could use these behavioral insights to sway consumer behavior. Similarly, Janusz et al. [10] use photo-elicitation to examine residents' perceptions of tourism development. Their strategy stresses the value of images in capturing viewpoints while concentrating on residents. Considering this study's results, this could also apply analogously to AI-generated food images, and AI-generated food images might similarly engage diverse stakeholders and effectively communicate the desired marketing message.

In another study, Justesen et al. [11] use participant-driven photo-elicitation to investigate hospital meal experiences. The authors' approach highlights the importance of images in capturing complex experiences. In link with these findings, a question arises if AI-generated food images can encapsulate the essence of dining experiences to enhance marketing materials. The findings are consistent with Kong et al. [12], which thoroughly summarize AI research in the hospitality and tourism sector. Although not directly related to AI-generated food photographs, the study exemplifies the changing role of AI in the hospitality and tourism sector. It suggests that AI could improve marketing efforts by creating aesthetically appealing content.

Similarly, Koo et al. [13] provide insights into AI and robotics in the travel and hotel industry to highlight the expanding role of AI in transforming consumer experiences. This viewpoint emphasizes using AI-generated food imagery in marketing campaigns to entice and engage potential customers. In a comparable study, Lv et al. [14] investigate AI service recovery in the hospitality industry, focusing on the importance of empathic reaction. The study does not directly link to food-related imagery but emphasizes the value of designing AI interactions to trigger strong emotions. Therefore, AI-generated food visuals intended to arouse sensory and emotional responses might increase the effectiveness of marketing materials.

In another study, Manfreda et al. [15] present a framework for high-engagement research application in qualitatively analyzing tourism and hospitality experiences. The authors' methodology supports the idea of immersive and engaging visual content, despite not focusing primarily on AI-generated photos. The findings might apply to AI-generated culinary photographs augmenting promotional materials. Similarly, Mariani and Borghi [16] analyze online review data to explore consumer perception of mechanical AI in the hospitality industry. The study lacks a specific primary focus on food images but examines AI reception in the hospitality industry.

Matteucci [17] uses the photo-elicitation technique to explore tourist experiences. Although not directly related to AI, the method emphasizes the visual nature of experiences. Similarly, Saydam et al. [18] thoroughly assess empirical investigations to examine the application of AI in the tourist and hospitality sectors. The authors provide a broad overview of AI uses, including generating aesthetically appealing marketing content. However, the study does not explicitly address AI-generated food photographs.

In another study, Sofield and Marafa [19] discuss using visual anthropology and photo-elicitation to revitalize field trips in tourism. This research stresses using visuals to improve comprehension and experiences but does not focus on AI-generated images. These findings are consistent with Ferrer-Rosell et al. [20], which delves into AI-generated content, freelance work, and hospitality and tourism marketing from the e-tourism point of view. The study sheds light on the role of AI in creative work, arguing that AI-generated content can influence marketing strategies, streamline content creation, and present new visual perspectives.

Furthermore, Tuomi et al. [21] explore the case of humanoid service robot PepperTM to establish the effect of AI-driven robots in improving interactions with hospitality service providers. This study shows the possibilities of AI interventions in improving guest interactions. However, the authors do not focus on food images. If the AI-generated food images were to be applied to similar interactions, the question for future research could be whether it could stimulate interest and appetite or engagement in promotional materials. Additionally, Zhang et al. [22] used computer deep learning models to examine the visual content of photographs and study tourists' behaviors and impressions. The study demonstrates the potential of visual content

analysis in comprehending visitor experiences but does not relate directly to AIgenerated food photos. Therefore, future research is needed to explore whether AIgenerated food photos could give similar insights into consumer food preferences and cultural perceptions.

8.3 Research Methodology

The aim of our research has an exploratory character; therefore, a qualitative methodology was used. On a specific level, photo-elicitation was used with different groups of agents who are regular gastronomy consumers [23]. Microsoft Bing Image Creator powered by DALL·E, an engine provided by OpenAI [24], was used to obtain the material for photo-elicitation. The tool was chosen because it is one of the most accessible AI image-generative tools the general public can use for free. In addition, the tool does not require expertise in AI, so anyone can use it without elaborate training. For the above reasons, it can be assumed that this tool can be used by a broad group of stakeholders who want to create AI-generated marketing content for free and effortlessly. In the first phase, 56 images of meals were generated using the keywords *white background, traditional dish, hyper-realistic photo, marketing photo, molecular gastronomy, starter/soup/fish/meat/dessert*. Also, the word *Czech* was added to each of the various combinations as the research was conducted in the Czech Republic with Czech consumers.

The generated images were subsequently presented to three professional chefs. They were tasked with ranking these images from the most to the least authentic, with complete authenticity being the image's ability to act like a real photo not generated by AI. Inner reliability in image ranking was calculated using Krippendorff's alpha, while the value of this statistic reached 0.85, indicating high inner reliability. By sorting the pictures, the chefs could create six categories (each containing nine images), from Category A, representing the most authentic dishes, to Category F, representing the least authentic dishes. The number of images was subsequently reduced from 56 to the final set of 18 images by removing three images from each A to F category. The order of these 18 images remained unchanged from the original set. As a result, the final set of images used for the research consisted of three images for each A to F category, as seen in Table 8.1. The number of images was reduced due to the following research phase.

The main phase of the research consisted of a total of four focus groups using photo-elicitation. A researcher led each of the focus groups, and the approximate duration of each of them was between 60 and 90 min. Each focus group contained four agents, while the focus groups were divided according to generational segments. The first focus group contained agents of the Baby Boomer generation (BB) born between 1945 and 1964 (two females, two males), second focus group had agents of the X generation (GX) born between 1964 and 1984 (two females, two males), third focus group contained agents of Generation Y (GY) born between 1895 and 2003 (two females, two males), fourth focus group had agents of Generation Z (GZ)

	e	1		1		0 1
A01			A02		A03	
B04			B05		B06	
C07		E	C08		C09	
D10			D11		D12	
E13			E14		E15	
F16		P	F17		F18	

 Table 8.1
 AI-generated pictures of meals used for photo-elicitation focus groups

Note A–F represent categories of AI-generated meals as sorted by chefs during semi-standardized interviews—from most authentic (A) to least authentic (F) [24]

born since 2003 (four females—in our research they were all adults). According to Evseeva et al. [25], we adopted the above-mentioned generational segmentation. When including also the initiatory interviews with three chefs, our research's total number of agents equals 19. Based on repeatedly occurring responses in individual focus groups, it can be claimed that theoretical saturation has been achieved.

All of the mentioned focus groups were conducted during August and September 2023. At the beginning of each focus group, the agents were told that they would be presented with 18 photographs of meals taken by a professional photographer. Thus, the agents did not know that these were AI-generated images. The agents were advised to discuss each of the pictures with each other. During the presentation of each of the pictures, the researcher asked several questions regarding (i) the ability to identify the given dish and the ingredients contained in it, (ii) the effect of the dish and its perception by the agents, (iii) the perception of the dish as traditional/modern, Czech/foreign, (iv) preferences regarding the presented dish. After viewing all 18 images, the agents were informed that these were AI-generated images and asked for an unstandardized discussion responding to this finding. All focus groups were audiorecorded, completely transcribed, and subsequently coded to evaluate the qualitative data obtained. The total number of words of coded text was 15,332. The ideal types of agents correspond to the individual investigated generational segments (BB with Agents A1-A4, GX with Agents A5-A8, GY with Agents A9-A12, GZ with Agents A13-A16). The results depict a quadrant in which the individual generation segments and their ability to recognize food and their preferences for individual meals are visualized, followed by the inclusion of the ability of AI recognition. Examples of selective transcriptions are also presented.

8.4 Results

The data analysis from presenting 18 AI-generated images during individual focus groups pointed to several elementary codes—essential emerging themes that mostly followed the question from the research scenario. The first code represented the ability to recognize meals and name their ingredients (meal/ingredient recognition abbreviated as M/I-R). The M/I-R was the main element triggering the discussion among the agents. The ability of M/I-R led to two possible scenarios. First, the M/I-R did not influence the subsequent proclaimed preferences of agents, which was the case of GX and GY. In the second case, on the contrary, the ability of M/I-R significantly influenced the choices proclaimed by the agents, which was the case of BB and GZ. The influence occurred in a positive direction, which meant that the higher the M/ I-R of the BB and GZ agents, the higher their preferences were (and vice versa). In other words, the ability to recognize the presented food significantly determined their desire to taste such food. Differences in the relationship between M/I-R and preferences for individual groups can be seen in the selective transcriptions below. The first example shows the necessity of M/I-R for subsequent food preference. The second example shows the independence between M/I-R and food preference:

Example 1:

A1(BB): "If someone showed me this dish, I wouldn't choose it."

A3(BB): "Me neither. I don't know what kind of food it is, and that bothers me; it discourages me."

Example 2:

A12(GY): "It's tempting to me, even if I don't know what it is, it's tempting to me. I like the meat; it's so beautifully prepared."

A graphical representation of these tendencies is contained in Fig. 8.1. The values are the frequencies summarized for all 16 agents who participated in the focus groups. Positive values indicate positive preferences for the given meals and positive M/I-R ability. Negative values indicate a dislike for the offered meals and an M/I-R inability. The M/I-R ability was evaluated as a measure of the agreement of the agents' statements with the instructions given to the AI to generate the image, as well as the ability of the agents to create their interpretations of the meals or ingredients. The M/I-R disability was taken as a mismatch of the agents' statements with the instructions given to the AI to generate statements with the instructions given to the meals or ingredients.

Figure 8.1 shows that the overall M/I-R of the agents was at an average level, achieving a negative score for eight dishes and a positive score for ten dishes. Dishes D12, D17, and F16 achieved the absolute lowest M/I-R, making these three dishes among the most difficult to identify. On the contrary, the highest M/I-R score was achieved by dishes A01, B05, C07, and E15, which almost all agents identified without trouble. When looking at the agents' preferences, most meals achieved positive values (13 dishes) compared to fewer non-preferred meals (5 dishes). The least preferred dishes were D12 and F16, and the most preferred were A01, A02, A03, B04, C07, and E13. The combination of both measured values then indicates low preferred foods with low M/I-R (D12 and F16), relatively low preferred foods with high M/I-R (B05), highly preferred foods despite relatively low M/I-R (A02 and E13), and foods highly preferred together with high M/I-R (A01 and C07).

From a generational point of view, Fig. 8.1 shows with a diagonal arrow the increasing preferences with increasing M/I-R, which were typical for BB and GZ (but not present for GX and GY). While the GX and GY agents were more experimental in their choices and often preferred foods unidentifiable to them, for BB and GZ agents, the desire to experiment with foods indescribable to them was significantly lower. Another result shows that the total M/I-R score increased with the decreasing age of the agents. The worst M/I-R score was achieved by BB, followed by GX, indicating the low ability of these generations to identify the presented dishes. A significantly higher M/I-R score was achieved by GY and the highest by the GZ generation, which had no problems identifying most of the dishes. While the particularly preferred meals varied according to generational segment, no differences were found in the number of preferred meals depending on the generational segment.

However, during the focus groups, aside from the topic of M/I-R and the topic of preferences, a third essential topic was confirmed: the ability to recognize the authenticity of meals (artificiality recognition abbreviated as AR), i.e., the ability



Fig. 8.1 Food space of AI-generated images. *Note* The axes can achieve values <-16; 16>, with the minimum value indicating negative M/I-R or negative preferences for all agents and the maximum value indicating positive M/I-R or positive preferences for all agents. Values near zero show almost no agent commented on the given question or that positive and negative expressions reached similar values (in the case of the presence of positive and negative values simultaneously, the resulting value is their sum)

to recognize images as AI-generated. While there were significantly opposing opinions for particular dishes for M/I-R values and preference values within individual groups, it did not appear for AR. The moment one of the agents in the group raised suspicions regarding the dish's authenticity, and he/she automatically aroused the same suspicions among the other agents. Therefore, we consider the quantification of AR on a discrete scale to be misleading (in contrast to M/I-R values and preference values, whose discrete quantification reflects certain dynamics within groups). The left part of Fig. 8.2 shows the ability of individual generational segments to recognize meal images as AI-generated (dichotomous scale). While GX, GY, and GZ hardly identified any images as AI-generated (the exceptions were scarce), BB frequently recognized meal images as AI-generated. Thus, for GX, GY, and GZ, almost any level of suspicion was absent, but for BB, the level of distrust was highly intense. The right part of Fig. 8.2 reflects the classification of the perception of the authenticity for meal images (done mainly by the BB). At the same time, it is evident that the perception of authenticity by ordinary consumers (by BB respectively) does not correspond to the perception of authenticity by the chefs, as the order of the dishes in Fig. 8.2 does not correspond to the ascending order of the numbers assigned by chefs.

The lowest level of suspicion was recorded for seven dishes (A01, A03, C07, D12, E13, E14, F18). In this case, neither group (nor the otherwise suspicious BB) tended to question the reality of the presented dishes. A minor suspicion appeared for two dishes (B05 and C09), but this suspicion did not trigger a discussion. A higher level of suspicion initiating group discussion occurred for six dishes (B06, D10, D11, E15, F16, F17), which was the case for BB agents but also for GX agents (E15 picture for GX). For three dishes (A02, B04, C08), statements equivalent to revealing the image as AI-generated were then mentioned by groups BB and GZ.

In contrast to the results above, more frequent mention of the code devoted to distinguishing cuisine as domestic/foreign or dishes as traditional/modern was missing. Even when the agents responded to the question, the question never triggered a group discussion, nor did they initiate a debate on the topic themselves. From the point of view of exploratory evaluation, we do not consider this qualitative code to be elementary. The same situation appeared with the experimental intervention, after which agents did not develop new ideas, nor did they mention comments opposing the previously mentioned statements.

8.5 Discussion and Final Remarks

Based on the set goal, we conclude that attitudes toward AI-generated food images that can be used as marketing materials show differences depending on the generational segments. Therefore, we add new findings below to the already published research, which claims differences between generations in the approach to AI [26]. In particular, it was typical for the youngest Generation Z to be most able to recognize the presented dishes and name their ingredients. For Generation Z, there was



Fig. 8.2 Perception of food authenticity by agents. *Note* The AR by group is classified into two levels (dichotomous scale); the AR by food is classified into four levels (ordinal scale)

an easiness and fluidity in identifying dishes and coming up with interpretations. However, the time spent on individual images was shorter than for other generational segments, and the depth of analysis of individual dishes did not reach such sophistication. The above conclusions likely resulted in no suspicion in almost any of the presented dishes, meaning that Generation Z could not recognize the images as AI-generated. At the same time, Generation Z preferred foods that it could identify, so it can be argued that it was characterized by a lower willingness to experiment.

A slightly lower ability to recognize presented dishes and the ingredients contained in them was typical for Generation Y. This ability was then even lower in Generation X. When making preferential choices of specific foods, both Generation X and Generation Y agents did not take into account whether they were able to recognize the food, meaning that they showed a greater willingness to experiment. Although the time they spent on the presented dishes was occasionally more prolonged than that of Generation Z, even the agents of Generation X and Generation Y could not recognize the presented images as AI-generated.

The most fundamental marketing implications then stem from the results of Generation BB. It was typical for the oldest generation to have the most difficulty identifying the dishes presented and naming the ingredients. This conservative-looking generation only preferred dishes that it could identify well. For those dishes that appeared to be unknown, Generation BB spent significantly longer analyzing the presented dish than other generational segments. During this process, Generation BB aroused suspicion toward the shown images, which led to the objection that the presented images were not genuine photographs but rather artificial images.

Based on our results, we believe that there needs to be more information on the authenticity of AI-generated food photos and their capacity to convey sensory elements like taste and aroma. Addressing these gaps is necessary to ensure AIgenerated graphics connect with consumers on an authentic and visceral level [5]. Cultural and contextual nuances related to culinary experiences may be complicated for AI to portray precisely. Therefore, further research is necessary to determine ways to use AI-generated photos to convey authenticity more effectively.

Future studies should focus on developing a more thorough knowledge of the impact of AI-generated food images on decision-making in the hospitality, gastronomy, and tourism industries. Studies comparing the effectiveness and authenticity of human-captured images versus AI-created visuals can provide some insight. One of our study's limitations was no comparison of genuine photographs with AIgenerated pictures. Another limitation stems from the qualitative research, as it does not provide representative results but explores emerging topics. It is advisable that emerging topics would be used for follow-up quantitative surveys, i.e., future work. Also, although focus groups could trigger fruitful group dynamics in the discussion, in our case, it manifested the influence of more dominant agents on agents who followed their opinions in some cases.

Our results show some insight into the appropriate marketing communication. Based on the conclusions, marketers do not have to be concerned with the authenticity of AI-generated food images when aiming at GZ, GY, and GX. On the other hand, they should avoid any suspicious details in the pictures when using them in communication with BB. Besides, more prominent experimentation, even with less-known dishes (generated by AI), can be used for communication with GX and GY. However, if GZ and BB are to be addressed by AI-generated food images, marketers should first have appropriate knowledge of dishes they regularly prefer. Lastly, a shorter time span for presenting AI-generated dishes is sufficient for younger segments of GZ and GY. A prolonged presentation time is needed for GX and BB, for which a longer time span can paradoxically result in a lower level of authenticity perception.

Developing marketing tactics will also rely heavily on research into ethical issues, customer views of AI-generated content, and the level of trust they inspire. We believe that the inclusion of M/I-R, preference, and AR categories used in our study shows that future studies should also investigate the practical approaches to integrating AI-generated food photos into a larger content strategy and their effect on consumer engagement, brand perception, and revenue creation [6].

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Chapter 9 Negative Impacts of Human-AI Interaction in Brands: A Data Mining Exploratory Approach



Ricardo Snatos, Amélia Brandão, Bruno Veloso, and José Braga de Vasconcelos

Abstract Artificial intelligence (AI) is a strategy for global economic development due to its economic potential. However, the need for more transparency in AI applications generates mistrust because of the complexity of the algorithms. AI has transformed the service industry along with the development and challenge of human-AI interactions. This interaction can elicit negative feelings in consumers, creating communities to voice their disapproval and hatred of brands. Research in this area needs to be improved, and this study aims to understand the negative feelings that result from human-AI interaction in online communities (Reddit). Using sentiment analysis techniques and a qualitative approach, we aimed to identify the predominant negative emotions generated by this interaction. This study also hopes to understand the emotional effects of this interaction better, thus filling in a gap in the literature. The insights obtained can help develop more effective interaction strategies between humans and AI that can benefit brands and society. The results show a sizable presence of negative feelings such as hate anger and frustration. It is, therefore, essential to understand the negative interactions between consumers, brands and AI and the need to develop strategies to mitigate these feelings. Contributions from the academic and corporate fields emphasise the importance of monitoring feelings and promoting more positive interactions between brands and consumers.

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9.1 Introduction

Research on human-AI interaction has primarily focused on its applicability and benefits, leaving a gap in the literature regarding the negative. Feelings that this interaction elicits among consumers concerning brands. This study tries to understand the types of negative feelings that can result from this interaction [3].

Belonging to a group contributes to individuals' greater involvement and active participation [35]. Therefore, establishing brand communities can play an essential role in implementing these new consumer interactions, which is necessary for developing new ideas that can lead to change and increase profitability [25].

The enormous economic potential of artificial intelligence (AI) has been increasingly discussed as a strategy for developing economies worldwide.

Due to their association with the development of artificial intelligence, applications are often thought of as needing to be more transparent. One of the reasons for this is the need for more understanding of how algorithms work. The complexity of these systems creates mistrust in users, especially when we talk about important applications in industries such as health or finance.

The service industry has undergone a rapid transformation due to innovative technologies based on AI, which have revolutionised how we live. These technologies have also given us the ability to extract information from a large amount of data (Big data), which is helpful to brands and helps decision-making. "Big data" is a growing phenomenon for which AI is becoming an increasingly viable option for companies to automate tasks; it is already being used in the health, business and design sectors [33, 36, 39, 61] and in Smart Cities, where AI offers more personalised education and mobility services. There are many advantages for consumers, such as more personalised services, 24/7 robot customer service advisors, virtual assistants and chatbots, and more. Consumers can also benefit from AI systems in terms of online shopping, where it is increasingly easy to get lost in an endless array of goods and services offered without the aid of AI.

AI is present in people's lives with Machine Learning (ML), Natural Language Processing (NLP), Expert Systems, Computer Vision, Robotics and Planning. Selecting which type of artificial intelligence to use depends on the user's purpose. A consumer's experience includes emotions, beliefs, preferences, perceptions, behaviours and achievements that occur during or after an interaction with a product or service [41]. Inefficient task performance and negative experiences are some of the different types of service failures that affect the user's perception of AI systems [8] and brands [4].

This study aims to broaden our understanding of negative feelings resulting from human-AI interaction and their impact on brands, using theoretical leverage and sentiment analysis in online communities.

Research conducted on online communities in Reddit will also allow us to assess the existence of brand hatred and fill the gap in the literature on this topic in the most varied fields of social sciences [42, 43, 59]. This study employed a methodological perspective, netnography and a set of tools associated with sentiment analysis (SA), which automatically extracts consumer opinions [49]. SA is used to extract information.

Before data collection, it can be used to understand the negative feelings a consumer experiences due to this human-AI relationship.

The key contributions of this work are:

- Applying sentiment analysis to determine whether the prevailing sentiments regarding the use of AI are positive or negative and its impact on brands.
- It is identifying the primary negative emotions stemming from the interaction between humans and artificial intelligence.

The subsequent sections of this paper are structured as follows: Sect. 9.2 provides an overview of artificial intelligence and its implications in the consumer–brand relationship, mainly focusing on negativity. Section 9.3 outlines the proposed methodologies for identifying the primary consumer feelings resulting from the relationship between humans, AI and brands. Section 9.4 presents the findings from the conducted experiments and tests. Lastly, in Sect. 9.5, offer a summary and engage in discussions regarding the outcomes of this study.

9.2 Literature Review

AI is one of the most innovative technologies associated with human thinking, allowing machines to assume cognitive functions and perform intellectual tasks such as problem-solving, reasoning and autonomous learning [14]. It is human nature to look for ways to be more productive constantly. Each of the first three industrial revolutions radically changed jobs and how tasks were performed. Physical labour began to be replaced by machines, leaving workers to perform cognitive tasks.

Technological advances, digitisation and "data analysis" seek to improve human cognitive capabilities by introducing AI and ML mechanisms. This has led to a profound change in some professions, and some businesses have ceased to exist, especially those that can be performed by robots or new business models.

Its ability to generate emotions makes AI important for analysing how organisations interact with consumers [29]. This ability to create feelings was crucial for its rapid ascension in the service industry and, consequently, to various areas of business, defence, design, health (diagnosing cancerous diseases more efficiently than radiologists) and the finance sector (where it is used to generate reports about investments, bank accounts and financial transactions) [33, 36, 39].

9.2.1 Artificial Intelligence

AI can be found in almost every aspect of our daily lives [15]. Its technology allows computers to perceive the world and evaluate scenarios in real-time by collecting data from physical or virtual sources, then provide personalised suggestions and even learn from experience [30, 58]. AI is an area that uses ML algorithms and deep learning (DL) algorithms. The most innovative AI technologies related to DL have allowed academia and industry to make great strides.

In improving performance and automating conventional industrial processes and techniques, much of the potential of AI is extracted through ML.

The term "meta-learning" [47] introduces a new ML model called "Automated machine learning". This allows systems to learn and replace their algorithms by analysing the collected data and combining predictions from other ML algorithms [59]. Defining mutually exclusive and exhaustive categories is challenging, and there is always some overlap between types of artificial intelligence. These are usually combined, and the algorithms are often modified to extend their application.

Artificial intelligence and marketing. One advantage of AI in marketing is the ability to automate the analysis of a large amount of data and information that adds knowledge to the Marketing mix [56]. Marketing teams have been supportive of its implementation. In digital marketing, AI can be beneficial for promoting products more efficiently customising offers based on user data, thereby increasing consumer satisfaction and loyalty to the brand [14].

In the same way, businesses and jobs have changed under the influence of AI and ML, and all customer consumption models have also been changed. It started as physical and face-to-face but has become increasingly virtual and distant. When a consumer shows interest in a product, a series of mechanisms are triggered, from the automatic creation of personalised advertisements on web pages and email coupons to the post-purchase analysis of their opinion, often expressed through social media [9, 34].

As AI technology advances, human interactions continue to evolve. This becomes particularly important given the need for more confidence and reservations regarding the use of AI in certain circumstances [3]. While many people believe that automation is beneficial, the literature on AI has identified several problems and shortcomings [38]. The increasing complexity of systems is one of these problems which has led to the "black box". This term generally describes the lack of transparency associated with something. This technology has become increasingly complex and challenging to analyse. As a result, the user does not understand the processes behind the tasks performed by AI. This generates an increased level of distrust, perceived complexity and resistance to the use of systems [15, 40, 50]. "Technostress" is a term suggested by Craig Brod in 1894 [21] and is used to describe the physical and psychological symptoms caused by excessive use of technology [55], the pressure one feels to have to keep up with the latest technology, or even the feeling of being overwhelmed by the amount of technology available [54].

Chatbots, virtual intelligence personal assistants and avatars are a system based on NLP [10] to simulate conversations with human users online. Chatbots are frequently used in customer service and support as they can provide information 24/7 and complete tasks, taking into account keywords or ideas [20, 58]. AIPA (Artificial intelligent personal assistant), such as Siri, Alexa, Google Assistant and Cortana, are increasingly common among consumers. They are programmed to facilitate user tasks, minimise consumer thinking and provide customised solutions [29]. However, a few negative aspects can cause dissatisfaction and stress [44]. These systems are used in many areas such as healthcare, entertainment, marketing, education and culture and optimising business processes, improving the customer experience [1, 45].

Avatars are used as a way of representing the user in a virtual world, which allows for a more authentic social interaction. "Brand Avatar" can assume a personified representation of a brand in a virtual environment therefore, its personality must reflect the brand since it interacts socially with consumers [18]. The proliferation of this technology has resulted in some unexpected service failures that prevent consumers from obtaining the level of performance they expect. For companies that use this type of service and make it available to their customers, these failures can damage the brand's reputation, reduce sales and, in some cases, lead customers to search for another brand [26]. One of the main reasons for this could be the lack of service maturity.

9.2.2 Negativity in Consumer/Brand Relationship

Consumption is not just a response to an external phenomenon; it is also influenced by emotions and feelings [24]. Emotions act as a catalyst for all humans.

Reference [17] and emotion analysis has been widely used over the years to improve relationships between consumers and organisations.

The analysis of negative emotions (NE) experienced by consumers is a significant concern for brands since it is consumers and their interaction with products and services that allow a brand to identify trends in behaviour and determine the type of approach it should adopt to decrease the opposition effect, as this is stronger than the support effect [7]. For example, organisations have resorted to web sentiment analysis to understand consumers' perceptions of their products and services. Emotion analysis can also be used to create more effective marketing campaigns, to understand motivation and to sustain consumer behaviour and changes.

Emotions around a brand can be positive or negative. Positive emotions result from an upbeat situation assessment, including loyalty, trust, closeness and satisfaction. Negative emotions arise when expectations of the brand fall short and objectives are not achieved, evoking emotions such as anger, distrust, dissatisfaction and frustration [12]. Emotions have different intensities, starting from "brand dislike" (apathy towards brands) to "brand hate" (a hatred of brands). Brand Hate is the most unfavourable position a consumer can have towards a brand [11, 60].

Anti-brand communities and eWOM Negative brand emotions can be expressed individually or in communities. Consumers who act alone demonstrate their displeasure through complaints, brand abandonment and, in some cases, even looking for ways to get revenge on the brand [60, 60].

Consumers who express their negative emotions in brand communities achieve greater expression through word of mouth (WOM), especially on social networks and online forums [13].

Anti-brand communities are groups of people harbour negative feelings towards a brand and share, criticise and display their displeasure and disgust towards the brand's actions. In these communities, the brand serves as a pillar for the conception, interaction and feeling of belonging to the group, taking on a social dimension when transmitted between individuals with similar sentiments, affecting the way they relate to the brands [46].

The evolution of the internet provides an excellent space for consumers and communities to talk about brands. Associated with the development is the proliferation of social networks, which has given negative criticism of brands a substantial reach.

The negative feelings of online anti-brand communities are usually associated with cultural, technological, political and legal issues [5]. These feelings are demonstrated by the poor quality of products/services and working conditions [32]. They are also connected to a desire to promote and grow the community, a lack of emotional compatibility and dissatisfaction with business practices, ideologies and economic systems [32].

Negative WOM, which results in negative attitudes [6], involves sharing "reviews" which warn or inform about service failures. These reviews do not, however, suggest that brand hatred is behind the relatively damaging comments, as evidenced by research conducted by Refs. [19, 48]. The researchers in this study not only considered "brand hate", they also felt the consumer. These negative comments may be made for social reasons, mainly if a "reviewer" is engaged in self-promotion.

EWOM is a concern for organisations as negative comments tend to have more of an impact than positive comments and can also influence decision-making processes [51].

9.3 Methodology

This section addresses the study topic, the main research objective and the research question. The conceptual model is also presented and serves as a theoretical framework for data analysis and forming hypotheses. The methodology adopted in this study is critical considering the impossibility of training pre-structured data on this specific topic. We needed to use "web mining and web scraping" tools to validate methods, which allowed for meaningful and reliable results and SA procedures and techniques. This section also justifies our decision to use Reddit to obtain our data and

presents suggestions for future studies. By designing a solid and consistent methodology, we expect to get valid results that can contribute to academia and the business environment. Lastly, we present and discuss the results and then reach conclusions.

9.3.1 Objective and Research Question

We found several ways that AI, marketing and consumers interact during the literature review. This is a recent phenomenon, as we can see in a study published in 1978 by Sheriand and Verplank on the ten levels of AI automation. Constant evolution and technological advances have led to brands increasingly adopting this type of technology, ranging from chatbots to personal assistance, avatars and augmented reality [10, 20].

As evidenced in the literature review, existing research on human-AI interaction has focused on investigating the benefits and applicability of this relationship [61], leaving a considerable gap concerning consumers' negative feelings towards brands that this interaction can generate.

Although research has mainly focused on the positive aspects of interaction, it is equally important to understand and explore the negative feelings that can also arise in this context. These feelings can range from distrust and frustration to anxiety and dislike of the brand [7, 27].

The research in this work proposes to fill this knowledge gap by conducting an in-depth analysis of the negative feelings that arise in the interaction between humans and AI, specifically in the context of brand relationships. Our objective is to obtain a more comprehensive understanding of the emotional dynamics involved in this interaction to enable companies to adopt a more sensitive attitude towards adverse consumer reactions and develop adequate strategies to deal with them. Answering the question "What types of negative feelings can consumers experience towards brands from their interactions with Artificial Intelligence?" can provide valuable information for a better understanding of AI and the effects of human-AI interaction on perceptions of and attitudes towards brands. These findings could have significant implications for developing more effective and consumer-centric marketing strategies, ultimately promoting healthier and more satisfying relationships between brands and customers.

The research question that guides this study is as follows:

• **RQ1:** What negative feelings can consumers experience towards brands from their interactions with Artificial Intelligence?

9.3.2 Netnography Approach and Web Scrapping

Introducing new augmented reality, virtual reality and AI technologies affects consumer experiences. It can have both favourable (efficiency, faction, loyalty) and

negative (isolation, frustration, other types of illness) impacts on consumers and society [15, 21, 40, 50]. We decided to carry out an exploratory study using netnography based on the following considerations: (1) the purpose of this investigation; (2) the publication of a Call for paper requesting the investigation of AI interaction with humans [52]; (3) the fact that virtual assistants are replacing traditional face-to-face interactions; and (4) the adverse effects of technology on customer interaction that are still poorly.

We have investigated and understood. Adapted from ethnography, netnography is a qualitative research method that gains insights into online community consumer attitudes and behaviours—considering the changes that internet development has prompted in terms of finding new research methods to determine the who, what, when, where and how in different online environments and virtual communities [22], adopting netnography allows us to obtain authentic, union-contaminated data on the adverse feelings of AI implementation directly from consumer opinions. Current research also suggests that netnography effectively enriches theoretical knowledge about factors influencing consumer resistance in specific contexts [27]. We made non-participatory observations in Reddit communities and then extracted the data for this study. Our data collection dates back to June 2022 and June 2023. We chose communities that met the following requirements, as suggested by Ref. [31]: relevance, interactivity, content, heterogeneous participants, rich and detailed data, and high traffic of publications and interactions.

Consumers are increasingly sharing their emotions online via social media, generating a large amount of data that can be used to analyse these feelings that consumers express in several publications. Feelings of anger, sadness, happiness and excitement can be extracted from the comments and analysed to assist decision-making. Our applied method follows a sequence used by Ref. [2] as can be seen in Fig. 9.1:



Fig. 9.1 Data collection and analysis steps [2]

The challenges associated with data extraction require using more advanced techniques to organise, search, index and review extensive data collections in a timeefficient manner. Data scraping on Reddit allowed us to analyse users' feelings and opinions towards brands. Sentiment analysis (SA) is a method that allows one to automatically analyse statements from reviews by combining language processing with ML algorithms to assign sentiments to phrases or expressions. This gives us an idea about a customer's opinion, reputation, concerns, experience, perception and general public satisfaction index [15, 49]. Once the "reviews" have been collected, SA can obtain information that can be used to improve marketing strategies [23]. Several possible methods for performing sentiment analysis exist, such as Bert, IBM Watson, Textlobm and VADDER [2]. These models consist of a set of lexicon libraries that can label feelings as either positive or negative, and then classify them into binary classes (positive or negative) [53].

Gather Data We chose to obtain the data for this study from Reddit due to its unique set of characteristics that can be cross-matched with social networks. Reddit is a social network that allows its users to publish content in pseudonymity, which will enable users to communicate anonymously about sensitive topics without any fear of social repercussions [37] and data collected from Reddit is diverse, authentic, representative of consumers in general, and easily accessible and current. Due to their openness, online forums like Reddit allow users to share real opinions and emotions about controversial issues and give them the freedom to post provocative topics they might not otherwise feel comfortable discussing in real life [57]. Furthermore, Reddit is a space where formal rules and implicit social norms are developed within different subcommunities (subreddits), in which users create subcultures suited to their specific needs.

To identify the negative feelings that result from human interaction with artificial intelligence and relate them to brands, we needed to classify the dataset data as positive, negative, or neutral using pre-processing and sentiment analysis. This study analysed publications and respective comments from discussion groups (subreddits), metaverse, anticonsumption, artificial intelligence and branding. The "anticonsumption" discussion group opposes excessive consumerism and promotes simpler, more conscious lifestyles; it is a group of users who meet to discuss ideas and relate bad experiences. The "Artificial Intelligence" group is a gateway to various sections of the Artificial Intelligence community and discusses AI-related ideas and concepts. These include philosophical and social issues, art and design, technical papers, AI in business, how AI affects our lives, the future and many other topics. The "branding" discussion group focuses more on brands and analyses applications, case studies, management techniques and brand growth. Lastly, the "metaverse" group discusses topics related to the metaverse, like virtual reality, augmented reality and artificial intelligence.

These subreddits represent communities with many users (Anti-consumption— 617,534; Artificial Intelligence—202,161; branding—14,958; Meta-verse— 40,542). This equates to a total of 875,195 users discussing topics which are relevant to our study. While comments and publications from a substantial number of platform users were subjected to analysis, after applying a filter using the keywords (brand, branding, branded, brands, Artificial intelligence, chatbot, virtual reality, augmented reality and AI), it was observed that a limited proportion of the discussions were primarily centred around the concept of brands (15,130)."

The Valence Aware Dictionary and Sentiment Reasoner (VADER) and the sentiment intensity analyser (SIA) were used to perform the sentiment analysis, available in the NLTK library (Natural Language Toolkit) and used for natural language processing in Python. The SIA method not only detects polarity within A text, but also the intensity of each opinion. The scores in this method range from -1 to 1, where scores below 0 are classified as negative and those above 0 as positive. The code used in this study was written in Python and compiled in the Google Colab Notebook.

"Web scraping" was used to obtain the data, a method of extracting data using HTML code analysis and automated data extraction. This required creating a "developer" account and an API authentication application, which gave us a customer ID and a secret code. A suitable Python library was used to interact with the Reddit API called PRAW (Python Reddit API Wrapper) to extract the data.

Pre-Processing Data Most of the data collected from Reddit networks contains a less formal language, where users also use emojis, abbreviations and URLs to express their opinions. Therefore, these can generate some noise during text analysis and should be extensively "cleaned" before measuring polarity to obtain more successful results. We took the following steps to bolster data quality: (i) Merged comments with their respective posts for the dataset version. (ii) Removed punctuation marks to ensure cleaner text. (iii) Eliminated symbols and numeric characters to simplify the data. (iv) Scrutinised the text for redundant words and removed them. (v) Excluded stopwords, guaranteeing that all remaining words were verifiable in the English dictionary, thus enhancing data integrity and relevance.

Sentiment Analysis Sentiment analysis was performed using the Sentiment Intensity Analyzer (SIA) and the VADDER library. Other alternatives, such as Bert, IBM Watson, Textblob, Lexalytics, MonkeyLearn, Semantria, could also be used. There were three main reasons we chose to use this method. The first reason is the simplicity and speed of implementing these methods, which allows users to perform sentiment analysis quickly and intuitively without needing any advanced knowledge of programming and natural language processing. They are helpful when there are time or resource constraints to develop and implement more complex solutions. The second reason is that SIA measures the intensity of sentiment beyond the binary classification (positive or negative), allowing to assign a degree of positivity or negativity. The third reason is its free and easy integration into Python code.

9.4 Results and Discussion

As can be seen in Fig. 9.2, our results show a prevalence of positive feelings about AI and consumer interaction; however, there is a percentage between 23 and 35% that registered negative emotions. This is a significant percentage that may have an impact on brand strategies, but it contradicts the results obtained from other studies on the adoption of new technologies, such as a study by Jose Ramon Saura [48], where the results showed that the current corporate culture is perceived negatively in Relation to the introduction of new technologies. A similar result was obtained in an article by Darius-Aurel Frank [19].

While artificial intelligence through automation prevents many human errors, automation levels lead to adverse results in effective consumer responses when critical incidents occur [38]. This paradox shows that technology's increased functional benefits can simultaneously increase consumers' risk and fear based on negative experiences [28]. Some of the feelings identified in our study include "Threat, Fear, Frustration, Anxiety, and Worried".

The word cloud provided a more in-depth study of negative feelings that appeared more frequently. Our observations showed that the most present negative feeling was "hate".

Brand hatred is a very present feeling in consumer dissatisfaction. The change in consumer behaviour is evident in all areas. This hostility reinforces these changes in consumer behaviour and the growing importance of studies on brand hatred, which



Fig. 9.2 Result of sentiment analysis and word cloud

are increasingly susceptible to dissatisfaction, especially when they fail to meet community expectations or do not consider what consumers and society value. The percentage and frequency of negative feelings also show the need to understand the negative interactions between brands, consumers and artificial intelligence. As our data collection from Reddit showed, when brands make decisions that consumers find difficult to understand, they tend to experience hate and, consequently, are more likely to describe a negative experience or review [12].

Unlike previous studies, this study's results confirmed that it is essential to monitor consumers' feelings and their relationship with brands and institutions in the corporate and academic spheres [59]. This analysis lets us know what users think about brands and how they can be more involved with consumers.

Brand hatred comprises emotions such as anger, contempt, disgust, sadness and fear [16]. As evidenced in Table 9.1, our study proved this with the emergence of emotions such as "Disgust, Anger, Frustration, Guilt, Regret, Shame, Hatred, Scam, Anxiety, Warned, Fear, and Worried". Going through a list of negative feelings and words allowed us to verify the behavioural nature implicit in this study.

Subreddit	Anticonsumption	Metaverse	Artificial intelligence	Branding	Total
Hate	8		2	3	13
Disgust	6				6
Bad	3		2	4	9
Wrong	3	3			6
Anger	2	1	2		5
Danger	2	1			3
Frustration	1				1
Fraud	1				1
Guilt	1				1
Regret	1				1
Shame	1				1
Scam	1	2			3
Anxiety	1				1
Threat		1	5		6
Mistake		1		2	3
Warned			4		4
Fear			2		2
Worried			1		1
Struggling				4	4
Failure				1	1

Table 9.1 Negative feelings and the number of times they emerged

9.5 Conclusions

This study used a three-phase methodology to extract human and AI interaction information and what feelings it causes towards brands. Our results identified negative emotions such as Hate, Anger, Fear, Worry, Threat, Warned, Danger and Regret—a few other words expressing negative feelings predominated, such as bad, mistake and wrong. We generally found most feelings positive, but about 30% of the feelings we identified were negative. After analysing the types of emotions and negative words in the comments and publications, we found that most of the feelings were related to distrust and uncertainty caused by consumers' difficulties in keeping up with the rapid evolution of AI and the impressionability of its future development.

Carrying out an experimental study on the subject has provided the opportunity to test feelings and relationships, which then help validate hypotheses and support the conclusions drawn in this context. Furthermore, this study extends its entire line of research to the context of online communities, investigating eWOM and its role in this relationship.

Our study adds a vital conceptual contribution to artificial intelligence literature and brand management, confirming the presence of strong negative feelings due to the interaction between brand consumers and artificial intelligence [48].

Based on our findings, if brands introduce AI systems, we suggest they do so in stages and use sentiment analysis to assess consumer reactions in the different social networks and online communities. By doing this, they will be able to evaluate their strategies, thereby avoiding the proliferation and escalation of Negative feelings. During each implementation stage and after these systems have been implemented, brands should seek to monitor their consumers and explain the advantages, reasons and how these systems work. AI systems must also be designed with the target audience and be transparent, informative and safe, gaining consumers' trust while interacting with the brand [50].

Constant monitoring of consumers' feelings will also help avoid negative experiences and reduce brand hatred, ensuring that decisions are made considering consumers' expectations.

The main limitation of this study is related to its sample size. Although comments and publications from many platform users were analysed, only a few discussions focused on brands (15, 130). Another limitation may be related to the type of platform users. Our data was obtained from the comments and publications of active users on online platforms interested in AI, which could lead them to increase their knowledge and expertise and ultimately reduce mistakes and negative feelings.

Future research could use the topics we have identified to establish new constructs, variables or indicators that specifically study risk issues for brands in specific scenarios or sectors. Even though the methodology needed for this type of research would be innovative, the algorithm would be built specifically for it and be based on the method of data extraction using UGC (User Generated Content) as a data source. It would be interesting to compare the data it could obtain with other data acquired

more traditionally, such as surveys or interviews, which might reach a target audience that needs more knowledge about the technological environment.

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Chapter 10 What Factors Determine the Consumer Acceptance of AI-Based Services? The Case of Lithuanian Consumers



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Abstract The rapid development of artificial intelligence (AI) is transforming the service sector, which is leading to changes in consumer behavior. Understanding the factors that influence consumer acceptance of AI-based services is a critical research topic in marketing. However, existing research on this topic is limited or provides mixed results. The research aims to identify the critical factors that determine consumer acceptance of AI-based services in Lithuania. Based on the results of the existing research, the study model includes seven critical factors that influence the acceptance of AI-based services, which are grouped into three categories: socialemotional (perceived anthropomorphism, social environment, and hedonic motivation), functional (perceived results and perceived efforts), and relational (trust and privacy concerns). The model also depicts the impact of AI-based service acceptance on their usage. A survey of 346 Lithuanian consumers was conducted to collect data for this study. The analysis of the survey results revealed that social environment, hedonic motivation, privacy concerns, and trust have a positive impact on consumer acceptance of AI-based services. As expected, perceived effort has a negative impact on the acceptance of these services. It was found that perceived anthropomorphism and perceived results do not have an impact on the acceptance of AI-based services. These research findings contribute to the existing studies on AI-based service consumer behavior by identifying the critical factors that influence consumer acceptance of these services in the context of a small Baltic Sea region country with a specific economic, technological, and socio-cultural context.

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10.1 Introduction

The rise of artificial intelligence (AI) is causing significant transformations in the technological environment, with effects at the societal, market, and micro levels. Rapidly developing AI technologies are creating new challenges for all economic sectors. Due to the dominance of the human factor, the most dramatic changes are associated with the services industry. According to Huang and Rust [14], AI is primarily reforming the services sector through the constant emergence of new service delivery channels. Based on their research, service strategies can be improved only by incorporating technological changes. The advantage of AI-based smart services lies in their ability to collect and communicate data in real time [42]. Given the context of AI application, the growing ubiquity of AI amplifies the relevance of factors that shape the performance of service companies, employees, and consumers. From a marketing standpoint, the key focus in this stakeholder network is on consumers.

The development of new and improved services is associated with changes in consumer behavior [26]. However, research on this topic is limited and often yields ambiguous or contradictory results. It is possible to assume that consumers who are well-informed about AI tend to have a positive view of it. Consumers believe that AI will save time, provide up-to-date and improved access to information, and allow people to perform dangerous tasks [18]. In addition, consumers believe that AI can help reduce prices and simplify the purchasing process. AI can also provide answers to complex questions related to climate change, unwanted diseases, and economic development [2]. While research has shown that consumers generally have positive attitudes toward AI, there is also evidence that some consumers are afraid of AI's capabilities and potential integration into all spheres of life. This tension is likely due to the complex nature of AI and the uncertainty surrounding its future development. A 2016 global survey of consumers by Weber Shandwick and KRC [39] research found that a significant proportion of consumers had limited awareness of AI. The findings of the study support the conclusion that consumers require a more in-depth understanding of AI in order to make sound judgments regarding AI acceptance. The rapid progress of AI, as evidenced by conversational interfaces like ChatGPT and Bard, suggests that consumer attitudes and perceptions about AI use are changing. The latest 2023 Zendesk CX trends report [43] revealed that most consumers do not have a negative or disapproving attitude toward AI-they believe that AI will radically transform services. Sixty-three % of survey participants believe that AI can help to solve the problems of user experience compatibility in different channels. From a scientific perspective, the quest to understand consumer acceptance of AIbased services, including their positive and negative perceptions, is a key research area for modern marketing researchers today.

Despite the development of research on consumer attitudes, intentions, and behaviors in the context of AI-based services, no studies representing the relationship between consumers and AI-based services in the case of Lithuania have been published yet. This suggests that research reflecting the situation of consumers in
Lithuania, a small European country, is timely. On the other hand, according to the 2022 World Competitiveness Index [41] calculated by the International Institute for Management Development (IMD), Lithuania ranks 25th of 64 countries in the world in terms of the acceptance of digital and technological skills, 2nd by talent knowledge of digital/technological skills. In addition, according to the European Commission [8], Lithuania is the fourth EU country to introduce an Artificial Intelligence Strategy.

Taking into account the existing research and context, the aim of this study is to identify the critical factors that determine consumer acceptance of AI-based services in the case of Lithuania. Therefore, the contribution of the article is associated with the expansion of the field of research on AI-based service consumer behavior and the understanding of consumers with a unique economic, technological, and socio-cultural profile.

10.2 Theoretical Background and Hypothesis

The results of research conducted so far show that AI-based services significantly improve the functionality of traditional services and provide new service opportunities [9, 16, 30], and this was especially important during the COVID-19 pandemic [16]. In addition, the authors note that users of AI-based services may experience a lack of human contact [9, 30] or a lack of understanding of how to use these services [9]. The use of AI-based services is now a necessity for most users, so consumer behavior researchers are studying how people accept AI-based services and what determines its (un)attractiveness to users.

The existing research suggests that the models developed by Ostrom et al. [27], Wirtz et al. [40], and Gursoy et al. [12] are particularly relevant from the perspective of the analyzed topic. This assumption is based on the fact that one of the most important variables in all models is the factors that determine the acceptance of AIbased services by users. It is also worth noting that previously mentioned authors analyze these factors quite differently. For example, Ostrom et al. [27] identify the antecedents of the user response to the application of AI in the service delivery environment and interpret them in the case of self-service technologies (SST). Gursoy et al. [12] developed a theoretical model of AI Device Use Acceptance (AIDUA) to explain how customers accept AI devices during service encounters. The model includes three stages: primary appraisal, secondary appraisal, and outcome stages. In the service robot acceptance model (sRAM) developed by Wirtz et al. [40], elements are identified and grouped into functional, social-emotional, and relational categories. To summarize, the factors analyzed to date can be characterized by specific contexts of AI application, such as the use of SST or service robots, and distinct approaches to their inclusion in models in terms of both consistency and classification. Therefore, there is a need to identify, as well theoretically and empirically justify a set of critical factors that could be used in a broader context of evaluating the acceptability of AI-based services to consumers.

In this case, three groups of factors are chosen as a reference point for research, which are distinguished according to the social-emotional, functional, and relational elements analyzed by Wirtz et al. [40]. According to the authors of the article, this division of factors covers the main aspects related to the use of AI technologies and its relevance to present-day users and at the same time demonstrates a structured and systematic approach of researchers. After a comparative analysis and systematization of the discussed factors, the social-emotional factors group include factors of perceived anthropomorphism, social environment, and hedonic motivation, the functional factors are attributed as the most important perceived results and perceived efforts, and the relational factors group is formed from the variables of trust and privacy concerns.

Another important aspect at the theoretical level is associated with the interpretation of the concept of consumer acceptance of AI-based services. In the AI Device Use Acceptance (AIDUA) model by Gursoy et al. [12], the stages of primary and secondary evaluation and results are distinguished. The logic of the service robot acceptance or sRAM model by Wirtz et al. [40] is based on the identification of the stages that consumers go through when accepting and using service robots. Recognizing the importance of understanding usage behavior, the article aims to evaluate not only the impact of the aforementioned factors on the acceptance of AI-based services, but also its interdependence with usage. The research model presented in Fig. 10.1 illustrates the theoretical framework of this study, highlighting the key variables and their hypothesized relationships.



Fig. 10.1 Research model

10.2.1 Social-Emotional Factors and the Consumer Acceptance of AI-Based Services

Perceived anthropomorphism. Perceived anthropomorphism is widely studied in the concept of human–robot interaction [7] and plays an important role in the model of Gursoy et al. [12]. Two opposing views exist in the scientific literature on the impact of anthropomorphism on user acceptance of AI-based services. The first view posits that human characteristics scare users [20], while the other view suggests that users are more likely to accept robots that are similar to humans or have human characteristics, such as memory, facial expressions, or body language [31, 32], as this helps to create a sense of empathy in users [3]. The sRAM model of Wirtz et al. [40] also includes a factor corresponding to anthropomorphism, which is described as perceived humanness and categorized as one of the social-emotional elements. Pelau et al. [28] found that the perceived anthropomorphic characteristics of AI-based devices influence their acceptability to users, noting that AI-based technologies must behave and visually appear like humans in order to be accepted. The existing research suggests that the perceived anthropomorphic characteristics of AI-based devices have a positive impact on both the quality of interaction and the acceptance of AI-based services. Based on this evidence, the following H1 hypothesis is proposed: Perceived anthropomorphism has a positive impact on the consumer acceptance of AI-based services.

Social environment. Social environment is assigned to the group of analyzed factors based on the recommendations of Gursoy et al. [12], which are reflected in the AIDUA model. The importance of the social environment factor is further acknowledged by Wirtz et al. [40] who also include factors related to social impact, such as perceived social interactivity and perceived social presence, in the sRAM or Service robot acceptance model. The social environment identified in the AIDUA model describes the user's effort to meet social norms [17, 22], which shape the customer's perceived ability to use AI-based services. In the sRAM model, social presence is defined through the user's feeling during the encounter with a robot [6, 13], and social interaction includes the user's acceptability of a robot that can communicate [6]. According to Kim and McGill [20], when interacting with robots, users apply a social model because they believe that robots have their own behavioral intentions. Gansser and Reich [10] claimed that the stronger the social environment associated with AIbased devices, the stronger the behavioral intention. This leads to the formulation of the following H2 hypothesis: Social environment has a positive impact on the consumer acceptance of AI-based services.

Hedonic motivation. In the initial evaluation stage of the AIDUA model, hedonic motivation is associated with the incentive to try new technological products [12]. The acceptance of these products is likely to be positive when consumers perceive that their choice will bring them pleasure. In the context of AI-based technologies, the motivation factor is described as the incentive for users to endorse, accept, and use AI-based technologies [27]. According to Gansser and Reich [10], the higher the

hedonic motivation associated with AI-based devices, the stronger their behavioral intention. Based on these statements, the hypothesis H3 is formulated: *Hedonic motivation has a positive impact on the consumer acceptance of AI-based services*.

10.2.2 Functional Factors and the Consumer Acceptance of AI-Based Services

Perceived results. The definition and assignment of perceived results to this group of factors are based on the results of a study conducted by Gursoy et al. [12]. The study's findings are reflected in the secondary appraisal stage of the AIDUA model. The importance of the perceived results factor is also confirmed by the fact that Wirtz et al. [40] include the functional factor of perceived usefulness in their model of customer acceptance of AI in a service delivery environment. Perceived results and perceived usefulness are defined as the efficiency of AI-based services in terms of service accuracy and consistency [12]. Consumer acceptance of AI-based services increases as the perceived usefulness of the service provided, its convenience, and compliance with social norms increase as well [24]. This leads to the formulation of hypothesis H4: *Perceived results have a positive impact on the consumer acceptance of AI-based services*.

Perceived efforts. However, the perceived usefulness of services for service consumers can be complicated, for example, due to communication barriers or the complex design of AI-based services. This highlights the role of the perceived efforts factor in this study. In the AIDUA model, perceived efforts are described as the customer's perception of how much effort (e.g., psychological, mental, and physical) is required to interact with AI-based services [12]. The perceived ease of use factor is also emphasized in the model of consumer acceptance of AI in a service delivery environment, which describes the consumer's ability to use AI-based services [40]. This opinion is supported by the assumptions of Gansser and Reich [10], who claims that if customers perceive that using AI devices will require too much effort, negative emotions will be aroused, which are likely to lead to customer's unwillingness to use AI-based devices. Based on the arguments presented, it is hypothesized: *Perceived efforts have a negative impact on the consumer acceptance of AI-based services (H5)*.

10.2.3 Relational Factors and the Consumer Acceptance of AI-Based Services

Trust. Trust as one of the three antecedents of consumer response to the use of AI in service delivery environments is analyzed in the work of Ostrom et al. [27] and is

reflected in their theoretical model. Wirtz et al. [40] also include the trust element in the service robot acceptance model. In this case, trust is perceived as the reliability, benevolence, and emotional trust in AI-based technology [21]. The importance of trust is discussed by Tinwell et al. [36], who argue that robots with human-like features encourage consumers to trust them. According to Kim et al. [19], the role of perceived trust in AI-based devices is important for consumer reactions to AI-based services, and this factor is a major determinant of their decision-making and behavior. Based on the discussed statements, the following H6 hypothesis is formulated: *Trust has a positive impact on the consumer acceptance of AI-based services*.

Perceived concerns. Privacy concerns are also an integral part of the relational factor group. This factor is identified as an antecedent of consumer response in the model of AI acceptability to consumers in service delivery environments by Ostrom et al. [27]. Lee and Rha [23] research reveals that the amount and quality of data are important elements for achieving high efficiency of AI-based services. If consumers perceive privacy risks, but value is obtained from AI-based services, consumers will use them [1] On the other hand, Gansser and Reich [10] note that the higher the consumer concerns about the security of AI-based devices, the weaker the intentions to act. Data processing plays a key role in the use of AI, so security-related risks are a barrier that can negatively affect intentions and usage behavior. Based on this assumption, the H7 hypothesis is formulated: *Privacy concerns have a negative impact on the consumer acceptance of AI-based services*.

10.2.4 Consumer Acceptance and Usage of AI-Based Services

Based on the existing research [12, 27, 40], it can be argued that the acceptance of AI-based services describes the consumer attitude toward these services and can be associated with the intention to use them. By contrast, the use of AI-based services, according to Ostrom et al. [27], can be interpreted as a consequence of the discussed acceptance of AI-based services. Na et al. [25] also discuss the idea that the consumer attitude toward the use of AI-based technologies (in this case their acceptance) can have a positive impact on usage behavior. Based on the discussed assumptions, the following H8 hypothesis is formulated: *The consumer acceptance of AI-based services has a positive impact on their usage*.

10.3 Methodology

The research model was conducted in a small Baltic Sea region country, Lithuania. The relevance of including Lithuanian consumers in the research sample is argued by the fact that Lithuania is characterized by rapid IT sector development, is one of the top five countries in the European Union to implement an AI strategy [8], and ranks 25th in the world in terms of the acceptance of digital and technological skills [41]. No special conditions were set for the empirical study to be carried out in a sample of Lithuanian consumers in terms of the service sector or type of AI services. For this reason, the context of the empirical study was not limited in advance, and the study covered all users of AI-based services, regardless of their type or sector.

Quantitative research was conducted to examine the consumer acceptance of AIbased services in Lithuania. An online survey was used to collect data, which partly determined the choice of the non-probability convenience sampling method. This method resulted in responses from respondents who were motivated and more likely to agree to participate in the study. This allowed for the full implementation of the study's goal, which was to test the model, and the transfer of the results to the general population was not the main task. Participation in the survey was voluntary and anonymous. A total of 346 surveys that were suitable for analysis were collected. The distribution of respondents by gender was similar (57.2% female and 42.8% male). Analysis of respondents by age showed that the largest group of respondents were 21–30 years old (47.1%). Other age groups were distributed as follows: 51 years old and over (8.95%), 41–50 years old (13.29%), 31–40 years old (11.6%), and 18– 20 years old (18.2%). This suggests that representatives from all age groups were included in the research.

A questionnaire was developed for the survey, which included original or adapted scales to measure nine model constructs, in addition to filtering and demographic questions that reflect respondents' demographic characteristics. Items describing the constructs of social-emotional factors, namely perceived anthropomorphism (5 items), social environment (5 items), and hedonic motivation (3 items), were adapted from Shin [33], Pelau et al. [28], and Gursoy et al. [12]. Scales designed to measure the constructs of functional factors, such as perceived results (4 items) and perceived efforts (3 items), were based on the research of Gursoy et al. (2019) [12] and Venkatesh et al. [37]. Statements for the scales of trust (5 items) and privacy concern (3 items) were adapted from Pinxteren et al. [29] and Vimalkumar [38]. The scales measuring the other two constructs of the research model, acceptance (4 items) and usage (3 items), were adapted from Pinxteren et al. [29], Zhong et al. [44], and Sohn and Kwon [34]. A five-point Likert scale (from 1—"strongly disagree") was used to measure all constructs of the research model.

All scales used to measure the research constructs are reliable, with Cronbach's alpha ranging from 0.688 for the social environment item to 0.922 for the construct of acceptance of AI-based services. The results of the exploratory factor analysis (EFA) show that the number of factors did not change, and the structure retained the theoretical definition. A small change in the structure of the internal trust and perceived results factors is noteworthy, which is associated with the transition of one trust item to the perceived results factor. In conclusion, EFA confirmed the suitability of the obtained results for further model evaluation and hypothesis verification.

10.4 Results and Discussion

A correlation analysis was performed to test the proposed research hypotheses. The Spearman correlation coefficient was used because the constructs were not normally distributed. The results of the analysis of the correlations between social-emotional, functional, and relational factors and the consumer acceptance of AI-based services, as well as the relationship of this variable with the usage of AI-based services, were interpreted based on the recommendations of [5].

10.4.1 Results of Correlation Analysis

The analysis of the relationship of social-economic factors with the acceptance of AI-based services by consumers revealed that there is a statistically significant positive weak correlation between the consumer acceptance of AI-based services and perceived anthropomorphism (p < 0.05, Spearman correlation coefficient 0.393). This suggests that respondents are more likely to accept AI-based services if they exhibit anthropomorphic attributes. A similar statistically significant positive weak correlation also links the acceptance of AI-based services to another social-emotional factor—hedonic motivation (p < 0.05, Spearman correlation coefficient 0.276). This suggests that respondents will be more likely to accept AI-based services if they provide them with pleasure, fun, or appear innovative. There is also a statistically significant positive, but very weak, correlation between the acceptance of AI-based services and the social environment factor (p < 0.05, Spearman correlation coefficient 0.276). This leads to the conclusion that social environment and the desire to gain social status encourage the acceptance of AI-based services by consumers.

The analysis of the relationships between functional factors and consumer acceptance of AI-based services shows that there is a statistically insignificant negative very weak correlation between the consumer acceptance construct and perceived results (p > 0.05, Spearman correlation coefficient - 0.026). Therefore, linear regression will not be applied in this case. The obtained results confirm the existence of a statistically significant negative, although very weak relationship (p < 0.05, Spearman correlation coefficient - 0.186) between the acceptance of AI-based services and perceived efforts. This suggests that as the value of the perceived efforts variable increases, the value of the acceptance variable tends to decrease.

Correlations between relational factors, such as trust and privacy concern, and consumer acceptance of AI-based services were investigated. The results showed a statistically significant weak relationship between trust and the acceptance of AI-based services (p < 0.05, Spearman correlation coefficient 0.162). This implies that respondents trust the information obtained using AI-based services and intend to use it, which encourages greater consumer acceptance of AI-based services. Another factor in the relationship group, privacy concern, has a statistically significant weak correlation with acceptance (p < 0.05, Spearman correlation coefficient 0.382). This

indicates that respondents are not concerned about their privacy in relation to AIbased services and trust the intellectual security of this service.

The correlation analysis results confirmed that there is a statistically significant positive and strong relationship between the constructs of acceptance and usage of AI-based services (p < 0.05, Spearman correlation coefficient 0.770).

10.4.2 Results of Hypothesis Testing

Linear regression was used to test the research hypotheses, and six regression models were created. The information presented in Table 10.1 shows that the functional factor, perceived results, was not included in the linear regression analysis. In this case, the regression model was not created because there was no statistically significant correlation with the consumer acceptance of AI-based services' variable (see Sect. 4.1). For this reason, the H4 hypothesis is not confirmed.

The data presented in Table 10.1 show that the coefficient of determination (R^2) for the effect of perceived anthropomorphism on the acceptance of AI-based services was found to be below the recommended value of 0.2. Although ANOVA statistics (p < 0.05) confirmed a statistically significant relationship, based on the results of a study conducted on a sample of Lithuanian consumers, this finding suggests that the impact of human-like qualities on the acceptance of these services is relatively weak. Therefore, the H1 hypothesis, which predicted a positive relationship between perceived anthropomorphism and consumer acceptance, was not confirmed. The findings of this study do not align with the results of studies conducted by Castelo [4] and Pelau et al. [28]. The researchers suggest that AI-based services must have anthropomorphic qualities to be accepted by consumers. The authors also emphasize that anthropomorphic attributes may be ineffective in terms of consumer acceptance if an empathetic interaction is not created during the service delivery process. As a result, the absence of an impact of perceived anthropomorphism on the acceptance of AI-based services can be explained by the lack or absence of such interactions. It should also be noted that the research results do not reveal the negative impact of perceived anthropomorphism, which is emphasized by Kim and McGill [20]. The

Dependent variable	Independent variable	R2	F value	p value		
The consumer acceptance of AI-based services	Perceived anthropomorphism	0.180	75,389	0.000		
	Social environment	0.200	42,928	0.000		
	Hedonic motivation	0.264	40,889	0.000		
	Perceived efforts	0.283	33,650	0.000		
	Trust	0.309	30,378	0.000		
	Privacy concern	0.453	46,871	0.000		

 Table 10.1
 Results of linear regression between social-emotional, functional, and relational factors and consumer acceptance of AI-based services

absence of a statistically significant correlation between perceived anthropomorphism and consumer acceptance of AI-based services suggests the need for further research on the relationship between these variables.

The highest value of the coefficient of determination (R^2) is observed for the privacy concern variable, which is equal to 0.453. This indicates that privacy concerns explain 45.3% of the acceptance of AI-based services. To determine whether the impact of privacy concern on the consumer acceptance of AI-based services is negative, as predicted by H7, the beta coefficient value is used. However, despite the existence of a statistically significant impact (see Appendix 1), the beta coefficient value of 0.380 indicates that the impact is relatively weak. Therefore, the H7 hypothesis is not confirmed. The results obtained in a sample of Lithuanian consumers are somewhat unexpected; they do not coincide with the findings of a research by Gansser and Reich [10], which found that privacy concerns negatively affect the acceptance of AI-based services. This opinion is also supported by Hubert et al. [15], who argue that consumers may be concerned not only about the loss of control over their personal data or the unauthorized access of third parties to the system, but also about the possibility that the service may not be performed as intended. It should be noted that the term "privacy concern" is evaluated subjectively in each researcher's work, as cultural differences lead to different attitudes toward informational privacy and its protection [11]. Hence, in the other studies, the factor of privacy concern has a positive impact on service acceptance. For example, the results of research by Syrdal et al. [35] reveal that consumers may not feel or tolerate the feeling of privacy concern if using the service is essential for them. Based on the research results, it is assumed that Lithuanian respondents are aware that collecting personal data is necessary to achieve the efficiency and personalization of AI-based services, and they accept this as a norm. This means that they do not actively consider the risks associated with data collection. This can be explained by the assumption that Lithuanian respondents, who are consumers of AI-based services, value receiving personalized service more than the risk of their personal data being misused. Therefore, the negative impact of privacy concern does not manifest itself in this case.

The lowest value of the determination coefficient (0.200) is observed in the case of the impact of the social environment on the consumer acceptance of AI-based services. This implies that consumers who accept AI-based services rely on the opinions and experiences of other important people in their lives. This has a positive impact on the acceptance of these services by consumers. The discussed results allow us to conclude that hypothesis H2 is confirmed. This verifies the results of research by Gansser and Reich [10], which found that the acceptance of AI-based services will be higher under strong social influence. The evidence suggests that the conclusions of earlier studies are also applicable to the case of Lithuanian consumers.

The results of linear regression presented in Table 10.1 show that trust, hedonic motivation, and perceived efforts explain a similar percentage (26–30%) of the consumer acceptance of AI-based services. First, the results of a research conducted on a sample of Lithuanian consumers reveal that consumers' trust in AI-based services or the information they receive while using these services has a positive impact on the acceptance of these services. It can be assumed that the research

respondents trust and feel that they can rely on devices with integrated AI, which is why they are more likely to accept AI-based services (H6 hypothesis). This is consistent with the findings of Kim et al. [19], who found that trust in AI-based services increases due to the quality of the content generated during the services and the high level of communication, which in turn increases the likelihood of service acceptance. Therefore, it can be argued that the results obtained complement the field of research on the consumer trust factor in AI-based service acceptance.

The study of Lithuanian consumers found that hedonic motivation has a positive impact on the acceptance of AI-based services. This suggests that consumers who are looking for new experiences are more likely to accept AI-based services (H3 hypothesis). The findings are consistent with the findings of research by Gansser and Reich [10], which found that the pursuit of fun, enjoyment, or novelty increases the consumer acceptance of AI-based services. Given the discussed results and their interpretations, it is concluded that H6 and H3 hypotheses are supported.

It is important to note that the results of the regression analysis confirm the negative impact of perceived efforts on the acceptance of AI-based services, as hypothesized in H5. If consumers find these services difficult to understand and use, they are less likely to use them. This is evidenced by the negative standardized beta coefficient (see Appendix 1). It can be concluded that the results of the research conducted on a sample of Lithuanian consumers confirm the findings of previous studies by Gursoy et al. [12]; Gansser and Reich [10] that the more complex the use of AI-based services, the lower their acceptability.

After analyzing the impact of social-emotional, functional, and relational factors included in the research model on the consumer acceptance of AI-based services, the aim is to clarify the existence of the impact of the acceptance of AI-based services on their usage. For this purpose, the H8 hypothesis is tested (see Table 10.2).

The results show that the acceptance of AI-based services explains 62% of the usage of these services (determination coefficient $R^2 = 0.620$). Therefore, it can be concluded that the positive attitude of consumers toward AI-based services and the tendency to use them will be reflected in the actual behavior of users of AI-based services. The data provide evidence that the H8 hypothesis is confirmed. The research with a sample of Lithuanian consumers produced similar results to the previous study conducted by Na et al. [25]. Scientists argue that the attitude and personal experience of the consumer can influence the consumer's decision to use a new AI-based technology. This can be considered as one of the essential conditions for the development of AI-based services in the market.

 Table 10.2
 Results of linear regression analysis between the consumer acceptance and usage of AI-based services

Dependent variable	Independent variable	R^2	F value	p value
The consumer usage of AI-based services	The consumer acceptance of AI-based services	0.620	561,258	0.000

10.5 Conclusions

A review of the scientific literature reveals that when analyzing the acceptance of AIbased services by consumers, authors typically investigate the factors that determine it, using various stages of the acceptance process of AI-based services and different cases of AI use, such as self-service technologies, AI-based devices, or service robots. It is concluded that, of all the models found in the studies, the sRAM or the service robot acceptance model is the clearest model due to its division of factors into groups and separates the stage of AI-based service usage as a consequence of acceptance.

In the context of the specific application of the sRAM model to service robot acceptance, an extended analysis of the factors that influence the acceptance of AI-based services was conducted. From the perspective of the development of this research field, it is valuable that critical factors were identified and incorporated into the research model, which are universal and can be relevant in different cases of the use of AI in the provision of services. When creating a model of factors that influence the adoption of AI-based services that generalizes the existing research, the logic of the sRAM model was used and the factors were divided into three groups: socialemotional, functional, and relational factors. This choice is based on the assumption that the factors assigned to the three groups of elements cover the main aspects that are important to the consumer, related to the use of AI technologies, and at the same time demonstrate a systematic and clearly structured approach of the researchers. After analyzing the scientific literature, it was found that the essential factors representing the social-emotional factors group are perceived anthropomorphism, social environment, and hedonic motivation; as essential functional factors, perceived results and perceived effort were included in the research model, and the relational factors group includes consumer trust and privacy concern. It is important to note that the proposed research model predicts the impact of the mentioned factors on the acceptance of AI-based services and its impact on the usage of these services.

To test the model, eight empirical research hypotheses were formulated. They were assessed based on the data of a survey conducted on a sample of 346 Lithuanian consumers. It is worth noting that the research results are summarized on the basis of the respondents who have had the opportunity to use AI-based services. They revealed that the strongest positive impact on the acceptance of AI-based services by consumers is made by social-emotional and relational factors-social environment, hedonic motivation, consumer trust, and privacy concern. It is important to emphasize that the analysis of the privacy concern factor revealed opposite results from those of previous researchers, as the Lithuanian consumer sample identified a positive impact of privacy-related concerns on the acceptance of AI-based services. Meanwhile, the results of the impact of social environment, hedonic motivation, and consumer trust on the acceptance of AI-based services are in line with the results of studies conducted in other cultural, technological, and socio-economic contexts. As expected, the negative effect of the functional factor-perceived effort-was justified for the investigated variable. From a scientific perspective, the findings of this research on the absence of the impact of perceived anthropomorphism and

perceived results are valuable and interesting. This encourages further research on the acceptance of AI-based services, especially related to the effect of the perceived anthropomorphism factor.

Limitations and directions for further research. Based on the fact that most of the studies conducted so far, contrary to the results obtained in this article, show a negative impact of privacy concern on the acceptance of AI-based services, it is advisable to explore the reasons for the positive impact of this factor on the adoption of AI-based services in the future. Considering the results of the correlation analysis that there is no statistically significant relationship between perceived results and the acceptance of AI-based services, it is recommended to study in more detail the role of this functional factor in the acceptance of AI-based services. In order to develop research on the impact of perceived anthropomorphism, privacy concern, perceived results, or other factors on the acceptance of AI-based services, it is advisable to include more middle-aged and older people, as most of the respondents in the study were younger. In addition, it would be timely to focus on specific service sectors, such as finance or healthcare, which are associated with the use of AI-based devices. In this way, the data obtained would allow to determine the impact of the analyzed factors on consumers in different sectors of AI-based services and would have greater practical value

Recommendations for AI-based service developers and providers. According to the findings of the empirical study, privacy concern and hedonic motivation are the most significant factors influencing the consumer acceptance of AI-based services. Therefore, AI-based service providers should (1) invest in building and strengthening customer relationships and (2) highlight not only the functionality of services, but also the sense of pleasure experienced during their provision. To leverage the positive impact of trust and social environment factors, both AI-based service developers and providers are recommended to strengthen the impact of trust and social environment factors or involving opinion leaders. To reduce the negative impact of perceived effort on the acceptance of AI-based services, AI-based service developers are recommended to emphasize the simplicity and convenience of AI-based services in terms of time in value propositions for consumers, rather than technological or innovative aspects.

Coefficients ^a						
Model		Unstandardized coefficients		Standardized coefficients	t	Sig
		В	Std. error	Beta		
1	(constant)	3.718E-17	0.040		0.000	1.000
	PERCIEVED_ ANTHROPOMORPHISM	0.424	0.040	0.424	10.559	0.000
	SOCIAL_ ENVIRONMENT	0.143	0.040	0.143	3.561	0.000
	HEDONIC_MOTIVATION	0.253	0.040	0.253	6.290	0.000
	PERCEIVED_EFFORTS	- 0.138	0.040	- 0.138	- 3.435	0.001
	TRUST	0.161	0.040	0.161	3.998	0.000
	PRIVACY_CONCERNS	0.380	0.040	0.380	9.471	0.000

Appendix 1: Results of Linear Regression: Beta Coefficients

a. Dependent Variable: ACCEPTANCE.

Coefficients ^a						
Model		Unstandardized coefficients		Standardized coefficients	t	Sig
		В	Std. Error	Beta		
	(Constant)	2.043E-17	0.033		0.000	1.000
	ACCEPTANCE	0.787	0.033	0.787	23.691	0.000

a. Dependent Variable: USAGE.

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Chapter 11 "Ready for Your Insurance Quote?" the Impact of Chatbot Empathy on Emotions and User Experience



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Abstract The development of "social" chatbots capable of engaging in empathetic conversations with users is one of the earliest goals of artificial intelligence (AI) (Zhou et al. in Comput. Linguist. 46:53–93, 2020). In financial services, companies are increasingly deploying chatbots for the benefit of their customers. Nevertheless, few empirical studies have investigated the chatbot-user experience in a real usecase scenario (Zhu et al. in Data Inf. Manag. 100041, 2023) in order to better understand how consumers respond to a chatbot's empathy, and how this affects their experience as customers. To address this gap, 12 participants were invited to interact with an empathetic chatbot for auto insurance quotes. The method first comprised this interactive experience of a real-case scenario simulation, and was followed by a Retrospective Think-Aloud Protocol (RTAP) step, where participants reviewed the recorded video of their interaction with the chatbot, and indicated their emotions at key identified moments during the simulation. The results demonstrated that managing users' expectations is a key factor in the quality of chatbot-user interaction. Empathy seems to have generated more negative than positive emotions in participants. As a result, data use transparency and private data protection remain important concerns in this context. This study simultaneously explores the effect

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of a chatbot's empathy on both user emotions and experience in a specific usecase scenario (i.e., insurance quote). It also presents a methodological contribution through the use of the RTAP method and proposes key takeaways for designing empathetic chatbots that will live up to the expectations of users in the Insurtech industry.

11.1 Introduction

Chatbots are interactive agents that engage in conversations and text interactions with humans [39], with the aim of providing a better customer experience [23]. It is predicted that by 2026, the deployment of chatbots will reduce customer contact agent labor costs by \$80 billion, enabling businesses to be more efficient and effective [16]. Although chatbots offer businesses the potential of greater efficiency, and to transform the customer experience [39] particularly in the insurance sector [41], many factors can influence user interactions with chatbots for better or for worse [12]. Companies will only be able to successfully deploy chatbots once they understand how to best design them for the benefit of users [1].

Recently, two major emerging chatbot design trends stand out: **anthropomorphism** and the **expression of empathy**. Anthropomorphizing a chatbot includes incorporating human-like characteristics [11]. Whether by assigning a name, gender, or personality, an anthropomorphic chatbot can encourage users to connect with the chatbot on a more personal level [12]. Users have high expectations of an anthropomorphic chatbot and expect it to perform better than a non-anthropomorphic one because of its human-like characteristics [12]. Chatbot empathy refers to a robot's ability to understand users' feelings and emotions, and respond to them in an emotionally appropriate way ([44], p.1). Chatbot's empathy constitutes some form of anthropomorphization, and it can help facilitate the development of virtual social relationships [44].

In the insurance context, empathetic chatbots can help better meet customer expectations and provide them with a richer user experience. Indeed, customer service agents usually deal with people who have experienced difficult situations (accidents, theft). A few insurers, like *Hi Marley* and *Spixii* for example, have integrated chatbots allowing users to discuss claims, billing and insurance policies, with the aim of providing the type of user experience now expected by customers [8]. According to Robson [42], the digital customer experience is even more crucial for insurers where customer communication is infrequent, due to annual submissions and irregular claims. Therefore, given the limited interactions between customers and their insurers, it is essential to understand how to offer the best insurance quote from the first contact [40]. Moreover, the lack of emotion and empathy necessary to make good decisions are among the key elements that concern the Canadian population about AI tools [29].

Despite the excitement generated by the recent developments described above, few studies have explored the effects of an empathetic chatbot [10] on the emotions

experienced by consumers and on their user experience [11]. To fill this gap, this study will follow up on Bălan's [1] recommendation for in-depth study of the variables linked to human resemblance in a chatbot and its impact on users. More precisely, one of the objectives of this study is to understand how a chatbot's empathy influences the emotions and experience of users in the context of insurance quotes. To do this, 12 participants experienced a simulated interaction with a chatbot followed by a Retrospective Think-Aloud Protocol (RTAP) test where they individually reviewed their interaction as filmed on video and were asked to indicate their emotions/thoughts at key moments in the interaction with the chatbot. The central questions of this qualitative research are: How do users experience interaction with an empathetic chatbot in this context? Does chatbot empathy influence the user experience positively or negatively?

To our knowledge, this is the first empirical study to delve into these issues in the insurance sector, an understudied area of financial services [35]. It thus directly responds to one of the priority themes of the Marketing Sciences Institute [33], which recommends that researchers study concerns related to privacy, and investigate the user experience in the context of interaction with a chatbot. This study also responds to the suggestion of Spring et al. [44] to include empathy, in order to better understand differences in user behavior. This study therefore offers theoretical contribution by enriching the literature on chatbots. It also offers practical considerations for the design of digital user experience based on customer support chatbots (i.e., best practices).

The remainder of the article is organized as follows. The next section explores relevant literature on anthropomorphism and empathy related to chatbots and their positive/negative effects on emotions and user experience. The research methodology follows in Sect. 11.3. The results are presented afterward in Sect. 11.4, followed by a discussion (Sect. 11.5), in which the theoretical and managerial contributions are addressed. The limits of the study and avenues for future research conclude this paper.

11.2 Literature Review

11.2.1 Anthropomorphism and Empathy in Chatbots

Even if users know that computers have no feelings or emotions such as humans do, they still tend to perceive computers or machines as social actors [9]. Together with the proliferation of chatbot applications, academic literature on the anthropomorphization of chatbots as virtual service agents has also grown [1, 12, 18, 32, 39]. However, it is not clear whether the anthropomorphization of a chatbot and the empathy demonstrated by it have a positive effect on its users [26, 47], or if this humanization risks provoking negative reactions [20, 40]. Many companies attempt to humanize their technology by assigning humanoid traits, such as appearance, gender, or name, in an effort to encourage customers to converse and bond with them [26]. Similarly, Pizzi et al. [39] consider anthropomorphism as a relevant dimension of chatbots allowing a relationship of trust with the user. More specifically, if marketing managers are able to anthropomorphize their chatbots, users will evaluate them more favorably [26]. To push humanization further, human reactions could be integrated into chatbots such as empathy toward a customer [18]. Increasingly, AI-based robots demonstrate empathy by being able to recognize human emotions and respond appropriately [11]. In this specific context, empathy refers to a chatbot's ability to understand and respond to users' feelings and experiences [37]. It is a combination of emotional reactions and cognitive understanding of the experiences and feelings of others [10].

11.2.2 The Positive Effects of Anthropomorphization and Empathy on Emotions and User Experience

A chatbot's empathy, its ability to perform intuitive tasks and ask for clarification leads the user to have positive expectations toward the chatbot [21, 43]. De Kervenoael et al. [13] demonstrated that the empathetic attributes of chatbots have a positive impact on user perception and chatbot usage intention. Specifically, an empathetic chatbot can better understand users' needs and offer them alternatives. As a result, users will be more likely to have a positive perception of the service provided by the chatbot [9]. Emotional aspects such as warmth, feelings and experience are commonly conceptualized as essentially human skills [7], and experiencing authentic emotions is necessary in a user-chatbot interaction [5]. Belanche et al. [3] found that human likeness positively affects chatbot users' expectations of emotional values. With more empathetic interactions, users can develop a civil relationship with the chatbot that can foster trust [11]. According to [23], users trust chatbots that have the ability to perceive, reason, and act in order to solve their problems. Klein and Martinez [25] demonstrated that anthropomorphic design cues in a chatbot lead to greater perceived satisfaction with the interaction. Many marketing products incorporate human attributes in their chatbot services to make them more friendly, so that users can better trust and engage in conversational interaction in complete safety [30]. According to Leite et al [28], robots and humans can develop a friendly relationship by becoming sensitive to each other's conditions and needs, while being more open to communicating information, thoughts and personal feelings to the other. Finally, according to Klein and Martinez [25], an anthropomorphic chatbot can increase the pleasure experienced during the interaction, through humanized cues, from visual representation to incorporated social dialogues and emoticons that add playful and lively elements to the conversation [9].

11.2.3 The Negative Effects of Anthropomorphization and Empathy on Emotions and the User Experience

However, the perception of some users is that chatbots always give rigid or standard responses and are not empathetic enough [9]. Indeed, chatbots are perceived as less knowledgeable and empathetic than humans [6]. Users may therefore be uncomfortable speaking with a chatbot about personal matters. Additionally, users may have a biased opinion that computer programs lack empathy and personal feelings, perceiving chatbots as less trustworthy than humans [9]. For some users, the anthropomorphic dimension of the chatbot can cause discomfort, unease and negative emotions among users [40]. Indeed, a chatbot that is too human can even generate anxiety [11], encourage deceptive behavior among users, or even reduce the level of trust as suggested by the Uncanny Valley theory [15, 27, 36, 40]. Similarly, Grudin and Jacques [19] showed that chatbots that appear too human arouse feelings of concern among users, described by authors as "the complications of anthropomorphization" which can have a negative impact on the quality of the interaction (Uncanny Cliff). In doing so, anthropomorphism when pushed to too high a level can lead to negative evaluations due to perceived threats to human identity [24, 31]. Additionally, increased human likeness may encourage users to raise their expectations, leading to more anger or disappointment with the chatbot when the interaction is unsatisfactory [12, 24].

In short, the literature on the effect of anthropomorphization and empathy of a chatbot remains contradictory at this stage; anthropomorphization of the chatbot is a double-edged sword. It is therefore important to carefully design chatbots taking into account the emotional context in which they are used, particularly in common types of customer service interactions that involve handling problems or complaints [12]. However, we believe that ultimately, in the insurance context, empathy demonstrated by a chatbot will have a positive effect, and we propose the following research proposition:

Chatbot empathy in the context of insurance quotes has more positive than negative effects on the user emotions and client experience.

11.3 Research Methodology

Qualitative methods are relevant for understanding the behavior of individuals [4, 45], and they are particularly suitable when seeking an in-depth answer to a question in a specific context [2]. This is the case for this study, for which we adopted a qualitative exploratory research design, using retrospective post-test interviews (Retrospective

Think-Aloud Protocol) [46]. In the following section, the research design, participant recruitment, data collection procedure via interviews and data analysis are described in detail.

11.3.1 Research Design

This research was carried out in several stages (see Fig. 11.1). First of all, in the first stage (simulation), an interaction with an anthropomorphized and empathetic chatbot was directly experienced by the participants in the laboratory. Specifically, the participant was first called upon to interact with the chatbot as part of a simulated car insurance request. In this simulation, the empathetic character of the chatbot was highlighted by various attributes: the chatbot systematically used a pronoun in the first person singular (i.e. I) and empathetic sentences were inserted into the interaction. For example: *I'm really sorry to hear that < Participant's first name > ! These are always situations that we would prefer to avoid. I'm glad to hear you received good service; I hope you don't find the process too long; we are almost there!*). In addition, the chatbot was represented by a first name and photo.

The simulation was video recorded then presented to the participants, leading to a retrospective think-aloud protocol (RTAP) [46]. The participants then had to individually watch the video recording of their interaction with the chatbot. They were asked to express their thoughts and reactions about their experience and behaviors in RTAP interviews at specific times. In RTAP mode, the participant is asked to describe what he/she did after the experience [14]. It allows for more elaboration on the participant's actual thoughts and experiences [46]. The procedure is particularly effective for producing detailed emotional experiences [38]. Participants are invited to verbalize their perceptions and behaviors by referring to the on-screen recording of the execution of their task during the simulation. During the post-test interviews, the screen recording was shown to participants as a reference and reminder of their behaviors in order to help them verbalize their reactions and emotions at certain key moments. The objective was to detect the effect of an empathetic chatbot on the emotions experienced and the user experience itself. This material was transcribed (step 2) then coded, in order to feed the analysis of the study results (step 3).



Fig. 11.1 Methodological process of the study

11.3.2 Participant Recruitment

Participants were recruited using the convenience method and snowball sampling. We first contacted people referred by our team of researchers through personal messages on LinkedIn. These participants then referred us to other potential participants. We also conducted classroom recruitment with university students. To complete, participants from more diverse demographic groups in terms of age were recruited from the researchers' entourage. To be eligible for the study, the candidate had to be over 18 years old and have car insurance. Ultimately, 12 participants took part in this qualitative study. The sample was made up of as many men (50%) as women (50%).

11.3.3 Procedure and Data Collection for Retrospective Post-test Interviews¹

The final interview protocol in RTAP mode comprised four stops planned during the participant's verbalization: two stops related to the emotions and empathy expressed by the chatbot and the other two stops related to the user experience. These systematic stops aimed to get the participant to describe and express their feelings during the simulation at key stages, hence allowing for test procedure consistency [14]. During the first stop of the video viewing, the following question was asked: "How did you feel when interacting with the chatbot?" At the second planned stop: "What was your reaction when the chatbot asked you to provide your address in full?" At the third stop: "How did you feel when the chatbot asked for permission to access your Equifax credit report?" Finally, at the last stop: "Did you find that the chatbot understood your feelings and identified with your situation or what you were feeling?" On average, each interview lasted 50 min (the shortest totaling 19 min and the longest 101 min, for a total of 597 min of interviews).

11.3.4 Data Analysis

The interviews were professionally transcribed, for a total of 241 pages. These transcriptions were imported into NVivo software for analysis. The data structure inspired by the work of Gioia et al. [17] was constructed in the form of aggregated dimensions: first-order themes and a set of supporting verbatim statements. It allows an integrated view of how we move from raw data to themes in conducting analyses [17]. Coding is carried out in three essential steps using an inductive method by finding themes with similar meanings: (a) Thematic tree through nodes, (b) Text search, and (c) Data re-queries using matrix coding [22]. For analysis purposes, detailed open coding of

¹ The present study is part of a large context in which other data have been collected (e.g., facial expressions via FaceReader software).

the interviews was necessary, in which some codes were not pre-determined, but rather developed from the raw data (inductive). Relevant codes were highlighted and grouped into central relevant themes. Some themes were expanded to reflect new emerging themes, while others were aggregated due to their meager content. Also, specific nodes emerged from the data set. Finally, a connection between the results of the different notions mentioned in the twelve transcriptions was drawn up. As a reminder, this research aims to understand how the empathy of a chatbot influences the emotions and experience of users in the context of an insurance submission. In what follows, the main results of the qualitative analysis are presented, supported by the main extracts from the interviews.

11.4 Results

11.4.1 How Do Users Experience Interacting with an Empathetic Chatbot?

Opinions and feelings about chatbot empathy vary depending on users' personal preferences and past experiences. Some say it adds friendliness to the interaction, while others say it doesn't matter or can even be annoying. Managing users' expectations (deadline, completion time, progress of the process, documents required before the meeting, etc.) is an element raised by the majority of respondents, and which can even determine the interaction that the user will experience (positive or negative). Finally, transparency in data collection, question clarity, and data privacy remain important concerns for many users when interacting with the empathetic chatbot. The following subsections provide a better understanding of what is experienced positively or, conversely, what is perceived negatively.

Positive Perceptions (P1, P2, P9, P10, P12)

The empathy expressed by the chatbot was generally perceived positively by almost half of the participants. It helped make the interaction more warm, comforting and encouraging, even though the participants were aware that they were interacting with a machine. This empathetic dimension was considered a positive addition to the overall experience of interacting with the chatbot. For these participants, empathy added a human dimension to the interaction and demonstrated understanding for difficult situations, such as a car accident.

A More Human User Experience

Several participants indicated that the chatbot's empathy improved their interaction experience. They found that this made the interaction more enjoyable and made them feel better understood and cared for. Some participants highlighted that the chatbot's empathy helped humanize the submission process; they found that it showed that the chatbot designers had taken care to make the interaction warmer. *P1: "Saying*

that everything is fine, and the fact he says 'thank you' is encouraging. I really liked that he informed us that the next two questions might be a little more disturbing, that's good, at least he introduced it, so that was reassuring. I feel that he has some compassion, in the sense that he understands that this is something we wish to avoid, and that it should not happen. But I appreciated that he took the time to let me know, and not just move on to the next question-Let's go, you're an object, let's move on!at least he takes the time to have a little emotion for that. Overall I thought it was good! It improved the experience of the interaction I had with the chatbot." P9: "Yes, I feel very good. I feel like it's more interactive than just saying nothing. Because I feel like it's a human, not a robot, I feel that the bot has a sense of compassion. So... yes, in total, I feel that I am interacting with the bot, so I am not encountering with a robot, I am encountering with a human... And I didn't feel that it's long. For me, it was okay, the time was okay, the number of questions was okay... I think the interaction gives me a somewhat false sense of 'this is a human interaction', not a bot interaction. But because in my background, I know that it is a bot, so I have always kept in mind that 'this is a bot'. But if the website doesn't tell me that this is a bot, then I would think differently. P12: "Yes, came to get me, but it's a nice touch, once again. It's like "Ah...?" » We know very well that it's not a human behind it, but the interaction still remains human, you know? It pays attention to me, yes. It's cool, it's nice to know that the chatbot cares about my well-being, if you like, a little! Yes, I found it special that the chatbot acted as if it had a feeling towards me."

Motivation to Continue

The empathy expressed by the chatbot was perceived as a form of motivation to complete the process. Participants found empathetic messages, such as "I hope the process isn't too long," to be encouraging and motivate them to continue the interaction. *P1: "I hope the process is not too long… there he wants to tell us! 'Don't give up! Stay to the end.' It was like a motivating spirit to say 'OK, it's alright! 'I think he was very understanding of the fact that it's not pleasant to have had a car accident and that, hey, for customers who want to have auto quotes, it's always a process that is complicated when you have had an accident. So for that, I have the impression that he cares, he really paid attention to my needs to feel good about this part of the complaint." P2: "I liked that it wasn't always the same message that was repeated. I found it human, but I would have liked it better if he have said 'It's almost over', that it had been positive. It could have been, precisely, 'we're almost there'...Overall, I found that these were effective questions and I found that they were questions that would allow for a good first draft."*

Trust and Lack of Judgment

Many respondents seem to feel confident when interacting with the chatbot. Some note that the interaction can be less stressful than talking to a human being. Some participants noted that they felt more comfortable using a chatbot because they knew it wouldn't judge them. The chatbot's empathy was perceived as non-judgmental and welcome. *P6: "Well, I liked that the chatbot was empathetic with me. I'm more comfortable saying I committed a traffic violation to the chatbot because it's not going*

to pass judgment on me, whereas the human person on the phone, well, I might have the feeling that she's bearing a judgment and I might be a little more embarrassed to tell her that. I'm more comfortable with a chatbot, because the chatbot isn't going to judge me."

Negative Perceptions (P3, P4, P5, P6, P7, P8, P11)

On the other hand, some experienced the interaction in a less positive way. Some participants consider empathy to be a double-edged component. It seems that the empathy of a chatbot does not lend itself to all interactions and requests for information. Some participants indicated that the effect of empathy probably depends on the user's personal experience. Those who have experienced difficult or traumatic situations may be more inclined to appreciate the chatbot's empathy, while others might find it superfluous.

Perceived Value/Redundancy of Empathy

Some participants questioned the usefulness of empathy in the chatbot context, particularly when it comes to gathering factual information, or filling out a form. They would prefer the chatbot to focus more on task efficiency. Some participants pointed out that repeated demonstrations of empathy can become redundant and annoving. They believe that the chatbot does not need to repeat empathetic phrases at every stage of the interaction. P6: "So she is worried that I find the process too long 'we are almost there'. In fact, I think it would have been more positive, in terms of the emotions generated, if she had just said to me 'We're almost finished'. You know, because she said to me 'The process is too long', when in fact I didn't find it that long! Even though it's true that it's a long time! Talking to me about negative things makes me think about negative things which I hadn't even thought about." P8: "...at the same time, the chatbot says: 'these are situations that we would prefer to avoid,' ... in fact, no one wants an accident, you know? If I were in a car accident and my child or my spouse died, phew! Maybe the message is aimed at me. But what if, like me, it was two rocks in a windshield that I didn't even claim for? I think that the experience of the message would be personal to the individual, now, the individual who has perhaps experienced a trauma, who has experienced a difficult situation, will appreciate the message, but for me, personally, it doesn't take anything away from me having it. As an individual in this context, it doesn't appeal to me. As I said, I know he's a robot, so he doesn't necessarily have empathy!" P11:"... what I expect is for it to be quick, effective and something that helps me get a response to my submission. It's more the efficiency that I'm looking for behind it than the personification of all that, I have trouble with that concept."

Privacy Skepticism and Transparency

Some participants express doubts about the confidentiality of the information they provide to the empathetic chatbot, emphasizing that they believe that everything remains accessible on the Internet. This reflects a common concern about online data security. They underlined the importance of transparency and complete information when interacting with a chatbot. *P4: "I have very limited confidence in electronic*

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things in general, especially when people talk to me about confidentiality, and they tell me that it won't be recorded. There are too many examples that prove the opposite. Laws are relatively relaxed, confidentiality, the right to privacy, that kind of thing, are less severe in North America. So I am a little less confident". P5: "When I think of an insurance company, I want to save money. I want to have the best service and for my information to be kept confidential and I don't really care about having smileys or anything. Emojis bring a funnier or smiley side, so to speak, but I don't know to what extent this is appropriate in an insurance context; what really matters to me is saving money." P8: "To explain confidentiality standards well, and say "that the information is confidential" is not enough for me. I would be very surprised if the exchanges remained strictly confidential, because all conversations are recorded and archived, but 'strictly confidential' I would have liked to know more about. I find the sentence interesting, but perhaps having put the word "confidential" in blue and having a click on it and seeing the company's privacy policies for those interested, could have been a big plus. In an era where digital fraud is increasingly widespread when it is understood to be confidential. What says that one day my information won't be hacked or whatever and it won't end up elsewhere?

Negative Reactions in the Face of Empathy

Some respondents expressed discomfort and distrust with certain questions asked by chatbots: they view the chatbot as a machine and do not expect it to express real emotions, referring to the results of Grudin and Jacques [19] who demonstrated that an overly human chatbot arouses feelings of worry among users (Uncanny Cliff). For example, the mention that the next two questions might be less pleasant arouses curiosity and concern. P3: "I know that I'm not talking to a human being, I don't expect the chatbot to say to me 'Ah, I'm really sorry to hear that, we'd like to avoid that kind of situation'. I don't expect that type of response. I am giving it very factual information, these are "yes or no" questions. I am interacting with a robot that asks me questions instead of me filling out an insurance quote form! Personally, I'm not a fan of this kind of little things." P4: "We talk to a machine and that's the feeling we have and therefore empathy from a machine leaves me totally indifferent because I don't believe in it. Having a robot tell me "that it loves me very much" or "that it has empathy for me". No. I can understand a robot that you can interact with it verbally. I can understand that this is reassuring! I hear it exists, but I can't imagine it. This is beyond my intellectual capacity at the moment! And the fact that it works with these people proves that there is something there. This is something that escapes me..." P5: "Answering the next two questions might be a little less pleasant". It could be... 'Forbidding, 'embarrassing', maybe even 'create a certain discomfort' to say to myself 'OK, what is that? What are the two questions that are coming up?' I'm not embarrassed to give it, but I'm a little surprised... I think it just depends on how it's introduced and I think that here, how it's brought about, well it can cause people to react. or it may create some discomfort". P6:" ... when she told me that she was happy to hear that you had good service? I was a little dubious because I don't think it really cares whether or not I received good service elsewhere? Presuming that my claim was made to another company, therefore, to a competitor, I say to myself 'If I had good service from the competitor, I do not think that it is really happy to hear that!' So I had doubts about its sincerity in this case.

11.4.2 Synthesis of Results

Among the main results, most participants highlighted the importance of properly balancing the empathy of a chatbot, since, according to them, the insurance sector is a high-involvement and utilitarian sector, where sensitive issues are addressed. Having a greater level of commitment. Participants P1, P2, P9, P10, P12 revealed a positive perception of an empathetic chatbot, participants P3, P4, P5, P6, P7, P8, P11 on the other hand seem to find that the chatbot is perhaps too empathetic, hence the need to carefully control the level of empathy. According to them, there are limits to the empathy of a machine and to the negative opposite effect that it can generate. Note also, that for some participants, poor management of their expectations could lead to negative emotions during the interaction, and to an unpleasant user experience. For them, the chatbot should have better managed their expectations in terms of deadlines, completion times or documents required before the meeting.

In terms of user reactions, respondents seem equally divided and mixed. In some participants (P1, P4, P6, P8, P11), this resulted in negative reactions, we then speak of discomfort, anxiety, irritation, micro-stress when the empathy of the chatbot is pushed to too high a level. While for the other participants (P2, P3, P5, P7, P12), we rather find neutral states of mind, as long as consent is there. On another note, there is consensus among the participants that the adaptability of the chatbot during the process is an important element leading the user to feel good when interacting with the chatbot. It is important for participants to have this opportunity to correct errors and return to the previous sections if necessary. Finally, the interviews also revealed that it would be more beneficial to ask very sensitive questions only once the customer has accepted the offer simulated by the chatbot, and that the customer wants an additional discount to finalize their quote. More concretely, Fig. 11.2 shows how empathy is experienced by users, and from there, we can affirm that our research proposition is invalidated, such as stating that:

Chatbot empathy in the context of insurance quotes has more negative than positive effects on emotions and user experience.



Fig. 11.2 Study scheme

11.5 Research Contributions

11.5.1 Theoretical Implications

This qualitative research, focused on the user of a chatbot in an insurance context, attempted to understand how the empathy of a chatbot influences the emotions and experience of users in the context of insurance quotes. This research is very relevant since it is, to our knowledge, the first study to look at the impact of an empathetic social chatbot on emotions and user experience [10, 11] in insurance. From a theoretical point of view, this study expands the research knowledge on users' perceptions of how they experience this interaction with an empathetic chatbot in this specific context, by articulating the positive and negative effects of empathy of a chatbot on emotions and the user experience. In line with the mixed literature, this article demonstrated that a chatbot's empathy can both positively affect user perception [6, 9, 11, 13] and negatively [20, 40]. But what particularly emerges from the results of this study lies in the importance of properly balancing the level of empathy of the chatbot, so that it does not reduce the level of trust in the chatbot and is not converted into a barrier to the quality of interaction (the Uncanny Cliff), [19] but rather generates positive emotions, in reference to the theory of the uncanny valley [15, 27, 36, 40]. From a methodological point of view, the RTAP approach allows the user to elaborate more on their real thoughts and experiences immediately after interacting with a chatbot in a real insurance auto quote situation made it possible to improve existing empirical studies which focused more on quantitative methodologies and outside of a real context.

11.5.2 Managerial Implications

From a practical perspective, this study also has managerial implications for designers and insurance managers who want to implement empathetic chatbots, with a view to improving the user experience. First, when designing empathetic chatbots, designers must take into account the positive and negative effects experienced by users to ensure that they meet the expectations and needs of specific users. For their part, insurers are called upon to be vigilant when deploying empathetic chatbots to serve their users, in order to gain their trust and avoid losing them, knowing that customer communication is very infrequent (annual). Secondly, as it is a utilitarian and high-involvement context, a balanced dosage of the empathetic chatbot-user relationship is necessary for good mastery of the emotional dimensions of the user and an interaction of trust since like this study has revealed, an empathetic chatbot can be a double-edged sword. Also, the empathetic characteristics of chatbots must be consistent with the identity and reality of the sector in question. The financial sector is a very sensitive one where difficult situations are experienced (accident, theft). Third, throughout the customer journey, managers must be transparent about the use and confidentiality/storage of data. Trust in the company is a key element for users. It is even recommended that managers ask personal and more sensitive questions only when the user has accepted the offer proposed by the chatbot, and the customer wishes to have an additional discount to finalize their insurance quote. To get users to have pleasant experiences, managers must maximize the perceived value of the benefits of this interaction.

11.6 Limitations and Avenues for Future Research

As with any study, the present research is not without limitations, and the results should be interpreted with caution. However, these limitations also open avenues for additional future research. First, this study was conducted in Canada, which indicates that some of our results may be specific to the Canadian context, given that consumers are less familiar with chatbots in Canada than in other regions of the world [34]. Second, since our findings are derived from qualitative data, the results cannot be generalized. Future research of a quantitative nature may be requested in order to test the model (Fig. 11.2) and these results on a larger scale and to confirm the findings of insurance users and better understand their usage behavior. Finally, it is important that future research continues to study how the complexities of emotions, sources of emotion influence the effectiveness of anthropomorphic digital customer service agents [12]. The role of empathy and the more human side of the chatbot deserve to be explored further. It will be important in future studies to take a particular look at the role of emotions and the mood of users before the chatbot–user interaction, in order to better understand users' emotions while interacting with a robot.

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Chapter 12 Wine Consumers' Attitudes Toward AI-Generated Images of Wine Regions: Exploring Relationship Between Preferences and Imaginative Conceptions



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Abstract This qualitative paper with a socio-psychological focus explored the possible relationship between wine consumers' preferences and their fabrications of imaginative conceptions, both elicited by AI-generated pictures of wine regions. A method of photo-elicitation was used for semi-standardized interviews with regular wine consumers. A set of presented photographs consisted of 14 AI-generated images of wine regions created by the DALL-E engine, pictures that can be used for marketing purposes. Results show that AI-generated images of wine regions are capable of eliciting fabrications of imaginations in the agents or, on the contrary, are capable of suppressing such imaginations. In the case of pictures eliciting imagination, positive or negative connotations can appear. Positive imaginations often appear with positive preferences regarding purchasing wine or visiting a wine tasting. On the contrary, negatively tuned imaginations appear simultaneously with negative preferences. However, the situation is less predictable in the case of images not eliciting the imagination, where the agents focus significantly on the analysis of the objects depicted in the images. In such a case, it is necessary to assess particular fabrications on a case-by-case basis, as it depends on the specific orientation of

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the image, which can cause both positive and negative preferences. The paper also proposes a categorization of consumers' imaginative conceptions triggered by AI photo-elicitation.

12.1 Introduction

Artificial intelligence (AI) has received much attention in tourism and hospitality literature and practices [1]. Several review articles have been published that have explored a range of applications within these sectors [2]. According to Filieri et al. [3], the travel and tourism industry could benefit the most from AI, which could reshape this industry. The tourism and hospitality sector with AI seems to be "facing a more intelligent and automated future development environment" [4]. However, according to others, it "cannot surpass the human touch, which is an essential determinant of experiential tourism" [5]. AI is currently present in almost every area of travel and tourism and is particularly relevant because tourists need to make a series of decisions about future trips. Recent improvements in big data, algorithms, and computing power have enabled significant enhancements in AI. Therefore, AI will likely become involved in all realms of this industry soon [6].

An important part of promoting a region or area is a destination image, an important aspect of successful tourism management and destination marketing [7]. There exist a lot of studies documenting the efforts of destination marketing organizations in researching, building, promoting, evaluating, and maintaining destination image and producing a series of materials, including brochures, guidebooks, postcards, and most recently, destination websites and other online [8] and visual materials, especially videos and photos. Various authors are analyzing different aspects of visual content connected with a given destination—tourist photos [9–13] or the photos produced by the destination management [14, 15]. However, there is still a lack of systematic research regarding the use of AI in the field of user-generated photos and official photos on government and business websites [4].

It is evident that AI-generated photos are gaining popularity due to technological developments. However, if we analyze how many studies focus on photo generation by AI without human intervention, there are few. Göring et al. [16] used DALL-E-2, Midjourney, and Craiyon to create a set of 135 images and combined them with real photos. The results indicate that some generators can produce realistic and highly appealing images. The authors also examined photo-realism and user appeal.

The user can perceive the presented photo from multiple angles and views. One of the approaches proposed by Andreu et al. [17] describes the distinction between projected and perceived images. Andreu et al. [17] arrived at a division into so-called pull and push factors based on research by other authors [18–23]. The projected image is referred as a pull factor, transmitted through communication channels such as tourist offices, travel agents, and agencies. On the other hand, there is also the so-called push factor, which individuals construct based on socio-psychological variables such as motivation, preferences, goals, and perception.

This paper explored the possible relationship between wine consumers' preferences and their fabrications of imaginative conceptions, both elicited by AI-generated images of wine regions. Therefore, we distinguish between objects present in the AIgenerated pictures used for elicitation and wine consumers' imaginations that can be seen as push factors [17] falling into the socio-psychological category. Previous research on AI also overlapped with social sciences and human reactions to AI content, e.g., explored psychological and ethical norms and practices [24], ethical research standards [25], perception of AI-generated children's faces used for charitable advertisements [26], or participants' perceptions of AI-generated art which was found to be influenced by the absence of AI's mind [27]. If AI-generated content recognition ability was traced, previous studies addressed especially deepfake issues [28]. Nonetheless, to our knowledge, research has yet to be published dealing with human perception of AI-generated wine regions or wine topics in general.

The paper structure stems from the qualitative methodology, i.e., it introduces obtained material from an AI-generative tool, followed by a description of explored topics and a presentation of employed agents. The results' section categorizes images into groups supported by selective transcriptions. In particular, it proposes a categorization of consumers' imaginative conceptions triggered by photo-elicitation.

12.2 Research Methodology and Conduction

For exploratory research, qualitative methodology was employed. Specifically, photo-elicitation was used, using the example of AI-generated images, explicitly using the DALL·E engine created by OpenAI, available on the Microsoft Bing Image Creator website [29]. As an AI tool, it is free to use and requires almost no knowledge in the field of AI, so it is available to the general public as well as entrepreneurs who would like to generate images that can be used for marketing purposes without any financial costs and with minimal time costs. The tool generated 52 images of wine regions that could be used for marketing purposes. Each picture had a size of 1024×1024 pixels. The images were generated by entering the following keywords determining their theme: *wine region, vineyards, hyper-realistic photo, marketing photo,* and 13 particular wine countries, i.e., *Germany/Austria/France/Spain/Portugal/Italy/Greece/USA/Chile/Argentina/South Africa/Australia/New Zealand*.

As shown below, the obtained images were used for semi-standardized interviews. In order to comply with the time limit between 60 and 90 min for one interview, the set of 52 images was reduced to 14 final images, which can be seen in Table 12.1. During their reduction, the effort was to maintain the greatest possible dispersion of the material concerning the presented landscapes and skies, buildings (including their absence or presence), and the variety of colors. The arrangement of the images corresponds to the ascending structuring of the wine regions in terms of their visualization: Category A without the presence of buildings, Category B without the presence of buildings but with higher use of contrast and green color, Category C
without the presence of larger buildings but the presence of drawing rather than photographic processing in the lower parts of the images, Category D with the presence of one larger realistically shaped building, Category E with the presence of several larger buildings having unrealistically shaped parts, Category F with the presence of a building or buildings having a large number of unrealistically shaped parts, and Category G with surreal elements such as unrealistic shaping of buildings in the front part of the pictures or the presence of desert directly next to the vineyard.

The data collection consisted of semi-standardized interviews with 15 agents, during which the previously mentioned photo-elicitation was employed, and the set of AI-generated images from Table 12.1 was used. Scholars introduced the photoelicitation research method concerning food and tourism during focus groups [30, 31]. The agents who participated in the interviews were eight women and seven men between the ages of 24 and 66 (median = 44), regular wine consumers, abbreviated as AG1 to AG15 in the results. With AG13, the required theoretical saturation for qualitative research was achieved. The agents signed informed consent and knew that the research was anonymous and data served exclusively for research purposes. The interviews were conducted in September 2023. Each agent was informed before the interview that he/she would be presented with 14 photographs of wine regions captured by a professional photographer. Therefore, the information that these were AI-generated pictures was not revealed. However, agents were informed that stakeholders could use these photos as marketing materials, specifically as a background for posters selling wines or invitations to wine tastings. A presentation of 14 images followed, with each agent being asked the same questions for each image: (i) perception of the given image, attribution to a specific wine country or region, (ii) interest in visiting such wine region (positive attributes affecting the agent), (iii) possible resistance to visiting such wine region (negative attributes affecting the agent), (iv) the marketing effect of the photo-as part of a poster related to the sale of wines or a visit to a tasting. After the presentation of the last photo, the purpose of the research was communicated to the agents, and they could answer in a non-standardized manner.

An audio recording was made during the interviews, which was later used to make complete transcriptions, in which recurring patterns were searched for, and codes were assigned to them. It was followed by the analysis of the transcripts with the same codes and the interpretative synthesis validating the appearance of the result themes. Inductive reasoning was used following the grounded theory method to obtain the results. Our study stems from a phenomenological and purely explorative approach, and quantifying results, e.g., via statistics, are not considered elementary as the study does not claim to be generalizable. Instead, understanding the context and construction of interpretations is particularly important [32]. It turned out that while the ideal types of agents were not found concerning the attitudes toward the presented images, relatively uniform attitudes were taken toward specific presented images and selected selective transcriptions.



Table 12.1 AI-generated images of wine regions used for photo-elicitation interviews

Note A-G denote classes of AI-generated wine regions sorted according to level of structuration—from least structured (A) to most structured (G) [29]

12.3 Results

The analysis of the obtained data showed the creation of ideal types at the level of individual AI-generated images more than at the level of the creation of ideal types of individual agents. As seen in Table 12.2, it was possible to classify images into four categories according to the degree of elicited imagination and the type of preferences. When considering the horizontal division of Table 12.2, the dividing criterion is the degree of elicited imagination. The upper part indicates the categories evoking positive or negative imaginations (e.g., C05 and E10), while the lower part indicates the categories not evoking imaginations or evoking contradictory imaginations (e.g., B04 and E14). When considering the vertical division of Table 12.2, the dividing criterion is the type of preferences, namely positive preferences in the left part (e.g., C05 and B04) and negative preferences in the right part (e.g., E10 and G14).

It can be said that in the case of evoking positive or negative imaginations, such imaginations were simultaneously mentioned with a positive or negative attitude toward presented images, specifically toward the wine region and its willingness to visit it or toward the presented image as a possible supplement to marketing activities (e.g., wine sales or an invitation to a tasting). Specifically, during the interviews, the agents mentioned positive preferences for those images in which they could create positive imaginations—in addition to Image C05, it was also evident for Images A01, A02, C06, D08, E09, F11, and G13. An example of selective transcription for Image C05 is shown below. The evoking of the imagination regarding a specific wine region (Rhineland) is noticeable. In the following answers, the agent returns to his fabricated idea of a specific wine region, and based on this idea, she builds her preferences regarding the wine purchase:

Well, there is a river there, so it could be Germany, around the Rhine ... (after a while) so if it were the Rhineland, I would be tempted. I would like to visit the region ... (after a while) so if it were the area, the photo would encourage me to buy wine. (AG6)

With a decreasing rate of elicited positive imaginations, there was an increasing rate of comments indicating negative preferences, which was noticeable for Images B03 and F12. The most negative preferences were then achieved with Image E10, the only one that evoked solely negative imaginations. Therefore, based on the above, there is a positive relationship between the type of imagination evoked and the type of preference. An example of selective transcription for Picture E10 is shown below, where the agent initially assigns a specific wine-growing country (Chile) with which he associates a subjectively unpleasant climate. Subsequently, the agent remains with this idea even in the case of the manifestation of preferences when he claims that he would not purchase such a wine for which Photo E10 would be used:

... it will be Chile ... (after a while) I can say that nothing would attract me because it is too hot there ... (after a while) the photo would rather discourage me from buying wine, again I have an association with some tiredness like it will be hot there. (AG1)

The categorization of fabricated imaginations is presented in Table 12.3. Specifically, it was possible to include them under one of the following categories: wine and





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Table 12.2 (continued)	
B04: the example of an image eliciting almost no imagination (comments were out of scenario) and positive or evasive preferences	G14: the example of an image eliciting almost no imagination (scarce imaginations were opposing) and negative preferences
PO4	

food, people, geography, and activities. In the case of wine, the agents most often mention its imagined quality reflecting the character of the presented wine region. The agents also named particular organoleptic properties of the wine or the grape varieties grown. Agents also often named the nature of the local people who live in the presented region and the climate most likely to be found there. A frequent category consisted of imagined tourism activities in the presented wine region. There were present both construction of activities that can be unified for all presented images (wine tasting, exploring a vineyard) and activities typical only for specific shown images (swimming in a lake, climbing mountains). Imagined activities can be divided into those that have positive or negative connotations.

In a closer analysis of the results, it is also necessary to consider the category of images evoking a low level of imagination. In these, if imaginations were exceptionally present, they were contradictory, i.e., positive and negative. A *sui generis* example that stands out from all other images is, in such case, B04, the only one in its category. While this image hardly evoked any imagination among the agents, the preferences for it were positive, or the agents did not comment on their preferences. For Image B04, it was typical for the agents to state that it does not focus on wine, vines, or the wine region. The agents intensely experienced such findings, and their concentration was focused on the factual description of the objects present in the picture rather than on the creation of imaginations. With Image B04, there was an apparent attempt for a deeper analysis of the image. While mostly mentioning positive answers when asked for their preferences, the agents were so interested in the thematic focus of the picture that even in part dedicated to the declaration of preferences, they returned to the previous finding dealing with a direction other than wine, as can be seen from selective transcription for Image B04 below. The example

Concept category	Examples of elicited imaginations
Wine and food	Quality wine, good wine, exciting wine, <u>cheap wine</u> , good food, wine with a high acid content, wine with balanced sugar, particular grape variety (e.g., Riesling), <u>sand in the wine</u>
People	Quirky people, people from a rich winery, rude people, bad behavior people
Geography	Too hot climate, pleasant climate, fresh air, clear water, too far away region, a region in the south, particular region (e.g., Rhineland)
Activities	Tour of vineyards, (<u>not</u>) getting to know (tasting) wine, (<u>not</u>) getting to know the landscape, getting to know the region, (<u>not</u>) walking in the mountains (e.g., observing the hills), swimming in the lake, walking (e.g., walking on the road), cycling, exploring civilization and cities, staying overnight in accommodation, traveling with a group of people, relaxing (e.g., lying in a vineyard, sitting on a terrace), trying out the exotic, learning about otherness, finding out the reality in comparison with the image

 Table 12.3
 Classification of fabricated imaginative concepts

Note The underlined examples were perceived negatively concerning the mentioned context

shows the statement where the agent claims non-negative preferences but with a subsequent concentration on the inappropriate thematic focus of the image:

... I really like the combination of mountains and vineyards ... I probably would not be put off by it. I don't find anything repulsive in those photos, but it seems to me more like landscape photos than seeing vineyards. (AG6)

Another example that evoked only very low imaginations (or contradicting positive and negative imaginations) was Picture G14. In this case, the agents, just like in B04, concentrated on the perceived thematic focus of the image, to which they devoted analysis and focused on describing the factual state of the items on the image. While in the case of B04, they commented on its minor focus on wine and greater emphasis on landscape, in the case of G14, they perceived the thematic focus as strange, inadequate, or shocking. This different attitude arising from the analysis of the image appeared at the same time as negative preferences. Even for G14, the agents returned to the inappropriate thematic focus of the photograph when stating their preferences. An example of selective transcription can be seen below, where the agent describes the elements depicted in the image, followed by the proclamation of negative preferences.

I see sand dunes, and it does not appeal to me for some reason ... just the wine and the sand somehow (he does not finish the sentence) ... but they are sand dunes, right? (visible confusion) ... It is just that wine and sand, or wine from the desert, does not appeal to me, or I just cannot imagine such wine ... (AG5)

The two cases mentioned above elicitating low imaginations show that agents focus more on describing and analyzing images, which can lead to positive claimed preferences in the case of a picture with a minor focus on wine or to negative claimed preferences in the case of adding an irritating element (e.g., sand dunes) to an image.

12.4 Discussion and Final Remarks

Based on the results of our research, AI-generated images, specifically images of wine regions, are capable of eliciting fabrications of imagination in the agents or, on the contrary, are capable of suppressing such imaginations. In the case of pictures eliciting imagination, positive or negative connotations can appear. Positive imaginations often appear with positive preferences regarding purchasing wine or visiting a wine tasting. On the contrary, negatively tuned imaginations appear simultaneously with negative preferences. Therefore, the research has shown promising evidence to conclude an existing relationship between fabricated imaginations and wine consumers' preferences, both elicited by AI-generated images of wine regions. However, the situation is less predictable in the case of images that do not evoke the imagination, where the agents focus significantly on the analysis of the objects seen. In such a case, it depends on the specific orientation of the image, which can cause both positive and negative preferences. However, the number of images appearing

this way was minimal in our research, so it is impossible to draw more general conclusions. Therefore, images that do not evoke the imagination must be assessed on a case-by-case.

Regarding theory contribution, unlike some studies that a priori categorize pictures into positive or negative [33], our study offers a closer look at the perception of images by agents. Therefore, we followed the authors who previously called such an approach an exploration of push factors [17]. In the case of our study, exploring push factors worked as a possible extension of previous studies dealing with motivation and perception of travel activities [34] or perception of destination image [35] based on push factors. The mentioned extension stems mainly from using AI-generated visual content.

While the previously published studies investigated the emergence of positive and negative emotions elicited based on graphical content [36], our study, within the framework of push factors, mainly dealt with the fabrication of imaginations that went beyond the scope of the presented content. Another contribution of our study is using an AI engine to create the presented content. Even in this regard, different reactions of agents to AI-generated content have already been investigated. Still, up to now, research has been conducted more on discovering reactions to the content of chatbots [37], while our study investigated attitudes based on AI-generated graphical content.

Limitations of the study outline possible future research. In particular, it should examine the perception of the authenticity of individual images and specific elements contained in the images. As it was possible to see in Picture B04, in the event of the AI's inability to generate sufficiently thematically focused content, the agents pick up on this tendency and subsequently move outside the framework given by the script in their statements. Furthermore, the research could be extended to investigate comparing AI-generated images with real photographs. Compared to the research methodology used in this paper, previous studies used such a comparison of genuine photographs (e.g., portrait photographs) with AI-generated content (modified portrait photographs), including analysis of results based on socio-demographic characteristics of respondents [38], which might mark out possible future research applied to our topic. It would also be desirable to use different levels of perceived mutual similarity between genuine and AI-generated images. However, while previous research used quantitative methodology [38], our study is purely explorative using qualitative methods. Expanding our analysis to a quantitative representative level might be desirable, aiming at various groups of respondents, i.e., winemakers, wine merchants, wine marketers, sommeliers, and wine consumers.

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Part II Customer Data Management and CRM

Chapter 13 Measuring Leadership Through CELID-S: A Contemporary Perspective



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Abstract This research work analyzed the prevailing style of contemporary leadership existing in middle management leaders and the influence on the satisfaction of the employees of a company in the pharmaceutical sector dedicated to the development, manufacture, and commercialization of medicines for human consumption. The predominance of the transformational style was diagnosed through the application of the leadership styles questionnaires (CELID-S) developed by Castro et al. (2004), with a high level in its dimension of charisma, and the general satisfaction of workers with the transformational leadership style considering the intrinsic and extrinsic dimensions, through the Warr, Cook, and Wall Job Satisfaction scale instrument, Spanish version and adapted by Pérez-Bilbao and Fidalgo (1995), called NTP 394:Satisfacción laboral: escala general de satisfacción. A mixed research approach was used, that is, quantitative and qualitative for the data collection through surveys of subordinate workers of the middle managers of the industrial plant and a diagnostic interview of the senior manager. The research carried out was of a descriptive correlational type with a cross-sectional approach and sought to identify the relationship between the two research variables "transformational leadership and general satisfaction" raised in the research hypotheses. The Office Excel tool and the IBM SPSS software were used to process and analyze the data. Pearson's relationship coefficient model was applied to measure the relationship between the variables under study, which shows a significant relationship between transformational leadership and general satisfaction. The proposal is based on a transformational leadership training and coaching plan for middle management that allows establishing this leadership model as predominant in all area leaders to homogenize their administration and achieve high levels of job satisfaction that allow them to respond in an effective transition to disruptive change in which the organization finds itself.

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13.1 Introduction

The role of a leader has been constantly studied within the trends of organizational leadership, and it has been determined that it is an increasingly changing and constantly evolving topic. It is one of the most relevant aspects of administrative management. During the periods of global change, in the industrial revolution, and the classical era, the importance lays in the hierarchy and the authority that managers or supervisors had over their employees. The first studies of the administration emphasized rationality and the need for organizations and workers to be as productive as possible and to seek the maximum optimization of resources to expand, expand or seek internationalization in the face of the growth of skills or companies in industries of the same sector [24]. The leaders exercised a supervisory role and were in charge of arranging, giving orders, and making decisions. For this reason, workers organized movements to demand rights in various situations in which they did not agree due to injustice in their relationship with the bosses, unfair distribution of work, abuse of power, abuse of authority, excessive workload, evasion of responsibilities in the event of illness or accidents, at work, among others. Subsequently, some disciplines contributed to the theories of human relations management in which the perspectives of a leader began to change, and among them, motivation theories stand out given that in the first contributions emphasis was placed on group management and the use of psychometric tests for the selection of people, in improving the relationship and attention to workers, in the study of organizations as a social system, in physical working conditions, among others [23].

As a result, the role of the leader has gradually become more relevant to the behaviors and satisfaction of employees in organizations. Due to the relevance acquired by human relations at work or organizational behavior, the leader is understood as a person who can influence others, intrinsically or extrinsically motivate his followers to carry out actions to reach goals and objectives. The presence of a leader in an organization modifies the behavior of its employees to the point of generating a greater commitment and sense of belonging since people are demotivated by various factors in the company, such as physical conditions, lack of social interaction with the employees, excessive working hours. But faced with inadequate leadership, most people resign, and it is in these cases that potential talent is lost.

In some countries, the practice of contemporary leadership styles is very focused on the welfare of workers. It could be said that many of the actions carried out by today's managers are the result of scientific studies of this particular phenomenon.

Currently, the leadership of organizations is a highly relevant factor to strengthen the management of companies, and their processes and achieving the development of objectives and the achievement of goals, Latin American leaders are one step behind the executives of the USA and the main countries of the European continent [8].

To prepare this study, the existing situation was analyzed in a pharmaceutical company, located in the city of Guayaquil in Ecuador. The organization is dedicated to manufacturing and marketing medicines for human consumption, providing products with high-quality standards through continuous process improvement. The

production area continues to be one of the fundamental pillars together with all its human talent. In its management, the leaders of the organization, and especially those in the production area, are the main actors who hold key positions in the organization.

The organization is facing several challenges in the field of organizational management, including a series of changes ranging from product innovation, the implementation of new technical procedures, new processes in different areas, and the need to change the management styles of people in the productive area. This situation requires an adequate and dynamic response to these changes, which have increased in the post-Covid19 era, in which the pharmaceutical industries have responded to the great demand for medicines resulting from this event.

The company is nationally recognized in the pharmaceutical sector and is a member of a group of laboratories that accredit international licenses. Identified problems such as inadequate leadership in the management of work teams, which affect the job satisfaction of employees.

In addition to the above, some of the supervisors are oriented by excessive work pressure, abuse of power of formal authority in their policies and rules, strict and unfair disciplinary regimen, centralized decision-making, excessive workload, and inadequate delegation of responsibilities. This situation leads to job dissatisfaction, in its two dimensions, related to intrinsic or extrinsic factors, causing workers who are usually not motivated, resulting in the existence of various subproblems, in terms of relative importance to organizational management, such as internal conflicts, affecting performance and productivity, and conflictive relationships.

The purpose of the study implies that a predominant leadership style can be established that is consistent with the company and its business model and, in turn, can be able to affirm that it has transcended to times where the leader plays another role different from the classical era. Its role lies in the guidance, direction, and confidence that is given to the worker and he feels satisfied.

Leadership management and its contributions are wide and diverse, but they express a similar characteristic which is the ability that a person develops to lead work teams; in this regard, the existing problems in the organization that shares similar situations with those described are presented in previous times, like the classic one, which generates a situation of attention and great importance in the organization that is generating an increase in the dissatisfaction of workers with their position, which shows that the management style is not adequate and demands the strengthening of capacities of the commanders who exercise it. The organization is made up of 434 employees, of which a total of 278 workers work in pharmaceutical production, where the investigation was carried out.

13.2 Literature Review

The subject of leadership has been studied intensely in the last century, whit a notorious evolution in the organizational field. In this context, it continues to be one of the most addressed issues in the administration and management of people. Bennis and Nannus [3] define leadership as the ability to inspire and impress employees, providing them with the purpose to fight for them. According to Hidrowoh [13], contemporary organizations need exceptional leaders to maintain a cohesive organizational system that meets the challenges of a globalized world. In addition, when there is a role model or a mentor leadership qualities tend to be better emulated [25] and this fact is commonly manifested when leaders generate a shared vision [21], which is very common in transformational leaders, who usually become role models [20], so in times of uncertainty, such as the current one, transformational leadership is perceived as an attractive option for organizational leadership [12].

Leadership has been studied for many years and has seen great change in organizations. The management and administration of people continue to be one of the most focused topics in terms of leadership. Today's companies need great leaders to maintain a solid organizational structure that I keep the challenges of our globalized world. Leaders who are mentored/modeled generally exhibit better leadership qualities, and this is seen when they create a vision that many people challenge. Leaders are considered role models, and in times of uncertainty such as the contemporary business environment, you must have a model that is the best option for managing an organization and its current reality. Leadership practices are closely intertwined with the context in which they occur and do not simply depend on the characteristics of individuals [6].

Currently, leadership is one of the most important capabilities required in organizations. It is necessary to consider that it responds to the results in terms of organizational performance and employee performance through effective decision-making and management of people in organizational areas consistent with the company's structure. Middle managers are responsible for the implementation of all the actions planned by top management. Therefore, it is of vital importance to follow up on their employees to identify the gaps between the actual performance and the expected performance of the work team, to direct and motivate subordinates is of vital importance [9]. Good management and decision-making are critical skills for success in any organization. Middle managers need to monitor their team's performance and identify areas for improvement, so they can effectively motivate and lead their team. The structure of the organization must be considered when managing employees, as well as how decisions and management affect the performance of both the company and the employees.

The term leadership focuses on two perspectives: as a personal quality or as the function that is executed within the organization, society, or system, and it is the latter that is most frequently studied due to the utility that accredits the performance of the leader in providing benefits to the company [19]. Therefore, leadership becomes necessary to direct and guide organizations and people toward the fulfillment of strategic objectives [15]. The leader is the fundamental tool to achieve the proposed goals and create commitment in people to work toward achieving them. A leader enhances the skills and inspires his followers, in such a way that, in any social field, he becomes essential to guide the workgroups. In the organizational field, it brings

many benefits to the people of the organization, in the achievement of goals, in the cohesion of work teams, in performance, and other factors of vital importance for companies.

Authors such as Hunt and Fedynich [14], Harrison [10], and Khan et al. [17], among others, include in their classification, of the great man theory and put it as a pioneer, while others point to it as the basis or source of inspiration for the trait theory [18]. In particular, when Dolan [7] presents the evolution of leadership theories in terms of formal theoretical treatment, he begins with the "Great Man Theory", and then presents the "trait theory", the behaviorist theory, the situational leadership theory, the contingency theory, among others. The Great Man Theory states that a leader is born with a high potential due to his nature, which is instinctive and not learned, so only men who have this heroic potential can become leaders, and they are characterized by various physical and attitudinal traits that allow them to be identified as leaders and also exert power, influence, and impact on others.

Over time, teams of researchers have devised different leadership styles because no particular leadership style can be considered universal, as there is no one right style, and they are adaptable to situations. However, despite the variety of leadership styles, there is a consensus that a good leader or an effective leader inspires, motivates, and directs activities to help achieve the objectives and goals of a team [2].

A leadership style is an interpersonal influence that is exerted in a certain situation to guide the achievement of one or several specific goals through the coordinated communication process with its followers [5]. This is seen as a combination of different leader characteristics, specific traits, and behaviors that leaders use to interact with their followers [1]. One reason to study it is that the research can help identify the critical skills leaders' need, where their effectiveness can be the key to success in many organizations (Aalateeg 2017).

In general, the authors agree that job satisfaction is a set of feelings, reactions, and emotions that are generated in workers as a result of a certain stimulus and due to experiences of both individual and organizational situations, which consequently produces certain satisfaction levels, whether pleasant or negative [4]. Job satisfaction describes the extent to which an individual can be pleased, comfortable, or satisfied with their work (comfort zone), and it is a pleasant or positive emotional state that results from valuing one's work or work experiences (Ali 2016). Job satisfaction is an important factor in increasing productivity and contribution at work [16]. While, for Pizarro et al. [22], job satisfaction is defined as the worker's predisposition toward the functions, tasks, or requirements of his work, such attitude is based on his actions that are based on the values, beliefs, and principles that the worker displays his own.

Based on the above, satisfaction involves various factors with which the employee relates, which depend on the organizational culture and the employer's decisions. Intrinsic factors refer to personal development conditions, work climate, interpersonal relationships, and personal motivation, and extrinsic factors are related to the salary received by the employee, physical environment and infrastructure, ergonomics, and other factors provided by the employer. Satisfaction depends on factors that are specific to the employee and others to the employer, scientifically

motivational and hygienic (intrinsic and extrinsic), which is why leadership is directly linked to the overall satisfaction of work teams within the organization.

It is considered that good job satisfaction leads to good job performance. Internally, it is related to motivation and well-being at work. Externally, it has to do with everything related to the strategies and rewards that occur in the development of tasks and actions, which are established in a company. Everything is related jointly, when achieving the fulfillment of goals and objectives to achieve the success of the proposed plans, an analysis of the decisions of the leaders regarding the satisfaction of their groups is required. This guarantees not only the stability of work but also the psychological and emotional well-being of workers to achieve success.

Leadership makes up the group of topics with the greatest interest globally that are part of the science of organizational behavior, largely determined by the fundamental role that has been assigned to this determining factor in productivity and the potential development of the organization (Gómez 2018). Companies are looking for high performance in the commercial market. This is reflected in the constant search for talents and competent people to link them and achieve the strategic goals of a company, another aspect that they favor is the creation of competitive advantage, and this factor is the sum of practices that seek the satisfaction of stakeholders, among the main ones, employees.

The conception of leadership that leaders have in the current era has become relevant and has become a factor of impact and constant influence on the success of organizations (García-Solarte 2015). Through good communication, strategies, rules, and regulations, this concept of leadership has been strengthened and each time occupies a higher level of importance among the success factors of an organization. Various scientific studies conclude that it is related to a diversity of variables, but all with emphasis on the leadership style that is included in each of them.

13.3 Methodology

This research work has a mixed approach since it aims to identify which leadership style predominates in the company and, at the same time, to make a diagnosis of job satisfaction through surveys carried out on middle managers' subordinates. On the other hand, a diagnostic interview was carried out with the Human Talent Manager, who is in charge of effective leadership management in the plant headquarters, to which the current diagnosis of the leadership style and the strategic proposal. The data of the variables collected over a period of time on a predefined population were analyzed. These instruments allowed a precise approximation of the current situation of the variables under study.

The measurement instruments are: the Leadership Styles Questionnaire (CELID-S) developed by Castro et al. (2004), whose purpose is to determine the predominant leadership style and the dimensions that compose it, by measuring the perception that subordinates have of their superior or boss, consist of 34 items, with a Likert rating scale.

And, the Warr, Cook and Wall Job Satisfaction Scale instrument, Spanish version and adapted by Pérez-Bilbao and Fidalgo (1995), called NTP 394: General Satisfaction Scale, which measures two dimensions: intrinsic and extrinsic satisfaction, based on Herzberg's theory of hygienic factors.

The research is of a descriptive correlational type with a cross-sectional approach and seeks to identify which leadership style predominates in the organization through the collection of information obtained from the Leadership Styles Questionnaire (CELID-S), which was applied to subordinates, and at the same time, to diagnose the job satisfaction that they have with the leadership style that has prevailed through the application of surveys based on the Job Satisfaction Scale of Warr, Cook, and Wall, adapted by Pérez-Bilbao and Fidalgo, called NTP 394: General Scale of Satisfaction.

This study focuses on specifying the current situation of the organization regarding the leadership style applied by middle managers and the job satisfaction of workers, as stated by Cerda (1998) "one of the main functions of descriptive research, it is the ability to select the fundamental characteristics of the object of study and its detailed description of the parts, categories, or classes of that object.

The pharmaceutical company under study has a population of 434 employees, and of this amount, 278 are in the plant, which is the target population of the study, the managers are 22 and represent 8% of the company's population, and 256 employees, representing 92% of the plant employees, were the object of analysis. For this study, a simple random sampling technique was used stratified, because the population shares similar characteristics for this research work and was subdivided into strata, that is, by departments (Table 13.1).

Proportional stratified sampling was applied to calculate the sample. In this approach, each stratum sample size is directly proportional to the size of the total population, that means that each strata sample has the same sampling fraction, and for the present study, the fraction of $\frac{1}{2}$ was estimated. To verify the value of the sample, it was calculated through Eq. (13.1).

$$\mathbf{n}\mathbf{h} = (\mathbf{N}\mathbf{h}/N) * n. \tag{13.1}$$

where

nh = Sample size of stratum h.

Nh = Size of the population in relation to stratum *h*.

N = Size of the entire population.

n = Size of the complete sample.

Applying the described formula, the following sample results are obtained (Table 13.2).

Table 13.1 Number of employees by company's	Department—plant	Number of employees
departments	Administrative Finance Dept.	2
	Quality Assurance Dept.	12
	Regulatory Affairs Dept.	8
	Foreign Trade Dept.	2
	Purchasing Dept.	2
	Accounting Dept.	2
	Quality Control Dept.	45
	Medical Coordination Dept.	3
	Costs Dept.	2
	Technical Direction Dept.	8
	Engineering and Maintenance Dept.	16
	Logistics Dept.	23
	Operations Dept.	2
	Planning Dept.	5
	Production Dept.	99
	Productivity Dept.	3
	Security and General Services Dept.	12
	Integrated Management System Dept.	5
	Systems Dept.	2
	Human Talent Dept.	6
	Transfer Unit Dept.	2
	Validation Dept.	17
	Total	278

13.3.1 Data Collection Techniques

See Table 13.3.

Regarding the techniques for obtaining research data, three measurement instruments were taken into consideration that were effective for data collection in the stratified sample. In the study, the variable "Leadership style" and the variable "Job satisfaction" were measured, to establish a relationship between the two.

The CELID-S questionnaire is based on the author Bass's theoretical consideration of transformational, transactional, and Laissez-faire styles and is derived from the Multifactor Leadership Questionnaire (Bass 1985). It is the most appropriate instrument in its form of application through a sample by strata, that is, by departments, and as its focus on -S (analysis of his superior) is applied to subordinates. It was very relevant to know the perception that their subordinates have of each of

No.	nh	No.	nh
278	2	143	1
278	12	143	6
278	8	143	4
278	2	143	1
278	2	143	1
278	2	143	1
278	45	143	23
278	3	143	2
278	2	143	1
278	8	143	4
278	16	143	8
278	23	143	12
278	2	143	1
278	5	143	3
278	99	143	52
278	3	143	2
278	12	143	6
278	5	143	3
278	2	143	1
278	6	143	3
278	2	143	1
278	17	143	9
Total	278		143

Table 13.2Samplecalculation results

 Table 13.3
 Data collection techniques

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Type of information	Research technique	Data collection techniques
Primary	CELID-S survey Warr, Cook, and Wall job satisfaction scale survey Interviews	Questionnaire

their direct bosses or line bosses to determine the leadership style that prevails in the organization.

In this case, the company and its relationship with the quantitative analysis of job satisfaction, in which, just as a leadership style may predominate, there may also be a dispersion of data and its analysis is not a representative value to consider and define it as a style. predominant leadership.

The dimensions that make up the instrument are:

- 1. Transformational Leadership. It has four sub-dimensions.
 - (a) *Charismatic or idealized influence*, respect for leaders, desire to be imitated, and to generate high levels of expectations among their followers;
 - (b) *Inspiration*, that is, the extent to which the leader motivates his followers by providing them with a vision of the future, goals, and purposes;
 - (c) Intellectual stimulation, which refers to the leader's actions about intellectual stimulation that enable followers to creatively solve difficulties and obstacles;
 - (d) *Individualized considerations*, that is, support for followers, assessing their personal development needs.
- 2. Transactional leadership. It has two sub-dimensions.
 - (a) Contingent rewards, which are interactions between leaders and followers guided by reciprocal exchanges. Leaders identify the needs of followers and make trade-offs between the needs of the team and the needs of everyone. Rewards or sanctions based on the achievement of objectives;
 - (b) Management by exception, where the leader only intervenes when it is necessary to correct or change the behavior of the followers. In general, the interventions are negative and critical, so the goals do not deviate from their course.
- 3. Laissez-faire. This is an observed characteristic of transactional leadership. It means that there is no transaction of any kind. The leader avoids making decisions, has no responsibility, and does not use her power. It is considered to be the most ineffective form of leadership.

13.4 Data Analysis

As previously mentioned, this research has a descriptive scope to determine the predominant style of company managers and is correlational to determine the relationship between transformational leadership styles, transactional leadership, and laissez-faire style in the sample of study, seeking to explain the relationships at a given time and to understand the predominance of leadership in the entrepreneur. Next, the quantitative analysis of the sample and the correlation of the variables were represented. The treatment and calculations for the analysis were carried out with the support of the Office[®] EXCEL spreadsheet and the IBM[®] SPSS software.

The CELID-S questionnaire (Questionnaire of Leadership Styles-Self Leadership) was developed by Castro et al. (2004) and consists of the operationalization of the leadership theory of Bass (1985). Derived from the *Multifactor Leadership Questionnaire test* in its Spanish version (Morales and Molero 2007) operationalized to the Spanish version by Bass and Avolio (1990) based on the theory of Bass (1985), improved by Morales and Molero (1995). It is self-administered, consisting of a total

Dimension	Variables	Half	Variance
Charisma	3-21-33-34	3,535	0.031
Intellectual stimulation	4-15-23-25-28-29-30	3,273	0.010
Inspiration	19–22–24	3,051	0.011
Individualized consideration	13–14–17	3,361	0.015
Transformational leadership		3,311	0.039
Contingent reward	8-10-11-12-16	2,825	0.106
Management by exception	2-5-7-9-18-26	2,986	0.078
Transactional leadership		2,913	0.089
	1-6-20-27-31-32	2,550	0.052
Laissez faire		2,550	0.052

 Table 13.4
 Mean and variance statistics

of 34 items. In the questionnaire, the participant answered about the perception of their superior's characteristics, indicating their level of agreement with each item on a five-point response scale. The leadership styles that were identified are transformational (charisma, inspiration, intellectual stimulation, individualized consideration), transactional (contingent reward and direction by exception), and laissez-faire (Castro 2007).

Table 13.4 shows the mean and variance in each of the leadership dimensions measured by the CELID-S, according to the perception of the participants in this study.

As can be seen, the highest means were observed in the dimensions that constitute transformational leadership, with charisma being the highest, followed by individualized consideration. The transformational leadership style obtained the highest average (3311), followed by transactional leadership (2913), and lastly laissez-faire (2550). Regarding variability, transformational leadership presented the lowest variation (0.039), followed by Laissez Faire (0.052), and, finally, transactional leadership (0.089).

13.4.1 Analysis of Results

The results obtained showed that transformational leadership presented a higher average, which indicates that it is the most prevalent style in the organization, followed by transactional leadership and finally Laissez-Faire leadership. It was possible to point out that these other two styles exist in the organization according to the surveys applied to the workgroups. From the predominant style, it is verified that the dimension of charisma has a higher level of relevance. The hypotheses have been verified in Table 13.5.

Type of hypothesis	Decision rule
(Ha): Transformational leadership predominates in the organization	\rightarrow x 3,311
(H1): Transactional leadership predominates in the organization	$\rightarrow \bar{\mathbf{x}}$ 2,913
(H2): Laissez-Faire leadership predominates in the organization	$\rightarrow \bar{\mathbf{x}}$ 2,550
(H0): Transformational leadership does not predominate in the organization	There is sufficient evidence to reject the null hypothesis

Table 13.5Hypothesis verification (Ha), (H1), and (H2)

For the analysis of data and testing of the first research hypothesis (Ha) and the alternative hypotheses (H1) and (H2), an Office EXCEL[®] spreadsheet was used, in which all the responses of the participants were consolidated. One hundred and forty-three respondents were consolidated and the mean of the sum of responses of each of the 34 items of the questionary was obtained in the first instance. Subsequently, the mean of each of the dimensions of transformational leadership was calculated (charisma, intellectual stimulation, inspiration, and individualized consideration) and transactional (contingent reward and management by exception), and finally, Laissez Faire, according to the distribution of items in the CELID-S questionnaire. Then calculate the average over the average of the dimensions of the variables, to obtain the averages of each of the variables and sub-variables, as indicated in Table 13.4 and Fig. 13.1. Consequently, it was deduced that the test statistic has been calculated by comparing it with the critical value, and the decision to reject the null hypothesis was made.

And, concerning the variance of the data obtained from the sample, it happens; on the contrary, the lower its result, the lower the data dispersion, and from the perspective of abstract reasoning, it is indicated that the respondents or the workers under study are more agreement between them and their variability is lower, that is, they agreed on criteria; it was analyzed that their population does not differ (it is equal) or the difference is not significant. It was determined that the data are very homogeneous because the variance is small and there is coincidence in the data (Fig. 13.2).



Fig. 13.1 Calculation of the mean of the variables



Fig. 13.2 Data variance

13.4.2 Reliability or Trustworthiness Analysis

Reliability was evaluated considering the internal consistency of the scale, using Cronbach's alpha coefficient (a); a statistic whose values range between 0 and 1. The higher the alpha value, the greater internal consistency, and therefore greater the reliability. The results reported in Table 13.6 presented values between 0.799 and 0.981, for transactional leadership and transformational leadership, respectively. These results evidenced the high consistency of the instrument used.

According to Hernández (2018), the reliability of the instrument is measured by its internal consistency. Its reliability indicates that when, if it is applied again, the results will be the same; in other words, the measurement instrument produces coherent and consistent results.

And, the results of Cronbach's alpha coefficient, with values closest to 1, indicated that the instrument has been validated to measure the leadership style in its different

Table 13.6 Internal	Dimension	Cronbach's alpha coefficient (a)
consistency	Charisma	0.936
	Stimulation intellectual	0.952
	Inspiration	0.941
	Consideration individualized	0.928
	Transformational leadership	0.981
	Contingent reward	0.843
	Management by exception	0.749
	Transactional leadership	0.799
		0.758
	Laissez faire	0.758

dimensions. Regarding its validity, the instrument was adequate when proposed and applied by other authors to other scientific studies that analyze the same variable. The measurement instrument meets the two fundamental requirements to be applied in the study (reliability and validity).

Cronbach's alpha measurement tool (α) analyzed the coefficient between them, that is, a partial correlation. It has measured the internal consistency in the data scale, that is, the degree to which the items of the survey scale are correlated or consistent among themselves, and therefore, it was interpreted that while there is greater reliability (the test is reliable and of greater precision), there will be fewer measurement errors (when the number is closer to 1). The results obtained show that there is reliability in the test, both in the scale and the data items, and therefore, it was considered significant and reliable to measure this variable. Among the most characteristic values and close to 1 are those of transformational and transactional leadership, which represent high internal consistency.

With this initial analysis of the data, objective 1 of the present study was met, which requires diagnosing the leadership style that prevails in the organization, and as an added value to the research, the reliability and validity of the tool used were mentioned as a requirement, that a measuring instrument must meet.

13.4.3 Relationship Between Leadership Styles

Table 13.7 shows the correlation coefficients (r) between the different dimensions and the leadership styles. From these results, it is observed that there was a strong relationship between the internal dimensions of each leadership style, while an inverse relationship is present between most of the dimensions and the Laissez Faire style, giving validity to what was theoretically established, which is summarized that the Laissez Faire style is not characterized as a form of leadership in itself, by developing a harmful level of competition among team members for not giving instructions or directing their group, by giving them freedom.

Pearson's correlation coefficient expresses the level or degree to which the data in the two variables under study have the same order and that it can be positive or negative, in the case of a correlation. Taking as an example some of the variables and dimensions of Table 13.7, such as transformational leadership and Laissez Faire leadership, it was verified that there is a negative correlation and it was concluded that the more Transformational Leadership predominates, the more variants of Laissez Faire style will decrease. Between the variables, they do not share any criteria. No hypotheses were made for this analysis, and their significance is minimal. The purpose of applying this intra-variable correlation is to highlight the relevance of the data in the application of the surveys, which meant that there is consistency in the responses of the respondents. The significant relationship between Laissez Faire and the management dimension with exception of Transactional Leadership was also highlighted, as there is a positive correlation.

		Charisma	Intellectual stimulation	Inspiration	Individualized consideration	Transformational leadership	Contingent reward	Address by	Transactional leadership	Laissez-faire
								exception		
Charisma	R	1	0.901^{**}	0.838^{**}	0.890^{**}	0.946^{**}	0.717^{**}	0.180^{*}	0.564^{**}	-0.335^{**}
	Next		0.000	0.000	0.000	0.000	0.000	0.032	0.000	0.000
Intellectual	R	0.901^{**}	1	0.923^{**}	0.923^{**}	0.985^{**}	0.762^{**}	0.181^{*}	0.594^{**}	-0.383^{**}
stimulation	Next	0.000		0.000	0.000	0.000	0.000	0.031	0.000	0.000
Inspiration	R	0.838^{**}	0.923^{**}	1	0.881^{**}	0.945^{**}	0.721^{**}	0.105	0.521^{**}	-0.373^{**}
	Next	0.000	0.000		0.000	0.000	0.000	0.213	0.000	0.000
Individualized	R	0.890^{**}	0.923^{**}	0.881^{**}	1	0.957^{**}	0.743^{**}	0.130	0.550^{**}	-0.384^{**}
consideration	Next	0.000	0.000	0.000		0.000	0.000	0.123	0.000	0.000
Transformational	R	0.946^{**}	0.985^{**}	0.945^{**}	0.957**	1	0.769^{**}	0.163	0.587**	-0.384^{**}
leadership	Next	0.000	0.000	0.000	0.000		0.000	0.052	0.000	0.000
Contingent reward	R	0.717^{**}	0.762^{**}	0.721^{**}	0.743^{**}	0.769**	-	0.279^{**}	0.805**	-0.190^{*}
	Next	0.000	0.000	0.000	0.000	0.000		0.001	0.000	0.023
Management by	R	0.180^{*}	0.181^{*}	0.105	0.130	0.163	0.279^{**}	1	0.794^{**}	0.484^{**}
exception	Next	0.032	0.031	0.213	0.123	0.052	0.001		0.000	0.000
Transactional	R	0.564^{**}	0.594^{**}	0.521^{**}	0.550^{**}	0.587^{**}	0.805^{**}	0.794^{**}	1	0.179^{*}
leadership	Next	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.033
Laissez faire	R	-0.335^{**}	-0.383^{**}	-0.373^{**}	-0.384^{**}	-0.384^{**}	-0.190^{*}	0.484^{**}	0.179^{*}	1
	Next	0.000	0.000	0.000	0.000	0.000	0.023	0.000	0.033	
** The correlation is	signific	cant at the 0.	.01 level (bilat	teral)						

 Table 13.7
 Matrix of correlation coefficients

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* The correlation is significant at the 0.05 level (bilateral)

13.4.4 Work Satisfaction

The mean for intrinsic satisfaction, which must be between 7 and 49, is 29.88, which represents 54.48%, with a standard deviation of 12.76; the mean for extrinsic satisfaction, which must be between 8 and 56, is 36.78, which represents 59.97%, with a standard deviation of 13.42; while the average for general satisfaction, which must be between 15 and 105, is 66.66, which represents 57.40%, with a standard deviation of 25.89.

Regarding internal consistency, Cronbach's alpha coefficient (α) was reported to be between 0.960 and 0.976. These results presented better quality than those reported in the reference instrument NTP 394 (1995). This means that there is a high level of internal consistency.

Table 13.8 presents the results of the measurement of job satisfaction.

To facilitate the interpretation of the results, Table 13.9 shows the intervals of the scale that were applied, whereby the intrinsic satisfaction of the personnel is found to be neither satisfied nor dissatisfied, while, for extrinsic satisfaction and general satisfaction, it is located at moderately satisfied.

	Intrinsic satisfaction	Extrinsic satisfaction	Overall satisfaction
Scale points	7–49	8–56	15-105
Media	29.88	36.78	66.66
Percentage (%)	54.48	59.97	57.40
Dev. std.	12.76	13.42	25.89
Cronbach's alpha (α)	0.960	0.947	0.976

Table 13.8 Results' measurement of job satisfaction

	very unsatisfied	Dissatisfied	Moderately dissatisfied	Neither satisfied not dissatisfied	Moderately satisfied	Satisfied	Very satisfied
	1	2	3	4	5	6	7
Percentage (%)	0–15	15–29	29–43	43–57	57–71	71–86	86–100
Intrinsic satisfaction	7–13	13–19	19–25	25–31	31–37	37–43	43–49
Extrinsic satisfaction	8–15	15–22	22–29	29–35	35–42	42–49	49–56
Overall satisfaction	15–28	28-41	41–54	54-66	66–79	79–92	92–105

 Table 13.9
 Scale intervals for evaluation of results

Variables	Items	Scale	Calculation	Regarding 100%	
Intrinsic	2, 4, 6, 8, 10, 12, and 14	7–49	105 * 7/15 = 49	= 100 - (100 * (49 - 29.88)/42) = 54.48	49–7 = 42
Extrinsic	1, 3, 5, 7, 9, 11, 13, and 15	8–56	105 * 8/15 = 56	= 100 - (100 * (56 - 36.78)/48) = 59.97	56-8 = 48
General	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	15–105	15 * 7 = 105	= 100 - (100 * (105 - 66.66)/90) = 57.40	105–15 = 90

Table 13.10 Scales and subscales of NTP 394

To analyze the interval table, it was considered how each of the components indicated in Table 13.10 was obtained; both the scales, the ranges of each dimension, and the general satisfaction and the percentages. First, the answers of all the respondents were consolidated in an Office EXCEL[®] spreadsheet from 1 to 15. All of the responses for each item were summed according to the extrinsic and intrinsic dimensions, as well as the sum of overall satisfaction. Subsequently, the averages of the variable and each one of its dimensions were obtained, and based on these values, the standard deviation and internal consistency were calculated. According to the reference instrument (NTP 394) that was used in the study to measure job satisfaction, its general scale is made up of the two subscales and was determined below in Table 13.10.

In this way, it was possible to interpret that the calculations made on the mean of the variable and its dimensions are percentages that are references to analyze how much the job satisfaction of the workers can be improved, which in this case is in high demand; general satisfaction can be improved by 42.60%. The analysis was summarized that intrinsic satisfaction was found at an average of 29.88, which is equivalent to 54.48%, extrinsic satisfaction was found at an average of 36.78, which is equivalent to 59.97%, and the data of the most relevance for the study are that the general satisfaction was found at an average of 66.66%, which is equivalent to 57.40 concerning 100%. The latter indicates that the satisfaction can be improved since it is located on a qualitative scale of "Moderately satisfied" or at a level 5 out of 7, as can be seen in Fig. 13.3.

13.4.5 Relationship Between Leadership and Satisfaction

To evaluate the relationship between leadership and job satisfaction, correlation analyses were carried out between the different variables, using the Pearson's correlation coefficient as a statistic, finding significant relationships between transformational and transactional leadership styles and general satisfaction, while the data analyzed did not show a significant relationship between the Laissez-Faire style and general satisfaction. The results are presented in Table 13.11.

7-49	8-96	19-109				
54,48	59,97	57,40	%			
Very unsatisfied 1 7-13 0-15%	Dissatisfied 2 13-19 15-29%	Moderately dissatistied 3 19-25 29-43%	Ni Ni 4 25-31 43-57%	Moderately Satisfied 5 <i>31-37</i> 57-71%	Satisfied 6 37-43 71-86%	Very satisfied 7 <i>43-49</i> 86-100%
Very unsatisfied 1	Dissatisfied	Moderately dissatisfied 3	Ni Ni 4	Moderately Satisfiedo 5	Satisfied	Very satisfied
0-15%	15-22%	29-43%	43-57%	57-71%	71-86%	49-50 86-100%
Very unsatisfied 1 15-28 0-15%	Dissatisfied 2 <i>28-41</i> 15-29%	Moderately dissatisfie 3 41-54 29-43%	Ni Ni 4 54-66 43-57%	Moderatel Satisfiedo 5 66-79 57-71%	Satisfied 6 79-92 71-86%	Very satisfied 7 <i>92-105</i> 86-100%

Fig. 13.3 Scales and percentage of job satisfaction

T 11 10 11 0 1 1				
Table 13.11 Correlation matrix leadership versus			General job satisfaction	
general satisfaction	Transformational leadership	r	0.566**	
		Sig	< 0.001	
	Transactional leadership	r	0.372**	
		Sig	< 0.001	
	Laissez-Faire	r	-0.141	
		Sig	0.094	
	**			

**. The correlation is significant at the 0.01 level (bilateral)

In Table 13.11, "r" is the result of the Pearson's correlation coefficient, which varies between -1 and +1, which indicates that if the value is high or closer to 1, there is a greater correlation between the variables and vice versa, the closer it is to 0, the less correlation there is, and the value of "Sig." is the value of significance and its result must be very low among the values set to mean a high correlation; for this analysis, the IBM[®] SPSS system was used, respectively.

Therefore, it could be interpreted that there is a high positive correlation between transformational leadership and general satisfaction due to its value of $r = 0.566^{**}$; in this case, both variables tend to increase together: the greater the Transformational Leadership, the greater the General Job Satisfaction, *as* well same; it was verified that there is a positive correlation of lower relationship between the variables of transactional leadership and general job satisfaction. And, consequently, it was verified that there is a negative correlation between the Laissez Faire variables and job satisfaction; since -0.141 < 0 (less than 0), it is interpreted that if there is more Laissez-Faire leadership, general job satisfaction tends to decrease.

According to the significance analysis, the value of 1% and 99% reliability is set, that is, a = 0.01 (this a value can vary between 0.01 and 0.10); then, the result associated with that correlation has to be less than or equal to. The hypothesis was verified according to the analysis in Table 13.12.

When a *p-value* is less than or equal to the level of significance, the null hypothesis is rejected; therefore, the hypotheses proposed for the study, both the research hypotheses and the alternative hypotheses, were verified. Since, according to what has been theoretically reviewed, the Laissez Faire leadership style is not related to job satisfaction, being very isolated from their management of work teams, and not being able to guide, mediate or resolve group conflicts in a natural and constant; transactional leadership style, by being stable in its procedures and maintaining them over time, offering valuable rewards for the workers and among these, some attractive to them and in one way or another generates motivation in them, then, it shows a positive direct relationship with job satisfaction.

Transformational leadership showed a positive and high relationship with job satisfaction, being a person accepted by his subjects, but voluntarily and developing in their capacities to adapt and face changes and uncertainties always to improve, through strategies, that can inspire and motivate them for their mere personal satisfaction and, at the same time, for the benefit of the organization.

Additionally, a linear regression analysis was performed for the variables with significant relationships to obtain a model. In annexes (*Annex. 1*), the results of the analysis and the resulting models are reported. Likewise, the values of the coefficient of determination (R²), and the analysis of variance (ANOVA), all significant at 1%, show the validity of the models presented, and, therefore, the relationship between job satisfaction and transformational and transactional leadership styles, respectively.

	5	
Type of hypothesis	Decision rule	Analysis
(Ha): Transformational leadership affects the job satisfaction of workers	a = 0.01 (p-value = 0.000 p < 0.01)	The <i>p</i> -value is less than the significance level <i>The null hypothesis is rejected</i>
(H3): Transactional leadership affects the job satisfaction of workers	a = 0.01 (<i>p</i> -value = 0.000 <i>p</i> < 0.01)	The <i>p</i> -value is less than the significance level There is a relevant level of significance in the correlation, but it is less related to the research hypothesis
(H4): Laissez Faire leadership affects the job satisfaction of workers	a = 0.01 (p-value = 0.094 p < 0.01)	The <i>p</i> -value is greater than the significance level <i>No significant relationship is found</i>
(H0): Transformational leadership does not affect workers' job satisfaction	There is sufficient evidence to r	reject the null hypothesis

Table 13.12 Null hypothesis rejection

To conclude the data analysis, through the linear regression analysis, it can be determined what objective 2 establishes, "If the *leadership that the organization has an impact on general job satisfaction*", then it is said that through the formula "y = a + bx", "y" would be the dependent variable; therefore, it is the one that is defined from the other variable "x", which seeks to know how the leadership style impacts on satisfaction. Taking into consideration that " R^2 " is the equation measure to predict the quality of that same equation, for which reason it was analyzed that the higher and closer to 1 the values are, indicates better quality.

Being a predictive model, it was possible to deduce that it is not necessary to measure satisfaction since the value of R^2 is representative and of quality to determine how much one variable affects the other.

The ANOVA analysis of variance sought to demonstrate how good the model is to predict the impact of one variable on the other, that is, in this case, to predict satisfaction and is a measure of support for R^2 , and to test the homogeneity of variances, therefore, scientifically reflects the goodness of fit of a model to the variable that it tries to explain, which in the same way, is equivalent to a degree of significance of less than 0.05 or 0.01 where *p*-value < significance, and both in the ANOVA analysis of variance of the transformational leadership and job satisfaction variables, the value is significant, it allows testing the null hypothesis that the population means are equal (equality of means), against the hypothesis alternative that at least one of the populations differs from the others in terms of its expected value and it was deduced that it has a high level of goodness to predict satisfaction (*Annex 2 and Annex 3*).

These measurements were made using the IBM® SPSS system.

It is worth noting the importance of using the ANOVA variance model as a classical multivariate inferential technique because a simple phenomenon and/or process was analyzed by studying the behavior of several independent variables (transformational, transactional, and laissez-faire leadership) and a single variable. dependent (job satisfaction), which makes it possible to abandon a more complex structural equation model to study a series of dependency/cause relationships simultaneously.

In general terms, the leadership style that predominates in the organization is transformational leadership which, according to what was theoretically reviewed and verified in the data analysis, is the one that most influences overall job satisfaction. As well as, there is a significant value of transactional leadership according to the criteria of the respondents; for this reason, a proposal for a transformational leadership model should be proposed for the training and development of middle management leaders of the plant, to significantly increase job satisfaction indicators that are at a medium to low level.

13.5 Conclusions

The leadership style that predominates in middle managers in the management of work teams was diagnosed by applying the measurement instrument Leadership Styles Questionnaire (CELID-S) developed by Castro et al. (2004), which was obtained as a result and rejecting the null research hypothesis, that the predominant style in the group is transformational leadership, followed by transactional leadership and in a smaller amount and very insignificant, the laissez-faire style. It was verified that, in the plant, there are various ways of directing human talent, therefore, there is not, and has not been established, a certain style of leading in middle management.

It was determined if the organization's leadership style affects the job satisfaction of workers through the application of the Warr, Cook and Wall job satisfaction scale instrument, Spanish version and adapted by Pérez-Bilbao and Fidalgo (1995), called NTP 394: General Satisfaction Scale. The style that affects the highest level of general job satisfaction is transformational leadership, followed by a lower proportion of transactional leadership, and there was no correlation between satisfaction and laissez-faire since its result was a negative correlation between the variables. It was analyzed from the dimensional point of view of how it influences the satisfaction in which intrinsic satisfaction was found on average less than the extrinsic satisfaction of the workers.

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Part III Data Mining and Big Data—Marketing Data Science

Chapter 14 **Analyzing the Framework Conditions** for Digital Entrepreneurship. **An Empirical Evaluation of Country Performance**



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Abstract Finding a way to integrate and exploit digital technologies in businesses is one of the market challenges, that requires a framework for digital entrepreneurship. Consequently, the goal of this research is to identify the framework conditions for digital entrepreneurship, by performing a Data Envelopment Analysis on a sample of 46 world countries. The results of the empirical endeavor highlight that 25 countries from the sample are considered relatively efficient based on their output maximization of specific levels of national inputs. The efficient decision-making units can serve as a peer or optimal benchmark for the inefficient ones. Taking into account their inputoutput performance, the USA, Guatemala, and Morocco are the most important peers. Oppositely, the most inefficient countries from the sample are Togo, Lithuania, Saudi Arabia, and United Arab Emirates. Summarizing the findings, the most efficient countries are the ones included in the lower-middle-income group. Based on the theoretical and empirical investigation, it should be stated the significance of the national context, where the level of income was not strongly related to the results in developing digital entrepreneurship.

14.1 Introduction

The three pillars of economic development include perceiving entrepreneurial opportunities, carrying out entrepreneurial activities, and promoting innovation. But since technology changed society as a whole, the market has changed as well, and as a result, entrepreneurs are using digital tools more frequently.

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The intensive use of digital platforms, mobile devices, mobile applications, and other digital infrastructures contributes to reconfiguring the entrepreneurial ecosystem [1]. Generally, even in the context of this new phenomenon [2], known as *digital entrepreneurship* [3], the discrepancies between the countries (but also the same country, between regions) are still maintained and the success of developing digital entrepreneurial activities is unclear [4]. This statement is supported by different perspectives from previous research that argue the ineffectiveness of the political decisions [5], the institutional infrastructure [6], or the unfriendly national context.

Grounded on the approaches from the specialty literature and assuming the limited space allocated for the analyzed topic [2], the main research purpose is to identify a general framework in developing digital entrepreneurial activities. Thus, taking into consideration the previously mentioned points, the paper will be structured as follows: Firstly, a review of the specialty literature will be exposed, and thereafter, the methodological approach will be described. Secondly, a Data Envelopment Analysis will be performed, considering a sample that includes 46 world countries, using specific variables representative of the research topic. Finally, in order to describe the particular outputs, the results will be presented, including the limitation of the study and the conclusions of the research.

14.2 Literature Review

Over time, adaptation has become a key determinant of the market process. One of the most important aspects that led to the transformation of the activities is the permanent technological change. Ergo, the business environment is confronted with one significant challenge, namely finding a way to integrate and exploit digital technologies [7] in order to create new business models, products, and processes. Under these assumptions, digital entrepreneurship is seen as the convergence between traditional entrepreneurship and the adoption of digital technologies [8, 9] and constitutes a crucial foundation for the growth of the digital economy [9, 10].

A general perspective on *digital entrepreneurship* was formulated by Nambisam, which defines it as the integration of digital technologies in entrepreneurial activities or, in other terms, the crossroad between digital technologies and entrepreneurial activities [3]. Proceeding from the literature, digital entrepreneurship leads to new dimensions of the market process, for meeting the consumers' needs [11]. However, this process is also influenced by several determinants of digital entrepreneurship, such as the entrepreneurial profile, financial resources, innovative attitude, or other external factors [12].

Based on pertinent data, an empirical spotlight is required to complete the theoretical background. Giving the scarcity of data concerning digital entrepreneurship, our research investigates different indicators associated with to the adoption of ICT tools in entrepreneurial activities. Basically, the data evaluating the impact of digital instruments on the economy assess the situation of different samples; for example, the DESI index analyzes the EU member states in terms of the digitalization of the economy [13], while Wiley Digital Skills Gap Index provides an overview on digital competencies discrepancies for 134 world economies [14]. Additionally, the Digital Adoption Index, provided by the World Bank, quantified digital adoption at individual, entrepreneurial, and governmental levels, but the last available data are for the 2016 year.

Considering these aspects, we studied the last report of the Digital Skills Gap Index (DSGI), which brings to the fore that a significant number of world economies are struggling to narrow the digital skills' gap. This gap refers to the disparity between the demand for digital skills, considering the level of industrial development, and the ability of policymakers, education institutions, and corporate trainers to address the talent shortage by providing the required skills [14]. Related to our discussed topic, Table 14.1 provides an evaluation of the digital skills in the countries of the selected sample.

The information provided through Digital Skills Gap Index (DSGI) emphasizes the persistent discrepancies between the world's economies. At the level of the selected sample, the highest value of the DSGI was registered in the United Arab Emirates, explained through its success in promoting ICTs' importance to governmental perspective, but also by the World Digital Competitiveness Index. Secondly, important scores were registered by Sweden and Qatar, particularly recognized for

Country	DSGI score	Country	DSGI score	Country	DSGI score
Chile	3.80	Uruguay	5.00	Austria	6.50
Brazil	3.90	Slovakia	5.10	Canada	6.50
Mexico	4.00	Hungary	5.20	China	6.70
Morocco	4.10	Indonesia	5.20	Korea	7.00
Panama	4.20	Latvia	5.40	Germany	7.10
Colombia	4.30	Poland	5.60	Israel	7.10
Egypt	4.40	Cyprus	5.70	Luxembourg	7.20
Iran	4.40	Slovenia	5.70	The Netherlands	7.20
South Africa	4.40	Lithuania	5.80	Norway	7.20
Tunisia	4.40	Japan	5.90	Switzerland	7.20
Romania	4.70	Spain	5.90	The UK	7.20
Croatia	4.80	Saudi Arabia	6.30	Qatar	7.30
Greece	4.80	The USA	6.30	Sweden	7.30
Serbia	4.80	France	6.40	The UAE	7.50
India	5.00	Oman	6.40	Guatemala/Togo	N/A

 Table 14.1
 Digital Skills Gap Index—2021

Source Digital Skills Gap Index, 2021

their digital responsiveness (Sweden) or governmental support (Qatar). At the opposite pole, there are Chile and Brazil, with major issues with digital skills institutions (Chile) or governmental support (Brazil).

Many countries recognize digital entrepreneurship as a fundamental driver of economic growth, job creation, and innovation [15]. Specifically, a study on the EU member states highlighted that digital entrepreneurship is closely associated with productive and innovative entrepreneurship, creating a strong relationship that fosters economic productivity and innovation [16]. Particularly, a study case on Estonia brings to the fore the necessity of prioritizing the enhancement of efficiency for improving digital entrepreneurial activities [17]. By referring to a sample of 22 countries, Aminova et al. identified a high, but unexploited potential of digital entrepreneurship in the Arabic world [18].

Building on the previous assumptions, a gap in the research literature on quantifying the general determinants of digital entrepreneurship was identified. Therefore, our research was designed to provide a framework for digital entrepreneurship. In this regard, the following sections will expose the methodological approach and the results of the proposed model.

14.3 Research Methodology

Consistent with the research objective of identifying a general framework for developing digital entrepreneurial activities, the methodological approach was designed based on a literature review and an empirical analysis.

The process of data collection was focused on analyzing the latest available information. Hence, the year under analysis was 2022. In line with existent perspectives from the specialty literature, for achieving the proposed goal, we assumed the aspects that contribute to a better understanding of the innovational dimension in entrepreneurship. Subsequently, seven sub-dimensions that describe the Global Innovation Index [19] and Global Entrepreneurship Monitor [20] were studied. The sample is represented by 46 world countries, and it was limited by data availability. Based on their income levels, Table 14.2 provides an overview of the sample structure.

The methodological approach was properly designed to achieve the proposed goal, namely, to identify the framework conditions for digital entrepreneurship. In this regard, performing Data Envelopment Analysis (DEA) method was considered appropriate. As indicated by the literature, DEA is a non-parametric test that provides the calculation of relatively efficient scores of a decision-making unit (DMU), based on input and output variables [21–23]. For the selected sample, an output-oriented model was selected for evaluating the output maximization for specific levels of inputs, assuming constant returns to scale (CRS).

Particularly, the *inputs* are represented by the following variables: *Institutions* (political, regulatory, and business environment), *Human capital and research* (education and expenses for this sector, tertiary education, university rankings, and

Level of income group	Country
Low-income	Тодо
Lower-middle-income	Egypt, Morocco, Tunisia, Iran, India, Indonesia, Brazil, Mexico, Panama, Colombia, Guatemala
Upper-middle-income	Romania, Serbia, China, South Africa, Chile, Uruguay
High-income	Austria, Croatia, France, Germany, Greece, Hungary, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Spain, Sweden, Slovakia, Slovenia, Switzerland, the UK, Canada, the USA, Cyprus, Israel, Oman, Qatar, Saudi Arabia, the UAE, Japan, Korea

Table 14.2 Countries by the level of income

expenditure on R&D), *Infrastructure* (information and communication technologies use and access, general infrastructure, and ecological sustainability), *Market sophistication* (credit accessibility, market capitalization and venture capital, trade, diversification, and market scale), *Business sophistication* (knowledge workers and knowledge absorption, innovation linkages, university–industry R&D collaboration), *National Entrepreneurship Context Index—NECI* (13 national entrepreneurial framework conditions), and *Total Entrepreneurial Activity—TEA* (the percentage of adults, aged between 18 and 64, who are starting or running a new business), while the considered outputs are: *Knowledge and technology outputs* (knowledge creation, diffusion and its impact), *Creative outputs* (intangible assets, creative goods and services, and online creativity), and *Digital entrepreneurship* (use more digital technology to sell products or services).

14.4 Results and Discussions

The results of performing the empirical endeavor through Data Envelopment Analysis are illustrated in Table 14.3 and Fig. 14.1. For methodological clarity, several specifications related to the interpretation of the results should be shortly introduced:

- (1) The efficiency scores, calculated taking into account the input-output ratio, provide an overview of each decision-making unit (DMU). Thus, based on the DEA results, these can be divided into two main categories, namely: (1) the efficient decision-making unit, with results for the input-output ratio equal to one; (2) any result different from 1 defines an inefficient approach of that decision-making unit.
- (2) If the DMUs are considered inefficient, based on their input–output ratio, they should adjust their practices by increasing or decreasing their returns to scale (RTS). Technically, a transformation of an inefficient DMU into an efficient one can be led by resizing the operational scale. Thus, an increase of returns to scale is considered if $\alpha < \beta$, where α represents the proportional input increase and β the resulting proportional increase of the single output, while oppositely,

	DMU	Output oriented efficiency	Efficiency score (%)	Lambda sum	RTS
1	Austria	1.02579	97.49	1.0508	Decreasing
2	Brazil	1	100.00	1	Constant
3	Canada	1.26533	79.03	1.092	Decreasing
4	Chile	1.09868	91.02	1.1659	Decreasing
5	China	1	100.00	1	Constant
6	Colombia	1.24981	80.01	1.1369	Decreasing
7	Croatia	1.10973	90.11	0.9709	Increasing
8	Cyprus	1	100.00	1	Constant
9	Egypt	1	100.00	1	Constant
10	France	1.2819	78.01	0.8947	Increasing
11	Germany	1	100.00	1	Constant
12	Greece	1.06864	93.58	0.918	Increasing
13	Guatemala	1	100.00	1	Constant
14	Hungary	1	100.00	1	Constant
15	India	1.07465	93.05	0.7713	Increasing
16	Indonesia	1.01398	98.62	0.9505	Increasing
17	Iran	1	100.00	1	Constant
18	Israel	1	100.00	1	Constant
19	Japan	1	100.00	1	Constant
20	Latvia	1.15426	86.64	1.0126	Decreasing
21	Lithuania	1.47656	67.72	0.9735	Increasing
22	Luxembourg	1.12619	88.79	1.0802	Decreasing
23	Mexico	1	100.00	1	Constant
24	Morocco	1	100.00	1	Constant
25	The Netherlands	1	100.00	1	Constant
26	Norway	1.34176	74.53	1.1424	Decreasing
27	Oman	1.26823	78.85	0.9912	Increasing
28	Panama	1	100.00	1	Constant
29	Poland	1	100.00	1	Constant
30	Qatar	1	100.00	1	Constant
31	Korea	1	100.00	1	Constant
32	Romania	1	100.00	1	Constant
33	Saudi Arabia	1.41104	70.87	1.377	Decreasing
34	Serbia	1.02079	97.96	0.8464	Increasing
35	Slovakia	1	100.00	1	Constant

 Table 14.3
 Efficiency scores and optimal Lambdas with benchmarks

(continued)

	DMU	Output oriented efficiency	Efficiency score (%)	Lambda sum	RTS
36	Slovenia	1	100.00	1	Constant
37	South Africa	1.12083	89.22	0.9364	Increasing
38	Spain	1.0094	99.07	0.8372	Increasing
39	Sweden	1	100.00	1	Constant
40	Switzerland	1	100.00	1	Constant
41	Togo	1.6156	61.90	0.6796	Increasing
42	Tunisia	1	100.00	1	Constant
43	United Arab Emirates	1.40924	70.96	1.6998	Decreasing
44	The UK	1	100.00	1	Constant
45	The USA	1	100.00	1	Constant
46	Uruguay	1.14322	87.47	1.1544	Decreasing

Table 14.3 (continued)



Fig. 14.1 Efficient and inefficient countries

for decreasing returns to scale, $\alpha > \beta$ [24]. In the case of efficient DMUs, the returns to scale are constant.

(3) Particularly, for the inefficient DMUs, optimal lambdas with benchmarks are provided through the R output. Correspondingly, based on the theoretical background, these are seen as peers for improving the overall performance of a DMU under evaluation. In other words, the references or the optimal targets are efficiency guidance measures for decreasing or increasing the input–output ratio. Based on the peer weight (known as *lambda*), it can be stated the relative importance of that optimal benchmark [25].

Concisely, technical efficiency is taken into account when calculating the relative (in)efficiency scores. Thus, based on our input–output variables, the results are particularly valid for the suggested model, which assumes an output-oriented approach. As regards the comparative efficiency scores of DMUs, research results can be presented. Thus, on the one hand, there are the efficient countries in terms of entrepreneurship digitalization, which are seen as peers for inefficient ones and graphically presented with green in Fig. 14.1. Oppositely, there are the inefficient ones, that registered scores higher or smaller than 1, presented with red in the figure below. With respect to this, it should be mentioned that each arrow from the inefficient DMUs to the efficient ones represents its peers or its optimal benchmarks.

The research findings highlight the fact that the majority of the analyzed sample can be seen as efficient in terms of providing a supportive framework for enhancing digital entrepreneurial activities. This statement is supported by the fact that 25 out of 46 countries under analysis are considered relatively efficient. Assuming a cluster approach, based on the level of income group, it can be stated that:

- (1) Taking into consideration a given level of input, none of the low-income countries is considered relatively efficient in maximization of digital entrepreneurship. Therefore, Togo, as an inefficient country with a low-income level, must improve its practices by increasing the returns to scale.
- (2) From the lower-middle-income group, 8 out of 11 countries (72.72%) are considered relatively efficient (Egypt, Morocco, Tunisia Iran, Brazil, Mexico, Panama, and Guatemala).
- (3) In the category of upper-middle-income, two countries out of six are relatively efficient (Romania and China), which means only 33.33%.
- (4) The most important category, high-income countries, registered values of efficiency only for 53.57%, which means 15 out of 28 countries (Germany, Hungary, the Netherlands, Poland, Sweden, Slovakia, Slovenia, Switzerland, the UK, the USA, Cyprus, Israel, Qatar, Japan, Korea).

Following the theoretical approach, these can serve as peers for the inefficient ones, based on their output maximization of specific levels of national inputs.

The results of the proposed model focused on maximizing digital entrepreneurship taking into account the national inputs, and labeled the ranking of the most important peers, which can be observed in Fig. 14.2.



Fig. 14.2 The efficient DMUs as peers—based on times appearing in reference sets

It was revealed that two different categories of economies—one with high-income (the USA) and one with upper-middle-income (Guatemala)—represent the most important peers for the inefficient ones, based on their particular results of the proposed model (fundamentally oriented to identify the results in developing digital entrepreneurship initiatives). From an efficiency perspective (in other words, technical efficiency), these are peers or optimal benchmarks for 12 economies, while Morocco and Slovenia are peers for 11 and, respectively, 9 world economies. In the case of the selected sample, even if Qatar and Hungary are relatively efficient in promoting digital entrepreneurship, their practices cannot be multiplied by other inefficient DMUs under analysis to improve their performance.

With reference to the efficient DMUs, particular aspects for describing the national digital entrepreneurial context should be highlighted. In the case of the USA, the value of the index that describes the national entrepreneurship context brings to the fore a favorable environment (5.2 points) that facilitates TEA (19.20 points). Also, in the same category of the most important peers, according to DEA results, Guatemala has registered a significantly lower value of the same index (3.8 points), but the highest score in TEA (29.4 points). If we assume the values of the Global Innovation Index, there is no doubt related to the USA's position (2nd ranked—61.8 points), comparatively with Guatemala, which is 45th out of 46th (17.80 points). Additionally, a spotlight on digital entrepreneurship, seen as an output of TEA and

innovation, ranks Guatemala (72.6 points) in a superior position than the USA (56.6 score) in using more digital technology to sell products or services, even if the other discrepancies between the level of development are still persistent. However, even if is a small space allocated to the study of the issues of digital divide and digital entrepreneurship in Guatemala, one of the studies reveals that the country offers a solid combination of entrepreneurs, technological assets, a skilled workforce, and a developing tech sector [26]. Statistically, in terms of innovation outputs, Guatemala outperforms innovation inputs, while the USA performs better in innovation inputs [19]. Putting together the model findings and the other available data, we can agree on a homogenous approach, that highlights that two different types of economies can be seen as good practitioners in digital entrepreneurship, especially in the output's maximization of the available inputs. This statement argues that not just the rich countries can innovate the market process, but also followers.

Theoretically and empirically, the results of the proposed model are supported by different studies, such as the Digital Platform Ecosystem Index (DPE), proposed by Acs et al. [27]. For example, in the case of the selected sample, there three main European economies are considered efficient in terms of maximization of the digital entrepreneurship output, based on their national inputs, namely: the UK, the Netherlands and Germany. Based on the DPE index, the UK (2nd ranked, after the USA) and the Netherlands (3rd ranked) outperform most other countries in the world, while Germany or other European countries are mostly followers, but not leaders in terms of digital entrepreneurship [28].

Oppositely, the most 5 inefficient countries from the sample in terms of maximizing digital entrepreneurship, based on particular national inputs, are Togo (61.90% efficiency score), Lithuania (67.72% efficiency score), Saudi Arabia (70.87% efficiency score), United Arab Emirates (70.96% efficiency score) and Norway (74.53% efficiency score). In their case, the input–output ratio that describes the orientation to digital entrepreneurship is confirming the inefficient use of the available resources for output maximization. Subsequently, the inefficient DMUs should consider the improvement of their input–output ratio by assuming the best practices implemented by the efficient countries.

For example, Togo, as a country included in the low-income category (< \$20,000), could increase its results assuming the peers' example, particularly Panama (lambda = 0.3908) and Guatemala (lambda = 0.2888). According to Global Entrepreneurship Monitor, the pandemic drastically reduced households' incomes, by over 90%. Even so, Togo citizens are oriented to invest in someone else's new business (less than \$100) and to open their own firms (24.1% TEA) [20]. In any case, the performance of Togo is in line with its level of development, where the major issues are in terms of innovation, particularly knowledge and technology outputs, creative outputs or business sophistication [19].

Lithuania's performance in terms of providing a framework for digital entrepreneurship is lower than the expectations. With an efficiency score of 67.72%, Lithuania can consider the practices of Romania (lambda = 0.376), Switzerland (lambda = 0.3139), Guatemala (lambda = 0.1498), Iran (lambda = 0.1181) and the USA (lambda = 0.0157). According to previous findings, Lithuania has the smallest

share of the ICT industry in the CEE countries [29], with a negative shift in the related rankings in the last few years. In this particular case, the Lithuanian's orientation to innovation inputs performance and the less effectiveness in outputs innovation was demonstrated [19].

Ranked by Global Entrepreneurship Monitor [20] as the best economy to start a business around the world, in the case of the proposed model, the United Arab Emirates is relatively inefficient in digital entrepreneurship. Similarly, Saudi Arabia—2nd in the same ranking, is also considered inefficient. Based on the available data and consistent with other previous research, their persistent problems are especially in the innovation outputs. According to DEA results, the United Arab Emirates has registered an efficiency score of 70.96%. For improving the results, the UAE's peers are Morocco (lambda = 0.6025), Guatemala (lambda = 0.407), Egypt (lambda = 0.2905), Panama (lambda = 0.2897), Slovenia (lambda = 0.099) and USA (lambda = 0.0111). Saudi Arabia, with a relative efficiency of 70.87%, should improve its performance by using the references of Morocco (lambda = 0.6624), Guatemala (lambda = 0.3851), Iran (lambda = 0.2759), Israel (lambda = 0.0352), Mexico (lambda = 0.0117) and Tunisia (lambda = 0.0067). In other words, even if these rich countries have different resources that can facilitate the use the digital technologies for entrepreneurship, these are still unexploited.

Similarly, Norway (74.53%) is also considered an inefficient DMU, especially due to its outperformance in the output innovation [19]. According to the available data, the most significant issues that Norway is confronting are related to the integration of digital technologies in the business environment [13], but also the ICT graduates [19]. In this context, the failure of digitization projects and digitization unevenly in the public sector was observed [30]. Based on the proposed model, the peers for Norway are Morocco (lambda = 0.5121), Japan (lambda = 0.2665), Slovenia (lambda = 0.243), Poland (lambda = 0.092) and USA (lambda = 0.0288).

Putting together the previous information, the defining lines of the framework conditions for digital entrepreneurship can be summarized as follows:

- (1) Digital entrepreneurship activities are strongly influenced by the national context [28]. In this regard, different studies highlighted the connection between the digitalization degree of a national economy and the orientation to digital entrepreneurship [16]. Consistent with our results, different researchers identified the drivers of digital entrepreneurship are, generally, digital education and knowledge, digital entrepreneurial alertness and intention [31].
- (2) The levels of inputs are a significant condition for achieving performance in terms of business digitalization but are not the only decisive factors. Thus, even countries with important results in terms of input can be criticized for their inefficient results in terms of digital entrepreneurship. Thus, we can bring to the fore the cases of Saudi Arabia and the Emirates, which are performers in overall entrepreneurship (based on the available data), but with results that can be improved in integrating digital technologies for the entrepreneurship process. Practically, there is a necessity of improving the digital entrepreneurship orientation through specific policies and institutions [32].

(3) The statement of innovation as a pillar of entrepreneurship is strongly supported by the economic literature. In nowadays society, innovation inputs are seen as a *sine qua non* requirement for a new entrepreneurial orientation, that integrates digital instruments. Thus, the digital divide between the analyzed countries, especially in terms of innovation outputs and digital entrepreneurship can be also explained by the discrepancies in terms of skills and capabilities [33]. The findings obtained through performing Data Envelopment Analysis emphasize the necessity of transforming the innovation inputs into creative outputs, that include the integration of digital technologies in the entrepreneurial process.

The efficiency measurements through the DEA method highlight significant discrepancies between the countries, assuming the proposed model is designed to maximize digital entrepreneurial activity. In the case of the analyzed sample, we can state that the majority of the DMUs that are considered efficient in terms of digital entrepreneurship belong to a lower-middle-income group. Hence, this finding confirms the benefits of the followers in terms of exploiting digital innovations rather than the leaders. Even so, the potential of digital entrepreneurial opportunities is still unexploited by important categories of rich countries, that are confronted with major issues, particularly on output maximization of the available inputs.

14.5 Conclusions

The transformation of the overall society has led to the adaptation of entrepreneurship and conducted to the increase of using digital technologies for achieving better results or, in any case, for survival. Thus, digital entrepreneurs have become a new type of market drivers, with specific results, influenced by particular circumstances. Under these circumstances, the research methodology was designed to investigate the national efficiency or inefficiency in digital entrepreneurship for a sample of 46 world countries, using Data Envelopment Analysis (DEA).

The results of the DEA reaffirmed the existence of national discrepancies between the countries, even in an interconnected era. Thus, based on the proposed model that consists of an input–output approach, there were identified 25 relatively efficient countries out of 46. The efficient decision-making units can serve as a peer or optimal benchmark for the inefficient ones. Based on their input–output performance, the USA, Guatemala, and Morocco are the most important peers. Oppositely, the most five inefficient countries from the sample are Togo, Lithuania, Saudi Arabia, United Arab Emirates, and Norway. In their case, the input–output ratio that describes the orientation to digital entrepreneurship is confirming the inefficient use of the available resources for output maximization. However, it should be stated the significance of the national context, where the level of income was not strongly related to the results in developing digital entrepreneurial activity.

To sum up the previous results, following other theoretical and empirical approaches, a key element that describes the framework for digital entrepreneurship,

namely the significance of innovation performance in entrepreneurship was identified. Generally, the outperformers in innovation outputs must improve their results by adopting the practices of their peers. Despite all of this, the research has inherent limitations. Firstly, the sample heterogeneity and a single year under analysis lead to a partial view of the world's performance in digital entrepreneurship as an output, starting from entrepreneurship and innovation. Secondly, the input–output model can be criticized for the selected approach, which includes only variables related to innovation and entrepreneurship, but these limitations are pillars for future research directions.

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Chapter 15 Profiling Online and Physical Supermarket Customers Using Factor and Clustering Methods



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Abstract Profiling of customers allows businesses to address their needs with precision and to perform effective marketing actions. Profiling methods can be applied on questionnaire-based surveys or customer history data found in databases or log files. Machine learning techniques are able to capture consumer behavior and automatically perform profiling and targeted marketing actions, while data analytics and statistical analysis methods are more suitable as decision support tools. The aim of this paper was to extract the profiles of supermarket customers from their purchase history, giving emphasis in understanding their behavior and linking data-driven findings with known profiles from marketing theory. The analysis was conducted on a dataset that derived from the purchase records of 61 K supermarket customers over a rolling year. Data from both physical stores and e-shop were integrated with demographic data available through the loyalty program of the supermarket chain. The core methods utilized were a combination of multiple correspondence analysis (MCA) and hierarchical cluster analysis on principal components (HCPC). These methods were chosen for their excellent ability to discover trends and build easily explainable profiles, as well as to identify clusters based on a large number of qualitative variables. The analysis identified six supermarket customer profiles, which were associated with product preference patterns and features such as level of spending, loyalty, and promo-hunting. The profiles extracted by our data-driven methods were associated to profiles documented in consumer behavior research, suggesting potential marketing implications.

15.1 Introduction

The study of consumer profiles has a long history, dating back several decades, with the earliest references to consumer behavior appearing in magazines of the 1950s [21]. The field is rapidly evolving nowadays, following the remarkable progress

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in machine learning technologies. Profiling methods allow businesses to address the needs of their customers with precision and to perform effective marketing actions. In the field of supermarkets and e-grocery, competition has led businesses to adopt personalized marketing techniques and develop mobile apps and advanced loyalty programs. The goal of profiling methods is to identify distinct segments within a larger population based on common traits, behaviors, preferences, or demographics. In supermarkets, profiling offers insights into the customer's needs and preferences, leading to increased customer satisfaction, higher sales, better inventory management, and a more competitive position in the retail market.

Besides its multiple benefits, profiling also creates many challenges, especially when it involves the collection and analysis of personal data. Individuals may feel uncomfortable with the potential misuse of their personal data, and certain groups may receive unfair treatment. A negative public perception of profiling practices can lead to reputational damage for organizations. Finally, overreliance on automated profiling algorithms can lead to decisions that lack human oversight and nuance, revealing the importance of striking a balance between automation and human judgment.

Consumer profiles can vary depending on the information they are built upon, encompassing demographic, psychographic, behavioral [6], or geographic aspects [15]. Methods are divided into two major categories: supervised and unsupervised, while the data can be collected through questionnaire-based surveys or can be originating from databases or log files. Questionnaire-based methods contribute to marketing theory and offer valuable knowledge to marketing planners. However, they have their limitations, such as response/non-response, small samples with high cost, and social desirability bias. They may also have limited depth and context, poor wording, or cause fatigue [3]. On the other hand, data-driven methods employing machine learning and data science, offer objective decision-making based on empirical evidence, utilization of large datasets, personalization relying on the customer's behavior and preferences, and market competitiveness by making data-informed decisions [7]. Machine learning techniques (mainly based on deep learning) are able to capture consumer behavior and automatically perform profiling and targeted marketing actions, while data analytics and statistical analysis methods are more suitable as decision support tools.

The aim of this paper was to extract the profiles of supermarket customers from their purchase history and loyalty program data, giving emphasis in understanding their behavior and linking data-driven findings with known profiles from marketing theory. Our further goal was to develop an advanced customer classification mechanism that provides information to the digital marketing platform used by a supermarket chain. For this purpose, we applied statistical methods from the family of multidimensional data analysis [2], namely a combination of multiple correspondence analysis (MCA) and hierarchical clustering on principal components (HCPC) [14]. The chosen data-driven approach involves powerful explorative statistical methods, which are promising for discovering patterns and building profiles, as well as identifying clusters of customers based on their purchasing behavior [9].

15.2 Related Work

In this section, we briefly review the literature on supermarket customer profiling. Initially, we present methods applied on questionnaire and transactional data. In this work, the metrics extracted from transactions are about the amount spent and the frequency of purchases, focusing on customer loyalty and spending. We subsequently examine studies that explore transactional data more extensively, taking into account product attributes such as their group, price, and whether they were offered as part of a promotional campaign.

15.2.1 Profiling Supermarket Customers Through Transactions and Questionnaires

One of the most fundamental methods applied in the supermarket (SM) sector is the Recency-Frequency-Monetary (RFM) analysis [8]. Clustering methods are also widely used. In [12], the authors, using transactional data from supermarket clients, evaluated the results of two different clustering methods: crisp clustering and fuzzy clustering and concluded that the latter provides better results. Rokaha et al. [27], utilizing hierarchical clustering, distinguish five groups of supermarket customers (high profit: high income and SM expenditure, high standard: average income and SM expenditure, low risk: low income and SM expenditure, high focus: high income but low SM expenditure, and low-care: low income and spend as much as their income). Lingras et al. [18] conducted temporal and non-temporal analysis based on conventional and modified Kohonen self-organizing maps (SOM)-a type of unsupervised neural network. The modified Kohonen SOM created interval set representations of clusters using properties of rough sets. The paper compared the above methods in studying customer loyalty and identified 5 clusters: loyal big spenders, loyal moderate spenders, semi-loyal moderate spenders, semi-loyal potentially big spenders, and infrequent customers. Although interval set clusters and crisp clusters were similar, the interval set representations of customers provided a warning of potential transition from a more desirable cluster to a less desirable one. Theodoridis and Chatzipanagiotou [29], using confirmatory factor analysis, distinguished four types of SM buyers in Greece: typical, unstable, social, and occasional, while Mahalakshmi et al. [19] distinguished seven types of consumers: lookers, discount hunters, buyers, researchers, new customers, dissatisfied customers, and loyal customers.

Loyalty is an important issue in marketing. In the supermarket sector, via a questionnaire-based survey, it was determined that the most significant factors contributing to loyalty included emotional commitment, satisfaction with the environment, and the value offered by the visit experience [30]. Omar et al. [25] combined geographical and behavioral characteristics and concluded that students studying in big cities are brand-conscious and consider price as an indicator of quality, while students whose university is located away from a large city are Recreational-Shopping

consumers. Harris et al. [11] conducted a survey on customers who made grocery purchases both online and offline. They grouped store and online customers separately, considering their perceptions of the advantages and disadvantages associated with each shopping channel. The cross-tabulation of these customer clusters suggested that the decision to shop online or in-store might not necessarily hinge on the perceived advantages of one channel over the other, but rather on the desire to avoid the greater disadvantages of the alternative.

15.2.2 Profiling Supermarket Customers Based on Purchased Products Characteristics

In their research, Oliveira and Ara [24] adapted a modified RFM model and used Gaussian mixture models to cluster the data. The RFM model was enriched with the average item price, the ratio of items on sale, and diversity. The average item price was an indicator of how premium a customer was, while diversity was measured as the number of different product categories in a transaction. The segmentation resulted in six customer profiles: frequent, specific, regular, opportunity, prime, and large shoppers. Nguyen [23] designed a segmentation model based on a combination of a deep neural network which attempts to compress the information of the input variables into a reduced dimensional space and a self-supervised probabilistic clustering technique. His results showed four clusters: customers who mostly buy daily groceries and fresh food, non-food cosmetics customers, customers that make small purchases (mainly convenience products), and customers who buy canned food, processed food, beverages, and confections.

Dogan et al. [5] highlighted that boundary data which are close to more than one segment may be assigned incorrect classes. So, they proposed an intuitionistic fuzzy clustering algorithm applied to supermarket consumers' data, according to the amount spent in eight main product categories. The results indicated that the intuitionistic fuzzy *c*-means produces more reliable and applicable marketing campaigns than conditional fuzzy *c*-means and *k*-means segmentation methods. Focusing on efficiency in big data, Huang and Zhou [13] designed a parallel algorithm of *k*-means based on Spark and validated it with sales data of a supermarket. By using the distributed system parallel computing, they improved the execution efficiency of the massive data operation.

Lingras et al. [17] implemented an iterative meta-clustering through granular hierarchy of supermarket customers and products. Information retrieved from transactional data about customers and products was represented as static granules. Subsequently, clustering was applied separately to both static granules. The proposed algorithm feeds the clustering profiles from one level of granularity to augment the information granules at the other level of granularity and vice versa. Also, in a later research, Lingras [16] performed a supermarket customers' clustering utilizing Kohonen neural networks, using as criteria the numbers of categories, subcategories, and items the customers purchased as well as the value of groceries, the number of visits, and discounts. The time series values of these six variables, over a thirteenweek period, were employed to represent the customers. Comparing the results to his previous work, he concluded that the value of groceries provides an indication of spending potential, the number of visits is a reasonable surrogate of customer loyalty, and discounts represent the value consciousness of the customer.

15.3 Methods

15.3.1 Overview of Analysis Process

The aim of the analysis process applied in this paper was to synthesize customer profiles by extracting patterns from their purchase history and identifying the main factors that explain their behavior. The input data were the log files of purchase history from both physical stores and e-shop, integrated with demographic data available through the loyalty program of the supermarket chain.

Our approach initially involved identifying distinct customer profiles based on their product group preferences. Subsequently, the elucidation of these profiles was enriched with demographic information and distinctive behavioral indicators, encompassing their preferred shopping channels (physical stores and e-shop), the temporal patterns of their shopping activities, their chosen payment methods, their dispositions toward private label products, the proportion of food-to-non-food product selections, as well as the ratio of products purchased on promotion. The customers' purchase history was analyzed by combining factor and cluster analysis: explorative factor analysis using MCA uncovered shopping trends and profiles of purchase preferences, while hierarchical clustering using Benzecri's chi square distance and Ward's linkage criterion was then applied to group customers with similar behavior. It should be noted that our analysis was primarily centered around product groups rather than individual items. This approach was driven by the supermarket chain's marketing objective, to identify the product groups that customers preferred when shopping at the particular chain, rather than focusing on specific brand preferences. Following that, the identified clusters were linked to preferences for specific product groups and various behavioral variables, which enabled the formulation of comprehensive customer profiles. Ultimately, marketing experts provided interpretations of these profiles, drawing connections to profiles documented in consumer behavior research and discerning potential marketing implications. The data analysis process scheme is presented in Fig. 15.1.



Fig. 15.1 Data analysis process scheme

15.3.2 Data Collection and Preparation

The dataset was derived from a rolling year's sales (1/4/2021–31/3/2022) of a large supermarket chain in Greece. The reference period starts 15 months after the outbreak of the COVID-19 pandemic. At that time, businesses and schools had reopened after the quarantine, and the normal daily activity of citizens was slowly being restored. For the purposes of the analysis, raw sales data were captured from both physical stores and the company's e-shop, integrated with the loyalty program data and aggregated at customer level. The supermarket's clientele consisted of hundreds of thousands of customers. Our dataset was a small sample of the company's clientele that consisted of 61.895 individuals (physical store, online and hybrid customers). The number of baskets in the dataset was in the order of 2 million.

The initial step in data preparation involved the integration of data from both the physical store database and the e-shop. The purchase data were then aggregated at customer and product group levels, taking into account both quantity and value. Additionally, a set of indicators was assessed for each customer, including preferences such as the type of store they typically visited and their propensity to purchase Private Label products, among others. It is worth noting that the product categorization hierarchy and the formulation of customer indicators were based on the existing work carried out by the company's analytics department.

After several cycles of experimentation in refining the feature set to be used, we concluded to a set of 52 qualitative variables:

(a) About 35 qualitative variables were utilized to capture each customer's purchasing history with respect to the products they predominantly buy (Table 15.1). Each variable corresponded to a specific product group and was derived from the total quantity of items purchased by the customer within that product group. These product quantities were transformed into attraction coefficients, normalized based on each customer's purchases and all customers' purchases collectively, and then categorized into three levels. As a result, we

obtained 35 qualitative product preference variables. Level 1 indicates that a customer buys significantly fewer or no items from a particular product category, level 2 signifies average quantities, and level 3 indicates a distinct preference, meaning larger quantities compared to other products in their basket and to other customers. These variables serve as active variables in both multiple correspondence analysis (MCA) and cluster analysis.

(b) About 17 qualitative variables depict the shoppers' characteristics. These variables were generated from statistical indicators computed from the customer's purchasing history and were converted into categorical variables using thresholding. The variables and their respective categories are presented in Table 15.2.

The descriptive statistics showed that the customers in the dataset shopped on average 33 times per year, and their average basket value was $22.30 \in$. They purchased 1 out of 4 products on promotion, and 18% of the products they bought were Private Label. Also 96.8% of them purchased only from physical stores, 1% purchased only online, and 2.2% from both channels. In addition, 55.8% of them preferred to pay by credit card, 41.5% in cash, and 2.7% with other types of payment.

Table 15.1 Active variables							
Variable name	Description	Variable name	Description				
Cold.cuts.UnP	Bulk cold cuts	Canned.food	Canned food				
Cold.cuts.P	Packaged cold cuts	Creams.pastry.R	Creams and pastry from the refrigerator				
Refreshments	Refreshments	Butchery	Bulk butchery				
Home.accessories	Home accessories	Butchery.Frz	Frozen packaged meat				
Dish.deter	Dish detergents	Vegetables.Frz	Frozen vegetables				
Cloth.deter	Laundry detergents	Greengrocery	Greengrocery				
Bakery.P	Packaged bakery	Cookies.snacks	Cookies and snacks				
Egg.butter	Eggs and butter	Alcohol.drinks	Alcohol drinks				
Milk.and.substit R	Milk and substitutes of milk from the refrigerator	Diapers.sanit.napkins	Diapers and sanitary napkins				
Yogurt	Yogurt	Breakfast	Breakfast				
Pers.hygiene	Personal hygiene products	Oil.vinegar.sauces	Oil, vinegar, and sauces				
Household	Household products	Cheese.P	Packaged cheese				
Food.dough.Frz	Frozen food and dough	Cheese.Unp	Bulk cheese				
Ready.meals	Ready meals	Bakery.fresh	Fresh bakery				
Confectionery	Confectionery	Papers	Papers				
Sugary	Sugary	Juices.water	Juices and water				
Pasta.pulses	Pasta and pulses	Beverages.R	Beverages from the refrigerator				
House.cleaners	House cleaners						

Table 15.1 Active variables

11	5 1
Variable name	Categories
customerShopType	eCustomer/Hybrid/StoreCustomer
Employee	Employee/Not employee
PLCustCategory	DislikePL/IndifferentPL/Like PL/Really like PL/PL lovers
TimeOfDayCategories	Morning/Noon/Evening
DailyWeekend	Daily/Weekend
PaymentType	Cash/Plastic/Other
AppUser	AppUser/Not appUser
DiscountType	Leaflet/Instore/TV/No discount
StoreType	GrandSM/LargeSM/MediumSM/SmallSM
Prefecture	Central Greece/Central Macedonia/East Macedonia and Thrace/West Macedonia/North Aegean/Thessaly/e-shop
fnfc	Food customer/Non-food customer/Balanced FNF
CustPremStatus	Very premium/Medium premium/Not premium
biocustomer	BioCustomer/Not bio customer
HaveChild	Yes/No
HaveElders	Yes/No
PromoHunter	Very PH/More than normal PH/Normal PH/Not PH
CatBasket	< 50/ 50 to 99.99/ 100 to 149.99/ 150 to 199.99/ 200 to 249.99/ 250 to 349.99/ 350 to 499.99/ > 499.99

 Table 15.2
 Supplementary qualitative variables

They preferred to shop at noon by 55%, in the morning by 24%, in the evening by 21, and 10% of them purchased only on weekends. The tech savvy customers that were using the company's application reached 5%. The non-food customers made up 31%, the food customers 33%, and the balanced between food and non-food products 36%. About 60.3% of the customers were characterized as moderate premium, 21.4% were very premium, and 18.4% not premium at all. Finally, 30% of the customers were very promo hunters, 31.5% more than normal, 29.5% normal, and 8.8% were not promo hunters.

15.3.3 Factor and Cluster Analysis

The core method utilized in our research was multiple correspondence analysis (MCA), a dimensionality-reduction method, similar to factor analysis (FA) and principal component analysis (PCA), that is not limited to quantitative variables but is particularly suitable to datasets with a large number of categorical variables [10]. It is a highly intuitive, graphical method for estimating and visualizing complex relations among qualitative features, as well as discovering trends in customer behavior [20]. MCA is commonly used to analyze data from surveys [14] but can also be

applied to a wide range of datasets of different nature, including logs and any type of frequency data. While it has been applied to marketplace data for profiling problems [1], the application of MCA to supermarket purchase history data is limited [28]. The analysis was applied on the generalized contingency table (Burt) that was formed from the product group variables. The behavioral variables were used as supplentary variables, i.e., they did not participate in the estimation of the factors but were only projected on the factorial planes in order to depict associations among product preferences and behavioral indicators.

Hierarchical cluster analysis on principal components (HCPC) was applied on the results of MCA for further analysis and visualization in order to explore patterns or groupings in the data based on the dimensions created by MCA. HCPC grouped individuals who shared similar characteristics according to a set of complex variables and built a tree structure that showed how individuals were progressively grouped [26]. The clusters were then projected on the factorial planes and were associated with purchase behavior, revealing customer profiles. The analysis was performed using the FactoMineR R package.

15.4 Analysis Results

15.4.1 MCA Results

The inertia distribution of the MCA results showed that the 1st factor expressed 33.4% of the total inertia of the analyzed table. The 2nd factor explained 4.7%, the 3rd one 3.9%, and the 4th one 2.6% of the total inertia. The empirical criterion for selecting the number of factors with useful information (inertia percentage greater than the 0.95-quantile of the inertia percentages distribution obtained by simulating n > 500 data tables of equivalent size on the basis of a uniform distribution) suggested to consider up to the 7th factor. The first 7 dimensions accounted for 50.2% of the total inertia, which is considered satisfactory. It was notable that a very large percentage of inertia was concentrated on the 1st dimension, whereas all other dimensions expressed single digit, smoothly distributed percentages. This was an indication that the 1st factorial axis reflected a fundamental phenomenon, while the other axes expressed finer contrasts in customer behavior.

The factorial plane $F1 \times F2$ is illustrated in Fig. 15.2. It is noted that categories with suffix "1" correspond to no purchasing or purchasing in small quantities of a product group, suffix "2" corresponds to average purchasing, and suffix "3" high purchasing. In this figure, the categories of product group variables are printed in red font, while the categories of supplementary variables in green.

On the left side of the diagram, we observed the low purchasing categories (i.e., level 1) of all the product group variables, while on the right side the corresponding average purchasing categories. It was clear that the 1st factor (33.4% of inertia) expressed the contrast between limited occasional buys and the average purchases



Fig. 15.2 Representation of active and supplementary categories on the plane $F1 \times F2$

of regular customers. By examining the supplementary variables, we discovered that the occasional profile was associated with no preference for private label and with being either very promo hunter or not at all promo hunter. In contrast, the regular profile was linked to a preference for private labels, a higher-than-average inclination toward promotional offers, a medium-to-premium spending pattern, having elder family members, and being a mobile app user. It was also noticeable that along this factor toward the right direction, the level of spending escalated from 100 to $150 \in$ per month (at the center of the regular profile) up to more than $500 \in$ per month at the extreme edge of the axis. Along the vertical axis (2nd factor—4.7% of inertia) high purchasing of **non-food** product groups (bottom side) is juxtaposed from **food** product groups (top side). The 2nd dimension was thus the food versus non-food factor.

From a business perspective, the factorial plane $F1 \times F2$ as a whole, including the supplementary categories, was interpreted as follows: the first group (top left) was the profile of those who purchase small quantities, appear to be food customers with small monthly baskets below $50 \in$, that shop mostly on weekends from small stores, and pay mostly in cash. They tend to be either very premium or not at all. The same applies to promotions, and they are either very promo hunters or not at all. A few of them that are not promo hunters also show no preference for private label products. In this group a few individuals were purely e-customers that did not purchase a lot and had not visited brick-and-mortar stores in the examined period. If they purchased products with discount, their preferable discount was TV and in-store offers. They were mostly residents of the prefectures of East Macedonia, Thrace, and Thessaly. They were not employees of the supermarket chain, and they did not purchase products for kids or elders.

The second group (top right) purchased larger quantities of food and non-food products. They appeared to be balanced FNF meaning that \pm 80% of their amount was spent on food and \pm 20% on non-food categories, and a lot of them had children.

Children might be the reason why many of them purchased organic products. Also, many of them were app users suggesting that this group is tech savvy and probably not very old. In addition, in this profile, customers tend to be hybrid, meaning that they purchase from brick-and-mortar stores, but they also order from the company's e-shop. They also tend to buy products for elders; these people might be old or younger family members who shop on their behalf. Their average baskets are between $100 \in$ and $350 \in$ per month and increase as we move far from the axis origin to the right. Employees seem to be great customers with large baskets spending more on food product categories. The third group (bottom) consists of non-food customers that purchase significant quantities of household products, cleaners, laundry, and dish detergents.

In Fig. 15.3, the 2nd factor is projected together with the 3rd factor, explaining in total 8.1% of inertia. While the 2nd factor (x-axis) juxtaposes the purchasing of non-food categories (left side) with food categories (right side), the 3rd factor (y-axis) juxtaposes the purchasing of ingredients for cooking (bottom side) from preference for snacks and ready meals (top side). The 3rd factor could be labeled as the home cooking versus ready-made. The group formed at the top right of the scheme consists of preference for snacks and ready-made food, high spending, tendency to shop in the evening, usage of the company's application, indication that the customer has children and is employee of the supermarket chain. The group formed at the top left shows customers that purchase non-food products like cleaners and personal grooming products. The group formed at the bottom left indicates the preference for grocery categories for cooking, whereas at the bottom right we found the profile of customers that buy fresh food categories like butchery, bulk cheese and cold cuts, and greengroceries. They often purchase butchery and cold cuts advertised on TV with discount but due to inelastic demand, they seem to purchase these categories even without discount. Both customer profiles at the bottom side of the 3rd factor can be characterized as those who prefer to cook.

Continuing the interpretation of factorial planes, up to the 7th dimension, we found that the 4th factor (2.6% of inertia) juxtaposed the preference for bulk cheese and cold cuts from the packaged ones, while the 5th factor (2%) juxtaposed the purchasing of breakfast products from fresh food and alcohol. The 6th factor (2%) differentiated the preference for dairy products like milk and yoghurt plus cold beverages from alcohol, refreshments, and groceries, and finally, the 7th factor (1.6%) differentiated the preference for frozen meat and vegetables from cheese, cold cuts, and cold beverages. The interpretation of the factorial planes formed by the above factors revealed a few more interesting profiles associated with preferences for certain combinations of products. These profiles were however difficult to interpret from a business perspective.



Fig. 15.3 Factorial plane $F2 \times F3$ associates the food versus non-food factor with the cooking versus ready-made factor

15.4.2 HCPC Results

The optimal number of clusters was defined by the inertia gain at the point where it starts to decrease with a slower rate. In our research, although the suggested number of clusters was 3, we chose to analyze 6 clusters, in order to delve deeper into the differences among the clusters. Table 15.3 displays the descriptive statistics for the 6 identified clusters.

Cluster	Cust count	%Cust (%)	Total transactions	Monthly basket	%Items on promotion (%)	%Private label products (%)
1	11.661	19	4.8	23.3	39.5	15
2	13.444	22	16.2	45.6	24.7	18
3	9.334	15	33.7	73.9	23.3	18
4	10.992	18	45.1	85.8	23.1	18
5	6.833	11	26.0	76.5	25.0	20
6	9.631	16	73.5	148.5	25.2	19
Total	61.895	100				

 Table 15.3
 Cluster descriptive statistics



Fig. 15.4 Projection of clustered individuals on the factorial planes

In order to associate clusters with customer profiles, the clusters were projected on the factorial planes $F1 \times F2$ and $F2 \times F3$. As mentioned above, factor 1 (*x*-axis in Fig. 15.4a) separated limited occasional purchases from average regular purchases, with increasing level of spending, and factor 2 (*y*-axis in Fig. 15.4a and x-axis in Fig. 15.4b) separated high purchasing of non-food versus food products. Factor 3 (*y*-axis in Fig. 15.4b) separated preference for cooking materials versus readymade products. Keeping these in mind, as well as the clusters' characteristics from Table 15.3, we developed an interpretation for each cluster. Notice that clusters 3, 4, and 5 overlap in factorial plane $F1 \times F2$ but are clearly distinguished in $F2 \times F3$.

Cluster 1: Not regular customers who only make a few occasional purchases, either food or non-food products. They seem not to care about private label and are a mixture of customers with a strong inclination toward seeking promotions and customers showing no interest in them at all. Cluster 1 comprised 19% of the sample.

Cluster 2: Low spenders who prefer bulk cheese and cold cuts. Cluster 2 comprised 22% of the sample.

Cluster 3: Moderate spenders who prefer snacks over cooking. They prefer packaged cheese, packaged cold cuts, cookies and snacks, home accessories, cold beverages, and refreshments. Their preferable discount items seem to be the ones advertised on the company's leaflet. They prefer to purchase snacks and light food over cooking. Cluster 3 comprised 15% of the sample.

Cluster 4: Moderate spenders, mostly food customers who seem to cook. They purchase greengroceries, eggs, butter, confectioneries among other food categories from grocery. The food categories they purchase can be either fresh, packaged, or frozen. Cluster 4 comprised 18% of the sample.

Cluster 5: Moderate spenders, non-food customers. They purchase house cleaners, laundry and dish detergents, household products, diapers and sanitary napkins plus papers and personal hygiene products. Cluster 5 comprised 11% of the sample.

Cluster 6: High spenders, balanced FNF customers (\pm 80% of their amount is spent on food and \pm 20% on non-food categories) who purchase all the product groups. Cluster 6 comprised 16% of the sample.

15.5 Discussion

The primary objective of this study was the identification of supermarket customer profiles. We utilized MCA and multidimensional clustering that are not commonly applied on this kind of data but are highly promising in discovering interpretable behavior patterns. Our analysis was performed on a dataset consisting of 61.895 supermarket customers' purchases within a rolling year. The method was applied to the product groups the customers purchased and was enriched with the shoppers' characteristics, provided by the supplementary variables. The MCA results were subsequently used in the hierarchical cluster analysis on principal components (HCPC). The HPCP identified six clusters based on the dimensions created by MCA, specifically (1) occasional customers who dislike PL products and are very or non-promo hunters, (2) low spenders who prefer bulk cheese and cold cuts, (3) moderate spenders who prefer snacks over cooking, (4) moderate spenders mostly food customers who prefer cooking, (5) moderate spenders that are non-food customers, and (6) high spenders that are balanced FNF customers.

Our findings are comparable with numerous previous studies, align with the existing literature, and shed more light on the products that different segments prefer to purchase and how these are related to behavioral features. In [18], the cluster "infrequent customers" is analogous to our "Occasional customers" and the cluster "Loyal big spenders" corresponds to our "Big spenders". Theodoridis and Chatzipanagiotou [29], like us, use the term "Occasional". Mahalakshmi et al. [19] identified a segment named "Offer Hunters" which is a quality that partly characterizes our "Occasional", while their "Loyal Customers" correspond to our "High Spenders". In [24], the cluster "Specific", which consists of customers that shop selected items and have low on-sale item ratio, is similar to our "Low spenders" who purchase specifically bulk cheese and cold cuts and also present low "items on promotion" percentage. Also, their "Large Shoppers" correspond to our "High Spenders". The clusters identified in [23] bare many similarities to ours. The first one that consists of customers who mostly buy daily groceries and fresh food corresponds to our cluster 4 that is "Moderate spenders mostly food customers who prefer cooking". The "Non-food cosmetics customers" corresponds to our Cluster 5 that is "Moderate spenders, non-food customers". The "customers that make small purchases (mainly convenience products)" correspond to our cluster 2 and "customers who buy canned

food, processed food, beverages and confections" correspond to our cluster 3 that is "Moderate spenders who prefer snacks over cooking".

15.6 Conclusion

In this research, we performed multiple correspondence analysis on a dataset of 61.895 supermarkets customers. The estimation of principal dimensions was based on the product groups that the customers purchased and was enriched with supplementary qualitative features. We then applied hierarchical clustering on principal components. The results revealed six clusters.

Over 40% of the company's customers (clusters 1 and 2) appear to be non-loyal, as they have very few transactions over the year. The company could apply attraction marketing strategies similar to what Tesco did, to entice lower income shoppers [4]. On clusters 3, 4 and 5, who are moderate spenders, retention, and growth marketing strategies, could be implemented. Finally, regarding high spenders, the company should focus on customers' retention strategies [22].

While our study provided rich findings supported by a large real-world dataset, we note some limitations. The results of MCA can be sensitive to the binning process. Different coding schemes can lead to different results, so it is important to carefully consider how to discretize the variables. Converting purchased quantities of product groups into scores 1–3 was crucial for the interpretability of the results but also introduced some roughness in the differentiation among moderate, high, and very high spenders. Interpreting MCA results can be challenging, especially when dealing with a large number of categorical variables or categories. Extracting meaningful insights from the plots and results can require expertise and domain knowledge. Despite these limitations, MCA can be a valuable tool for analyzing categorical data and uncovering patterns and associations, especially when used in combination with other techniques. Future research could explore the findings from product groups in conjunction with an RFM analysis or a loyalty clustering. Moreover, our methods can be compared to alternative ones, such as latent class analysis and neural networkbased learning algorithms. Finally, a more specialized research could focus solely on FMCG product categories, thereby allowing for a finer analysis of a reduced number of categories.

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Chapter 16 Data-Driven Insights: Analysing Variables in Black Soldier Fly Larvae's Transformation of Organic Waste



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Abstract The objective of the research is to recognise the variables related to the biotransformation of vegetable waste, cooked meatless meal, raw meat and a combination of vegetables, cooked meal and grass for 17 days, by black soldier fly larvae. A conditioned reactor was used to maintain a stable temperature and relative humidity at 27 °C and 80%. An increase in the mass of larvae fed vegetables, meat and mixed waste was observed, while the growth of larvae fed cooked waste decreased after day 10, possibly due to a decrease in substrate moisture. The decrease in growth rate after day 12 was attributed to protein and lipid consumption during their metamorphosis to pupa. Moisture, pH, ash and density, as well as elemental and bromatological content of plant residues were analysed. The nutritional content of larvae fed with plant residues was also evaluated. The nutrient concentration and the carbon-nitrogen ratio in the manure were analysed. The results showed that the plant substrate had 77.1% moisture, a slightly acidic pH and an optimum carbon-to-nitrogen ratio of 17 for larval growth and development. Larvae fed with plant substrate had an extractable lipid content of 34.6%, and the bioconversion of nitrogen to protein corresponded to 32.31% (4.67CF). The larval survival rate was 96.67%. The frass (insect excrement) had a low nutrient content, suggesting that it may not have significant value as a fertiliser.

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16.1 Introduction

The increase in organic waste production, demand for livestock feed supplements, and concerns about degradation speed have led scientific research to focus on insect production as an alternative solution to address disposal problems and food safety. Insects have been identified as a promising source of protein and nutrients for animal feed, and their use can potentially reduce the environmental impact of waste disposal while improving food security.

The black soldier fly, a tropical Diptera, has been studied for its potential in transforming organic residues and serving as a substitute in fish and poultry feed diets. Black soldier fly prepupae are a valuable feed source for animal husbandry, with larvae containing 45.2% crude protein and 31.4% lipids. As a result, black soldier fly prepupae have an estimated value of US\$330 per ton when used as animal feed [1].

The biomass produced by black soldier fly larvae thru the metabolic decomposition of substrate is known as frass, which contains significant amounts of total organic carbon and nitrogen in its composition. This makes it suitable for use as an agricultural fertiliser [2].

In their 2018 study, Liu et al. reported that larvae had the capacity to transform residues into biomass at a rate of 38.7%. Diener et al. [3] indicated that the maximum dry matter reduction rate was 44.1%, while Liu et al. [4] found that black soldier fly larvae could reduce more than 50% of residual dry matter [4–6].

The feeding rate conditions reported in publications by Beesigamukama et al. [7], Cheng et al. [8], Diener et al. [3], Lalander et al. [9], Ma et al. [10], Sarpong et al. [11], for biodegradation processes with *Hermetia illucens* (L.), included in Table 16.1. The feeding rate can affect the weight of the larvae and the yield during the development of the prepupal stage. In the study carried out by Diener, variable feeding rates were used in populations of 200 individuals per container. For the food with an initial moisture content superior of 60% and a feeding rate of 200 mg/ (larva.day), the organisms obtained a higher prepupal dry weight [3, 7–11].

The variables monitored in the substrate during biotransformation included pH, humidity, and temperature. Cheng et al. [8] have demonstrated that the moisture

Substrate	Feed rate (mg/larvae)	Temperature (°C)	HR (%)	Author
Food wastes	100	35	70–75–80	[8]
Brewer's spent grain	125	28 ± 2	70 ± 2	[7]
Poultry feed (UFA 625)	12.5-25-50-100-200	26	67	[3]
Organic waste	200	28	-	[9]
Municipal organic solid waste	71-89-107-125-143	26–26.7	-	[11]
Bran, corn flour, and water	500	27	60–80	[10]

Table 16.1 Variables reported as optimal for growth and development of black soldier fly larvae

content of the substrate can have a significant impact on the growth and survival of larvae, with excess moisture potentially resulting in undesirable effects such as slowed growth [8]. The optimal range for larval consumption and survival of 65–80%, as reported by Surendra et al. [6], with the exception of meat waste and grass [6]. Furthermore, Kumar et al. [12] recommend maintaining humidity levels above 70% during processing, as lower levels may lead to decreased microbial activity and subsequent changes in temperature [12].

The moisture content of the grass residue was determined to be 60.6%, which is lower than the value reported by Mhindu et al. [13] of 70% [13]. Additionally, Jain et al. [14] reported a pH of 6.95 ± 0.01 and a density of 0.073 g mL⁻¹ in their study [14].

Fashillah and Bagasttyo evaluated the biodegradation process and found that pH does not affect the life stages of black soldier fly larvae. Their trials showed that the rate of decrease corresponded to 10%, indicating that young and mature larvae have a high tolerance to extreme pH values ranging from 0.7 to 13.7 [15]. In contrast, Meneguz et al. [16] and Ma [10] suggest that growth in alkaline conditions is better than in acidic conditions, with the optimum pH between 6 and 9 [10, 16, 17].

The survival of black soldier fly larvae is affected by substrate humidity and environmental temperature. Altho Park's manual indicates that the species can tolerate environmental temperatures between 15 and 47 °C [18], low temperatures can delay the processes of biodegradation, development, and reproduction [19]. Tomberline and Sheppard suggest that adults reared at 27 °C weigh about 5% more than those reared at 30 °C and live about 10% longer [6].

In Beesigamukama's research [7], larvae reared with substrates having C:N ratios of 15, 20, and 25 obtained a higher survival rate for prepupae fed with substrates having a C:N ratio of 15 [7].

The lipid content in black soldier fly larvae has been reported to range from 29.4 to 51.5% in [17, 20–25]. The fat content of the larvae depends on their diet, as demonstrated by Georgescu et al. [26], who found that adding 10% vegetable oil to the substrate increased larval mass in the first 15 days of rearing. The highest mass obtained was 282.77 \pm 2.9 mg in larvae supplemented with linseed oil, altho the mass was reduced at the end of the prepupa stage in a 20-day cycle, likely due to the energy consumption required for the transformation process [26].

This paper presents the results of a study on the biotransformation of domestic vegetable waste, meatless cooked food, raw meat, pruning and grass residues mediated by black soldier fly larvae. The moisture, pH, ash, volatile solids, and density of the residues were evaluated in a laboratory reactor under environmental temperature conditions of 27 °C and relative humidity of 80%. The growth rates of the larvae were monitored over 17 days as they were fed with the four diets. The vegetable residues were characterised, the larvae fed with vegetable residues underwent bromatological analysis, and the elemental content of larval manure was compared with the quality requirements for biological agricultural fertilisers included in NTC 5167:2022 in Colombia.

16.2 Materials and Methods

The tests on larval growth and organic waste transformation were conducted in Bogota, Colombia. To facilitate the development of black soldier fly larvae, a laboratory-scale reactor was constructed, which included a monitoring and control system for maintaining optimal environmental temperature and relative humidity conditions for a period of 17 days.

The study involved the sampling of waste materials, the elemental analysis of wastes, the design of experiments for biodegradation, the analysis of larval growth, and the characterisation of the residual biomass obtained after the transformation process.

16.2.1 Organic Waste Sampling

The test consisted of four diets based on different types of organic residues: fresh vegetables and fruits (lettuce, onion, tomatoes, papaya, pineapple, among others), meatless cooked food (rice, potato and grains), waste with animal protein content (beef), and lignocellulosic waste (grass). The vegetable food waste was obtained from a composting plant, the meatless cooked food waste came from a restaurant at the Central Technical Institute School, the animal waste was collected from an outlet, and the grass was obtained after mowing. The waste materials were sampled according to the method described in ISO 8358:1991 [27].

16.2.2 Organic Waste Pretreatment

Black soldier fly larvae have reduced mouthparts for feed assimilation and require particle size reduction for feeding [28]. For optimal feeding, Dortmans et al. [29] recommend using a crusher or hammer mill to achieve a particle diameter between 1 and 2 cm, which allows the larvae access to the food [29].

16.2.3 Organic Waste Characterisation

The procedure for measuring moisture content involves taking a 500 g sample and placing it in an oven at 70 °C for 24 h. The sample is then allowed to cool in a desiccator, and dry material is weighed. The dry material is then sieved using ASTM sieve No. 35 (0.5 mm). The following equation is applied:

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$$\% \text{moisture} = \frac{\text{wet sample weight} - \text{dry sample weight}}{\text{Wet sample weight}} \times 100$$
(16.1)

The method for measuring density is based on quantifying the mass of product deposited freely per unit volume in a container of known volume. A clean and dry graduated cylinder is first weighed, after which the material is allowed to fall freely into the cylinder until it reaches the 30 ml mark. The graduated cylinder, now containing the sample, is then weighed, and this process is repeated three times

Real density =
$$\frac{\text{weight full graduated cylinder} - \text{weight empty graduated cylinder}}{\text{volume}}$$
(16.2)

To determine the pH, 100 g of the sample are weighed and then mixed with distilled water until saturation. The volume of water added is recorded, and the mixture is allowed to rest for two hours. After calibration, the pH is measured using a potentiometer.

Volatile solids provide an estimate of the organic matter content in the sample, calculated as 100% of the sample minus the percentage of ash, carbonates, and moisture. However, it is important to take into account other volatile components that may come from nitrogenous sources. Weigh approximately 5 g of the material into a porcelain crucible, and place the crucible in a muffle at 650 °C for 4 h. After allowing the crucible to cool, transfer it to a desiccator, and record the final weight.

$$\% ashes = \left[\frac{\text{final weight}}{\text{initial weight}} \times 100\right] \left[\frac{100 - \% \text{moisture}}{100}\right]$$
(16.3)

Volatile solids =
$$100 - \%$$
 ashes (16.4)

These methods were performed according to the protocol described in the Colombian technical standard NTC 5167:2022 [30].

16.2.4 Experiment Design

The one factorial and 4 levels experimental design used in this study had four diets as independent variables: (1) vegetable waste, (2) raw meat waste, (3) meat-free cooking waste, and (4) a mixture of 66% meatless cooked food waste, 25% vegetable waste, and 8.4% grass. The response variables were the growth rates of *Hermetia illucens* L. larvae in terms of mass, length, and width. The larvae were fed with the four diets and their growth rates were evaluated on days 3, 5, 9, 10, 12, 15, and 17.

It states that the ambient temperature of 27 °C was selected as the optimum temperature based on a report by Harnden and Tomberlin [31], and the relative

humidity was maintained at 80% according to the results of Makkar and collaborators [32]. The laboratory reactor, which has internal dimensions of $68 \times 45 \times 45$ cm, is equipped with an automated system for controlling relative humidity and environmental temperature. This system uses a DHT11 humidity module and a type K thermocouple brand Elecbee. Additionally, the reactor includes a wooden structure with dimensions of 38 cm in length and 42 cm in width, which is divided into four compartments. Overall, it provides information on the environmental conditions that were used for the study.

For the experimentation included in the study, a feeding rate of 176.4 mg/ (larvae.day) was established, with an initial mass for the substrates of 600 g in wet fraction, including 200 larvae per plastic container and three replicas (12 total containers, size $17 \times 21 \times 7$ cm). According to Parra Paz et al., the optimal feeding rate is 163 mg/(larvae.day) and minimum is 95 mg/(larvae.day) [33]. Statistical analysis of variance was performed for growth rate by mass. Proximate and elemental analyses were performed on vegetable waste, with a focus on prioritising economic resources, given that 90% of the organic waste generated in Bogota comes from uncooked plant food.

16.2.5 Bromatological Characteristics of the Larvae

The larval growth was monitored for 17 days. Subsequently, 50% of the larvae fed with vegetable residues were removed from the containers to carry out the bromatological analysis. The other 50% were allowed to grow until day 19 in the laboratory reactor to compare the nutritional content. The proximate composition was determined according to the official methods of the International Association of Analytical Chemists. The moisture content was determined in a hot air oven at 105 °C until constant weight was achieved, following the AOAC 930.0 method. The aethereal extract was determined by Soxhlet extraction for 4 h, according to the AOAC 930.09 method. Crude protein was determined by the Kjeldahl method, using the factor 6.25, following the AOAC 978.04 method. The ash content was determined by calcination at 550 °C for 4 h, following the AOAC 930.05 method [34].

16.2.6 Manure Characterisation

The biomass produced during the transformations was subjected to analysis for moisture, pH, density, and volatile solids content (described in Sect. 2.3), as presented in Table 16.2. Additionally, elemental analysis was performed, and the results are presented in Table 16.6.

The method for carbon quantification known as the Walkley Black method is based on the reduction of the dichromate ion, and the carbon content is measured by the non-reduced dichromate ion, therefore it is an indirect method, it is performed
Parameter	Vegetable and fruits (1)	Meatless cooked food (2)	Raw meat (3)	Grass (4)
Moisture (%)	78.1 ± 0.49	71.8 ± 0.28	52.9 ± 8.82	60.6 ± 6.33
pН	5.48 ± 0.02	6.20 ± 0.07	6.87 ± 0.05	-
Ashes (%)	5.06 ± 0.78	1.03 ± 0.06	4.64 ± 1.51	7.25 ± 1.14
Volatile solids (g)	16.89 ± 0.78	27.13 ± 0.06	42.45 ± 1.51	32.19 ± 1.14
Density g/cm ³	0.82 ± 0.02	1.15 ± 0.07	0.95 ± 0.05	-

 Table 16.2 Exploring the physicochemical features of organic wastes

by spectrophotometry using a calibration curve. The total nitrogen methods AOAC 955.04 and 970.02 consists of reducing the nitrates and nitrites present in the sample to ammonia, and transforming the nitrogen present into ammonium sulphate by acid digestion. This method is performed using the Kjeldahl technique, in which a 2.2 g sample is subjected to distillation and acid–base titration [34, 35].

In the case of organic mineral products present in fertilisers, the method of mineralisation of the elements takes into account their presence in both organic and mineral matter. For phosphorus (AOAC958.01), potassium (AOAC 971.01), magnesium (AOAC 937.02), and calcium (AOAC 945.04), digestion is carried out with hydrochloric acid, for organics compounds an oxidising agent is used [34].

Quantification of metals such as Iron, Copper, and Zinc is carried out using the same methods used to quantify them in soils. The sample is mineralised in a mixture of nitric and hydrochloric acid and evaluated by atomic absorption. The procedures were carried out following the protocol outlined in the Colombian technical standard NTC 5167:2022 [30].

16.3 Results

16.3.1 Waste Characterisation

The study analysed four types of waste: (1) vegetable food waste, (2) raw meat waste, (3) meatless cooked food waste, and (4) a mixed waste prior to undergoing biotransformation.

The vegetable waste residues were found to have the highest moisture content 78.1%, while the meat waste had a moisture content of $52.9 \pm 8.82\%$, which can make it difficult to digest. Moisture in the residues was determined without adding any water, on the same day of collection. Density is an important factor to consider in the process design as it affects the area requirements for treatment.

16.3.2 Biotransformation

In the experiments, four different types of substrates were used to feed the larvae while maintaining the environmental temperature at 27 °C and a relative humidity of 80%. The diets were composed of vegetable waste, cooked waste, meat waste, and mixed waste. Each container was populated with 500 individuals and fed at a rate of 1 g of substrate per larva cycle.

Figure 16.1 displays the transformation of larvae during the feeding process. At the end of the feeding cycle, the larvae's physical changes in terms of villi, colour, and size increase can be observed in the figure.

Larvae fed with meat-free cooked food residues achieved higher weights, followed by larvae fed with the mixture, larvae fed with plant food diet and supplemented with raw meat had lower weights. However, the larvae that achieved the greatest length were those fed with mixtures and fresh residues. Larvae supplemented with meatless cooked food residues had greater reductions in size throughout the experiment. The results of mass growth (g) and mass growth rates for larvae fed with the four types of waste are presented in Table 16.3.

The experimental results presented in Table 16.3 and Fig. 16.2 for the biodegradation treatment of 3-day-old larvae indicate that there is an increase in larval mass during the first 12 days. However, in the last days of the cycle, as colour changes begin in the prepupae, the rate of growth decreases. This decrease may be due to the consumption of fat and proteins stored in the initial stages during the transition to the prepupal stage [36].

In relation to the mass growth rate, the results of larval growth in terms of width (cm) show a similar behaviour of reduction after day 10, as described in Table 16.4.

Figure 16.3 illustrates that the larval growth rate decreases in the sample fed with vegetable waste. In the second case, a reduction is observed in the larvae fed with



Fig. 16.1 Growth in larvae fed with plant residues (a), meatless cooked (b), meat raw waste (c), mixer (d), day 3 and day 17

Day	Vegetables and fruits	ps	MgtV	Meatless cooked food	Sd	MgtC	Raw meat	Sd	MgtMt	Mixture	Sd	MgtMx
	Mass (mg)			Mass (mg)			Mass (mg)			Mass (mg)		
e	7.8	± 2	0	10.0	± 2	0	8.2	± 5	0	8.8	± 2	0
5	42.1	++ 4	0.81	28.2	土 2	0.64	16.7	土 2	0.51	92.2	± 52	0.90
6	70.4	士 14	0.40	152.3	± 19	0.81	37.0	土 3	0.55	175.7	± 2	0.47
10	71.4	± 5	0.014	147.3	± 30	-0.03	36.4	± 5	-0.01	197.8	土 12	0.11
12	94.9	主 35	0.25	150.3	土 24	0.02	35.8	+ 8	-0.01	188.0	± 16	- 0.05
15	81.3	+ 1	-0.17	126.7	土 24	-0.18	30.3	土 4	-0.18	173.2	土 28	- 0.08
17	68.0	十 7	-0.19	127.5	土 43	0.006	32.5	土 2	0.06	141.3	± 13	-0.22
<i>Note</i> V ₆ with m ₆	sgetable, meatless cooke atless cooked food wast	id food, ra te, <i>MgtMt</i>	aw meat ar mass larve	nd mixed waste; <i>Mgt</i> al growth rate fed wi	V mass l ith raw m	arval grow leat waste,	th rate fed wit <i>MgtMx</i> mass l	h vegeta arval gr	tble waste, owth rate f	<i>MgtC</i> mass la ed with mixed	urval grow I	th rate fed

Table 16.3 Measuring larval mass for efficient Hermetia illucens larvae rearing



Fig. 16.2 Tracking larval growth rate

cooked waste, indicating the beginning of the transition stage. However, for the larvae fed with mixed and meat waste, the growth rate decreases slowly.

The larval growth rate related to length reflects a decrease from day 9, as shown in Table 16.5. Particularly, for larvae fed with meat and mixed waste, they lose length from day 10.

During the initial days of the cycle, the larval growth rate shows an increase, which is consistent with mass, width, and length growth. The researchers report average growth rates, making it impossible to directly compare the results with previous studies (Fig. 16.4).

The analysis of variance conducted on the relationship of larval mass growth reveals that both time and feeding type are significant factors (with a *p*-value < 0.05) in the development process of the prepupae, as shown in Table 16.6. The results indicate that the type of waste used in larval feeding significantly affects their growth and development, and there is also a temporal dependence in this process, suggesting the need for continuous monitoring and careful evaluation of the factors involved in larval feeding.

The survival rate for black soldier fly larvae was 93.27% for cooked waste, which could be related to a decrease in substrate moisture percentage during the last days of the experiment to less than 50%. For mixed waste, it was 98.33%, and for fresh waste, it was 96.67%. In contrast, the larvae fed with animal protein had a survival rate of 34.93%, possibly due to the amount of fat present in the substrate leading to the loss of individuals.

Day	Vegetables and fruits	Sd	WgtV	Meatless cooked food	Sd	WgtC	Raw meat	Sd	WgtMt	Mixture	Sd	WgtMx
	w (cm)			w (cm)			w (cm)			w (cm)		
e	0.16	± 0.01	0	0.12	± 0.03	0	0.14	± 0.03	0	0.16	± 0.02	0
5	0.31	± 0.02	0.48	0.28	± 0.05	0.56	0.21	± 0.01	0.34	0.36	± 0.01	0.54
6	0.34	± 0.02	0.09	0.43	± 0.05	0.35	0.28	± 0.00	0.25	0.49	± 0.01	0.25
10	0.35	± 0.01	0.02	0.48	± 0.04	0.10	0.30	± 0.05	0.04	0.47	± 0.01	-0.03
12	0.38	± 0.05	0.06	0.47	± 0.03	-0.03	0.31	± 0.02	0.03	0.51	± 0.02	0.07
15	0.33	± 0.00	-0.14	0.44	± 0.06	-0.05	0.29	± 0.00	-0.05	0.44	± 0.03	-0.14
17	0.35	± 0.00	0.04	0.47	± 0.04	0.05	0.29	± 0.00	0.00	0.46	± 0.05	0.03
<i>Note</i> V fed wit	egetable, meatless $cook$ h cooked food waste, W	ed food, ra gtMt larva	aw meat, a al growth	nd mixed waste; <i>WgtV</i> la rate in width fed with rav	urval grow w meat we	th rate in v iste, <i>Wgt</i> M	vidth fed witl 1x larval grov	n vegetabl vth rate in	e waste, W width fed	<i>lgtC</i> larval with mixe	growth ra	e in width

sion	VgV
expan	_
size	Sd
larval	fruits
Assessing	etables and
l 6.4	Veg
Table	Day



Fig. 16.3 Tracking larval growth across width

16.4 Discussion

In the present study, the evaluated organic waste materials exhibited a moisture content within the optimal range for larval consumption and survival of 65–80%. In this regard, the use of residue mixtures may be advantageous for improving moisture conditions during processing.

The pH value of 5.48 in the vegetable waste sample suggests that the substrate had initiated the organic decomposition process prior to the test. For the cooked waste, the pH of 6.20 indicates that the increase in temperature could promote the hydrolysis of macromolecules, thereby improving the degradation conditions and acceptability to the larvae. In the case of meat residues, the pH of 6.87 for the substrate is neutral, consistent with the findings of Makan, who reported pH values of 6.65 for protein residues [32].

According to Kawasaki et al., the survival rate of black soldier fly larvae decreases when they are fed diets with meat content higher than 80% [40]. In our research, larvae fed with meat residues showed a survival rate of 34.93%. It is necessary for the diet of larval development to include saccharides, and it is speculated that non-nitrogenous content could be considered as carbohydrates [40].

During our experimentation, the dynamics of larval growth showed that in larvae fed with vegetable residues, cooked food waste, and their mixtures, maintaining the conditions of temperature at 27 °C, relative humidity above 65%, and substrate humidity above 60%, a transformation of at least 50% from prepupae to pupae occurs on day 17, and the largest larval mass is obtained between days 12–14, depending on the substrate. In the research conducted by Ribeiro et al. [41], larvae fed with residues of wheat bran, punkin, apple, cabbage, red onion, grape skins, and spinach, were able to moult 50% of the larvae between 48 and 85 days in conditions of temperature of 27 and 30 °C, and relative humidity of 50% [41]. We consider that controlling relative humidity above 60% and maintaining substrate humidity above 50% guarantees the development of black soldier fly larvae.

Table	16.5 Measuring the rai	te of larva	l length gro	wth								
Day	Vegetables and fruits	Sd	LgtV	Meatless cooked food	Sd	LgtC	Raw meat	Sd	LgtMmt	Mixture	Sd	LgtMx
	1 (cm)			1 (cm)			1 (cm)			1 (cm)		
3	0.60	± 0.03	0	0.58	± 0.06	0	0.57	± 0.01	0	0.60	± 0.04	0
5	1.05	± 0.03	0.42	1.02	± 0.01	0.43	0.76	± 0.04	0.25	1.11	± 0.09	0.45
6	0.99	± 0.04	0.25	1.52	± 0.04	0.33	1.08	± 0.01	0.29	1.85	± 0.06	0.40
10	1.40	± 0.03	0.001	1.80	± 0.14	0.15	0.98	± 0.03	- 0.09	1.76	± 0.04	-0.05
12	1.47	± 0.04	0.04	1.67	± 0.16	-0.08	1.13	± 0.13	0.13	1.95	± 0.06	0.09
15	1.44	± 0.01	- 0.02	1.44	± 0.07	-0.16	1.13	± 0.03	-0.00	1.80	± 0.01	- 0.08
17	1.44	± 0.04	-0.001	1.37	± 0.08	-0.05	1.09	± 0.01	- 0.03	1.74	± 0.05	- 0.02
Note N	Aeatless cooked food, v	egetable,	raw meat a	nd mixed waste; LgtC la	arval grow	th rate in	length fed w	ith cooke	d food was	te, LgtV la	urval grow	th rate in

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length fed with vegetable waste, LgtMt larval growth rate in length fed with raw meat waste, LgtMx larval growth rate in length fed with mixed residues, N



Fig. 16.4 Assessing larval size expansion in length

Variation origin	Sum of squares	Degrees of freedom	Mean squares	F	Probability	Critical value for <i>F</i>
Day	0.04	6	0.0068	8.51	1.8Eâ^'04	2.66
Diet	0.05	3	0.0167	20.91	4.28Eâ^'06	3.16
Error	0.01	18	0.0008			

Table 16.6 Analysis of variance in larval growth

Larvae fed with waste mixed with fruits, vegetables, cooked food without meat and grass obtained higher weight during the experiment, followed by larvae supplemented with cooked food, vegetable diet and larvae fed with raw meat failed to finish their development cycle. The most significant length was presented in larvae fed with the mixture, followed by larvae developed by means of vegetable food. In the study by Fischer and Romano [42], larvae were fed fruits, vegetables, starches, and mixture over 14 days, then their final weight and the nutritional composition of larvae and excreta were measured. The starch treatment produced heavier larvae compared to the fruit treatment. However, larvae reared on starch had the lowest amino acid levels. Vegetable fed larvae had higher crude protein and essential amino acid concentrations compared to all substrates [42].

The obtained frass had a C:N ratio of 12, complying with Colombian standards, but the carbon concentration was low. Therefore, a carbon source should be sought to improve fertilisation conditions. At the end of the trials, it was established that the concentrations of phosphorus, potassium, magnesium, and calcium in the larval excrement are below the recommended levels for biological fertilisers. However, these elements can still be utilised to supplement the nutrient supply to the soil.

In our experiment, larvae fed with vegetable residues had a fat content of 34.6% and 30.9% on days 17 and 19, respectively. The fat content of the larvae depends on their diet, as demonstrated by Georgescu et al. [26], who found that adding 10% vegetable oil to the substrate increased larval mass in the first 15 days of rearing.

The highest mass obtained was 282.77 ± 2.9 mg in larvae supplemented with linseed oil, altho the mass was reduced at the end of the prepupa stage in a 20-day cycle, likely due to the energy consumption required for the transformation process. In our experiment, larvae fed with a mixture of vegetable and cooked waste obtained the highest mass of 197.8 ± 0.012 mg on day 10, which decreased to 141.3 ± 0.013 mg by day 17 [26].

The crude protein content contained in the larvae was 43.2% on day 17 of experimentation, the conversion factor used to obtain crude protein from nitrogen content on a dry basis was 6.24 (meat and derivatives) [43]. However, a conversion factor of 4.67 has been reported for protein meal and 5.62 for protein extract [44, 45], for the present investigation using the standardised conversion factors the adjusted protein content is 32.31% (4.67 CF). In the tests carried out by Queiroz et al. [45], the protein content in the defatted extract was 32.71% (4.67 FC), Ravi et al. obtained 31.6% (4.76 FC), equivalent to the results obtained in larvae fed with vegetable residues.

The biomass (frass) obtained after exposing the substrate to bioconversion for 19 days had a pH of 8.71. The alkalinity of the medium is attributed to the production of ammonium and other ions [46, 47]. This result is consistent with that obtained by Beesigamukama et al. [7], the frass in their experiments had a pH of 8, indicating that it was maintained under these conditions due to the volatilisation of urea. This demonstrates the conversion of nitrogen into protein and ammonium.

16.5 Conclusions

Black soldier fly larvae can effectively biodegrade a diverse range of organic waste materials, including meat products, cereal grains, fruit residues, oil cake, sludge from domestic water treatment plants, manure, rice husks, chicken feed, and fishing waste. Maintaining optimal moisture conditions, which should be within the range of 65–80%, during processing is crucial for the growth and survival of the larvae.

The pH of the substrate also affects the degradation process, and an alkaline condition with a pH value between 6 and 9 is recommended. The larvae have a high tolerance for extreme pH values ranging from 0.7 to 13.7, with growth in alkaline conditions being better than in acidic conditions. The survival rate of the larvae is also affected by the substrate's humidity and environmental temperature.

The larval growth dynamics show that the largest larval mass is obtained between days 12–14, depending on the substrate. A transformation of at least 50% from prepupae to pupae occurs on day 17 when maintaining the conditions of temperature at 27 °C, relative humidity above 65%, and substrate humidity above 60%. Finally, the C:N ratio of the substrate plays a significant role in the larvae's survival rate, with a C:N ratio of 15 being the most favourable.

The data obtained in the experiment explain the variables to be taken into account in the biomass growth and transformation models.

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Chapter 17 Big Data in Journalism in Ecuador



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Abstract This research seeks to evaluate the incorporation of Big Data and its impact on communication in Ecuador through the analysis of academic offerings and publications in the media. The research is descriptive in nature, integrating quantitative and qualitative methods. The instrument used is the content analysis of newspapers and curricula of university degrees, between January and July 2022. The newspapers studied were "El Comercio" and "El Universo". The lack of specialists and lack of knowledge have limited the implementation of Big Data. It is imperative to develop projects to restructure the curricula of communication careers to include Big Data.

17.1 Introduction

Big Data accumulates all kinds of information, and it is a key to digital transformation in the new millennium, "usually conceptualized with three V's: volume, velocity and variety" [1]. For Gutiérrez [2], Big Data describes the massive avalanche of digital activity pulsing through wires and airwaves and is the way in which companies today obtain information.

Data is created every minute and goes unnoticed by people's eyes. Big Data gained momentum at the beginning of the new millennium around the prospect of "data that is so big, fast or complex that it is difficult or impossible to process using traditional methods" [3]. Big Data presumes a large influx of technological trends that have been maturing since the first decade of the twenty-first century [4].

The communicational evolution of Big Data requires the mass media to turn towards the demands of its audience, because it facilitates the personalization of

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content, making the user the axis of the conversation on the network. The opportunities presented by modern communication are innumerable; likewise, thanks to communication technologies, it has been possible to generate more value for companies that are becoming more interconnected every day [5].

Big Data has an impact on business, journalism, and also art, which is why it has been incorporated into most sectors [6]. According to Moreno-Guerrero et al. [7], its level is so broad and involves diverse elements that impact the population. In this regard, Segarra and Aced [8] state that Big Data generates a great impact on the configuration of strategies and messages that make it possible to adapt to the profiles and interests of different audiences.

The use of Big Data within communication entails the management of massive data applications and places journalism professionals as part of this transition. It is therefore necessary to consolidate their consolidation in the digital, comprehensive, and interdisciplinary culture, so that they are able to look at the world in all its complexities [9].

Through the use of social networks, the transfer of content or articles published on the web generates data, and as there are millions of users, it is concluded that the production of data is continuous and immeasurable, in addition to the "data transferred between billions of objects or things, which communicate with each other, through sensors" [4]. Along these lines, "the total amount of data expected to be created, captured, copied and consumed globally [...] will increase to 181 zettabytes by 2025" [10].

The accelerated implementation of Information and Communication Technologies (ICT), and especially the consolidation of the Internet within social, cultural, and economic relations, has transformed many areas of human activity and interpersonal relationships.

Under this premise, it is understood that it is the user who, having become a prosumer, becomes involved in issues of public interest and manages to capture their attention, generating new content and impact on society. Similarly, methods in journalistic practice are changing in parallel to social and communicational scenarios, as transmedia journalism affirms. In this sense, Big Data and mass media open a new era in the collection, analysis, visualization, and distribution of content, known as data journalism.

Although the use of a multiplatform attracts millions of people who connect via mobile, PC, or tablet, it is the consumer who has changed and increasingly makes use of all the channels at his disposal. It is therefore necessary to adapt formats to the new media and demands of the hyper-connected user.

This milestone requires the traditional media to make a true convergence and exercise leadership on the Web. This implies a presence in digital social networks, and that through hypermediality (video, photography, audio, articles, forums) and interactivity (commenting, sharing, participating), it can simplify the process of collecting, analyzing and interpreting this data, converting it into valuable online information for publications (news) in real time.

In view of this, social communication professionals need their profiles to include technological knowledge in their academic training. This is due to the importance and ease of data exchange that digital media bring to public and private companies, providing more confidence and security when maintaining this information. Big Data, meanwhile, is the emerging trend in terms of the use and analysis of massive data via the Internet.

Although Big Data is assumed as a change in society in general, proposing guidelines that until today had not been realized, communication, as a career, is affected due to the immersion of this technology at the time of unifying data, accounts, and other journalistic items.

The communicator, therefore, must maintain a cutting-edge education. However, this must be supported by the institutions of higher education, which are primarily responsible for the education of future professionals. The relevance of this research topic lies not only in the requirements of communicators but also in society, based on their interaction with these new data collection formats.

In this scenario, referring to the journalistic sector and therefore the means of obtaining information, we would be talking about the entry of the Internet generating innovations such as Web 2.0, or the narrative possibilities, all in favour of the progressiveness of each economic sector.

Data management is one of the key points for access to public information; this is why it is necessary to identify the way in which data is generated and to have access to the databases that are most relevant to the thematic axes of a report on any subject.

The connection between Big Data and journalism offers various approaches, basically in relation to investigative journalism, precision journalism, documentation, infographics, fact checking, Open Data, and Big Data. Specifically, data journalism would be born out of the application of Open Data and Big Data.

As it happens, journalism today dispenses with many things, replacing them with the myriad of digital tools that are freely available on the web.

The action of Big Data is effective when journalists follow the corresponding process in the collection of information, so that the data obtained provides reliable information and serves as a basis for journalistic narratives, whatever the format used. In addition, it should be considered that not everything published on the Web is verifiable.

Therefore, when accessing databases, it is important to avoid transmitting fraudulent information because it can cause serious damage, in some cases, to the audience or media companies.

Parallel to this, one of the cultures promoted by technological progress is transparency within the information and communication environment, and Big Data has transformed the work of the media in a globalized information world. It entails changes in the tasks of documentalists and journalists.

Open Data corresponds to all accessible and reusable data that does not require permissions and has no requirements for access, i.e. all data that can be freely used, reused, and redistributed by anyone. It becomes a fresh opportunity for social communication, through public participation and through various types of non-documentary material.

At the end of 2007, the Open Government Working Group Meeting recognized the need for compliance with some general principles to ensure that Open Data is easily

usable, reusable, and redistributable, and the thirty experts in attendance indicated what these might be and put them to governments for consultation.

It does not imply the publication of data; it is a process for entities to achieve viability through initiatives that are under an organized short and long-term planning.

Nowadays, most governments and entrepreneurs adopt the model of open government or open business, respectively, which support a change in the data in their possession, making it public and making it accessible for use by users. This situation has a positive impact on society and improves communication, democracy, society, and the economy.

The basic characteristics of Open Data are based on the Open, Public, Electronic, and Necessary Government Data Act that the US government implemented, where it mentions how federal agencies shall publish information online using data that is readable and, in a language, understandable to all audiences. This situation has been adapted in the other states by making the required adjustments according to the legislation of the country of origin.

The focus of Open Data is to enable transparent communication and to avoid restriction to confidential documentation, when in many cases it leads to poor management by the state or the company, depending on its use.

This only implies that Open Data highlights the value of the public, providing them with public information with which an innovative process of data transparency is maintained.

Thus, Open Data represents the matrix of journalism, and data that previously could only be accessed by a few, is now freely accessible, in particular governmental, corporate, etc., information.

In this way, information is available to all citizens, without any type of restriction, thanks to the technical resources that are gradually being developed and made available to citizens for their use and dissemination.

For this reason, when talking about data journalism, we would necessarily be referring to the application of Open Data and Big Data, considering that Open Data are those that connect with the different options existing on the network for data management through the collection, processing, reuse, and dissemination of this data without any type of restriction.

This is why transparency must be managed through access from all types of optics, starting with the professional journalists, by means of which they manage to filter the information through the diversity of statistical and visualization tools available on the web. This culture of transparency and openness of data for all audiences facilitates the research and analysis of the databases on which news reports and stories are based.

The use of Big Data implies a commitment to teaching and learning to take advantage of the possibilities of this technology in the generation of goods and services [11] and requires technical and computational mechanisms that transform work in the world of virtual communication [12].

In this panorama, and in relation to journalism, there is talk of the narrative possibilities in favour of progressivism [13]. Thus, data journalism emerges, involving ICTs in the management of large sets of records that are usually public and accessible on the Web [14]. In view of the above, it is not surprising that the task of documentalists and reporters has been transformed because they have to approach other profiles in the globalized world. "The connection between Big Data and journalism offers different approaches" [12] and allows journalists to overcome some of the difficulties they had in the "analogue" world.

17.2 Methodology

The research is developed in a mixed paradigm, an approach that systematically integrates quantitative and qualitative methods in order to analyses under a holistic view of the study phenomenon [15]. The mixed approach is based on the pragmatic paradigm; it is considered that the meaning, veracity, or value that individuals attach to a phenomenon is determined by their previous experiences [16].

The mixed methodology merges qualitative and quantitative techniques, approaches, and concepts within the same research. The instrument used is the content analysis of newspapers and university curricula.

The first content analysis corresponds to the newspapers "El Comercio" and "El Universo", between January and July 2022. These newspapers were selected because at the time of the study they were the leading newspapers in terms of visits according to the Alexa site, and they are also the oldest newspapers in Ecuador and leaders in the highlands and coast regions, respectively.

According to Krippendorff [17], content analysis represents a scientific method capable of collecting data from language, semiotics, and other communicational morphologies that give way to the formulation of holistic criteria in research.

The second content analysis was carried out on the educational curricula of the main universities in Ecuador, with an emphasis on communication degrees. This review focused on determining whether Big Data has been included in the programmes and its impact on the academic training of future communicators.

The three best-ranked Ecuadorian universities according to the World University Rankings were considered. Its evaluation is one of the most important in the world, and five metrics are used for this purpose. The universities are San Francisco de Quito; Escuela Politécnica Nacional and Pontificia Universidad Católica del Ecuador.

The instruments used were validated by experts to guarantee scientific rigour, because "validity and reliability are the two quality criteria that all measurement instruments must meet after being subjected to consultation and expert judgement" [18].

17.3 Results

Fifty % of the degree courses analyzed have Big Data subjects; however, these have been exclusively oriented towards technological careers, leaving aside digital competences in other areas such as communication. The focus given to Big Data is centred on Cloud Computing.

Big Data is not part of the academic training of communication students. Only in the case of the journalism degree at the Universidad San Francisco de Quito was it evident that Big Data has been included in the curriculum in three subjects: data journalism, digital strategies, and multimedia practices.

The only degrees that have Big Data subjects are those related to computer science. Therefore, the focus has been on the technological field, i.e. communication has been ignored. There is a need for training that considers Big Data as part of the digital competences of communicators (Table 17.1).

The analysis of the newspapers shows that both have developed websites with simple and user-friendly interfaces that incorporate a navigation menu that facilitates the exploration of the sections. "El Universo" handles the reserved rights classification, and "El Comercio" has included the Creative Commons licence. These media have adapted to new narratives by considering dialogue with their audiences.

They have also implemented new forms of journalistic construction such as hypertext within their narratives.

In this analysis, 1500 articles from each media outlet were reviewed. The objective was to show how Big Data is implemented. Some relevant findings are:

University	Careers offered	Big Data subjects
Universidad San Francisco de Quito	 45 Undergraduate 19 Master's degrees 11 Specializations 1 Doctorate 	Data journalism, digital strategies, multimedia practice
Escuela Politécnica Nacional	 20 Undergraduate 4 Higher Technology 12 Professional Masters 8 Research Masters 6 Doctorates 	Data structure and algorithms, database fundamentals, distributed databases, usability and accessibility, embedded systems, security technology
Pontificia Universidad Católica del Ecuador	 45 Undergraduate 27 Master's degrees 	Databases, data structure, analysis, and design of information systems, tics, algorithms and pseudo-codes

Table 17.1 Curriculum analysis

- In "El Comercio", in 94% of the published articles, the author is mentioned. In "El Universo", authorship is given to the journalists in charge.
- There is an average of 400 words per published article.
- Both newspapers have social media accounts, the main ones being Facebook, Twitter, and Instagram.
- Comments have been enabled in 100% of the publications.
- In "El Comercio", the transmedia narrative is present in 73% of the publications, on a daily basis. Meanwhile, "El Universo" has implemented these narratives in all its contents.
- In 60% of "El Comercio" articles, 4–6 links are added. In more than 50% of "El Universo" publications, no links are included.

Regarding the use of Big Data, Big Data was present in most of the articles, 80% in "El Universo" and 60% in "El Comercio". In the case of Open Data, it is also evident in 80% of the articles in "El Universo" and 53% in "El Comercio".

Therefore, it can be inferred that despite an evident use of Open Data and Big Data as a strategy for the execution of data journalism, the investigated media still do not manage to unite the role of the journalist with the Big Data specialist in order to promote new spaces for the creation of content.

17.4 Conclusions

Given the scenario described above, it is imperative to develop projects to restructure the curricula of communication degree programmers to include Big Data, which transcend from data storage to the management, analysis, and socialization of this information. Given the rise of the Internet and the proliferation of technologies, a continuous updating of curricula is justified so that the content responds to contemporary demands.

Although the media have implemented Open Data and Big Data as a strategy for the execution of data journalism, it is still a professional challenge to merge the role of the journalist with the Big Data specialist in order to promote new spaces for the creation of content such as Data Labs.

Big Data allows for immediacy in the generation of information. Evidently, from the search for sources to the projection of data in real time, the use of Big Data has gradually improved the newsrooms of newspapers, but there is still a long way to go, in which the updating of the curricula of communication careers in Ecuador is the starting point.

Through an interdisciplinary strategy that starts with academic training, it will be possible to promote the adaptation of communicators to the new paradigms of journalistic practice. In this way, the deficit of specialists in communication and Big Data required for the application of new strategies can be solved, which will also allow the country to have access to a new way of consuming and producing information. In a digital age, individuals are producing more and more data every day, through their interaction on the web. Social dynamics have changed due to the rise of the internet, connectivity, and mobile devices. Such is its impact that tools have been developed for the analysis of this data; however, the speed, volume, and power still represent a great challenge in what has been called the fourth industrial revolution.

This enormous amount of data has been called Big Data. This category refers not only to the large volume of information, but also to the technologies that have been developed to capture, manage, and process it.

In this sense, if we consider that Big Data collects all kinds of information, huge amounts of structured, semi-structured, and unstructured data. We not only consider the volume of data but also the variety and speed of access and processing.

Big Data is attracting academic and professional attention as technology advances by leaps and bounds. Many media, both traditional and native, are trying to innovate and adjust to this pace of change in order to increase their chances of success and survival.

In a broad framework of this research, it helped to determine that Big Data is not part of the academic training of communication students.

In Ecuador, projects have been developed that include the use of Big Data by professionals; however, these have focused mainly on massive data storage, i.e. the creation of servers.

With regard to the sources and rights of the news, El Universo uses the reserved rights classification in all of its articles, while El Comercio has also included the Creative Commons licence, thanks to the fact that the Ecuadorian legal framework promotes the guarantee and protection of copyright in journalistic work.

The analysis of the pieces published by El Comercio and El Universo also revealed a change in the paradigm of the media, which were initially unidirectional; however, the platforms of these media have enabled comment sections, which are not only spaces for interaction typical of Web 2.0, but also represent spaces for dialogue between users, the media, and also with the community that consumes the content.

Communication evolution requires mass media to turn around the demands of their audience in order not to lag behind in the fast-paced and changing information society. Therefore, the technological solutions provided by Big Data are fertile ground for media and communicators, becoming a unique opportunity to generate useful and relevant content for society.

Big Data enables close contact between the media and their audiences because it not only allows them to capture and understand their opinions, perceptions, and interests in real time, but also facilitates the personalization, reception, and construction of new content, making the user the central axis of the online conversation.

In the field of communication, academic training is required that considers Big Data as part of the digital competences of communication-related degrees, for which technical and human investment is required to facilitate the storage and processing of large volumes of data. In addition to offering courses or workshops that allow communication professionals to update their knowledge and adapt to the demands of the information society. It has become evident that journalists need to learn how to combine different sources of information in a single article, filtering the sources used to guarantee the reliability and verification of the data. In this context, Big Data is consolidated as a technological matrix that improves the user's experience, since the quality of information increases significantly.

Therefore, it is recommended that programmers can be created to enhance the digital skills of Ecuadorian communicators, as these are key skills for improving national journalistic work.

Every Internet user with a mobile phone is a potential source of information; therefore, the first change within the journalistic field must be the way in which readers are viewed, as they are no longer just consumers.

Readers' interactions allow the journalistic narrative to be expanded and the necessary communication channels must be in place so that people can express their opinions.

On the other hand, it is important to bear in mind that each article must be treated individually, that is, to avoid monotony, as this could mean that the reader becomes bored.

In this sense, it is essential to make the content increasingly attractive, through the use of various technological tools such as dynamic infographics, multimedia content, and even updating the platforms and adapting the content so that it can be consumed on the different devices currently available.

Although it has become evident that the media analyzed have implemented Open Data and Big Data in their narratives as a strategy for the execution of data journalism, it is still a professional challenge to merge the role of the journalist with that of the Big Data specialist, in order to promote new spaces for the creation of content such as Data Labs.

Through an interdisciplinary strategy that starts from academic training, it will be possible to enhance the adaptation of communicators to the new paradigms of journalistic practice.

It is postulated that there is a lack of knowledge of the methods of applying Big Data, and it can be implemented in various ways, from research or data journalism to consumption management, i.e. adapting content to the reader's devices. Therefore, having trained personnel is essential. In Ecuador, the technological gap makes these precepts distant. The lack of specialists and lack of knowledge have limited the implementation of Big Data.

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Part IV Digital Marketing and Branding



Chapter 18 Destination Brands Experienced Through Digital Platforms: A Semiotic Approach for the Interpretation of a Case Study

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Abstract This paper addresses the role of destination brands' digital platforms as texts designed to offer tourism experiences. Current audiences are increasingly searching for and interacting with products, services, and places through technological advances such as the Internet, mobile devices, and social media, which amplify or even replace their consumption. Thus, destination brands' marketing and communication management have had to adapt to achieve and reinforce the desired reputation and perceived image in a digital environment. In that sense, this work begins by presenting a discussion about marketing, branding, tourism, and technologies applied to places and destinations' strategic communication. From there, it develops an operational proposal for an analysis protocol used in the case study of the Japan destination brand, reading and interpreting the semiotic structures and interactional regimes of its official website and app. This articulation of concepts and its methodological application support the conception of digital platforms as significant objects, managed as audiovisual texts and with strategically organized content that opens or optimizes possibilities of direct relationships between the destination and its audiences. In this way, these platforms' actual and future relevance for the communicational, technological, and touristic success of the management of places is corroborated even beyond each case's specific and variable information.

18.1 Introduction

Technologies have revolutionized tourism practices through advances that offer increasingly significant and interactive experiences for travelers and other involved actors. The leisure travel industry marks this trend today by constantly improving

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communication processes, relations and business models through work on destination brands' digital platforms.

This paper connects marketing and branding for strategically managing places, focusing on tourism and destination brands as entities affected by new technologies that impact the design of their tourism communication platforms. This work aims to interpret the official digital platforms of destination brands as significant objects organized by signs that seek to generate tourist consumption experiences among their audiences. With this objective, the paper addresses the example of the destination brand of Japan as a case study that allows reading fundamental structures and interactions through the official brand's tourism communication platforms. The selected destination brand represents an outstanding sample at a competitive level and global recognition in the last decade, efficiently articulating the technological, touristic, and socio-cultural fields in its reputation and perceived image. Instead of using technology as a commodity, the Japanese brand shows its strategic integration in how it offers and communicates its destination.

The integrated proposal is relevant to understanding the relations between place branding, tourism marketing, and destination brands with competitive and significant communication strategies that take advantage of technology, new tourists, and digital platforms. To achieve that, first, a specialized and contingent theoretical framework will be discussed, contemplating scholarly approaches and relations on the concepts of marketing and branding of places [1-4] as well as tourism marketing and destination brands [1, 4-8], and new technologies in tourism digital platforms [2, 4, 4]8–11]. Then, the research methodology is presented based on the recent operational proposals of the structural semiotics of Rossolatos [12] and the interactional regimes of Perusset [13] because they allow analyzing the organization of the objects of study as significant systems and then interpreting their interactional consumer experience offerings. From there, an analysis protocol is built and applied to the Japan case as a referent for the destination brand category [1, 3, among others], explicitly working with its official travel website [14] and app [15]. This protocol presents a step-by-step approach, combining the theoretical framework and methodology to synthesize the marketing value proposition and the branding promise experience behind the structure, interactions, high-tech services, and co-creation possibilities of digital platforms of specific brands, read as designed audiovisual texts.

In sum, this analysis protocol is developed to study the strategic communication of destination brands and their capacities to manage and interact with organized contents, their possibilities of physical and virtual interactions, and their interest in the communities and the co-creation of a destination, effectively worked and represented in their digital platforms. In other words, the applied proposal aims to observe the communicational structure and brand-user interactions derived from this type of text over these platforms' specific and variable contents.

Theoretical Background

18.2.1 Marketing and Branding of Places

18.2

Every day, diverse industries try to sustain and support close relationships with all their target groups. Broadly, Kotler et al. [4, p. 49] argue that marketing contributes to creating value by building value for society while capturing customer value. Likewise, branding combines key elements to identify and differentiate products and services in the market [4, p. 267]. Then, in this paper, brand integrity depends on building a promise and providing the expected experience by connecting the brand identity with its image through its value, equity, and positioning [4, pp. 267–269, 274].

While branding is essential in the daily global competition between products, services, and places, reliance on traditional marketing and brand communication tricks can be dangerous. Explicitly talking about places, Anholt [1] states that brands can support their competitive identity, progress, and prosperity thanks to the communication management of their reputation and perceived image. However, those reputations and images are not created or altered solely through expenditures on branding effects, persuasive marketing, classic propaganda, or flashy advertising but for the trust in the place behind the brand [1, p. 5, 3, pp. 109–110, 4, p. 546]. Torres [2] seems to agree about this place branding strategic approach, commenting that this kind of brand cannot be artificially fabricated or spontaneously created because it needs a natural development. Torres proposes that "the only way to build the desire perception is through consistent and coherent behavior aligned with the 'Central Idea'" [2, p. 107] as a key concept with which the managed place is to be known and aligned through actions, activities and specific policies [2, p. 111]. In that sense, advancing on policies, Anholt underlines that places are not really for sale-nor do they have a single and unifying purpose—so they must permanently build their reputation, overcoming perceptual manipulation and focusing on monitoring their image, strategically dialoguing with their audiences, and guaranteeing their distinctive and available offering [1, pp. 5-7]. Because of that, for this paper, place branding is understood as an inclusive and involving process related to perceptions, emotions, and feelings. A complex social and political activity with productive and economic effects [5, p. 14, 2, p. 8, 3, pp. 190–192].

As an excellent example of applying place branding, Anholt proposes to nation brand managers that "instead of asking how they can charm or coerce people into admiring their country, they should ask themselves why people in other countries should even think about their country in the first place" [1, p. 43]. Anholt partially discords with the emphasis on the central idea of Torres, stating that successful nation brands work on communicating their richness and complexity aspects instead of a clear, simple, and single promise, as any other commercial brand would do [1, pp. 38–39]. However, Anholt also recommends avoiding communicating an accumulation of multiple stimuli to gimmicky present very different countries as almost identical [1, p. 87]. Torres is close to this last proposal when mentioning that, even if they want

to, nations do not usually have control over the messages that others publish about them and that an advertising campaign may not be enough as a reputation, image, and credibility communicational policy [2, p. 79]. For this reason, place brands depend more on their behaviors than discourses [2, p. 81]. Following this goal, Dinnie [3, p. 40] says that even though several national tourism campaigns present generic and undifferentiated offers, every nation brand should be determined by a "unique, multidimensional blend of elements that provide the nation with culturally grounded differentiation and relevance for all of its target audiences" [3, p. 5]. That means, among other things, consciously considering the past heritage as well as the present living culture of the country [3, pp. 5–6].

Nevertheless, Anholt points out branding work on tourism as an exceptional case since the latter is "a refreshingly simple and honest business" [1, p. 88] and because the holiday is a more or less tangible product that can increase the brand image of a place, quickly and maybe forever, attracting visitants through strategic communications [1, pp. 88–89]. Along with attracting, for Anholt, tourism is often the loudest voice in communicating places, and tourism promotion invites people to create and share personal narratives that reinforce the destination brand, its image and reputation [1, pp. 89–91].

18.2.2 Tourism Marketing and Destination Brands

Branding has been strategically adopted in countries worldwide to strengthen its competitiveness in talent attraction, inward investment, local exports, and tourist attraction [3, pp. 10, 26, 216]. However, many places mainly depend on tourism marketing and advertisement.

Tourism is addressed in this paper by weaving supply and demand factors related to leisure—or sometimes business—travel and related hospitality industry, such as holistic processes and experiences [4, p. 30, 7, p. 28]. In this context, a destination is any place with real or perceived boundaries other than residence [4, p. 518]. Besides, on the one hand, destination marketing is understood as the systematic connection of the economic model and enhancing the competitiveness of that kind of place [4, p. 519]. On the other hand, destination branding is understood as the management of a tourist place brand to create its differentiated image and capture and accumulate unique reputational value over promises, promotions, exchanges, and representations associated with the destination [1, pp. 91–92, 4, p. 545].

For some time now, scholars have proposed that tourist destinations have represented both an object of desire and an indicator of lifestyle for consumers as a projection of personality, social recognition, and status [4–7]. That is because leisure trips involve personal plans, emotions, and memories that depend, in part, on the work of managing the brand of the chosen place and its ability to deliver impactful experiences [5, pp. 4, 6]. Thus, the tourism industry strengthens local identities, images, and economies. Moreover, branding can effectively establish rational and emotional links between places and consumers [6, 7]. For example, these relations are managed by working with psychological travel motivations such as those shared by Kotler et al.: prestige, escape, sexual opportunity, family bonding, relaxation, and self-discovery [4, p. 536].

Destinations are the most influential brands in the tourism industry. This prominence is probably because destination branding supports tourism marketing strategies that consolidate the differential images of the places in the minds of all the target groups through comparative and competitive advantages [4, p. 521, 8, pp. 2–3]. Strategically, those responsible for destinations strive to differentiate their places from others and favorably influence the position of their brands in a highly competitive global marketplace [6, p. 60, 7, p. 63]. Tactically, these brands try to manage their reputations, communicating distinct attributes, benefits and attitudes through their history, culture, and sceneries [6, pp. 64–66, 7, p. 63].

The success of the destination depends on turning comparative advantages into demonstrable competitive achievements [4, p. 521], which consider the cognitive, affective and behavioral dimensions-for example, on websites and social networks-[8, pp. 10-11]. Morgan and Pritchard propose that a winning destination brand has to be: credible, deliverable, differentiating, conveying powerful ideas, enthusing stakeholders and partners, and resonating with the consumer [6, p. 70]. In addition, according to Hodson [7], the wealth of destination brands can be measured in their consumer loyalty, linked to a range of favorable and inter-influencing attributes, benefits and attitudes. Specifically, Hodson refers to the following items: destination-related attributes---natural and manufactured features, services, culture, social environment, atmospheres, and overall experience-7, pp. 91–94]; non-destination-related attributes—user imagery, usage imagery, and overall brand personality-[7, p. 94]; destination brand benefits-multidimensional and empirical operationalizations—[7, p. 101]; and destination brand attitudes preferences, travel/visit intentions, choices, repeat visits, willingness/intentions to recommend, word of mouth, display or expression of travel inclinations and preferences [7, p. 127].

18.2.3 New Technologies in Tourism Digital Platforms

Over a decade ago, Anholt already highlighted three areas of reputation that became critical of the attractiveness of destinations: environment, personal advancement and technology [1, pp. 54–55]. Looking at the third one, advances on the Internet, technological and digital devices have caused crucial changes in products, services, and places, directly affecting the tourism industry and driving the development or even redesign of its distribution, planning, consumption, and communication [2, 4, 8, 9, 11].

Tourism consumers have been increasingly browsing digital platforms such as websites, apps, and social networks to obtain information, moving away from traditional media such as television, radio or magazines [4, p. 383, 9, p. 1]. Similarly, the daily use of mobile devices has also made it necessary to adapt digital tourism,

increasing user-friendly platforms and allowing tourists to obtain helpful information and dynamic access more quickly [4, p. 482, 11, p. 459]. The preceding path serves as a guide to optimize marketing and advertising capabilities on the industry side [4, 8]. That is why technological advances have been applied to brands, from essential products to complex places, especially in communication management [3, p. 8].

According to Schiopu et al. [10], youth tourism is an important growing market due to supply diversification and people mobility, modifying consumption behaviors, and promoting technological advances. The new generations are mainly motivated to create and share content about their holiday experiences, above other related issues [8]. Scholars argue, for example, that Generation Y [4, 10] and Generation Z [4, 11] have promoted the mentioned tourism technological advances, representing attractive markets with new lifestyles and strong influence on familiar travel decisions. These kinds of tourists have fostered innovation through their consumption practices because they are stimulated by using various social media and social networks, strengthening their personal identity and social image, sharing textual and audiovisual content with family, friends and online communities, downloading information about different products, services, and environments, consulting reviews and ranking experiences, making reservations and payments online, improving and customizing transactions, expecting rewards for interactions, solving problems on the spot, or even allowing themselves to be influenced by factors of the context of consumption [4, 10, 11]. In that sense, young tourists are now a distinctive active niche with remarkable purchasing power that wants to collect and share experience and knowledge on new socio-cultural environments, for which they may even be willing to spend more than traditional travelers [4, pp. 121–122, 10, pp. 831–832].

However, this digital tourism trend has expanded beyond young people. Still, it is unsurprising, considering that more than 50% of people are connected to the digital world, at least 40% access social networks on mobile devices [4, p. 45], and around 65% of tourists, and 86% of investors begin their search for a destination using an online search engine, where the actions, activities, and policies of the destination are instantaneity reflected and ranked at a digital level [2, pp. 125–126]. So, the new digital tourism contributes to the local economies and communities by developing specific accommodation, food and leisure infrastructures [10, pp. 831–832]. In parallel, digital tourists contribute by providing valuable personal data to understand and manage consumer behavior and expectations through practices such as dreaming, comparing, choosing, planning, booking, purchasing, experiencing, and sharing destinations online, as digital monitorable processes before, during and after their trips [11, pp. 459, 462, 471]. That is why tourist brands have integrated websites with social and mobile media into their communication plans and multichannel marketing systems [4, pp. 45, 372].

Torres [2] ensures that social and digital media are profitable platforms to show a place brand, but underlining they are not a strategy. Nonetheless, the most advanced nation brands in terms of social media are precisely the most tourist destinations due to people's love of traveling, seeing, and participating in exciting places [2, p. 96]. For Torres, the power of destination brands' social media lies in their globalizing capacity with or without an investment of money, whose credibility depends on a

scalable—or viral—effect linked to what users like and share [2, p. 96]. This type of engagement strengthens the interactions and involvement between the brand and its target audience through common ideas and interests, either physically or virtually, creating communities around destinations and eliminating classical intermediaries [2, pp. 97, 125]. In this way, for this author, the digital identity of place brands appears as a tactical opportunity to achieve their market objectives, thanks to current and future technological and communication management that Torres exemplifies as "Nation Branding 2.0" [2, pp. 124, 134]. People are already interacting with countries, cities and regions in a live and digital manner, which can become more and more absolute, affecting the reputation and image in studies, rankings, and popularity [2, p. 135].

From there, Kumar et al. referred to the concept of Travel 2.0, derived from Web 2.0 and linked to specific improvements in the technological tools at hand of tourists, which enables updates and interactions to positively influence the image of destinations, as well as companies, organizations and businesses related to the promoted places [9, pp. 1, 5]. As a double-ended beneficial technology, these authors claim that "social media is becoming a tool for management of destination marketing both for the travelers and organizations" [9, p. 5]. Furthermore, Pencarelli advances toward the concept of Tourism 4.0, derived from Web 4.0 and Industry 4.0, as a new ecosystem of value based on the production of high-tech services that incorporate crucial elements that blend the physical and virtual worlds by integrating tangible and computational practices on tourism [11, pp. 456–457]. Thus, there is a technological revolution in social lifestyles and habits owing to customizable and wearable high-tech and "smart" accessories such as smartphones, tablets, watches, bracelets, glasses, and lenses, which sometimes even offer forms of augmented reality [11, pp. 457–458].

Pencarelli speaks of "smart destinations" as those territories that articulate technology, government and society regarding its governance, environment, mobility, economy, people, and living [11, p. 465]. Likewise, the idea of "smart tourism" considers managing information for the destination's general sustainability, especially in its efficient and effective use of new technologies to enrich customers' tourist experiences and improve the quality of life of all the internal and external communities [11, pp. 460, 470]. In short, Pencarelli says that, without focusing on digital innovation above high-touch relationships and human-to-human contacts, new technologies can improve the overall tourist experience by optimizing the value offering to turn tourists into smart tourists, as animators and co-creators of the destination sustainable ecosystem [11, pp. 463–464, 473]. Creating this ecosystem experience depends on the collaboration of several active actors: tourists, inhabitants, local authorities, governments, service providers, social media platforms, support technologies, tourism infrastructures, and other enterprises not directly related to tourism [11, pp. 466, 470]. In that sense, multichannel and online opportunities must also be managed for diverse stakeholders to actively collaborate in creating destination brand narratives [8, p. 10]. Moreover, Tran and Rudolf raise to take strategic advantage of the smart tourism paradigm, promoting destinations as dynamic spaces of collaborative experiences through efficient, responsible, and sustainable practices [8, p. 13].

18.3 Research Methodology

18.3.1 Analysis Framework: Semiotic Structures and Interactional Regimes

The research in branding has shifted from a marketing-focused approach to a more multidisciplinary one due to brands' high impact on intangible and cultural value. In this sense, Rossolatos [12] has commented on the possibility of combining market and consumer research, for example, with semiotic study and discourse analysis regarding brand images, brand values, brand storytelling, cultural branding, political branding, country-of-origin branding, place branding, destination branding, or digital and social media branding. Following Rossolatos' ideas, a semiotic perspective will be applied to this paper, looking to understand the superficial and latent discourses of the destination brands through the reading and interpretation of their communication structures from an interdisciplinary scientific-social framework [12, pp. xii–xiii].

Dialoguing with Rossolato's frame, Perusset [13] proposes the experiential consumption factor as the core of analysis from marketing to semiotics. Also, conceiving experiences as "immersions in places entirely designed and semiotized by brands" [13, p. 3], Perusset recommends using the theory of interactional regimes, relating some basic consumption experiences with specific offerings. Since experiences are everywhere, any consumption practice can be observed from some experiential marketing category intended to satisfy a need or desire [13, pp. 3–5]. Then, the category of places managed as destination brands is not an exception, and here, it will be interpreted as a concrete communicational manifestation of a place brand's meaning.

Perusset [13] argues that people are now most interested in discovering new personal meanings rather than ready-made meanings in their consumer experiences, not necessarily as new kinds of offerings but as new kinds of interaction and control over existing offerings. Operationally, this author states that consumption experiences depend on interacting with four offering categories that can be discussed from a semiotic perspective: goods, plays, works, and existences. It means that people commonly consume: goods, which can be possessed and manipulated; plays, which program rules, staging, recreations, interactions, and performances; works, which assent activities or results; and existences, which may adjust to unregulated and uncertain situations, bodies, or living systems [13, pp. 6–8]. As places, destinations are notably related to this last offering group, although the experiences derived from their brands could be linked to the others. Among them, the discussed tourism digital platforms are also definable within the category of plays, whether in their role of transaction service, information, ideas, or digital experiences. Either way, Perusset concludes the semiotic relevance of the effort required from the consumer and the tension between these four offerings of experience. There, "existence demands a lot of efforts and goods require less, while play relaxes and work gives even more peace of mind" [13, p. 10]. Therefore, it is worth asking, for the case study of this paper, about the meanings and efforts related to a destination brand, which represents a place as an offering of existence, and its communication and promotion technological platforms, understood as play offers.

In sum, this work proposes to analyze destination brands as semiotic structures significant objects or designed audiovisual texts—communicated by different digital platforms that can be interpreted in semiotic terms and represented, in terms of interactional regimes, as offering categories to satisfy visitors' needs through consumer experiences and thus strengthen their reputation and image on the tourism market. This analysis proposal focuses on interpreting the communication organization and the derived brand-user relationships that are worked through its official digital platforms designed and managed as texts, not on the deep understanding of each case study's specific and variable content.

18.3.2 Analysis Protocol

The recently revised analytical framework integrates the theoretical background discussed in an applied proposal for the case study on destination brands through the semiotic structures and interactional regimes present in their digital platforms as designed texts as follows:

- i. Semiotic reading and interpretation of the communicational structure of the text. The first step takes Rossolatos' approach [12] to reveal the superficial and latent discourses of the brand by reading and interpreting the design and function of the structure of the signs that make up the analyzed text. For this case, the protocol aims to identify significant factors such as the base layout, the navigation protocol and the study platform's content typologies.
- ii. **Definition of the offerings that represent interactional regimes in the text.** The second step applies Perusset's suggestion [13] to delineate the brand's interactional regimes desired by describing the experiential offerings represented in each text. In that sense, the protocol aims to list and group the different offerings of the objects of study according to the capacity of the user to intervene and to relate with the platform.
- iii. Articulation of structures, interactions, high-tech services, and co-creation possibilities in the text. The third step advances on the previous structural [12] and offering [13] readings of the text toward their specific interactions, high-tech services, and co-creation possibilities, as highlighted for tourism communication by Kumar [9], Pencarelli [11], and Tran and Rudlof [8]. This articulation is translated in the protocol by linking how the user interacts with the destination, specifically with technological and smart deliveries designed to allow different levels of user involvement.
- iv. Synthesis of the marketing value proposal and the brand experience promise behind the designed text. The last step of this protocol is based on the definitions of the brand's value and promise of authors such as Anholt [1], Kotler

et al. [4], and Dinnie [3] to summarize the experiential strategy of the studied destination brand. Thus, highlighting findings as experiential deliveries [7, 8, 11] and represented attributes, benefits, and attitudes [6, 7], the interpretation of the platforms is closed through their value proposition and experiential promise, strategically shared from a marketing and branding perspective, respectively.

18.4 Application in Case

18.4.1 Case Presentation

This work considers one specific case study prominent in the place and destination brand sector. The selected brand is Japan due to its recent healthy performance in tourism, socio-cultural, and technological image. For the study, two different technological platforms were chosen as communication offer samples of the destination brand: its official travel website [14] and app [15].

To briefly explain the Japanese destination brand potential, it is worth noting that about a decade ago, Anholt already commented on the evident reputational improvement in country brands, noting: South Africa, Ireland, Germany, Spain, and Japan, primarily caused by economic and political investments [1, p. 49]. Moreover, the author affirms that "the Japanese miracle" of its branding story success depends on a robust exportation-economic image built after 1945, as a model followed by other Asian countries—South Korea, Singapore, Malaysia, Taiwan, and China—[1, p. 76]. An example that confirms this last point is the products and services that explicit their Japanese origin, as a powerful brand, on their vast and demanded worldwide exportations since the Second World War until now [1, p. 143].

Commonly known as the "country-of-origin effect", Dinnie defines this expression as "the effect that a product or service's origin has on consumer attitudes and behavior toward that product or service" [3, p. 84]. The author explains the positive differentiator value played by the country-of-origin branding with French perfume, Scotch whisky, Swiss watches, Italian fashion, Colombian coffee, and Japanese technology [3, p. 84]. This last symbiotic relation between Japan's nation brand and recognized technological-commercial brands of Japan is adequate for this paper because they can impact each other and because technology is the lens through which this destination brand will be analyzed, precisely, through the design of digital communication technology platforms of this brand to connect with its visitors.

The two platforms selected for the analysis, the official website [14] of the Japanese destination brand and its official travel app [15], are observed as digital communication technologies and consumption for customers. In general, countries are reinforcing their strategies toward technological leadership as a central component of their country branding and communication efforts [3, p. 244]. Furthermore, these strategies also impact the general image rankings of the countries. In the Japanese case, a good illustration is its sustained rise in countries' competitiveness and development index in travel and tourism, carried out every two years by the

World Economic Forum. There, Japan has advanced from the top 25 to first place in the last decade, ranking as follows: 22 in 2011 [16], 14 in 2013 [16], 9 in 2015 [17], 4 in 2017 [18] and 2019 [19], and 1 in 2021 [20].

18.4.2 Case Study

Japan Official Travel Website [14]

Semiotic Reading and Interpretation of the Communicational Structure of the Website. When entering the website, a window appears to choose the navigation language, accompanied by the possibility of accessing a help chat. Next, the site structure has a Home and five main sections: Destinations, Things to Do, Plan Your Trip, Blog, and News, as well as a search engine and some other minor sections: Trade, Media, Meeting and Events, Newsletter Sing-Up, Coronavirus (COVID-19) Advisory Information, and Social Networks.

With a white background, this platform permanently presents the main menu at the top of the screen—below a submenu with the aforementioned minor sections—while at the bottom of the site, there is a footer with helpful links related and institutional information, among others. The central body of the website has a vast space between headers and footer, where the different contents are displayed in a vertical path with the possibility of scrolling and interacting. Among these contents, written texts, graphic figures, and visual images are displayed on a simple invisible grid, which allows understanding and easy navigation between elements, with some buttons and links. The written texts function as titles, guiding concepts, detailed or summarized information, signage, and clickable. The graphic figures fulfill corporative, iconographic, signaling, complementary information, and interaction button roles. Visual images represent backgrounds for written text and graphic figures, featured examples, title pages, and supplements. Therefore, this platform demonstrates a simple hierarchical order with a clean structure and efficient navigation protocol.

Definition of the Offerings that Represent Interactional Regimes in the Website. The interactional regimes of the website seek to collect and manage user data, in addition to making available and offering information searches related to the destination, the offer of products and services associated with the trip, assistance options for the safety and comfort of the user before, during, and even after visits, and some opportunities for users to share opinions, records, and information of their authorship.

The brand's offerings on this platform are: transactional, related to the processing of user data, links to offers and advertisements for hotels, tickets or visits, posts or records of the users themselves, and their likes; of information, such as all types of highlights, destination news, blogs on various topics and related areas, corporative contents, security and COVID-19 data, and other downloadable contents of interest; of ideas, such as maps and guides to the place, specific popular or niche points of interest, recommended routes, as well as utilities and highlights; and experiences, with the possibility of pressing likes, sharing personal Instagram posts, also following the brand through different social networks, access to media, newsletters, and even some virtual visits.

Articulation of Structures, Interactions, High-tech Services, and Co-creation Possibilities in the Website. The website's structure presents various interaction options and certain high-tech services, where its opportunities for sharing and co-creating digital content stand out.

When interacting with this platform, access to accessories such as the chat, the search engine or the social networks is recognized, as well as the availability of various links, interactive maps, or downloadable content by users, which allow tours tailored to different visitors and requirements. This website reflects a brand with high-tech services since it offers multiple main contents and secondary networks quickly and with a highly responsive design to navigate from any technological device. In addition, it is directly related to the user, taking advantage of complementary information and platforms with a highly dynamic, hierarchical design, and several layers of depth within reach. Thanks to these high-tech interactions and services, the brand acquires user data that contributes to the evaluation and improvement of the platform itself, along with strengthening the spirit of closeness, community, and co-creation that derive from user interests, registrations, and publications.

Synthesis of the Marketing Value Proposal and the Brand Experience Promise Behind the Designed Website. In brief, the website works to deliver a technology-related value proposal through destination content whose brand promises pillars such as attractiveness, efficiency, modernity, and community.

From a marketing point of view, the platform portrays an intention to manage the investment-competitiveness relationship of the place through the selection and delivery of quality and dynamic content and complements, which support travel fully to achieve optimal experiences by users who seek information while providing their data and even sharing with the destination itself, related actors and other audiences. At the same time, from a branding point of view, the image managed by the place highlights awareness of the needs and desires of the target audience, articulating attributes, benefits, and expected attitudes around the destination's offer to support elements of the reputation of this destination in the tourism sector, thanks to an open and accessible day-to-day identity of the place, as an icon of heritage, technology, culture, nature, urbanism, and community. It guarantees a good existence and the possibility of adding excellent experiences among those who visit and consume it with the help of this website.

Japan Official Travel App [15]

Semiotic Reading and Interpretation of the Communicational Structure of the App. Once downloaded and installed, the app has a Terms of Service and Privacy Policy screen and another Data Management screen to be accepted. Then, the app is designed with a Home and four other main sections: Discover, Transit Search—or Route–, Points of Interest (POI), and Other. On a white background, this platform presents the name of the current section at the top of the screen and the navigation menu with section icons remains always at the bottom. Like the website, the center has ample space between the mentioned header and footer for the dynamic and vertical main body. There, different written texts, graphic figures, and visual images are presented on a simple grid, which allows easy scrolling and has various clickable and interactive elements. Written texts fulfill the functions of titles, guiding concepts, summarized or hierarchical information, filters and navigation buttons. The graphic figures play iconographic, signaling, complementary information, and interaction button roles. The visual images are essentially used as backgrounds for written texts and graphic figures, featured samples, covers, and supplements. In sum, it is also a hierarchical platform with a simple structure and easy navigation protocol.

Definition of the Offerings that Represent Interactional Regimes in the App. The main objectives of the interaction regimes of the app are some of the same as those of the website, such as the management of user data, the delivery and search of information related to the destination, the offer of products and services associated with the trip, and the availability of assistance for the safety and comfort of the user before, during, and even after visits.

Marking slight differences with the website, the principal offerings represented on the app are: transactional, about the collection of user data, access to tickets, and discounts for places and transportation; of information, such as the weather forecast, the notices, the discounts on tickets and passes, the featured discoveries, the contact and emergency information, and the FAQ; of ideas, such as the recurring points of interest, the outstanding routes, the offers available, and the services of utility and assistance; and experiences, looking to customization settings, the ability to mark spots on the map, the option to saving data as favorites, and the access on offline utilities.

Articulation of Structures, Interactions, High-tech Services, and Co-creation Possibilities in the App. As already reviewed, the app's structure offers different interaction options and some high-tech services, although it does not provide many explicit co-creation possibilities compared to the website.

The interaction of this second platform allows efficient recognition or consumption of the offerings linked to the promoted destination, taking advantage of digital interaction components such as search engines, filters, dynamic links, feedback, or customizable configurations. As the website, the app demonstrates the brand's interest in providing a high-tech service by developing a free download platform for mobile smart devices. It also links the user with smart georeference, personal data, and memory services. However, the co-creation of the user with the destination is not direct but instead focuses on collecting their personal and browsing data by the platform administrators. Through the high-tech interactions and services already underlined, the user undoubtedly contributes to the evaluation and improvement of the app, but without sections or actions where the visitor can openly share impressions with other users or communities linked to the destination.
Synthesis of the Marketing Value Proposal and the Brand Experience Promise Behind the Designed App. Independently or complementing the website, the app relates to a value proposal for the destination based on practical and mobile content delivered at people's fingertips and a brand promise with a solid technological, orderly and engaging character, pointing to a close and positive relationship with its contemporary and digital audiences.

From a marketing point of view, this platform also demonstrates a conscious handling of the investment-competitiveness relation of the promoted place, selecting and making specific key offerings available to users through technology while collecting data from them without much effort. Likewise, from a branding point of view, the worked image on the app demonstrates knowledge about the needs and desires of the target audience too, by concentrating attributes, benefits, and expected attitudes around the destination offerings to sustain the wealthy reputation it enjoys in the tourism industry, thanks to the verifiable identity of the place as a good existence offering and the good experiences of those who visit and consume it taking advantage of the app.

18.5 Conclusion

The analysis protocol proposed and tested in the case study corroborates digital platforms' significant and interactional role as mediating structures designed for meeting and communicating between destination brands and their audiences toward the tourism consumption experience, with a conspicuous interest in contemporary connectivity and mobility.

This understanding crosses marketing and branding approaches by assuming that currently, the strategic communication of competitive factors and the promises of destination brands impact the reputation and image of the promoted places. From this perspective, "smart" tourist destinations must manage and connect with reputational values in the minds of their audiences through rational and emotional links with a high-technological and digital load, delivered as updating services, interactions, physical-virtual environments, sense of community, and experiential co-creation. In addition, this work combines the ideas of semiotic structures and interactional regimes for the reading of superficial and latent discourses, represented in categories of authentic offerings, where in the case of digital platforms of destination brands, those of existence and play stand out. With this methodological articulation, which embraces marketing and branding with semiotic interpretations, the analysis protocol proposes four practical steps, for studying significant objects as audiovisual texts through organizational and relational findings in their operational design.

The specific object of study, the destination brand of Japan, presents structural and interactional keys through its official website and app that—beyond some formal and navigation differences—combine toward a technological, practical and mobile value proposition committed to the promise of an attractive, efficient, modern, community, orderly, and close to the brand. There, the destination competes by offering content,

fundamental delivers, and helpful accessories for tourism, exchanging information for user data without much effort, which allows the development of relations between the audience, the place, and—especially the website—other relevant actors. In this way, the brand image shows empathy with its audiences, articulating the representation of attributes, benefits, and attitudes that support a verifiable reputation through the integrated guarantee of existence and first-class tourist experience. The analysis corroborates that although Japan's destination brand does not necessarily present a direct offer of technology as a specific central value, it integrates it into its experiential communication offering, with structures and interaction possibilities made with digital users in mind.

Finally, the theoretical-operational discussion and the applied analysis proposal raise opportunities for new interpretive studies of individual, group, or comparative cases in the category of destination brands that use digital platforms for their strategic communication. The limitations may lie in the representativeness of this type of specific analysis, in the socio-cultural differences of origin and the audiences of each chosen case, or even in the perishable nature of the results obtained in platforms and texts that can communicate seasonal realities or quite specific moments of each tourist destination. However, this paper offers a sufficiently broad, adaptable and ascertainable conceptual and methodological proposal to face bases of future tourism, technological, and communicational challenges in the academic, administrative, or combined field, especially from a perspective of organizational and relational management between the place and target audiences increasingly technological and digitized.

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Chapter 19 Resilience and Transformation: Examining Marketing Strategies and Consumer Behavior in a COVID-19 World Connected by Social Media

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Abstract The COVID-19 pandemic has presented society with a plethora of unprecedented challenges, not only reshaping consumer behavior but also altering how public and private entities deliver goods and services. This transformative process has naturally introduced new obstacles across various domains, notably in marketing, communication, and digital platforms, especially online social networks. Consequently, it is essential to fully comprehend the profound shifts during this pandemic era and assimilate the adaptations that enabled brands to effectively communicate and align their value propositions with the ever-evolving needs of their target demographics. Our methodology involved an exploratory literature analysis that encompassed identifying pertinent sources and conducting subsequent screening. We then organized, categorized, and analyzed these sources to synthesize results in alignment with the study's context. It is increasingly evident that the pandemic has significantly impacted marketing and consumer behavior. The ascent of digital communication channels, particularly through online social networks, has become a linchpin for optimizing the symbiotic relationship between brands and consumers. This phenomenon extends beyond the pandemic, proving essential in the current landscape and beyond.

19.1 Introduction

In December 2019, in the city of Wuhan, the capital of Hubei province in China, a new type of viral pneumonia was discovered, responsible for the death of 27 patients, with the reason behind this occurrence initially unknown. By early 2020,

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and at an unexpected pace, the first cases were reported outside of China. The World Health Organization (WHO) classified the outbreak as a public health emergency of international concern, naming it COVID-19/SARS-CoV-2. On March 2, 2020, the first two cases were confirmed in Portugal, and just 11 days later, the WHO declared the outbreak a pandemic. Little did the world anticipate the consequences; it plunged into a massive economic and social crisis due to the sanitary challenges imposed to contain the virus [1]. The WHO recommended a set of measures to control the virus's spread, including sanitation of spaces, hand hygiene, respiratory etiquette, social distancing, travel restrictions, space occupancy limitations, hospitalization of the infected, quarantine for individuals with high-risk contacts, mask-wearing in public spaces, and more, all aimed at mitigating the detrimental effects the pandemic was having on the healthcare sector, with overcrowded facilities, makeshift hospitals, saturated intensive care units, and overwhelmed morgues, among other situations that highlighted the difficulty in managing the situation.

Santos [2] indicates that the pandemic had a significant impact on various levels: economic (business closures, job losses, reduced support), social (border closures, lockdowns, quarantines), cultural (accelerating the transition to the digital realm), and political (increased support, pressure on various public services). Winston [3] considered the pandemic an unforeseeable event with severe consequences that dramatically changed the economic and political landscape, which he referred to as a "black swan" event, causing unprecedented damage since the Great Depression of 1930. He and Harris [4] claim that this period represented one of the most significant shifts in the history of marketing, communication, and modern advertising, driven by social changes and uncertainties related to consumption and investments across B2C, B2B, C2C markets, and even public entities.

The lockdown period prompted by the COVID-19 pandemic transformed the communication landscape, partly due to legal obligations and partly due to the advantages it offered over traditional means. Since the onset of the pandemic and the lockdown period, users increasingly turned to new technologies for online communication, engaging in more profound and lasting conversations, and embracing video and audio communication tools and platforms such as WhatsApp, Messenger, Google Meet, Skype, among others, fostering greater interconnectivity among users, as reported by Wen [36]. The same source notes that the shared topic of the virus brought people back together online through video calls, religious gatherings, online proms, or even weddings. During this lockdown period, various entities utilized all three branches of communication-journalism, public relations, and advertisingto influence behaviors that would mitigate the virus's spread, as consumer habits changed and forced public and private, individual and collective entities to adapt to a new form of visual, written, or multimedia communication conducted via interconnected computers and hardware through a common network. COVID-19 may have accelerated this transition from traditional to digital communication, but this transition was bound to occur sooner or later. With the advent of these new technologies, particularly the Internet, new ways of communicating and engaging with consumers emerged, notably through new communication channels such as online social networks [5]. This shift from unidirectional to bidirectional communication

enabled brands to achieve greater engagement and establish long-term relationships with their consumers [6, 7]. With all these transformations, it is only natural that marketing also underwent changes and adapted to this new way of creating value and presenting solutions to consumers.

In this context, an exploratory literature review approach will be conducted. This methodology aims to understand the existing literature on a particular topic and plays a crucial role in developing a solid knowledge base, allowing for the identification of gaps in the field of study and guiding subsequent research more precisely [8]. This review involves the analysis and interpretation of scientific articles, reports, books, conference papers, books, among other elements, in order to provide a state-of-the-art overview of the constructs under study. It will begin with source identification for future research and presenting the final considerations, laying a solid foundation for future research and contributing to the advancement of knowledge in these areas of study. Our aim is to offer a comprehensive and current overview, with a specific focus on studying consumer behavior and the pivotal role of communication and marketing, especially through social media, in the context of the COVID-19 pandemic.

19.2 Consumer Behavior During the COVID-19 Period

The COVID-19 pandemic has proven to be a catalyst for digital transformation, profoundly influencing how people study, work, socialize, communicate, and shop. The Internet played a pivotal role in enabling these activities, serving as a vital resource for information sharing, communication, and a means of bridging the gap between physical and virtual spaces, reducing geographical distances and connecting the real world with the virtual [2]. In the face of these circumstances, the Internet emerged as an essential tool to address the challenges posed by the pandemic. Companies that were well-prepared and Internet-based, such as food delivery, digital entertainment, online education, and remote work solutions, thrived, contrary to more traditional offline businesses.

Darley et al. [9] note that the classic consumer behavior model and the purchase decision-making process have evolved with the advent of the online environment, including factors such as website, user experience (UX) and user interface (UI), social media, and website quality, among others. These consumers have shifted from being mere consumers to prosumers, increasingly stimulating communication and embracing new technologies for communication, learning, evaluation, buying, and selling [10, 11]. This behavior has given rise to the ROPO effect (research online, purchase offline), where consumers search for information online before making a purchase, which is subsequently completed offline, for example, in a physical store [12, 13]. More recently, another concept called reverse ROPO has emerged, where consumers initiate their research and experimentation offline and then complete their purchase online [14, 15].

In addition to these elements, Sheth [16] points out that the context influences consumer behavior, whether it is temporal or local, and presents four types of events that can influence consumption: life events (divorce, marriage, changes in residence, community, neighbors, family, and friends), technology (new equipment and solutions that replace old habits, such as the Internet, e-commerce, smartphones, enabling increased online searches and purchases); rules and regulations (especially in the public sphere with rules governing the use of spaces, taxes on certain products considered unhealthy, such as sugar, tobacco, and alcohol, or tax incentives for environmentally friendly products such as solar panels and electric vehicles); natural disasters (natural phenomena such as volcanoes, tornadoes, tsunamis, pandemics, or even global events like wars or financial crises can influence consumer behavior). Considering the context of the COVID-19 pandemic and Sheth's findings [16], it is safe to say that behavior has indeed changed.

A survey conducted by the Grupo Ageas Portugal [35] found that 45% of Portuguese citizens altered their consumption habits, with more significant changes observed among higher-income individuals, who tended to make fewer changes. Of these, 31% believe that the changes are long-lasting, particularly among females and younger generations. The categories that experienced the most significant increases include food, health, home products, sports, and technology, while the largest declines occurred in travel, clothing, culture, and automobiles. The immense uncertainty and efforts to control the pandemic situation, minimizing physical and emotional risk, sometimes led to impulse purchases and bulk buying, as seen with food products and items related to hygiene and well-being, such as toilet paper (which became scarce) and safety products, along with medications [4]. On the other hand, mobility restrictions between countries led to greater product scarcity, resulting in longer waiting times for both online and offline purchases, further encouraging bulk buying.

E-commerce data in Portugal indicate increases during the pandemic, ranging from 150 to 170% compared to previous periods, with growth observed in both younger (70%) and older (47%) generations. According to the same study, younger individuals intend to continue online shopping at a rate 2.5 times higher than seniors. Another study by Eurogroup Consulting Portugal reports that, of their own accord, 75% of Portuguese citizens began adhering to public health rules (hygiene, social distancing, personal protection), going out less, buying fewer trips, socializing less, and frequenting less crowded places. On a different note, 10% of Portuguese citizens admitted to adopting healthier eating habits, learning to cook, quitting smoking, losing weight, engaging in more walks and bicycle rides, increasing reading habits, watching more television and listening to more music, working longer hours, exploring spirituality, reflection, serenity, meditation, engaging in more prayers, and experiencing heightened fear of death. Sheth [16] mentioned eight immediate effects of COVID-19 that altered and introduced new habits and practices in people's daily lives and consumption:

• Stockpiling: The concentration of essential products such as bread, water, toilet paper, and cleaning products, common in countries facing product crises

like Venezuela, became a global phenomenon during COVID-19, especially in products that were expected to become scarce.

- Improvisation: In times of adversity, improvisations naturally emerge. Consumers
 sometimes adopt new consumption habits in place of their usual ones. For instance,
 religious ceremonies during Christmas and Easter were conducted through live
 streaming via Zoom or Facebook Live, teleconsultations and online classes persist.
- Repressed demand: During periods of uncertainty, some product categories are put on hold, such as car and real estate purchases, concerts, and events, among others.
- Digital technology adoption: The introduction of new digital technologies into consumers' daily lives was notable, especially in applications like Zoom or Microsoft Teams for work.
- Home delivery: The prohibition of leaving home forced brands to develop solutions that reached customers. Options like UberEats, Glovo, TakeAway, Netflix, and Amazon Prime emerged.
- Work-life balance: Creating boundaries between work and personal life became challenging.
- Online meetings with friends and family: Unable to meet physically, people resorted to digital means such as online social networks to check on the well-being of friends and family.
- Discovery of talents: Perhaps, one of the greatest opportunities for consumers during this period was the development of new skills and talents. In addition to new ways of working and studying, consumers discovered new artists, authors, online stores, original content production, including recipes.

These effects brought about by the pandemic resulted in a series of transformations that presented new challenges but also opened up opportunities for brands. Santos [2] believes that the pandemic only accelerated the adoption of digital technologies, as consumers were already making regular purchases through these means. Online shopping became one of the preferred formats, with 52% of users avoiding physical stores [17]. In 2021, the share of digital commerce in total purchases increased from 10% (pre-pandemic) to 18% during the pandemic, with a 37% increase in online purchases from Portuguese merchants, according to SIBS Analytics (2021). There was also an increase in electronic payments through MB Way in both physical and online stores, with 4 out of 10 payments being made electronically, reducing physical contact and making the act of purchasing more secure. Interestingly, the same study reveals that Portuguese consumers prefer to shop on Saturdays around 12 p.m.

These changes in consumer behavior, driven by deprivation, anxiety, and even depression, may alter how, why, or even how much they consume, leading to a revaluation of their attitudes based on various factors, including social class and inequality [18]. This period gave rise to responsible consumption, where consumers reflect on the origin of their products, favoring national over imported products and considering the environmental, social, and personal consequences of their consumption [4].

19.3 Marketing in the Time of COVID-19

According to [19], marketing is undergoing an evolutionary process, shifting from its initial focus on products to the humanization of brands and customer engagement. It has also transitioned from a society based on the industrial revolution to a digitized and hyperconnected society, from economic value to social value, and from a goal of one-to-many communication to an omnichannel concept focused on constant many-to-many communication [20, 21].

This evolution of marketing is closely tied to the evolution of communication and its three branches: journalism, public relations, and advertising. Communication has integrated digital media alongside its traditional means [22].

These new digital communication channels have allowed the creation of online communities where consumers can communicate more openly and directly [23]. This proximity to consumers is beneficial for both parties involved in the communication process because the receiver has more power to provide feedback, which is extremely useful for the sender to adapt their messages, codes, or channels to convey their message more clearly [24, 25].

The pandemic brought about changes in consumption that required businesses to adapt to the challenges imposed by this unique global condition. Companies were forced to develop new solutions to cope with the constraints. Many companies realized that having only one customer acquisition channel and the absence of a customer retention and relationship program proved disastrous for their economic viability. This was especially true for businesses where digital channels were non-existent [26]. This lack of strategic vision led to order cancelations, disrupted supply chains, missed deadlines, lack of customer service, and a failure to provide solutions that met customers' needs and desires. On the other hand, it forced companies to create products, services, and solutions that allowed them to meet consumer demands and remain active and visible in the market [2, 26].

According to Castro et al. [33], companies needed to make fundamental changes to their management, including increasing their resilience to address daily challenges, digitizing their entire value chain, and studying and understanding consumers in the face of pandemic scenarios through the use of data, both internal and external. This data includes customer contact history, monitoring social networks, operations, and employees to architect possible scenarios for sustainable development during the pandemic and beyond [2, 27]. Measures such as extended opening hours, suitable cancelation policies, contactless deliveries, online service provision, extended payment deadlines, the shift from traditional marketing channels to the online ecosystem, or even contributions to social causes were strategic solutions suggested by Wang et al. [37]. Social purpose is part of the values of most brands, and the pandemic was a moment for them to put that commitment into practice [27]. Consumers' perception of a brand is strongly influenced by the brand's response to a crisis, and this perception can be more significant and long-lasting during these times [4, 28].

Santos [2] identifies several examples of how businesses in the Portuguese market sought to adapt to this scenario, including:

- Allocating more resources to online stores (e.g., Auchan, Ikea).
- Adding new products to their offerings (e.g., Delta Q).
- Reorganizing categories based on social media search volume (e.g., Ikea).
- Offering safe, contactless shopping through click & collect (e.g., Ikea, Worten).
- Providing assistance with online shopping (e.g., Continente, which promoted a specific service for baby boomer generation consumers).
- Offering teleassistance services (e.g., Cruz Vermelha Portuguesa).
- Providing free deliveries (e.g., Odisseias, La Redoute).
- Advertising through Google Ads, Facebook Ads and Instagram Ads (e.g., Super Bock, The Florist).
- Demonstrating social responsibility (e.g., Ikea, Pleez, Odisseias, La Redoute, Eugénio Campos, etc.).

The emphasis on the digital realm, especially on websites and social media, was something suggested by literature in the past and implemented by companies in response to changing consumer behavior, as a way to stay connected and retain customers in this unique moment in history. The general sentiment was that digital channels allowed businesses and society as a whole to continue their activities.

19.4 Online Social Networks in the Time of COVID-19

Online social media played a crucial role in minimizing the lack of contact between brands and consumers and maximizing sales [33]. The use of these platforms increased exponentially, primarily because they were the main (and sometimes the only) means of contact with family, friends, work, and others during periods of isolation and general lockdown, as experienced in Portugal on two occasions [27]. Online social media helped brands interact with consumers and boost sales during the pandemic. The companies studied by Santos [2] unanimously used social media to maintain proximity to their audiences through constant communication, interaction, and measurement of the impact of their actions and customer satisfaction.

During the pandemic period (2019–2022), global social media usage increased from 3.51 billion users to over 4.59 billion users [29]. In Portugal, the reality was no different, with significant increases, often exceeding 8% annually [30]. According to a study by Marktest [31], Instagram was the preferred social network for young people, and TikTok entered the top 10 in Portugal with over 500,000 new users in just two months, from March to May of 2020. Photos and stories were the most popular formats on social media, and Pinterest, along with Twitter, saw significant growth during this period (perhaps due to the search for images and do-it-yourself content in the former and the need for up-to-date pandemic information in the latter).

The same study reported that one-third of Portuguese people made purchases through social media, an increase of 3.3% points compared to 2019, with categories

like clothing (34%), footwear (13.4%), and home goods (9.7%) being the most popular. Facebook was the preferred social network for these purchases (72.6%). Moreover, 70% of users recalled seeing sponsored content while browsing the Internet.

According to a report on the Distribuição Hoje website [32], the Portuguese brand Salsa, through its digital marketing director Raquel Ribeiro, considered Facebook an excellent traffic generator for the brand's website and an excellent channel for sales promotion. The same official stated that Facebook was responsible for 90% of sales generated through social media, despite representing only 6% of digital channel sales (in Portugal, Spain, and France). Besides sales, a brand's presence on social media has a significant impact on visibility and brand awareness in the market where it operates. Although most customers discovered the brand's website through organic search, paid media, and email marketing, the official believes that social media holds enormous potential in the near future.

Mango, another brand with a strong online presence, reported a growth of over 3 million customers in the digital channel during 2020, with 900,000 customers acquired during the lockdown months. The company expected to end the year with revenue of nearly 800 million euros from the digital channel, accounting for almost 24% of the brand's total revenue, according to its CEO Toni Ruiz. For Mango, social media is relevant for promotion and marketing because it allows them to gain insights into their audience (age, gender, and interests) and, in turn, redirect their campaigns. The company also mentioned that launching its e-commerce channel over two decades ago allowed them to face the challenges of lockdown more quickly and in line with the brand's quality standards.

The El Corte Inglés department store chain (Spain and Portugal) also saw an increase in sales through digital channels, especially among users who saw their promotions on social media and later visited the website. The brand considered these platforms essential for promoting the relationship between users and the brand.

Besides products, some international services like Netflix, Zoom, Teams, and Spotify also experienced increased usage during this period. Raquel Ribeiro had no doubt that the pandemic had altered consumer buying behavior and that the choice of omnichannel, decided upon by the Salsa brand in 2015, proved essential to cope with the restrictions that limited customer access to physical stores, pushing consumers toward the digital channel. The brand was prepared, and the results obtained demonstrated that the decision was correct. To address the situation, Salsa developed an exclusive digital service for personalized sales. Shop assistants became the eyes and hands of customers through a chat service on the website, Facebook Messenger, and WhatsApp. This allowed real-time assistance or the scheduling of visits to physical stores, where customers were provided with highly personalized and secure service. Additionally, the Salsa brand had its product catalogs updated and integrated across different social media platforms. They invested in social media advertising through posts highlighting trends, opportunities, abandoned or unfinished shopping carts. Mango also believed that its customers would continue to choose the omnichannel approach, interacting simultaneously with online and physical stores.

Aligning with the latest evolution of marketing according to [19], this search for the online channel compelled businesses to streamline their communication and participation across various available media to meet consumer needs and demands effectively.

19.5 Final Considerations

The COVID-19 pandemic has had a profound impact on all sectors of society, resulting in significant losses in terms of human lives, the economy, social structures, and politics.

Despite the technological advancements and social changes that have occurred in recent years, no one was prepared for the arrival of this catastrophic event, which drastically altered the lives of individuals, families, governments, and businesses.

This abrupt change led to a transition from in-person to digital or hybrid living, with a substantial increase in the use of digital platforms for communication, work, shopping, and leisure. Consumers, who were already playing the role of "prosumers" (both producers and consumers), became even more engaged with these platforms, adopting digital technology, making purchases on online stores, discovering talents, working remotely, and balancing their personal and family lives. Nearly half of consumers consider these changes to be here to stay.

Marketing, which was already in a state of constant evolution, had to quickly adapt to this new reality. The transition to the digital world was not a surprise, as many aspects of everyday life already had digital components. Brands were already using various digital platforms to market products and services, as well as to manage and optimize communication and interaction with consumers. Digital communication, integrated into the marketing mix, evolved from offline to online, exploring the possibilities offered by search engines, websites, email marketing, and, especially, online social networks.

These platforms allowed for the collection of insights, facilitating the creation of new forms of communication aimed at gaining consumer loyalty. During the COVID-19 pandemic, the importance of these new means of communication, advertising, distribution, and relationship-building became evident. Companies emphasized the importance of online social networks in generating traffic to their websites and increasing brand visibility. Furthermore, preparation and experience in the digital environment enabled them to develop personalized consumer experiences through omnichannel distribution.

In conclusion, the exploratory approach taken in this study revealed that the COVID-19 pandemic had implications for consumer behavior, making it more active and hyperconnected, altering purchasing habits, and shifting between in-person and online shopping. It also brought changes in marketing, with a focus on omnichannel, hybrid, and multidirectional approaches that seek to personalize and contextualize consumer experiences.

Additionally, it prompted changes in communication, making it more present in the digital sphere, based on constant many-to-many communication through online social networks, search engines, and websites. Brands had to integrate these changes within a short timeframe, and those that did not only manage to maintain their operations but also increase their revenue (in the online sphere) compared to the same periods in previous years. Brands that can incorporate this new hybrid behavior into their strategies have the potential to enhance their value, visibility, sales, and consumer recognition.

As a future research direction, we aim to conduct empirical research focused on a specific generation (Generation Z) through quantitative research methods. This will help determine whether these behaviors are enduring and whether companies continue to adapt their strategies to address these new behaviors or revert to their pre-pandemic approaches. Additionally, we plan to narrow our research focus to specific industries, such as the tourism sector.

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Chapter 20 Key Pillars in Storytelling to Generate Emotional Branding



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Abstract Emotions are important when it comes to creating strong and lasting bonds between the target and the brands; therefore, storytelling and emotional branding need to be part of marketing strategies. This study aims to identify which emotions and which pillars are key in the storytelling of the spot "Amarás, única como tu pelo y tu Perú" (Amaras, unique as your hair and your Peru) to generate emotional branding. This research is located within the phenomenological paradigm with a qualitative methodology. The sampling technique was for convenience. Twenty-one female psychology students from Federico Villarreal Public University (UNFV), with ages ranging from 22 to 26. The emotions conveyed by the participants were joy, pride in being Peruvian, curiosity, strength, surprise, motivation, nostalgia, sensitivity and calmness. In terms of emotional branding, three key pillars that helped to attain an emotional connection with the students were identified. Three key pillars were identified for the students to achieve closeness with the brand: customer experience, brand authentic self, and warm glow. As a conclusion, the brand's storytelling evokes positive emotions in the students and identifies them as Peruvian.

20.1 Introduction

Advertising is an essential promotional tool used by all companies, regardless of their size or international reach [1]. The advancement of digital technologies has helped companies to create and spread different methods for creating and personalizing advertising messages; as a result, companies collect and store important information about consumers. In this way, ads can adjust to their needs and preferences [2]. After the arrival of COVID-19, advertising aims to stand in the middle between affective and cognitive elements when promoting. Currently, in a world where there is an

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overload of advertising information, creating and realizing emotional content is vital for brands [3].

Emotional advertising is the technique used by brands to establish close and deep connections with their audience through common situations with which consumers can feel familiar and identify with [4]. This technique has proven to be effective in achieving the attention of the target with the advertising saturation [4]. Sales strategies have constantly advanced. Initially, the functions, quality, price and utility of the product were promoted; now the strategy is to go further, attract the consumer, and have them show interest in the ads delivered by the brand, that is, emotional messages [5, 6]. This new strategy is known as emotional branding and aims to create meaningful emotional connections with consumers [7, 8].

One of the obstacles that brands face in a very competitive market is that customers constantly change their tastes and needs; in other words, they are not loyal to a brand. Emotional branding is the ideal advertising strategy for brands to connect emotionally with consumers [9]. Today's emotional advertising is likely to be much more recognized and effective since it is easier to go viral. The storytelling tool is used to take advantage of this opportunity and reach customers through the emotions caused by the stories told [10].

Storytelling has always been in the lives of people, in this case, of consumers, playing a very important role in terms of the spread of advertisements [11]. One of the keys to storytelling is the verisimilitude of the stories. It is considered an important factor in the creation of advertisements. When the story is perceived as true and coherent, it generates a positive behavioral change in the user [12]. Therefore, the verisimilitude of the stories creates a positive bond with the consumer, resulting in a greater commitment or engagement by the consumer toward the brand, and also achieves affective and cognitive responses [13]. The use of emotional branding in companies is vital because it is a technique that allows to connect emotionally with the consumer and the brand, the use of this, becomes a considerable and lasting relationship between them [14]. Therefore, the veracity of storytelling must be investigated previously, because all the elements and messages that the story entails must awaken the subconscious of the consumer, where they visualize their memories and this evokes interest in it [15]. Thus, storytelling is a tool that helps connect brands with consumers, establish long-term relationships and complete the purpose of brand building [16].

Based on the above, the following research questions are addressed: What emotions does storytelling evoke in the spot "Amarás, única como tu pelo y tu Perú" to generate emotional branding among psychology students from Federico Villarreal National University (UNFV)? And what pillars are key to generate emotional branding?

20.1.1 Key Pillars of Emotional Branding

In a changing world, it is important for brands to study and analyze their audience to understand them and create strategies that drive engagement with them [5]. The key to advertising success is to identify the emotional needs and desires of users to create positive bonds between them [5]. Emotional branding focuses on customers' feelings and builds brand lovalty through emotion. Its goal is to emotionally satisfy the public by conveying a story that touches their emotions; in this way choosing the product, i.e., building loyalty so that they choose the brand over others [17]. Emotional branding is an experience, an idea, and an expectation that consumers have about a product before buying it. Users have a high level of imagination, where they expect to connect with an experience or reality that links them with the product in order to meet their needs [18]. In the same way, emotional branding is an important technique for companies, because having it as part of their communication strategy they manage to transcend in the future and differentiate themselves from the competition [14]. There are four pillars that successfully help a brand to bond emotionally with the consumer, which are the following: consumer experience; brand authentic self, which is the authenticity of the brand; warm glow, which refers to the feeling of consumer well-being; and co-creation [7, 8].

Customer experience refers to the proper creation of customer experiences, where the customer has direct or indirect contact with the service or product offered by the brand; also, presenting these positive factors makes the experience memorable [19]. Consumers prefer an additional value which is not just to show a product, but an experience that awakens that emotion that makes them buy the product and connect with the brand, thus, applying this pillar is successful for the company [20]. This experience is crucial to achieve a brand commitment, where it must go beyond the expectations of the user and seek solutions to problems creatively to arouse the emotional interest of the user, so the brand will be in the eyes of the consumers [21].

The brand authentic self is the perception of users about the brand image, that is, whether it differs from others as unique or not [22]. In other words, it drives the idea that the "authentic self" can be a fundamental factor for advertisers, in terms of the visual construction of the brand, in order to remain differentiated in the labor market, creating a personalized reputation of their image [23, 24]. Likewise, authenticity is a tactic for one brand to stand out over another. If the brand is considered authentic, consumers would pay a higher price or feel identified with it [25].

Warm glow generates a rewarding feeling of pleasure in the public when the brand advertising conveys a warm and caring message that arouses the emotional interest of the public [26]. Here the brand does not simply show its products or services as a priority [26]. In addition, advertising campaigns with emotional messages are perceived positively by the public, and brands obtain great benefits, such as more favorable interactions, high probability of selling their products or services and a rewarding experience toward the brand [27].

Finally, co-creation in branding is the collaboration between the brand and the consumer to achieve shared experiences and emotions; that is, the public participates

in developing an advertising campaign based on their opinions and ideas and the brand takes them into consideration to make the experience more unique [28, 29]. This creates close bonds and a favorable connection between the audience and the brand; in turn, it meets their needs in a personalized manner [28, 29]. Today companies take this pillar into account to strategically reach their audience with co-creation signals and have them participate in value creation activities [30]. In this way, having cocreation as one of the advertising strategies is important for brands can have another group perspective, in this case of their audience, to personalize their content based on the needs of the audience [31].

20.2 Methodology

This study was situated within the phenomenological paradigm which involves an interactive process of understanding a phenomenon in depth with the ability to generate theories [32, 33]. To understand how society works, it is necessary to understand people's experiences and perspectives [33]. Its approach is qualitative to understand both the meaning and the importance of the experiences lived [34], and it is fundamental to understand the well-being and the quality of life of people [35]. This study analyzes the campaign "Amarás, única como tu pelo y tu Perú" of the Amaras brand.

The data collection technique was the semi-structured interview, where the questions are dynamic, open and with a great deal of flexibility on the part of the researcher and the interviewee [36, 37]. A guide of 34 open questions was prepared based on two main topics: Verisimilitude and emotions in storytelling; and key pillars of emotional branding. The interviews were carried out in Google Meet and Zoom platforms, based on the availability and kind of technology the students relied on. The interviews lasted about 12 to 42 min, depending on the flow of the moment and the connectivity to the Internet.

To select the sample, the non-probabilistic sampling technique has been used for convenience [35]. This type of sampling is used when it is difficult to access the entire target population where participants are selected for their availability and accessibility to participate in the study [38]. Additionally, sampling was theoretical because it refers to the development of concepts when collecting and analyzing data [39] until theoretical saturation is reached, i.e., when no new findings or categories arise (Foley et al., 2021). A sample of 21 UNFV psychology students obtained met the following requirements: (a) be a psychology student, (b) be between the ages of 22 and 26, (c) be enrolled in the ninth academic cycle of the program, and (d) agree to participate voluntarily in the study.

The information was processed through thematic analysis which provides a rich and detailed description of the data and allows to locate and identify categories and topics [40]. The respondents received an information sheet explaining the dynamics of the study. Each participant gave verbal consent to participate in the study and to record the interviews in audio [41].

20.3 Results and Discussion

20.3.1 Emotions that Awaken in the Storytelling of the Amaras Spot for General Emotional

The emotions awakened are inclusion, identification with Peru, strength, freshness, surprise, happiness, pride, joy, tranquility, and confidence. The interviewees mentioned that they felt identified with the spot as they saw a relation between the diversity of climates and places of Peru, with the types of hair; they were proud to see their country, strengthening Peru; and included when identifying their hair type with any of the models in the spot. At the same time, the visual elements (nature, background music, the woman's voice-over, the colors and the images) transmitted in their tranquility, freshness and strength. They mention that the whole set produces confidence and curiosity to acquire and test the product because they want to love it as the name of the brand: Amarás. This evokes an affective connection between the brand and the public by creating an emotional storytelling that embraces the sense of pride of being Peruvian, and each element generates a sense of warmth with Peru and hair care.

When creating advertising campaigns, proposals that cover emotional issues must be taken into account to awaken feelings in users, because this helps to viralize content and generate a positive impact on brand loyalty; therefore, visual resources such as music, emotional voices and images help to make communication more powerful [42, 43]. Stories have the power to connect emotionally with the target [44]. Storytelling identifies with the public, because of all the stories told that result in emotions. This is a popular technique to create attractive content, which structures an affective bond to the company [11, 45]. In this sense, it is necessary that the story evoke feelings to establish an emotional bond with the target and achieve an efficient message that will capture the interest [11].

Well, it gives me confidence, because for me they know how to use all the resources. (...) I think they have done a good market research and therefore it is very attractive. (P02)

It transmits energy, strength, something close that transmits the thoughts and ideas we have. (P13)

For the interviewees, the product conveys confidence because the story is adapted for them and the resources used are real since it identifies Peruvian women; therefore, it can be said that there was verisimilitude in the story of the message. They comment that the spot shows a reality that is not seen in other brands, as they always display an idealized standard of beauty which does not identify Peruvian women; additionally, they star in a single type of hair: straight, leaving aside dyed, curly, wavy hair, and others. In this way, they feel a closer connection with Amarás as it distinguishes itself from the competition and creatively shows them a truth that happens every day with women's hair. However, two students do not agree with the representation of the models in the spot. They believe that they do not resemble the true Peruvian features. Despite this, they do not discredit the main message, they consider it as





a usual situation that they experience in their lifestyle. If consumers perceive an ad's storytelling as false or meaningless, this can be negative and even offensive. It is suggested that marketers build strong brands that spark positive emotions in the creation of their campaigns [8, 12]. In this way, by moving away from invented or far-fetched topics and away from fantasy and creating more human content and situations experienced by consumers, it contributes to the credibility of the message, engaging with the plot and thus presenting a true connection with the brand [13, 46]. Storytelling as a tool offers a variety of stories represented by actors who convey a message of lived experiences and emotions to allow a real understanding in the receiver. In this way, he can relate new thoughts with old ones and generate a beneficial behavior change [15, 44] (Fig. 20.1).

Good... with the spot and with the message it offers, it is much more reliable. I feel that it is more directed to my hair type. (P01)

With the girl in the seven-colors mountain and sometimes with the desert, because I did see that my hair is dry, as it represented the hair and I said: "Oh, it looks like my hair". (P07)

20.3.2 Key Pillars in Storytelling of the Amarás Spot to Generate Emotional Branding

There are four pillars identified in this study. However, three are found in this spot: customer experience, brand authentic self, and warm glow with a significant impact on the interviewees which aroused emotional branding. Each pillar is analyzed below.

The customer experience pillar was key for the students because they found the message interesting, striking, creative and unique, together with the visual content of the brand. They felt represented and identified with their country and with the issue of hair types. Four interviewees are not in favor of the product, because they did not obtain the desired results, but in saying so, they do not criticize the spot, rather they liked very much the way the brand communicates with the public. Therefore, companies must take into account the emotional and social signals of their target audience when creating an advertising message, since the sum of these resources,

and the strategic changes they make to achieve dynamism, achieve a satisfactory consumer experience [47, 48].

Some of the students commented that friends and family had tried the shampoo giving them positive feedback; so, when they see the spot, they want to buy the shampoo. Thanks to word of mouth, a new target is reached through the public that has already tried the product or seen it in digital media. This means that the company has created in them a sense of satisfaction and taste for the brand [19]. The user's shopping experience is important as a future customer; therefore, the brand must impact the consumer with new proposals that solve their problems and satisfy them emotionally fulfilling their expectation. These experiences remain with them developing loyalty with the brand, and thus, buying the products [19, 21].

Well, every time I see a spot of this shampoo, I feel more desire to use it, because sometimes I feel identified with one of those types of hair (...) The spot is very good at attracting people to buy the product. (P02)

The brand has good marketing. I like how they have connected; it is just that the product has not worked for me. The brand is becoming known, but I have not had a good experience because my hair fell out a lot. (P11)

Regarding the brand authentic self-pillar, the respondents distinguish the brand over the competition, because by creating a unique message that identifies only Peruvian women, Amaras becomes more attractive and differentiating. The brand was able to position itself in the minds of consumers by transmitting a visual and auditory message different from the rest. The interviewees mention that the pastel colors in their products are striking, because they are fashionable shades that are not found in other shampoo products; they also mentioned passion fruit because they think it is an uncommon flavor and they like the smell of the fruit that only Amaras has. In this way, the brand authentic self influences the consumer when the company conducts a previous study to know its target and the market; so, when the marketing strategy is presented, consumers are surprised when they see a completely new advertising piece. This generates interest and a close bond from present to future [22, 23, 25]. It is important that a brand is presented with attractive designs from the start, as this is part of emotional branding when purchasing a product or service. Emotional branding attracts positive experiences and can express an authentic self rather than an idealized one [7, 8] (Fig. 20.2).

I see different kinds of girls. They don't show any specifically. For example, in different shampoo spots, they promote a standard of beauty; that is, a perfect girl with pretty hair (...) I think the spot makes an identification, because each of us can identify with a girl in the spot. (P06)

They are pastel colors that are rarely seen in the brands, since they show a very vivid blue (...) as pastel colors are in trend it makes you more attracted, because they are chicer. (P10)

Finally, the warm glow pillar opened the hearts of the students as a pillar that helped build more trust between their hair and Peru. One of them mentioned the aware-raising message to take better care of their scalp. As mentioned, they felt a sense of pride toward their country, for being Peruvian and having a brand that





only addresses them. The fact that the spot takes Peru as a starting point, made the participants feel represented with their culture. This caught the attention of the public and aroused an emotional interest to encourage the purchase of the shampoo. The brand entered the hearts of the interviewees through the pride of being Peruvian, as the product is not the star, but the story they transmit. If the brand transmits messages with causes that satisfy the consumer and arouse feelings, there is a greater chance that the consumer will be interested in buying the brand's products or services. All this becomes a commercial success if advertising campaigns with cognitive values are created [27]. Consumers already have their own identity that helps them make decisions. Therefore, when an ad captures the emotional attention of the recipient by developing storytelling, it awakens an interest in the brand, as the message it conveys is closely related to their daily lives, resulting in a purchase decision.

Message of reliability with the product, because I think this will help us take much better care of our hair. Also, the name [Amarás (You'll love)] left a very nice message of awareness. (P01)

We have a feeling that we love our country very much and we are very Peruvian. They present you with any little thing; then you kind of get more attached to it, so you're always going to prefer that over another foreign branded product. (P10).

20.4 Conclusions

This work had two main research questions. For the first question, the emotions conveyed by the participants were joy, pride in being Peruvian, curiosity about the product, strength, surprise, motivation, nostalgia, sensitivity and calmness. This is thanks to the set of elements and resources, both visual and auditory, that the brand uses to provide a sense of pride of being Peruvian and hair care in Peruvian women. Besides, by creating content that identifies the Peruvian public, students perceived the spot as true, because they show landscapes of Peru and real types of hair that are not seen in other spots. Therefore, by creating a situation that women generally go through with their hair type in their mornings, it connects and generates a bond

with the brand, because it shows them a reality that in itself is not new. They just saw the opportunity that other companies did not to convey this message creatively. Storytelling showed verisimilitude in the story, which helps to present a more human closeness between the brand and the consumer. The use of storytelling as a resource to generate emotional branding was successful for the brand, as it succeeded in generating affective emotions and creating stories with a real message.

In emotional branding, there are four pillars. For this campaign, three key pillars were identified for students to achieve closeness with the brand. First, the customer experience generated an affective bond between the students and Amaras, because, according to the participants, a pleasant, attractive, interesting and curious experience was achieved by linking cultural elements and the variety of hair types they show. The spot generated confidence and desire to try the product; adding also, that their circle of friends and family recommends the product from word of mouth, strengthening trust. Secondly, brand authentic self. The brand is different from the competition because its spot is innovative and unique. They remember the brand as such, but not the product itself. The brand managed to understand its consumers and adapted to their tastes and needs, because the pastel colors they used are fashionable and not found in the market. This helps people to recognize the brand when they see the product. Thirdly, warm glow where Amaras embraced a sense of pride of being Peruvian, a topic very dear to Peruvians that does not fail if used correctly. This made the interviewees identify with Peru and prefer a Peruvian product to one that does not identify them as such.

It is recommended to replicate this study in the future with participants living in different regions of Peru, such as the coast, the highlands, and the jungle, because the spot shows specific areas of the country. This study had certain restraints, such as internet connectivity problems, which made it difficult to understand some of the answers of the interviewees. For this reason, the interview took longer than agreed. Another limitation was that the participants did not turn on their cameras, so we could not observe their gestures.

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Chapter 21 Emotions in Advertising and Their Connection to Consumers



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Abstract After the Covid-19 pandemic, several brands started using emotional content in their [advertising] spots. These companies focus their campaigns not only on offering a product, but also on triggering a feeling for their brand and creating a moving environment for their current and potential customers. This study analyzes the emotions generated by the campaign, "*Este 2022, unidos nada nos podrá vencer*" ["This 2022, [if we are] united, nothing can defeat us"]. This study was conducted on engineering students at a private university in Lima to persuade them in their purchase decision. This study is positioned on a phenomenological paradigm and design. Twenty (20) semi-structured interviews were conducted with university students between the ages of 19 to 25 years old. The data was then processed through thematic analysis. This campaign generated the following emotions: were joy, pride, hope, pride (sic), nostalgia, motivation, engagement, and longing to be Peruvian. The spot communicates the integration of people's diversity and that their services are available for everyone equally, so no one would feel discriminated against.

21.1 Introduction

Consumers' social, private, and cultural habits changed drastically because of the Covid-19 pandemic [1] which showed that, in difficult circumstances they are more receptive to affective messages [2]. The pandemic was no exception, as many brands focused on expressive and poetic campaigns, rather than adopting informative strategies, to persuade consumers more effectively [3]. Ads with emotional content are

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more likely to generate word of mouth and are shared online more often than ads without emotional appeal [4]. Emotional appeals are like advertising triggers that arouse consumers' emotions, influencing their preference for products, attitude, and decision towards the purchase [5]. For brands, having a celebrity has a better chance of attracting consumers and increasing profits. In other words, consumers are more easily influenced by a message from someone they feel closer to and can relate to. Therefore, to create an effective advertisement on social media that can successfully persuade a consumer one must understand the factors of an advertisement [6]. Entertainment, as well as the information transmitted, play a relevant role on the effectiveness of ads in social media [7].

There is a strong and positive correlation between consumer perception and online advertising [8] to capture the consumer's attention emotionally, generate deeper connections, and have them share the emotional experience [9]. Thus, an advertisement is entertaining if the consumer finds it appealing and provides sensory pleasure and offsets consumers' feelings [10]. Over time, advertising has evolved and now includes emotions in ads and, this way, connects emotionally with consumers and influences their decision-making process [11]. Emotional advertising drives a higher purchase intent [6] because it causes a more effective message recall than rational advertising [12]. A study conducted in Pakistan on brand perception, concluded that consumers have difficulty developing a positive brand perception as it depends on the emotional or functional needs of the customer [4]. In other words, there is a direct relation between what a consumer perceives about a brand and the message it conveys.

Storytelling is a telling a story that appeals, reminds, moves, and engages through emotions, thus providing a better understanding of the message and generating greater empathy in consumers [13]. Storytelling helps to generate greater attraction and excitement when used as an advertising piece, as it influences emotions to achieve a communicational objective of the story itself [14]. It was noticed that storytelling supports the identification of the target audience with the story and the development of a sense of belonging that supports the trust and a more experience-based appeal [15]. From an advertising approach, storytelling is defined by the persuasive power of its stories, since in addition to providing information, they arouse emotions and trigger memories in their consumers [16]. In Peru, brands in the banking industry are trying to reinvent themselves after the pandemic. The research question guiding this study is: What emotions does the campaign "*Este 2022, unidos nada nos podrá vencer*" ["This 2022, united, nothing can defeat us"] cause on engineering students at a private university in Lima to persuade them in their purchase decision.

21.1.1 Emotional Advertising

The Covid-19 pandemic has had a strong influence on consumer behavior [6]. This resulted in the use of emotional appeals in advertising campaigns under the assumption that the greater the emotional impact, the more memorable and effective the

advertisement would be [6]. Emotional advertising has a strong influence in the consumer, as it can arouse their emotions and influence their purchasing behavior [17]. Emotional advertising is defined as a method that triggers an emotion. This type of emotional advertising carries messages that persuade consumers through triggers that appeal to their emotions regardless of their positive or negative impact [18].

Currently, the emotional perception of products has become more relevant than the product itself, thus, advertisers use emotional messages more frequently to influence the purchase attitude [19]. However, it has been noticed that people from different cultures experience different emotions and their behavior is also influenced by contextual emotional developments [20]. Advertising not only provides information to the public about a product or service but must also be able to persuade potential consumers so that they may decide to choose and purchase products or services offered by marketers. Therefore, the more creative and clearer the message conveyed by the ad is, the more persuasive it will be to consumers. Advancement and development have changed advertising strategies that have a strong impact on the purchasing decisions of your target audience. Advertising plays an important role in its consumers' expectations towards a brand and product purchase decision [21, 22]. Therefore, the indicators of emotional advertising would be pleasure, excitement, command, and recall [19]. Likewise, emotional appeals arouse positive or negative emotions that, in turn, produce consumer purchase decisions [11]. Therefore, incorporating emotional content into an advertisement can often create a strong connection with the consumer [18]. The most used themes, time and time again, by brands have been nationalism and family love, which have produced good results and considered that emotional appeal can persuade more effectively a person who has little motivation or little ability to cognitively process a message [19]. Despite all this, companies that consider that their products have nothing different from their competitors use the emotional appeal route to persuade people to buy their product [7].

21.1.2 Consumer Persuasion

Currently, consumer perception and behavior are changing. Consumers' brand perception relies on their experience, accessibility, credibility, and word-of-mouth referral [23]. Consumers are more likely to choose a brand over a competitor's brand if they are exposed to videos or posts promoted by influencers [24]. Consumer persuasion happens through messages sent via social networks [25]. The goal of an advertisement is to inform and persuade its target about the product, as these advertisements influence their customers decision making on which product or service they want to purchase [8]. Likewise, young adults base their perceptions on the experiences they have had with the brand [26]. On the other hand, social media content develops brand image, creates communities, attracts consumers, and promotes a global reach [27]. In the industry, consumer attitudes can be influenced by effective advertising, being the advertisers' purpose to sell their products. This way, the company can use

advertising to motivate its customers. Many consumers use social media or virtual communities to find information and create connections with other people, which is why several companies hire influencers to convey their message and persuade their followers [28]. Also, consumers perceive influencers with more followers as engaging and trustworthy and are more likely to believe about the product or service they represent [29]. The more trust the consumer builds up for the company, the better positive results it will gain such as repeat customers, product choice, and company loyalty [30].

In addition, consumers actively voice their perceptions and thoughts about a brand, and people in their [social] circle trust them to make the right purchase. This is why, advertising and word of mouth are some of the impact factors that determine how a customer perceives a brand [31]. Consumers who agree with the message show a more positive attitude towards the advertisement, while consumers who disagree show more negative attitudes towards the brand and the advertisement [32]. There are many factors and characteristics that influence the process of consumer decision making and buying habits [33]. Also, consumer decisions are not just individual, but confirm group behaviors that are influenced by advertising and their frequent interaction on digital platforms. Consumer perception of a brand is based on trust and social media help to build trust by establishing contacts with consumers. Product quality influences consumer perception, just as a product with outstanding packaging design also influences their purchase intent [35].

21.2 Method

The study paradigm is phenomenological because it describes the meaning of the actions of a study population as they experience the same phenomenon in common [36]. Their approach is qualitative, because it analyzes experiences and opinions that help explain the phenomenon under study [37]. The selected sample was 20 university students of engineering, within an age range between 19 and 25 years. Sampling was theoretical, based on the situations or data to be incorporated throughout the study to develop theory [37] until theoretical saturation was reached. This happens from a sufficient distribution of codes, categories, and themes to fully show all the dimensions of the phenomenon to be studied [38].

For data collection, the semi-structured interview was used because it has more flexibility than structured ones, and they can be adapted to the interviewee so that they are able to express their opinions more spontaneously [39]. A guide of 26 questions was developed. It was classified into 3 categories: emotional advertising, consumer persuasion, and storytelling. The campaign to be analyzed is *"Este 2022, unidos nada nos podrá vencer"* ["This 2022, united, nothing can defeat us"] by Banco de Crédito del Perú (BCP, for its acronym in Spanish). Its campaign appeals to emotions to reflect that after two complicated years of the pandemic, Peruvians united can face any crisis [40].

The data was analyzed according to the thematic analysis. It identifies, organizes, and distributes the data by themes and categories for the understanding of the case under study, after carefully reading it and reaching results for better interpretation [41]. The anonymity and privacy of the participants was protected. The interviewees received a fact sheet explaining the purpose of the study, confidentiality [37] of the disclosed data, which is provided voluntarily, and the participant's verbal consent [38] on an audio recording. An alphanumeric coding protects participants' confidentiality and privacy [41].

21.3 Results and Discussion

21.3.1 Telling a Story Through an Advertising Spot

All the interviewees liked the spot due to the message transmitted by Paolo Guerrero, former captain of the Peruvian soccer team. Participants regard BCP as one of the biggest banks of Peru, because of its reliability and good positioning due to its large number of clients. When they hear BCP, a big company comes to mind, a market leader that provides many services, such as credit cards, Yape (mobile app for sending and receiving money, Internet purchases, using promotions, among other benefits), and loans. They consider Paolo Guerrero as the ideal person for this spot because of his influence based on his leadership and motivation, he transmits his message to all Peruvians that we can move on and restart the pace of growth they had before the pandemic. Emotional advertising transmits messages that convince the consumer to make behavioral changes that contributes to social or individual wellbeing. Hence, many brands hire celebrities to promote their services and influence consumer purchases and consumption behavior [11, 18].

I identify with this spot because Peruvians are fighters (...) since Paolo Guerrero is the historic captain of the Peruvian national [soccer] team, it takes me back to those times when we all got together in our homes and watched Peru's games (...). It gives me a lot of pride, empowerment that we may be able to achieve everything we set our minds to despite adversity (P02).

In one word, I would define it as unity because it displays Paolo Guerrero as captain of a group who speaks (...) Together as a team we are stronger. (P05).

Participants relate Paolo Guerrero's message with the brand as leader of the team and the market. In addition, he tries to motivate all people to work united, together with BCP, to achieve several things with the products and things they offer. All participants identified with the characters in the campaign, since they consider that they are part of the people from different regions, languages, and diversity of Peru. In addition, the music and the typography match the setting and message they want to portray. Therefore, consumers feel influenced when the ad's message is delivered by a person with whom they are familiar and close [7]. The use of celebrities who are admired by the public creates a greater attention and attraction to the product's image and their expectations towards the brand [19]. Paolo Guerrero's message has a strong relation to the brand since BCP transmits what they want to put into action. [It is] aimed at its target audience, who are the small business owners and small workers in the country who mostly use its product. (P06)

I associate the message to [the image] that the Bank wants to project on Paolo Guerrero, on his image, an average Peruvian who strives every day to get ahead and that the Bank will always support you. (P014).

The scenes they remember the most are when Paolo Guerrero gathers everyone on the field and makes them hug each other, creating a circle as the national soccer team. And, therefore, his participation in the ad is an excellent way to attract the public's attention, since he is a representative figure because of his leadership, strength, and security for all Peruvians. Therefore, storytelling is the way to tell a story, which is rewarding and helps to understand the message, and draws personal qualities closer more empathetically [13]. It is also the one used most often to persuade, build an organization's image and prestige by improving communication, strengthening relationships, and increasing productivity throughout the agency [15]. Storytelling is based on the persuasive power of its stories, since a seductive story appeals directly to the consumer emotions and favors the participation of its target audience before the speech displayed and its memory [16].

Consumer perception of the brand depends on what it communicates (value and purpose), and this is shown in their attitudes [32]. Positive attitudes towards the ad have higher brand recall than negative ones [17], creating advertisements that strengthen the emotional bond to generate positive emotional appeals in consumers that lead to a strong perception of the brand [7]. Then, when attitudes match the content of the message, people trust brands. But if people perceive negative attitude messages, it reinforces distrust towards the brand [42].

I consider them both to be very influential, Paolo is a character that is in the public eye. I think BCP is found in all areas of Peru. So, they're kind of like very tight-knit, super influential organizations. (P01)

I think it is very much in line with the message BCP wants to transmit (...) Guerrero is not a captain that came out of nowhere, but a captain that was shaped [in a process]. He produced so many wins with the [soccer] team, has had certain impact on the people who finally made him become the captain. Then, BCP is also going to want to be the captain of x the market where it runs. (P011)

21.3.2 The Influence of a Brand in the Purchase Decision of the Consumer

Most of the participants answered that they saw the spot on TV and YouTube. Regarding the characters' clothing and spot location, it is considered appropriate because it is very casual and in line with everyday life. However, for most of the participants, they should have added some scenes in other regions of Peru (coast, highlands, and jungle). Half of the participants did not like the fact that more places in Peru were not included as it only focused on Lima, and that more scenes of entrepreneurship were not added. They should go a little deeper into this subject. Advertising persuades consumers' behavior and attitude by influencing their emotions and purchase decision. Therefore, the public's receptivity will determine its impact. Since, if consumers do not trust the brand message, it will be less likely to develop an attitude change [8, 32]. The bank also wants the spot to show the integration of people's diversity and that all its services are for everyone equally and that no one should feel discriminated against. The students felt that more scenes of other regions of Peru should be added and that all kinds of people should appear. All the participants liked the spot; especially when Paolo Guerrero tells his team: "Let's work hard for 2022!" offering motivation and hope to the team referring to the diversity that exists in the country. Companies use celebrities or micro influencers to increase trust and brand credibility that contributes positively to the company [8] and emotions that play an important role in the efficacy of advertising on consumer behavior and attitudes, as they respond positively when the message fits their perspective and matches their characteristics [30].

I think it would have been interesting to see (...) areas shared by people who maybe live a little further away from downtown (...) And also some parts of the jungle, so that they do not only say everything in Lima (sic), but throughout Peru. (P02)

I felt a bit inspired. We have lost that trust in our authorities who do no longer represent us. (...) This spot inspired me to try to [see if] there are capable people to represent us; that this should not discourage us and that we all continue together and support each other to build a better Peru. (P05)

Most interviewees relate Paolo Guerrero's "let's stop thinking about our differences" with identification, diversity, and strength, since unity motivates us to seek a better society to live in. All participants agree that the phrase mentioned by the soccer player "together we are stronger" means that working as a team, either at work or school, towards a specific goal is faster and produces better results than when one does it on our own, since the results are not the same. If the consumer agrees with the ad's message, their attitude and perception towards a brand can be positively influenced, and brands may use this type of advertising strategy to strengthen their image [35]. Social media has encouraged consumers to keep a relationship with a brand to improve their personality and feel obliged to keep a connection to it, so it helps them to move up the social ladder [27].

It is a very motivational phrase, since unity creates strength, and with unity, teamwork and respect, many things can be achieved (P03).

Yes, I think they should include scenes, people from different regions and different careers, not only focus on one target audience. One part of the spot says, together we are more, there should be more settings (P018).

21.3.3 Emotions Generated by the Campaign "Este 2022, Unidos Nada Nos Podrá Vencer"

All participants agreed that the emotions generated by the campaign are joy, hope, pride, nostalgia, motivation, engagement, and longing. Joy, because despite the difficulties that the participants are going through, they must keep fighting for their dreams. Hope, because together, Peruvians are stronger. Pride for being Peruvian and being able to get ahead, despite life's difficulties. Nostalgia, that arose after the pandemic and difficult times that happened due to the loss of family and friends. Motivation, because no matter how many complicated situations arise, they will always find a way to get through. Commitment, because the bank includes its clients in other regions of Peru in its campaign. A desire to achieve their goals by working as a team and not giving up at the beginning. Emotional ads arouse positive or negative emotions that motivate consumers in their purchase decision. This had greater relevance since Covid-19 and many brands began to include emotional content in their ads. To boost purchase intent [1, 11] and encourage the population to overcome this post-pandemic crisis with messages of resilience and psychological support to cope with the situation; that is why emotional ads generate effects of excitement and valence to generate better advertising recall and purchase intent [3, 6]. Also, message matching in advertisements would determine how consumers perceive it [35] and what it generates in their emotions, attitudes, and affective responses that have a greater impact than cognitive responses [8] (Table 21.1).

After the pandemic, many brands acknowledged the possibility of taking Covid-19 as a reference in commercials, as a source of customer engagement, to encourage emotional reactions and positive attitudes towards the brand [1]; content determines

Type of emotion	Participant's opinion
Joy	It transmits a feeling of happiness. () It is very interesting how different regions of the country are linked through the same phrase that is repeated in other dialects. (P06)
Pride	Very proud of being Peruvian, empowered to dare to be whatever I want, and more if a person that is as successful as Paolo says it. (P02)
Longing	Well, it transmits longing, more than anything () Paolo Guerrero has always been an idol that encourages all of Peru. (P013)
Motivation	What I liked the most about the spot is feeling that sensation of being able to motivate, being a team all together, help the country move on. (P016)
Engagement	It transmits to me that beyond being a bank, it wants to sell the experience of their financial background, and how to attract the trust of the spectator, making people believe that they are with the consumer. (P014)
Yearning	It is a very moving commercial () we will always find the way to move on and everything starts with the same attitude [we bring]. I feel it is a very encouraging spot for all the people who had the chance to see it. (P011)

 Table 21.1
 Emotions triggered by the campaign

negative or positive emotions depending on how the message is received by the consumer. Therefore, it is important for the message to be clear and understandable [6].

A message that stood out considerably is unity: Peru is the unity of Peruvians and a positive message that we can get ahead and that we can all achieve many things (P019).

This guy has something special; he strongly represents unity, teamwork, and the wonders that a team can achieve when it is surrounded by people who contribute, so it is a very clear message for all types of people (P03).

21.4 Conclusions

It is concluded that the emotions generated by BCP campaign "*Este 2022, unidos nada nos podrá vencer*" ["This 2022, united, nothing can defeat us"] on students of the last cycle of the school of engineering, aged 19 to 25, are joy, hope, pride, nostalgia, motivation, commitment, and longing of being Peruvian. For most of the interviewees, it seemed like a good spot that has generated considerable nostalgia and strength with the message that Paolo Guerrero transmitted. Likewise, most participants consider that Paolo Guerrero's message is in line with BCP brand as the leader of the national team and the market, since it seeks to motivate everyone to act as a team accompanied by BCP, which will always support them.

This study had certain limitations, such as the distance and the change of schedules by the interviewees who were in other places in Lima and could participate in the interview via Zoom and not in person. Another limitation is the small presence of women, since most students of engineering are usually men. The participants of this study are engineering students. It is recommended to interview students from other fields and provinces of Peru, who speak other languages, such as Quechua and Aymara, in future studies. Finally, another campaign addressing the same topic can be studied to figure out the motivation that drives their purchase decision.

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Chapter 22 The Influence of Social Media Marketing Activity on Purchase Intention in the Beer Sector: Case of SuperBock's Instagram



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Abstract Over the last decade, social media has transformed the way brands interact with their audiences, forcing them to establish a digital presence based on consumer preferences and, at the same time, building a relationship with them. This study focuses on the influence that Instagram has on purchase intentions in the largest beer brand in Portugal, "SuperBock," which also has a high level of engagement among its audience on the platform. Previous studies have shown that Social Media Marketing Activities (SMMA) were based on the dimension's entertainment, interaction, fad, customization, announcement, e-Wom intensity, e-Wom skirt, and e-Wom content (Kim and Ko in J. Bus. Res. 65:1480-1486, 2012). A quantitative methodology was followed using an online questionnaire. The sample was non-probabilistic, for convenience, consisting of 202 individuals. The results obtained show that all SMMA on SuperBock's Instagram positively influences the purchasing intention of its consumers, with the "advertising" dimension having a greater positive impact on respondents, followed by the "emotional value of e-Wom" dimensions. and "e-Wom intensity." Simultaneously, the dimensions of e-Wom also influence consumers' purchase intention. The results confirm that SuperBock Instagram SMMA had a positive influence on consumer purchase intentions, with the advertising dimension having the most significant impact.

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22.1 Introduction

Kim et al. [1] Nowadays, brands have various ways of communicating with their consumers, such as radio, television, email marketing, social networks and traditional media such as advertising posters, among others. However, digital media have revolutionized the way brands communicate and have been exploited exhaustively in recent years. In January 2022, there were 8.63 million Internet users in Portugal, equivalent to around 85% of the population, and 8.5 million social media users in the same period, equivalent to 83.7% of the country's total population [2]. It is, therefore essential, for brands to build an online presence in order to interact with users of these platforms. This study looks at the beer industry, one of the main products in the beverage sector made up of water, hops, malt and yeast, which has a loyal and growing consumer market (Bento, 2016). Since the beginning of its production, beer has played an important role in the economy. At the beginning of Egyptian civilization, workers' wages were sometimes paid in beer, and later, in the Middle Ages, it came to be considered a staple food that was consumed by both adults and children, as it was cheaper than wine and safer than drinking water, which at the time was untreated, making beer a source of income for companies [3]. SuperBock is one of the brands of the SuperBock Group, a company originally called "Companhia Fabril Portuense," which has been producing beer under the "Cristal" brand since 1890. The SuperBock brand was registered at the end of 1927 and is now the best-selling Portuguese beer brand in the world [4]. This brand stands out for its communication on social networks through the publication of original, creative, informative, up-todate and humorous content on a regular basis, with which its users identify and end up creating an online community. The main objective of this study is to understand how Social Media Marketing Activity (SMMA) on Instagram influences the purchase intentions of its users, taking into account the SuperBock brand and its products. This study thus aims to identify the impact of SMMA on SuperBock's Instagram on users' purchasing decisions, as well as to answer the following research question: Which dimensions of SMMA on SuperBock's Instagram stand out positively for users and the influence of E-Wom on the purchase intention of the SuperBock brand?

22.2 Literature Review

22.2.1 Social Media Marketing Activity

The rise of technology and social networks in recent years has forced brands to build a digital presence in these same media. These have created new forms of communication between brands and users, allowing them to develop a feeling of closeness [5, 6]. Social networks have created new forms of communication for entrepreneurs and brands at very low cost and have made it possible to obtain direct feedback from consumers [7]. Making social media fundamental to business and corporate marketing. The components of social media have been discussed by various authors. Kim and Ko (2012) classify the characteristics of social networks into five dimensions: entertainment, interaction, trends, personalization and wom [1]. Entertainment in social networks represents a hedonic aspect for users [8], resulting in a sense of fun and pleasure when using them [5, 9]. Interaction consists of all the contributions users make to brands on any of the social media platforms [8]; this being a space where consumers can interact with each other, and discuss and share opinions about a specific brand [9]. Social media trends consist of offering new and up-to-date information about products and services [10]. Personalization represents the extent to which the product or service satisfies the different tastes of consumers based on their requirements [11], and personalization on social networks has become a tool for brands to communicate in a unique and original way in order to develop a relationship with users and increase their loyalty to the brand (Martin and Todorov 2010). Later, other authors, such as Bilgin, added advertising as a component of social media, which refers to all promotional and advertising content aimed at increasing sales and developing a consumer portfolio [5].

The social network Instagram

Instagram is one of the largest social media platforms in the world and is considered the best social network for brands to interact and connect with their consumers [12]. In a 2019 Facebook study on the influence of Instagram on boosting brands and their sales, 80% of respondents said they use Instagram to decide whether or not to buy a product or service, and 87% of Instagram users said they take action after viewing product information on Instagram; this action could be following the brand, visiting their website or making a purchase [13].

E-Wom

E-Wom is a negative or positive statement made by consumers in the future, present or past about a product, service or brand that can be accessed by any online user [14]. Given today's online connectivity, consumers are heavily dependent on the opinions of others, which in many cases have a greater impact than marketing communications from brands [15], so it is essential for brands to analyze consumer feedback through their opinions in order to understand whether the service being provided is suited to the needs of their audience [16].

E-Wom can be divided into four dimensions [17]: intensity, emotional value, positive value and negative value, and content. Intensity is the number of opinions or reviews written by consumers online. Emotional value is determined by consumer opinions and is classified as positive or negative, a positive value is a positive comment about a good experience with a particular product, service or brand, and a negative value is a negative comment after a bad experience with the product, service or brand. And finally, the content consists of all the information made available about the brand in its online media [17].

The Intention to Buy

Purchase intention is a combination of consumer interest and the possibility of buying a product [1]. The authors also argue that this is a variable based on consumer attitudes to measure future contributions to brands. Several academic studies define purchase intention as a personal action in accordance with the brand and conclude that intention is the consumer's personal motivation to perform a behavior [18]. In a study by Doh and Hwang, they concluded that e-Wom influences consumers' attitudes toward their purchase intention [19].

According to Kotler et al. (2017), there are three factors that influence consumers' purchasing decisions: firstly, the influence of marketing communications in various types of media; secondly, the opinions of friends and family; and thirdly, personal knowledge and attitudes toward the brand based on past experiences [15].

22.3 Conceptual Model

Figure 22.1 represents the conceptual model and the respective research hypotheses adapted from the study by Aji (2020) who studied how SMMA on Instagram affects purchase intention in the ready-to-drink tea industry in Indonesia.

The conceptual model shown in Fig. 22.1 will allow us to analyze how each of the dimensions of the SMMA affects the purchase intention of consumers of SuperBock brand products.



Fig. 22.1 Conceptual model and research hypotheses. Source Own elaboration

22.3.1 Research Hypotheses

Social networks allow content to be produced and consumed without any time or location limits, so through the active participation of consumers, social networks influence the way they behave or think about a brand (Aji et al. 2020). Entertainment represents all the pleasure and fun acquired through social media. Authors Kim and Ko (2012) concluded that offering free content entertains users who use social media in the luxury brand industry, as does being connected on a platform with friends, family and colleagues. According to the literature review, the following hypothesis is presented:

Hypothesis 1 (H1): There is a direct relationship between users' entertainment on SuperBock's Instagram page and their purchase intention.

Consumer interaction on Instagram represents their entire contribution to brands on this platform. Some studies claim that interaction between consumers and a brand on a social network positively influences users' trust and eliminates any feeling of uncertainty they may have about engaging with the brand [20] and making online purchases [21]. Therefore, based on the research carried out, the following hypothesis is proposed:

Hypothesis 2 (H2): There is a direct relationship between user interaction on SuperBock's Instagram page and their purchase intention.

Social networks are one of the most practical ways of accessing information for any user of these platforms. Trends are represented on a social network through the amount of recent and up-to-date information offered to users. In a study on the aviation industry, Seo and Park (2018) concluded that this dimension of SMMA is the most impactful compared to the others [11]. Based on the existing literature, the following hypothesis was defined:

Hypothesis 3 (H3): There is a direct relationship between the trends on SuperBock's Instagram page and the purchase intention of its consumers.

Personalization represents the extent to which a service or product satisfies the different tastes of its consumers by taking their requirements into account. Seo and Park (2018) concluded that consumers prefer social networks that suit their tastes and preferences with reliable content [11]. Based on the research carried out, the following hypothesis is proposed:

Hypothesis 4 (H4): There is a direct relationship between the personalization of content on SuperBock's Instagram page and the purchase intention of its consumers.

Advertising is represented on social networks through advertising content and brand promotional campaigns. A study by Mangold and Faulds (2009) concluded that advertising is a significant component of SMMA [22]. Therefore, based on the research carried out, the following hypothesis is proposed:

Hypothesis 5 (H5): There is a direct relationship between SuperBock brand advertising on Instagram and the purchase intention of its consumers.

E-Wom is made up of four dimensions: intensity, emotional value (positive and negative) and content. Seo and Park (2018) concluded that a brand should encourage its customers to voluntarily share its e-Wom and then control their behavioral and

emotional responses through efficient social media management [11]. Emotional value is represented by all the positive and negative opinions of consumers on social media. In a study by Bilgin (2018), the author states that sharing positive information about a brand influences the purchase intent of potential new consumers [5]. Content is represented by all the information on social media that is related to a brand's products and/or services. Hajli states that consumers share information, knowledge and past experiences with others on social networks and that this information can influence, positively or negatively, a brand's relationship with its consumers [23]. Based on the existing literature, the following hypotheses were defined:

Hypothesis 6 (H6): There is a direct relationship between consumers' e-Wom intensity about the SuperBock brand and their purchase intention.

Hypothesis 7 (H7): There is a direct relationship between consumers' e-Wom emotional value of the SuperBock brand and their purchase intention.

Hypothesis 8 (H8): There is a direct relationship between the e-Wom content discussed by consumers about the SuperBock brand and their purchase intention.

22.4 Methodology

This study takes a quantitative and deductive approach, focusing on using the data collected to test a theory or hypothesis(es) by providing an efficient form of data collection [24]. The unit of analysis for this study is individuals who use the social network Instagram and who interact with and/or follow the SuperBock account in Portugal. The sample is collected using the convenience sampling method (nonprobabilistic). In order to carry out the study, it is essential to define the characteristics of the sample and its size [25]. Several authors state that a small sample will not provide reliable results. According to Joseph Hair (2014), the sample size should be at least 200 responses [26]. To carry out this study, a questionnaire was developed. This is a data collection method in which each individual answers the same questions in a certain order [24] and they must be interpreted in the same way [27]. Data was collected using a cross-sectional approach, which consists of studying a phenomenon at a specific point in time. The questionnaire was developed using the Google Forms platform and shared via the social networks Facebook, Instagram, WhatsApp and Reddit for a month and a half in the year 2022 and 202 responses were obtained. In order for all respondents to meet the requirements of this study, some screening questions were introduced at the beginning of the questionnaire, namely: whether they are users of the social network Instagram, whether they follow SuperBock's posts on it, and whether they are consumers of SuperBock beer. To ensure content validity, the questionnaire items should represent the concepts of this study. All the questions presented in the questionnaire were based on previous studies (Aji et al., 2020). These questions are divided into three groups (SMMA; e-Wom, and purchase intention) and will be answered by respondents using a 5-point Likert scale (5 =strongly agree; 4 = agree; 3 = neither agree nor disagree; 2 = disagree; 1 = stronglydisagree).

22.5 Results and Discussion

22.5.1 Presentation of Results

The respondents who took part in this research were mainly young people aged between 20 and 29 (74.3%), male (34.7%), female (64.9%) and of other genders (0.5%). Most of them have higher education qualifications (82.2%) and are from the northern (46.5%) and central (40.1%) regions of Portugal. The professional occupation of the respondents is varied, with the majority being students (38.6%), followed by employees (30.2%) and student workers (24.4%). Of all those surveyed, 93.6% are Instagram users, and the majority use the social network between 2 and 4 h a day (50.3%), followed by less than 2 h (42.3%). Still, on the beer consumption habits of those surveyed, it was shown that they consume beer more at weekends (80.7%) and mainly at family get-togethers or with friends (36.8%). The Cronbach Alpha technique was applied to the three groups of questions in this study (SMMA, e-Wom, and purchase intention) as well as the KMO and Bartlett tests. In the analysis of the SMMA group, made up of ten items, a Cronbach Alpha value of 0.84 was obtained, so it is assumed to have adequate internal consistency. However, it was possible to see that one of the items in this group undermines its internal consistency and should, therefore be removed. Thus, after deleting the item "1.3-Instagram allows me to share information with others," the Cronbach Alpha value increased to 0.857. The Cronbach Alpha technique was applied to the three groups of questions in this study (SMMA, e-Wom, and purchase intention) as well as the KMO and Bartlett tests. In the analysis of the SMMA group, made up of ten items, a Cronbach Alpha value of 0.84 was obtained, so it is assumed to have adequate internal consistency. However, it was possible to see that one of the items in this group undermines its internal consistency and should therefore be eliminated. Thus, after excluding the item "1.3 - Instagram allows me to share information with others," the Cronbach Alpha value increased to 0.857. Subsequently, the KMO and Bartlett's test was applied to these items, and a value of 0.813 was obtained, as shown in Table 22.1. This value confirms that the sample is adequate as it is greater than 0.5, and, as it is greater than 0.8, it is assumed that only one factor is extracted, so we can proceed to analyze the data.

In the analysis of the e-Wom group, made up of ten items, a Cronbach's Alpha value of 0.786 was obtained. Although this is a reasonable value, its internal consistency can be accepted as it is higher than 0.7. However, it was possible to see that

Table 22.1 KMO and Bartlett's test for the SMMA group items	KMO and Bartlett's test			
	Kaiser–Meyer–Olkin Measure	0.813		
	Bartlett's Test of Sphericity	Approx. Chi-Square	251,896	
		df	36	
		Sig	,000	

Source Own elaboration-SPSS data

some items in this group were detrimental to its internal consistency and should therefore be excluded from the study. The following items were therefore excluded: "2.6—I mainly mention negative aspects of the SuperBock brand to others."; "2.7—I have criticized the SuperBock brand to others."; "2.8-I discuss the prices of Super-Bock brand products with others."; "2.9—I discuss the variety of SuperBock brand products on offer with others."

After excluding these items, the Cronbach Alpha value increased to 0.842.

The KMO and Bartlett test on main items presents a value of 0.823, which confirms that the sample is adequate since it is greater than 0.5 and, as it is greater than 0.8, it is assumed that only one factor is extracted so that data analysis can proceed. The same procedure was used in the analysis of the group relating to Purchase Intention, where a Cronbach's Alpha value of 0.74 was obtained. Although this is not an excellent value, it can be accepted as it is higher than 0.7. However, one of the items in this group undermines the consistency of the group, so mine should be eliminated from this study. Thus, after excluding item "3.4-I intend to continue to be or become a consumer of SuperBock brand products." The Cronbach Alpha value increased to 0.842. Subsequently, the KMO and Bartlett's test was applied to these items, and a value of 0.725 was obtained. This value confirms that the sample is adequate as it is higher than 0.5, but as it is lower than 0.8, we cannot assume that only one factor will be extracted from this group, so a factor analysis should be carried out to confirm the number of factors extracted. A factor analysis was then carried out using SPSS, which allowed us to check the number of factors extracted using the component matrix, as shown in Table 22.2.

After the factor analysis, it can be seen that only one component is extracted from the purchase intention group, so we can proceed to analyze the data. In order to analyze the respondents' answers in general, a descriptive statistics analysis is applied, which indicates the average, minimum and maximum values of each variable analyzed, as well as their standard deviations. The results are shown in Table 22.3.

By analyzing the results in the table above and taking into account the scale used in the answers (5-point Likert scale), it can be seen that the set of SMMA dimensions has a positive influence on SuperBock's Instagram page (mean = 3.89; standard deviation = 0.63). Thus, any other scale that obtains higher values than the SMMA scale must be assumed to have an extremely significant weight in it, as is the case with the advertising (mean = 4.30; standard deviation = 0.82), e-Wom intensity (mean = 4.04; standard deviation = 0.84), and e-Wom emotional

Table 22.2 Component matrix of the group of items purchase intention	Component matrix		
	Items	Component 1	
	4.1	0.882	
	4.2	0.880	
	4.3	0.854	

Extraction Method: Principal Component Analysis Source Own elaboration-SPSS data

Table 22.2 Component

Descriptive statistics							
	N	Min	Max	Mean	Std. Deviation		
Entertainment	57	1,50	5	3,80	0,87		
Interaction	57	1	5	3,49	1,07		
Trends	57	1,50	5	3,75	0,79		
Personalization	57	1	5	3,52	0,86		
Advertising	57	1	5	4,30	0,82		
Intensity	57	1,5	5	4,04	0,84		
Emotional Value	57	2,67	5	4,16	0,55		
Contents	57	1	5	3,63	1,23		
SMMA	57	1,93	5	3,89	0,63		

 Table 22.3
 Descriptive statistics

Source Own elaboration-SPSS data

value (mean = 4.16; standard deviation = 0.55) dimensions, indicating that these dimensions are extremely relevant to consumers of this brand. In order to test all the hypotheses developed, the linear regression technique was applied to each one. In order to test the significance of the regression between the variables, the ANOVA test was carried out. This analysis allows us to check which is the null hypothesis and which is the alternative hypothesis. The null hypothesis states that the variables are not related in any way, so the model will have the same adjustments with or without the independent variables, while the alternative hypothesis states that there is a linear relationship between the variables under analysis. The null hypothesis is rejected when the significance value is less than 0.05, while the alternative hypothesis is rejected when the significance value is greater than 0.05.

Hypothesis 1 (H1): There is a direct relationship between users' entertainment on SuperBock's Instagram page and their purchase intention.

To test hypothesis 1, the ANOVA test was carried out to identify the null hypothesis and the alternative hypothesis. The result of the ANOVA shows that the significance value (sig.) is 0.00. Since this value is less than 0.05, the null hypothesis is rejected. It can therefore be concluded that the "entertainment" dimension has a significantly positive influence on purchase intention, so Hypothesis 1 (H1) is supported.

Hypothesis 2 (H2): There is a direct relationship between user interaction on SuperBock's Instagram page and their purchase intention.

To test hypothesis 2, the ANOVA test was carried out to identify the null hypothesis and the alternative hypothesis. The results of the ANOVA test between the "interaction" and purchase intention variables show that the significance value (sig.) is less than 0.05. Therefore, the null hypothesis was rejected, and it was concluded that the "interaction" dimension has a significantly positive influence on purchase intention, consequently, Hypothesis 2 (H2) is supported.

Hypothesis 3 (H3): There is a direct relationship between the trends on SuperBock's Instagram page and the purchase intention of its consumers.

To test Hypothesis 3, the ANOVA test was carried out between the "trends" and purchase intention variables. The results of the ANOVA test on the "trends" and purchase intention variables show that the significance value (sig.) is 0.00. As such, we proceeded to reject the null hypothesis and concluded that the "trends" dimension has a significantly positive influence on purchase intention, so Hypothesis 3 (H3) is supported.

Hypothesis 4 (H4): There is a direct relationship between the personalization of content on SuperBock's Instagram page and the purchase intention of its consumers.

To test Hypothesis 4, the ANOVA test was carried out between the variables "personalization" and purchase intention. The results revealed by the ANOVA test on the "personalization" and purchase intention variables show that the significance value (sig.) is 0.00. Thus, the null hypothesis was rejected, and it was concluded that the "personalization" dimension has a significantly positive influence on purchase intention, so Hypothesis 4 (H4) is supported.

Hypothesis 5 (H5): There is a direct relationship between SuperBock brand advertising on Instagram and the purchase intention of its consumers.

To test Hypothesis 5, the ANOVA test was carried out between the variables "advertising" and purchase intention. The results of the ANOVA test for the variables "advertising" and purchase intention show that the significance value (sig.) is 0.002. Therefore, since it is less than 0.05, the null hypothesis was rejected and, consequently, Hypothesis 5 (H5) is supported.

Hypothesis 6 (H6): There is a direct relationship between consumers' e-Wom intensity about the SuperBock brand and their purchase intention.

To test Hypothesis 6, the ANOVA test was carried out between the variables "intensity" of e-Wom and purchase intention. The results revealed by the ANOVA test on the variables "intensity" of e-Wom and purchase intention show a significance value (sig.) of less than 0.05. As such, we proceeded to reject the null hypothesis and concluded that the "intensity" dimension of e-Wom has a significantly positive influence on purchase intention, so Hypothesis 6 (H6) is supported.

Hypothesis 7 (H7): There is a direct relationship between consumers' e-Wom emotional value of the SuperBock brand and their purchase intention.

To test Hypothesis 7, the ANOVA test was carried out between the variables "emotional value" of e-Wom and purchase intention. The results revealed by the ANOVA test indicate that the significance value (sig.) corresponds to 0.002. Therefore, as it is less than 0.05, the null hypothesis was rejected, and it was concluded that the variable "emotional value" of e-Wom has a significantly positive influence on purchase intention; thus, Hypothesis 7 (H7) is supported.

Hypothesis 8 (H8): There is a direct relationship between the e-Wom content discussed by consumers about the SuperBock brand and their purchase intention.

To test Hypothesis 8, the ANOVA test was carried out between the variables "Content" of e-Wom and purchase intention. The results revealed by the ANOVA test indicate that the significance value (sig.) is 0.00. Therefore, as it is less than 0.05, we proceeded to reject the null hypothesis and concluded that the variable "content" of e-Wom has a significantly positive influence on purchase intention; thus, Hypothesis 8 (H8) is supported.

22.5.2 Discussion of Results

This study aims to understand whether SMMA on SuperBock's Instagram page influences the purchase intention of consumers of this brand. As such, tests were applied to analyze the hypotheses of this study. Initially, it was essential to determine whether the sample was adequate, as well as the internal consistency of each of the constructs. These tests showed that the sample was adequate and that there were some items in the questionnaire that were detrimental to its internal consistency, so they had to be excluded so that the data would be one-dimensional and suitable for analysis. A simple descriptive analysis shows that one of the dimensions stands out positively from the consumers' point of view, advertising (mean = 4.30; standard deviation = 0.82), and this result is in line with the conclusions of Mangold and Faulds (2009) in which the authors state that this is a relevant component of SMMA. This is followed by the dimensions of the emotional value of e-Wom (mean = 4.16; standard deviation = 0.55) and intensity of e-Wom (mean = 4.04; standard deviation = 0.84), the results of which are in line with the conclusions of Bilgin (2018) and Seo and Park (2018), both of whom argue that these dimensions are fundamental to consumers' purchasing decisions. We then carried out the remaining tests to test the hypotheses developed in this study using ANOVA analysis.

Hypothesis 1 (H1), which aims to test the relationship between the "entertainment" dimension and purchase intention, obtained results showing that there is a positive influence of this dimension on the purchase intention of SuperBock beer consumers. This result corroborates the conclusions of [1] in which the authors state that entertainment represents a hedonic aspect for consumers.

Hypothesis 2 (H2) consists of testing the relationship between the "Interaction" dimension and the purchase intention of SuperBock beer consumers. The data determined that there is a positive influence of this dimension on consumers' purchase intention and confirms the conclusions of [20] and [21] in which the authors state that interaction influences consumers' trust in the brand, eliminating any feelings of uncertainty about it, leading them to become involved with the brand and make purchases of its products.

Hypothesis 3 (H3) aims to understand the influence of the "trends" dimension on the purchase intention of SuperBock beer consumers. The results obtained show that this dimension positively influences the purchase intention of SuperBock beer consumers, in line with the conclusions of Seo and Park (2018) in which the authors state that it is extremely relevant, being the most impactful in their study on the aviation industry.

Hypothesis 4 (H4) aimed to test the relationship between the "personalization" dimension and the purchase intention of SuperBock beer consumers. The data revealed that there is a positive influence of this dimension on the purchase intention of consumers of the SuperBock brand. This data complements the conclusions drawn by Seo and Park (2018) in which the authors state that consumers have a preference for social networks tailored to their tastes and preferences.

Hypothesis 5 (H5) consists of testing the relationship between the "advertising" dimension and the purchase intention of SuperBock beer consumers. The data obtained determined that there is a positive influence of this dimension on consumers' purchase intention, confirming the conclusions of Mangold and Faulds (2009) in which the authors identify "advertising" as a significant dimension of the SMMA.

Hypothesis 6 (H6) aims to understand the influence of the "Intensity" dimension of e-Wom on the purchase intention of SuperBock beer consumers. The results show that this dimension has a positive influence on consumers' purchase intention. These data complement the conclusions of Seo and Park (2018), in which the authors state that brands should encourage their consumers to share their opinions online.

Hypothesis 7 (H7) aimed to test the relationship between the "emotional value" dimension of e-Wom and the purchase intention of SuperBock beer consumers. The data shows that there is a positive influence of this dimension on consumers' purchase intention and confirms the findings of Bilgin (2018) in which the author states that information sharing influences purchase intention.

Finally, Hypothesis 8 (H8) aims to understand the influence of the "content" dimension of e-Wom on the purchase intention of SuperBock beer consumers. The results obtained show that this dimension has a positive influence on consumers' purchase intention. This data complements the conclusions of [23] in which the author states that all the information, knowledge and past experiences shared by consumers influence their relationship with the brand.

22.6 Conclusion

This article looks at the beer industry, specifically the brand that sells the most beer in Portugal, SuperBock. After analyzing this industry, it can be said that beer is one of the main products in the drinks sector in Portugal, and that it is mainly an exporter of this product. The growth and importance of social networks for brands to develop an online presence were also discussed, as well as how this evolution has affected consumers' purchasing journey. The study focused on the social network Instagram because it is the preferred social network in Portugal and because it is a platform that influences the promotion of brands and sales. Thus, the literature review allowed us to identify various dimensions of social networks that served to achieve the main objective of this study: to understand how SMMA on Instagram influences the purchase intention of consumers of SuperBock beer, as well as to identify which dimensions stand out the most for consumers of this brand. As such, the dimensions entertainment, interaction, trends, personalization, advertising and e-Wom were identified, with e-Wom comprising the dimensions of intensity, emotional value (positive and negative) and content. Based on previous studies, this literature review enabled the development of an online questionnaire to collect the necessary data. Subsequently, in order to validate the results of this study, reliability tests were applied to the data collected through the online questionnaire, which showed that they were valid for analysis. Next, in order to test the hypotheses developed, tests were carried out in which the results obtained showed that all the hypotheses of this study are supported. These results confirm the conclusions of the authors and their previous studies mentioned throughout this research and allow us to answer the main question of this study: Does the SMMA of the SuperBock brand on Instagram have a positive influence on the purchase intention of consumers of this brand? In addition, the results show that advertising on Instagram is the dimension that stands out the most for consumers, followed by the dimensions of emotional value of e-Wom and intensity of e-Wom, and that e-Wom also has a positive influence on their intention to buy this brand. Although the objectives of this study have been achieved, it does have some limitations. Considering the size of the industry and the brand covered in this study, the sample size can be considered small, and it also focuses on a mostly young audience, which limits any generalization about the data obtained and its reliability. It would therefore be advisable for future studies to use larger samples, collecting data over a longer period of time than the one used in this study. Another limitation is the focus on just one brand and one social network, in this case SuperBock and Instagram, which limits the generalizability of the data to the rest of the beer industry, and, since this research focuses on SMMA on Instagram, we end up not understanding its influence on other social networks. As such, it would be useful for the industry to investigate the influence of these SMMAs on other brands and other social networks. Finally, although this study addresses the influence of SMMA on purchase intention, it would be pertinent in the future studies to understand its influence.

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Part V Gamification Technologies to Marketing

Chapter 23 Phygital Brand Experience: Merging Physical and Digital Formats to Enhance Customer Engagement



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Abstract Brand experience formats have recently evolved from mostly physical to digital and new phygital formats, the alternative that combines both physical and digital experiences simultaneously. Moved by the need for further research in this field, with not so many brand and academic referents of phygital brand experiences, this analysis pretends to illustrate a case study of a successful phygital brand experience: Crims, the Exhibition. This brand experience included a gamified phygital format that customers could access through their mobile devices and play while interacting with the physical space. The case study illustrates to what degree the consumers were interested in engaging phygitally with the brand and what were some of the elements of this successful integration of the phygital format. The conversion data reaching 27.5% of the customers, with a completion rate of 43.9%, despite the technological requirements, reveals important interest and engagement with the brand through this mixed reality format. The elements of the phygital proposal, like gamification, high interactivity with the physical experience, as well as brand content integration, have been identified as contributing positively to the engagement, while the technology requirements, personal data registration, and high complexity of the game were acknowledged as major barriers to the adoption of the phygital format in the brand experience.

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23.1 Introduction

After the COVID-19 lockdowns, brand experiences have expanded in formats to digital and phygital, similar to the way we work, buy, or socialize. The digital formats are in constant evolution and have a vast field of research developed, but phygital formats of mixed reality combining physical and digital are more recent and need further exploration and analysis. This combination of formats suggests that phygital might provide the best experience of both worlds, but also can have greater barriers to adoption, and these effects also need further research. Most of the academic literature studying phygital terms [1] is still very linked to retail experiences only, which were the first ones to adopt the omnichannel strategies [2]. This research addresses the phygital format in the context of a brand experience, as an offering on its own, as defined by Pine and Gilmore in their Experience Economy theory [3] and not necessarily linked to a retail transaction or shopping activity. One of the aims of this study is to link the recent phygital literature with the existing brand experience theories and analyze how these apply to a real case study as an example.

The interest in the brand experience as a unit of study is that it is one of the most customer-centric offerings since its main goal is the experience lived by the customers and enhancing their relation with the brand.

Phygital format must first be identified as an interesting alternative by the brands when they stage their experiences to consider including it. The creators of Crims, the Exhibition, did not doubt to introduce a digital layer, interconnected with the physical exhibition because the customers are online anyways and permanently connected to their mobile devices. This was an extra opportunity to engage with the brand, not only physically, but also with a digital layer, and they did not doubt to seize it. The phygital layer provided the customers with a new task to do and enriched the experience added to browsing through the exhibited materials, giving customers a good reason to look for clues in every room. This design of the experience that required the interaction with both formats simultaneously inspired this research to identify the clues of a successful phygital brand experience that could have also managerial implications.

The chosen methodology was a case study since the context and how the phygital layer was integrated into this brand experience are unique and cannot be generalized. The research and analysis though aim to identify those concepts and elements that influenced the experience positively and negatively the brand experience and engagement, which can be useful in further studies and phygital adaptations.

23.2 Theoretical Framework

23.2.1 Brand Experience

The way the brand experiences are defined in this research is considering experiences as an autonomous economic offer, clearly distinct from service offerings as suggested by the Experience Economy theory developed by Pine and Gilmore [4]. To delineate the boundaries of the brand experience, the subject of the research requires to be an experience that is intentionally designed and staged by a brand as an involving event that customers actively experience. These experiences manifest in diverse formats today, including physical, digital, and the unique amalgamation of both known as "phygital," where both physical and digital elements coexist simultaneously.

However, the term "brand experience" does not have a single, universally accepted definition. A systematic review conducted by Yanina Chevtchouk [5] reveals the various approaches and definitions associated with the term in academic literature, where some definitions emphasize the experiential nature of interactions, viewing brand experience as a combination of internal consumer responses and behavioral reactions evoked by brand-related stimuli. Brakus and Schmitt [6] emphasize that experiences encompass all customer interactions with a brand. Chevtchouk's final definition of brand experience is a composite of memorable, subjective esoteric impressions triggered by various brand interactions across contact stages. This comprehensive perspective, while inclusive, can also lead to categorizing all marketing proposals as brand experiences, diluting the specificity of the term.

Another lens that defines experiences from a more concrete standpoint is the work of social psychologists Gilovich and Van Boven [7]. They propose a distinction between experiential purchases—intangible events or activities—and material purchases, tangible possessions. Gilovich and Gallo's [8] later research underscores the "experiential advantage" of intangible purchases, highlighting the social connections, contribution to identity, and unique evaluative criteria associated with experiences. Building on this perspective, the concept of the "Experience Economy," by Pine and Gilmore, aligns with the notion of intentionally staged events by brands to engage customers emotionally, physically, intellectually, and spiritually.

Therefore, the term "brand experience" from now on reflects this distinct approach—an offering comprising memorable events orchestrated by brands. Although the brands can stage experiences through different platforms, and formats—digital, physical, or phygital, these experiences actually happen inside the customers. The experiences depend on someone being the subject and experiencing them. If a brand wants to stage any experience, either an online game, a physical workshop, or a phygital activity, the experience will not even start if nobody shows up. The brand experiences reside precisely in this customization and subjective interpretation, making it difficult to design, stage and research. Morgan expresses it after a qualitative study on various experiences in a festival: "The visitors are not a passive audience for the performances staged by the management, they are part of the performance." [9]

23.2.2 Brand Experience Formats: Physical and Digital Experiences

The brand experience was traditionally linked only with the physical format, where the brand could provide a place, an atmosphere, and activities for the customers to live the brand-designed experience. Flagship stores [10], brand spaces, and other entertainment experiences, offered by the brands, have long been the unique and different offerings that helped the customers live the brand, be surrounded by it, feel it, and save memorable moments linked to the brand, in a physical space.

From a customer point of view though, addressing the subjectivity of the experience physicality of the experience refers to their physical presence and attendance. Identifying the physical presence was unnecessary in retail before e-commerce was available [11]. Now the options and differences between physical, digital, and the phygital are alternatives that must be considered when staging brand experiences.

Some studies based on goods show evidence of customers valuing more physical goods than digital [12]. On the contrary, there is no physical ownership involved in experiences; instead, it is formed through the interaction of the customers with the event [9] and it is this personalization that makes them more valued than products or services according to Pine and Gilmore [3].

What is new to the brand experiences—digitalization—was new to retail back in the early 2000s and the comparison between the two worlds, physical and digital, was important to understand what e-commerce was enabling. R. Burke did research on physical and virtual stores in 2002. Asking more than two thousand consumers about their preferences, he concluded that they were generally satisfied with the convenience, quality, selection, and value provided by retailers but not satisfied with the level of service provided, the availability of product information, and the speed of the shopping process which they preferred online [11].

Partially due to the pandemic lockdowns [13] and partially because of technological improvement, digitalization is now more widely considered a plausible option for experiences in different fields like education [14, 15] health care, banking, workplace [16], as well as entertainment and brand-staged experiences. Digitalization has largely impacted everything from the way businesses are developed and run, to marketing and how customers relate to the brands, but has also provided new spaces for digital and interactive experiences [17] like live-streaming of events, or participating in the metaverses where brand experiences can also be staged and shared digitally with the customers. Digital gaming has been the clearest antecedent of this shift. S. Hollensen and P. Kotler defined in their study that COVID-19 had probably accelerated this customer behavior change needed for the implementation of the metaverse [18]. They imagine the future shift from having access to the internet to being "within" it permanently, and for that to happen the lockdowns were a necessary trial that made the skeptics participate with their kids in virtual worlds and activities such as Fortnite or Roblox and meet regularly with their workmates on digital meeting platforms (such as Zoom and Teams).

The metaverse, this massive interoperable network of real-time 3D experienced synchronously by unlimited users [19], more than any other digital environment is experiential and not only transactional like e-commerce, or informative as the websites or communication-based like social networks. The virtual worlds not only offer virtual 3D reality to be explored with an avatar or a digital twin [20] but also allow a completely new type of interaction and experiences among the customers and the brands.

23.2.3 Phygital Brand Experience

"As the digital world will gain prominence, and be (re)connected with the physical, and as we may encounter virtual realities and interact with machines in the future, experiences will change" [6].

The new concept that combines physical and digital at the same time is defined as follows: "The Phygital experience consists in hybridizing the physical and the digital components at the same time and in the same place" [21]. The easy access to digital devices and the liquidity of our world are giving the customer access to both physical and digital presence and experience simultaneously, enhancing their perception. This new possibility of mixed reality suggests that these experiences might offer the greatest benefits from both formats, but this should be profoundly analyzed and researched. On one hand, the brands maximize their offering through more than one format, mastering the omnichannel [22], and on the other hand, the customers get involved in experiences in various ways which probably increase engagement.

The terminology has probably been used for the first time in 2013 by the Australian marketing agency, Momentum, contracting "physical" and "digital," and it was mainly applied to retailing. There are several case studies of how retail brands tested phygital for customization of the products: Walgreens and their "smart coolers" personalized drink options for the customers according to their "scanned" profile; or Container flagship store digital customization of materials; Levi's custom made jeans in their stores; or the "Nike by you" custom shoes. These exemples are included in M. Johson and R. Barlow article about Phygital Marketing Advantage [23]. Ballina and his colleagues have studied phygital in a wider experience, not only shopping and transactions in smart city tourism. This is when the phygital formats appear to be very useful but are subject to coordination with several digital technologies involved (IoT, open data, cloud computing, geo-positioning systems, artificial intelligence, self-learning machines, or cognitive computing) that offer "a hyperconnected" layer to the physical experience in real time and that allow a customer to live an experience in a customized way [24].

Moravickova and Kilestikova studied the phygital concept and the way it is building brands, identifying three important technologies that provide access to the digital in real time while enjoying the physical experience: QR codes, augmented reality, and mapping technologies [25]. QR codes are quick response two-dimensional codesmade of black and white squares that can be scanned by a phone camera and lead to an encoded message or a website. They are the most versatile example of phygital use and are the ones used in the case study. Maybe more enhancement for the experience is the augmented reality that not only connects with the digital world, as the QR codes, but puts a virtual layer on the physical reality, which could be also a mapping technology. Google Maps is another good example of a phygital experience since it maps the city while you walk and gives you an extra information layer about the places. Unlike virtual reality, augmented reality does not replace the physical world by immersing the customer in a digital world but by inserting information and visual layers over the actual physical reality [26].

Although there are phygital initiatives in many fields, the phygital brand experience is yet to be exploited and explored. There are also contrary opinions about the use of the terminology which is another hybrid version of the omnichannel concept that does not provide a novel advance in managerial practice [27]. Klau does recognize that phygital is more about a specific part of customer experience and that further research could bring different insights on the values, motivations, and benefits of phygital for consumer behavior. There is a proposal of the holistic framework by W. Batat, specifically on this issue. Instead of omnichannel logic, he considers the phygital experience to be much more useful for creating strategies that can fulfill the target's tangible and intangible needs by combining the two worlds [28].

23.2.4 Gamification

Gamification is not about the game or gaming, but rather about the application of games elsewhere. Deterting establishes that gamification is a use of game design in non-game contexts. [29]. This use can be for different purposes as changing the users' behavior through game motivators like achieving a reward, extrinsic motivations, or the inherent satisfaction in playing called intrinsic motivation [30, 31]. Maybe one of the definitions that best suits this research is provided by Huotari and Hamari [32] who define gamification as a process of enriching a service or experience with playful interaction to support users and add value to their experience. They also concluded that all games are systems that integrate the player as a co-creator of the experience. This characteristic of the gamifications makes them the perfect match for the brand experience scope given in this research.

However, it is important to clarify: the game is not the experience, it only enhances it [33], and there are four elements to the games proposed by Schell: story, mechanics, aesthetics, and technology [34].

23.2.5 Branded Content

Since this case study is about an entertainment brand and content-based offering, branded content is relevant and proved to be so, after the analysis. It is though an inherently interdisciplinary research topic. Branded content evidences changes in the relationship between the publishers and marketers because the brand itself creates the content and the audiences, while it is usually done by the media. And this is even more so in this study case when the analyzed brand is a media product.

As Nathalie Dens says in her recent review, at its core, the branded content has the aspiration to connect with consumers in more relevant, less disruptive ways [35]. Branded content approach is to create and distribute valuable content to a defined audience, in an ongoing brand-consumers conversation, trying to produce a desired action in the customers [36]. The content does not present selling pitches but has the same goals as that of advertising in increasing sales and building brands.

The brand experience itself is a kind of branded content made into an experience for the customer, and when consumers engage with branded content marketing, they also "co-create" deriving personalized values from their interactions.

23.2.6 Customer Engagement

Broadie defines customer engagement as a multidimensional concept that includes different dimensions: cognitive, emotional, and behavioral, although most of the authors center on behavioral [37]. For Bowden, it is an iterative process that starts with customer satisfaction that includes previous positive attitude, trust, involvement, and bonds both rational and emotional [38]. This process's culmination is engagement and loyalty.

This is similar to Brakus's model of brand loyalty [39], which suggests that brand experience, which includes the following mediators: brand satisfaction, brand personality, and identification of the subject with the brand, leads to brand loyalty. Daria Plotkina ran a study on mobile brand non-transactional apps and concluded that the interaction with the app improves brand satisfaction, perceived personality, and identification with the brand [40]. The digital game played in this study case could be very much considered as a non-transactional brand app.

Berger on the other hand studied how the highly interactive and optimally challenging interactions through gamification could be related positively to the emotional and cognitive dimensions of brand engagement [41].

23.3 Methodology

This case study uses a methodological structure for a rigorous case study that includes the following elements: research questions or aim, the research design, the data recompilation from multiple data sources, analysis, and the write-up [42]. It is an exploratory case study, as classified by Yin [43] differing from descriptive and explanatory case studies [44]. The context and the timing of the case study are important, and the phygital experiences after the COVID-19 lockdowns are a very real-time context which makes it interesting and creates a difference [45, 46].

As mentioned, this case study responds to the aim of exploring the managerial and customer use of a phygital proposal integrated into the brand experience to answer the following research questions:

Q1 What are the positive and negative outcomes for the brand when introducing a phygital format in their brand experience?

Q2 How much do customers use the phygital format in a brand experience?

To respond to the research questions about a phygital brand experience, the research design defined that the case study must answer the following research needs:

- A brand with a wide customer base and former customer engagement.
- A physical experience staged by the brand and to be lived by the customers.
- A phygital itinerary option and data of its use.
- Access and consent for creating a study case with all the information.

Crims, the Exhibition was held in Barcelona, from October 25, 2022, to April 10, 2023. This brand experience responded positively to the requirements of the research and its unique context and high engagement of its customers pointed out that a holistic exploratory analysis will lead to inspiring results about the phygital brand experience. It is a single case study with a holistic research design defined upon detecting the phenomena singularity in the high percentage of the customers' use and completion of the phygital experience proposal.

The research included direct exploration and analysis of multiple data sources:

- Exploratory visits to the exhibition on three occasions by the researchers.
- Use and analysis of the phygital itinerary—mobile game.
- Assistance and analysis of brand presentation on the exhibition design.
- Two semi-structured interviews with the exhibition commissioner.
- Access to case study database with use data and funnel of completion of the mobile app game for 25 weeks.

The case study is limited becuaseit is a singular example, a bridge toward developing new hypotheses to be studied and confirmed and contrasted in further studies. [44] The replication of this case is probably not easy, but the analysis and conclusions point to those elements that can be replicated by other brands and in other contexts. Finally, it pretends to be an inspiration study case initializing a theory generation through inductive logic, but recognizing the limitations to its singular context and brand momentum.

23.4 Case Study

Crims is the brand name of a radio program that started in 2019 on Catalunya Radio led by Carles Porta, narrating true crimes committed in Catalonia, the autonomic region in Spain, with Barcelona as the capital. After achieving leadership in the audience, in its timeslot on FM radio, Crims started expanding as a brand to other formats like the podcast on demand, and was launched as a TV serial on a national open TV broadcast channel: TV3. By the end of 2022, when the exhibition opened, there were already two seasons of Crims broadcasted on television, three seasons on the radio, everal Crims books published and apodcast program launched on Amazon Audible called "Why do we kill?" with 20 episodes.

The true crimes presented in all different formats of Crims contained Carles Porta's presence, style, and direction, taking the viewers through the labyrinths of each real crime story. Crims expanded with a strong branding based on three elements that are always included in all its formats: rigor, respect, and narrative rhythm. This branding coherence in all its formats was one of the reasons that it was suited as a brand experience case study. More than an entertainment product, Crims behaves as a well-defined brand adapted to different channels and formats but is always preserving the essence. The way the brand relates with its customers, who are brand lovers and engage with the brand in all possible ways, is always with the rigor of the crime reality, respect for the victims, and narrative rhythm that assures the experience. At the exhibition launch, the brand counted almost 20 million audio plays across all platforms, and more than 15 million video views, which sum up to more than 35 million times that Crims has broadcast its true crime stories. The vehicular language used in Crims is Catalan, spoken by 10 million people, which illustrates this a very extended local brand and very linked to the territory of Catalonia where the real crimes happened.

Crims, the Exhibition, was opened in Palau Robert, an exhibition house in the center of Barcelona, open every day of the week. During 165 days with record attendance, an average of 1000 customers visited this exhibition daily. The contents were commissioned by Carles Ortet exhibiting the details of crimes featured in several radio and television seasons, which were well known by most of the customers. The itinerary proposed was to present some crimes through the eyes of the killers, others through the victims' pain, and finally some through the police investigation. The purpose was to present this fascinating content in detail, to understand better the motives, implications, and consequences of the crimes, as the author and brand creator Carles Porta usually says in the programs: "to shed light in the darkness."

The exhibition had three main rooms: the killer's mind, where the most known true crimes from Crims are exposed and illustrated in household crime scenes, the victims' room which is a beautiful nature-like space to remember the victims and their families, and the biggest room which is the eye of the investigator, that includes an autopsy lab and all kinds of devices and materials used by the police to investigate crimes. These main rooms were connected through smaller ones, like a radio studio, where it all began, the recognition wheel where visitors could integrate their image with the suspects through an AI system, the interrogation room to feel the heaviness of silences that precedes confessions, and the editorial room with all the Crims books and data about Crims expansion as well as the true crimes' data in Catalonia. There is a secret room accessed only with a code achieved after the completion of the phygital game.

The physical brand experience was enriched with a possibility for the customers to access a phygital layer of the experience: a digital game linked to the exposed information. The access to the game, through QRs exposed in two posters at the entrance, was voluntary and used the customers' own electronic devices, mobile phones. The QR code led to a CCMA website where the user had to register leaving an email address. After that, there was a choice of three possible languages to start the game: Catalan, Spanish, and English, and after that, the quiz-like game of nine questions was opened. Most of the information of the game was text-based, although some questions required checking some links to maps or getting QR codes from the physical exhibition. The quiz had easy dynamic questions like filling in the blank, multiple choice questions, ordering sequences, or answering with numbers. The contents of the questions were complex though and required browsing the true crimes and being competent in identifying clues. The ustomers were crime investigators in the game app. 1 They were asked to find the right suspect from a recognition wheel, matching the robot portraits suggested or deciding true or false answers of three suspects or even identifying items or names seen through surveillance cameras. Most of the questions needed to be answered by the clues in the physical exhibition, although the game was online and could be accessed also elsewhere. The right answers were hidden in the exhibition space and suggested interaction with the details exhibited, or listening to the phones that were suspended from the ceiling.

23.5 Analysis

The exploratory visits to Crims, the Exhibition, and the first interview with Commissioner Carles Ortet, suggested the phygital layer which was used extensively by the customers and positively affected the way the exhibition was experienced by many of them. In each room, there will be several small groups of 2–5 people around one or various mobile devices, guessing the quiz questions. The access to the analytics of the mobile game sheds some light on this.

The total number of customers who visited the exhibition during the 165 days that it was held was 165,761 with an average of 1005 per day. The total users of the interactive game app were: 45,601, which is 27.5% of the total visitors. Considering that the game was designed mainly for heavy brand lovers, which counted for 10% of the potential visitors according to brand prevision, the final results exceeded

the expected use. If we take into account the group resolving practice, which was also very extended, we can conclude that the game app was introduced and known by most of the customers.

The completion rate suggests the customers engaged with the proposal with an average completion of 61.1%, who were the users who completed more than four out of nine questions. It was not possible to move to the next question without solving the previous one, but the users could answer as many times as they needed until they got the right answer. The analysis of the completion funnel shows that 85.5% of users completed at least the first of the nine questions, and 43.9% of users completed all nine questions and got the prize—a code to enter the secret room. These results indicate that most of the users accessing the game through the QR and registered were eager to complete the game or at least play several questions while living the rest of the experience. The content of the secret room was a setup for a picture, or photo call, simulating the usual TV set for the interviews in the TV show. The room could be also found if other users had opened it before. This partially removed the final goal of the game. But besides that, 43.9% completed the game, which is still an important completion rate and points to other intrinsic goals for the users like wanting to get to the end.

Other interesting data was the churn rate of the users in each question, and the highest drop in completion was from the first to the second question because the average descended by 17.5%. The second question asked to relate the description of seven crimes with seven names exposed in the first big room, which required both knowledge of the cases and patience to look for so many clues. The following questions had churn rates that go from 1 to 3% indicating that the complexity of the questions was similar and easier than the second question. In the last questions, the churn rate increases. For question 8 the drop is by 7.9% because it required consulting the QR codes hidden in the exhibition which was an additional technicall requirement. e. The last question had a drop of 5.6% which could be explained by the fact that the secret room door was not always closed and the users could access the final goal without answering the last question. On the other hand, at the moment of completing the last questions, the customers are at the end of their visit and might not have the same interest as when discovering the proposal.

The analytical data of app use was contrasted with the researchers' direct observations, branding analysis, and interviews with the Exhibition Commissioner, Carles Ortet. These analyses identified the following elements as positive drivers for the brand experience and clue elements for the success of the phygital layer: gamification, branded content, and interactivity. Although the gamified quiz had simple dynamics and design, with almost only text and no graphics, it had a branded look and seemed very easy to use. The questions were not easy though, but most of the customers gave it a try. The game for those who played became a true guide throughout the experience, leading the customers along the different rooms struggling to find the clues. The exhibition involved so many details and the game made the customers aware of them. The brand recognized the power of the game to lead the experience only after the exhibition, but was undoubtedly something to take into account while designing the brand experience. The other element that stands out is that the game gave the customers the role of crime investigators, completely integrating the activity as branded content, not only with the content but also with the role, the dynamics, and the investigation-like game. If the brand was about fashion, it could have been a design or influencers game, but this was an investigator game on a true crime scenario. When creating an experience, the aim is to increase the interaction with the proposals in all ways, and mobile devices are often seen as a distraction. But if their use is put in favor of interacting with the brand proposal, the disadvantage becomes an ally. The main goal of enhancing interaction was achieved for the heavy users and most of the customers.

The following elements were identified as barriers for the customers to better phygital experience, although some of them were unavoidable: the technological requirements, the registration form, and the high complexity of the questions. When thinking about introducing a phygital layer, the technological requirements are a must, and since it is always a barrier, the brand experience designers want it to be as frictionless as possible. The solution is usually investing in developing ad hoc apps, with added services, and then struggling with how to incentivize their use and adapt the technology to all the different devices. This phygital proposal was the simplest, but most effective. A QR led to a branded website, and from there, the customer had to register-yet another barrier-and then back to a website-supported game. This reduced the technical requirement of a smartphone with data or a Wi-Fi connection but did not require any expensive development or setup. Registration was another barrier but unavoidable if the phygital proposal met the brand's need to get its followers' contacts and a way to engage further. Crims as a brand is freely broadcasted content through various channels, and it is a leader in audiences, but its customers are then completely anonymous for the brand. The registration is the only step that the customers had to do out of the brand, but they registered within the institution CCMA, a public organization that manages all the audiovisual media linked to the Generalitat de Catalunya (regional government), responsible of Catalunya Radio and TV3 channel. The customers had to give consent for CCMA to register their data and contact them, concerning CCMA contents. Although this was considered an unavoidable barrier, the brand received no complaints about this and the users gave their consent easily, starting the game right after that.

The creators would have defined the complexity of the game questions differently if they had done the exhibition again. As said formerly, the game was designed for those who knew everything about Crims, and the creators considered they would be the only ones to get into a complex phygital game. The truth is that all kinds of customers tried the phygital itinerary and some of them reported to the creators that the questions were too difficult. The commissioner thinks that the complexity of the questions could have been progressive or with different degrees of difficulty while meeting different target needs. This will have to be done in the next exhibitions though.

23.6 Discussion and Conclusions

The purpose of this research was to find an example of a brand experience, that illustrates the phygital format [28] as an important element of the offering. Crims, the Exhibition, fits this description perfectly even though that was not the main intention of the brand when designing the experience. In this brand experience, the adapted phygital layer was a side proposal that became relevant only once it was launched. After running this research and analyzing the data, we can conclude that the case study is interesting not only because it is phygital, mixing the digital and physical layers at the same place and time, but it also illustrates that phygital experience does not always have to be a very complex and highly technological to be relevant. Contrary to the other phygital experiences that rely on complex AR technologies or app development that can be perceived more as entertainment than brand experience, this setup was very simple but well integrated with the brand. The most important element of the phygital game proposed, according to Schell [33], was not the mechanics, neither the technology nor the aesthetics, but the story and the branded and integrated content [47].

This case study aimed to illustrate a phygital brand experience for inspiration, and therefore not only describe this singular case but also identify some clues that might be useful in designing and integrating the phygital brand experience. The conversion and completion rates that exceed the heavy brand users' target suggest that the phygital layer was interesting for a greater audience in this case. It could also imply that this phygital alternative itinerary instead had the potential and interest to become the main brand itinerary proposal. Phygital [1] could not only be an alternative option but has the potential to be the main strategy for the brand experience. The digital game app layer influences the interaction with the physical space. Therefore, the brand experience, if designed phygitally from the very beginning, can use the digital layer to guide and influence interaction in the physical space. This phygital combination has the potential to increase interactivity [41] and enhance brand satisfaction, perception, and identification with the brand, achieving engagement and loyalty. [40]

If the omnichannel approach [2] for the brands is the way to provide all the possible ways of access and reach greater targets, phygital is not only engaging as another channel but as a format that involves the customers in every way at the same time and provides a complete brand experience. If the most important experience is the part that happens inside the customers, according to Pine and Gilmore [3] and Chevtchouk [5], then phygital is a great option for achieving it.

The limitations of this case study lay in the methodology itself which makes this exploration irreplicable and unique and only applicable in its context, influenced by this singular brand. The paper pretended to review and broaden academic references on phygital brand experiences and that goal was achieved. The managerial implications are more limited since what works for one brand might not work for another. We cannot discern to what degree the branded content integration with the true crime narrative and investigation influenced the outcomes of the phygital experience, since it precisely made the customers feel like investigators looking for clues at the crime

scene. It is tough to know how this branded content adaptation will work for another brand, but at least it seems that identifying with the brand and branded content could be an interesting element to consider when creating brand experiences. This research itself could be considered another integrated branded content format of Crims and we feel proud to try to be part of the different channels and formats of the brand and keep "shedding light on darkness."

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Chapter 24 The Impact of Card Games on Enhancing Financial Education and Daily Life Skills for Older Adults

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Abstract Life expectancy is steadily increasing, and by the year 2030 it is estimated that one in six people in the world will be over 60 years of age. However, this aging population brings with it mental health challenges, with an alarming 20% of older adults facing mental disorders, with depression being the most prevalent. The purpose of this research article is to implement a gamified tool using pictograms to teach financial education to older adults. The methodology employed encompasses a literature review, the design of the gamified tool and the implementation of a pilot test with 11 older adults. According to the results obtained, they reveal that the game designed with pictograms is highly effective in the acquisition of financial knowledge and skills by older adults, thus concluding that gamification and the use of pictograms stand as valuable approaches for active and meaningful teaching, adapting effectively to different demographic groups.

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24.1 Introduction

Currently, life expectancy has increased compared to previous eras. According to the World Health Organization (WHO), by 2030, one in six people in the world will be over 60 years of age (1.4 billion) and by 2050, it will double to 2.1 billion people [1]. As older adults age, it is common for them to face a number of health challenges, both physical and mental. In this context, people over 60 suffer from some type of mental disorder, represented within the elderly population with 20%, highlighting depression as the most common disorder within this demographic group, manifesting itself through symptoms such as crying, sadness, feelings of loneliness, hopelessness, guilt, alterations in appetite and suicidal ideation, among others [2]. Thus, it is important to note that mental health can also affect physical health significantly, where there is a relationship between the presence of mental disorders in older adults and an increased risk of high morbidity diseases, which in turn can have an impact on the overall functioning of the person [3]. Notably, loneliness is presented as an important component of depression. Loneliness is defined as an impacting problem within the quality of life of a person in any age range, however, in elderly people due to their vulnerability to the presence of diseases, decreased sociability, difficulties in their functionality, loss of family and friends, among others [4]. According to Weiss [5], the feeling of loneliness can be reduced with the presence of social relationships that lead to the integration of the individual, the increase of self-esteem and the feeling of importance, he also mentions that this feeling is more related to a quality of emotional ties than to physical contact, i.e., for the researcher is important the lack of emotional intimacy in their environment [6].

According to Wu [7], education improves cognitive areas and reduces psychiatric disorders, where individuals who participate in social activities can enrich their lifestyles and thus generate benefits in their mental and physical health. The ability to effectively manage financial resources is essential for economic well-being, both at the personal and family level. Therefore, making informed decisions about savings, investments and spending has become crucial to ensure a sound economic future. Consequently, incorporating educational strategies related to economics provides individuals with the knowledge necessary to have effective control over their financial resources and the skills needed to manage their wealth effectively [8].

Thus, lack of financial literacy can have a significant impact on the long-term decisions of individuals, particularly older adults. According to Elan [2], this demographic group is among the population with the lowest level of financial education, which leads to deficiencies in the use of financial products and a lack of technological skills to access fundamental financial services. That said, this lack of financial education is a widespread challenge globally and has been identified as a crucial obstacle to progress toward greater financial inclusion. However, the lack of financial inclusion, according to Bonfil [3], arises due to different factors related to the demand and supply of financial services. On the demand side, the lack of sufficient income and the absence of financial education are presented as obstacles that hinder
the adoption of savings practices and limit the understanding of the benefits associated with financial services. Indeed, for older adults these barriers may be even more pronounced, given that they are often dependent on pensions or fixed incomes, which can make it difficult to implement effective financial strategies. On the other hand, in terms of supply, the concentration of financial institutions in segments of the population with greater purchasing power represents a crucial challenge. Thus, for seniors residing in rural areas, this situation becomes even more problematic, as they face additional obstacles in accessing formal financial services and products specifically designed for their needs and circumstances [4]. From this perspective, the incorporation of educational games emerges as an important tool in education. These games, which combine ludic elements with educational objectives, have proven to be highly effective in improving the learning process. Thus, it is essential to consider that, in the context of this population facing limitations in financial education and access to financial services, these serious games could be a valuable tool to provide them with the necessary knowledge in a more accessible and friendly way [5].

In this order of ideas, it is important to teach the older adult population in the acquisition of financial knowledge, providing the necessary tools to make informed decisions related to the assets they have built throughout their years of life. Therefore, the focus of this research is proposed under the design of a gamified tool for teaching financial education aimed at older adults, which seeks to foster an active and meaningful learning environment within people. Finally, it is expected that this research will provide an important advance in the area of education for older adults.

24.2 Background

The following is a bibliographic review of authors who share the same concern regarding the impact of educational games for the learning process in older adults.

Digitalization in games has directly impacted the individual's teaching and learning. This research study aimed to conduct a theoretical analysis of the literature related to digital games based on visual art education learning. A qualitative descriptive approach was used as methodology, where it resulted in the finding that digital games related to learning photography have improved student retention and participation. Thus, the authors conclude that digital games related to the teaching of photography are an important tool for the development of visual skills, allowing to be a beneficial power in the educational context [5].

The implementation of Information and Communication Technologies (ICT) within the educational process has allowed students to collect skills in important competencies within education, as well as economic competencies. The objective of this research article is to analyze the importance of ICT in the acquisition of knowledge for educational competencies. In this way, a documentary and descriptive analysis is used as methodology. As for the results, they highlight the importance of ICT in the acquisition of key educational competencies and their contribution to

the development of the economy and society. Finally, the authors conclude that the financing of innovative technologies in primary education is important [6].

Educational games in older adults is an under-researched topic in education, thus impeding the understanding of the accessibility of games in the elderly. The main objective of this article was based on addressing the lack of research in the field of educational games for older adults in education, with the purpose of understanding the accessibility of games such as Kahoot and Quizizz in this population. Through this study, accessibility challenges related to game pacing, classroom design, and lighting were identified, although participants demonstrated a willingness to engage in the activity despite these barriers. In conclusion, the authors emphasize the importance of addressing these challenges and developing more accessible educational games for older adults, recognizing the interest and motivation of this demographic to participate in educational activities [7].

Quality of life is related to social sustainability contained within education, learning and awareness. In older adults, this strategy is essential; therefore, the authors propose to identify the motivations of the elderly when using serious games in order to promote the learning process through technology. Within the research, a review of previous research on the subject was carried out, where the motivational factors of the population were identified. According to the authors' findings, the motivations of older adults are related to emotional satisfaction, perceived benefits, participation, feeling busy, social interaction, knowledge acquisition and thus, increased social sustainability. It is concluded that educational games are important in learning, allowing the collection of motivations in older adults [8].

The population of elderly people is increasing over the years, so it is essential to promote connectivity to each demographic group, in this case, seniors. In this research article, we propose to analyze the impact of smartphones on the quality of life of the elderly and how it influences the adoption of technology. Regarding the methodology, a sample of nine older adults between 63 and 82 years old was used, where they handled a cell phone during a determined period of time, from there a data collection was carried out under an interview and a survey. Thus, the authors found that older adults who used smartphones demonstrated a more independent living capacity and expressed levels of satisfaction with their current lives, generating as a conclusion that the use of technology within this population group has a positive impact on their quality of life, thus mitigating the feeling of loneliness and boredom [9].

Serious games (SGs) enable social interaction and learning for knowledge acquisition. In this regard, the authors aim to analyze the trends of serious games for health care. In this research, the methodology used was a literature review under the Web of Sciences database and with it, an analysis of the scope of the topic to be investigated. The authors concluded that the application of SGs in health care is an important area for future research, both rehabilitation and medical design and education reflect the latest research topics and future trends in this field. As well as the combination of bibliometric methods and scoping review provided a comprehensive understanding of the current status and prospects of research in SGs for health care [10].

24.3 Method

The present research article is based on a mixed descriptive approach methodology, divided into three key phases. In the first phase, a comprehensive literature review was conducted on the impact of games on older adults. Thus, a search was conducted in academic and scientific databases, such as SCOPUS, Redalyc, Scielo, Latindex, among others, using keywords such as education in old age, gamification, active teaching, cognitive memory in older adults and education with tools, among others. Selection criteria were applied considering the quality of the studies, their direct relationship with the present article and the relevance of the results. Thus, this literature review provides a solid basis for the next phases of the research.

In the second phase, the design of the educational game was addressed, focusing on the teaching of basic financial concepts specifically aimed at older adults. This process included the definition of the game structure, rules, game mechanics and the effective adaptation of the game to meet the needs and preferences of the target audience, i.e., older adults. Each element of the game was designed with the purpose of making the learning of financial concepts attractive, accessible and effective for this demographic group.

The last phase involved the implementation of a pilot test of the educational game in a selected sample of older adults. This phase allowed us to address the cognitive difficulties previously identified in older adults and to apply effective gamification strategies in teaching financial concepts. During implementation, guidance was provided to participants and a controlled environment was created to ensure that the game was used appropriately. Data were collected through various instruments, such as questionnaires, cognitive tests and satisfaction surveys, to evaluate the effectiveness of the game in improving the financial literacy of older adults.

24.3.1 Participants

Within the sample population for the pilot of the previously designed game, there were 6 male and 5 female participants, belonging to a home for the elderly. It should be mentioned that their participation in this study was carried out with the informed consent of those responsible for the older adults in the home. In addition, a question-naire was applied to the staff of the home, including the director, nurses and assistants, in order to determine the major problems in the care of the elderly. At the end of the intervention, a short interview was conducted with the older adults consisting of 5 questions regarding the use of educational resources based on pictograms.

24.3.2 Materials and Resources

Different databases such as SCOPUS, Redalyc, Web of Science, PubMed, Medline, Scielo, Latindex, among others, were used as instruments for the documentary review. In the search for information, terms related to financial education, the context of older adults in relation to financial inclusion, gamified games with pictograms, intrinsic motivation and active learning were used. In addition, a questionnaire was applied to the staff of the home, consisting of 5 questions related to the use of pictograms in older adults.

In the second part, several digital design tools were used to model and develop the gamified game aimed at teaching financial concepts to older adults. As for the content of the strategy, game elements such as cards, board, images represented by pictograms and dynamics were contemplated. It should be mentioned that the design of this instrument took into account the different contexts related to older adults, cognitive and physical difficulties, neurological problems and disabilities, thus allowing the accessibility and usability of the game for this demographic group. Finally, for the implementation, the material designed within the previous phase was used within the facilities of the home for older adults, this implementation was under group and individual activities, allowing social interaction. In this way, the participants were evaluated through the use of the checklist that allowed them to recognize the influence of the tool on the participants and thus, provide feedback on what was found.

24.3.3 Procedure

First, for the literature review phase, the topic of the impact of games on older adults was defined. An exhaustive search of relevant academic and scientific sources was carried out in databases such as SCOPUS, Redalyc, Web of Science, PubMed, Medline, Scielo, Latindex, among others. From there, key words were used such as: education in old age, gamification, active teaching, cognitive memory in older adults, education with tools, among others. The criteria of selection, quality of studies, direct relation with the present article and relevance of the results were applied; where it was analyzed and compiled for use in the following phases. In this way, the identified information was collected, allowing the registration and organization of data to be taken into account in the second phase aimed at the design. It should be mentioned that an analysis of the data collected was carried out, where the trends in the cognitive difficulties faced by older adults in the financial sphere and their need for inclusion were identified.

Based on these findings, a game was created with the purpose of addressing the cognitive difficulties identified in older adults and applying effective gamification strategies in the teaching of financial concepts. The design process included defining the game structure, rules, game mechanics, and how it would be effectively adapted

to meet the needs and preferences of the older adult audience. Every aspect of the game was designed with the goal of making learning financial concepts engaging, accessible and effective for this demographic.

Finally, a pilot test was implemented to the 11 participants within the home's facilities, through the following activities:

- Contextualize and familiarize participants with the use of pictograms, providing them with a detailed explanation of the didactic activities and their meaning.
- Acknowledge the practice before starting, explain to the older adults what the gamified game consists of, allowing the identification of the elements, dynamics and context of the tool for the execution of the activity.
- Allow older adults to take the game to their time, enable player interaction in the activity, encouraging them to participate for rewards and prizes, thus generating extrinsic and intrinsic motivation for active learning.
- Identify by means of an evaluation the results of the activity, recognize the results found by means of a recognition of pictograms and concepts related to the research topic by the participants.
- At the end of the evaluation, review the results, thus allowing the identification of concepts acquired and areas for improvement of each participant according to their cognitive context regarding financial inclusion.
- As a last instance, execute a feedback of the results found on an individual basis. Highlighting their achievements and mentioning areas of improvement for meaningful learning.

Design of the Educational Game

This research project aims to have a positive impact on the elderly population through the learning of important concepts related to the financial area and, at the same time, to allow the social interaction of the individual for his or her personal enrichment. In this way, it seeks to empower older adults with tools that give them the confidence to make informed financial decisions. To achieve these objectives, the design of this research is divided into a series of clearly defined phases, which are presented in Fig. 24.1. In this sense, the purpose of the research and planning of the gamification strategies is defined, which allows establishing a solid direction for the project. Thus, we proceeded to the collection of essential information for the construction of the tool, followed by the conceptualization and design of the gamified game adapted to the specific needs of the population in relation to financial education. Now, based on these findings, we seek to materialize the general concept of the game, preparing it for its implementation with the target group.

During this final stage, a detailed explanation of the didactic activities and the meaning of the pictograms used in the game was provided to ensure that participants fully understood the context and dynamics of the game. In this way, it was explained what the gamified game consisted of, allowing the older adults to identify the elements, dynamics and context of the game. Through the execution of the game, an observation of participation was carried out, from there, the results of the activities proposed were evaluated through a survey where participants were evaluated on

DESIGN OF THE EDUCATIONAL GAME



RESEARCH

relevant understand the needs of the population.

Conceptualise and design the mechanics, dynamics and elements of the game according to the context of the

IMPLEMENT

Implementation of the game in learning environments for the empowerment of the population in financial education.

Fig. 24.1 Phases for the design of the educational game aimed at older adults

their ability to recognize pictograms and understand concepts related to the research topic.

At the end of the evaluation, the results were reviewed with each participant individually. Their achievements were highlighted, and areas for improvement were identified for more meaningful learning. As shown in Fig. 24.2 the categories and cards of the game in Spanish.

Results and Discussion 24.4

Prior to the application of the activities related to the implementation of the gamified game, a survey was conducted with the staff present in the home to learn about the management of the use of pictograms and their impact on older adults. In this way, the following information was collected.

As can be seen in Fig. 24.3, respondents comprised of nursing assistants, interns and administrative authority responded to a series of questions related to the use of



Fig. 24.2 Cards of the game designed for older adults

pictograms and their impact on older adults. Thus, for questions 1, 2 and 3, it was found that caregivers have worked with pictograms in previous activities, indicating that they find the tool useful and easy to understand for the elderly, thus generating a perception of comfort on their part. Now, under the question "Have you noticed any difficulty in older adults when working with pictograms?", 77.8% answered no, indicating that it is a useful tool, but that some older adults have had some difficulty with the activities using pictograms, so it is necessary that the tool designed within this research is accessible and inclusive for each type of difficulty.

Design and Implementation

In the final phase, a pilot test of the design was conducted with elderly people. The researcher explained the playability and purpose of the tool so that the participants could understand the activities to be performed. During the test, a motivating environment was maintained and the prior knowledge of the participants was taken into account to facilitate their learning, an example of which can be seen in Fig. 24.4.

As envisaged, the work sessions were conducted regularly, in a calm and nonpressured environment, encouraging active participation and enjoyment. Progress was continuously monitored, and activities were adapted as needed, as shown in Fig. 24.5.

At the end of the implementation of this project, an extremely positive result could be observed. The elderly participants showed a remarkable interest and commitment



Fig. 24.3 Graphic representation of the questions and answers of the questionnaire applied to the staff of the group home



Fig. 24.4 Explanation of the game focused on older adults

during the cognitive stimulation sessions with pictograms. Their active and enthusiastic participation in the activities showed a genuine enjoyment of the learning and mental stimulation process.



Fig. 24.5 Execution of the activities proposed in the game

24.5 Conclusions

The use of pictograms is presented as a highly beneficial tool to stimulate the various cognitive areas in older adults. This strategy not only fosters attention and memory, but also promotes the development of language and abstract thinking. Thus, for those older adults who face difficulties with traditional reading or writing, pictograms offer an effective alternative for learning and communication.

In the educational field, it is essential that caregivers use a variety of methods that adjust to the specific needs and cognitive abilities of older adults, thus ensuring an effective adaptation of teaching strategies and individualized attention, which is essential for the success of the learning process in this population. Seen in this way, designing an innovative proposal that integrates the use of pictograms as a central tool for cognitive development in older adults is revealed as a highly effective and enriching strategy, because it not only facilitates learning, but also stimulates the mind in a meaningful way, promoting autonomy and active participation in cognitive activities.

In this way, the game designed with pictograms as a financial education tool for older adults has proven to be particularly effective in the acquisition of financial knowledge and skills, where its ability to give space to be an interactive and playful tool actively involved older adults in the learning process, which increased their participation and retention of information. Therefore, this hands-on approach has a positive impact on the acquisition of financial knowledge, as it gives them the opportunity to apply what they learn immediately. Moreover, because it is a game, the experience becomes more engaging and less intimidating compared to studying financial concepts through traditional materials. Finally, older adults evaluated the activity regarding the use of pictograms as a tool for cognitive development, which provided information on the effectiveness and acceptance of this strategy in this population. Acknowledgements The authors would like to thank the Corporación Ecuatoriana para el Desarrollo de la Investigación y Academia-CEDIA for their contribution in innovation, through the "FONDO I+D+i" projects, especially the project I+D+I-XVII-2023-61, "Análisis y aplicación de formas de interacción humano – computador (HCI) en una herramienta tecnológica de comunicación aumentativa y alternativa basada en pictogramas, que ayude a las personas adultas mayores a comunicarse con su entorno"; also the Universidad Tecnológica Indoamérica, Universidad de Cuenca, Universidad de las Fuerzas Armadas and Universidad del Azuay for the support for the development of this work.

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Part VI Machine Learning Applied to Marketing

Chapter 25 Automated Consulting Services—Perspectives of Customers, Consultants and Companies



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Abstract The consulting industry, traditionally characterized by personal relationships, faces a rapidly evolving competitive landscape. In the digital world, automated consulting is gaining significance as a means to offer efficient and scalable services. However, research on the implementation of this automation has been limited to date. This study, on one hand, explores consumer acceptance of automated consulting, particularly in relation to the context, product complexity, and influencing factors. On the other hand, it provides guidelines for consulting firms and businesses on which steps of the consulting process are suited for automation. The results indicate that end consumers prefer a combination of human and automated consulting, as they value the personal touch. The initial phase of consulting is most suitable for automation, as the information is not highly personalized at this stage. Trust, user-friendliness, and time investment emerge as key influencing factors. It is important to note that automated consulting is not suitable for all situations. Companies should continuously scrutinize and optimize processes before automating them. The findings of this study are relevant for businesses that are developing or looking to introduce automated consulting services. A checklist has been created to summarize the relevant influencing factors at the consulting, business, and customer levels.

25.1 Introduction

The consultancy sector has historically been characterized as a human-centric enterprise, focused on the provision of intricate services [1]. However, a paucity of foundational transformations has been observed, with the predominance of consultancy activities still executed manually, devoid of automation [1] The sector is nevertheless

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encountering a transformative shift engendered by technological advancements and shifting customer exigencies [2].

Technological modalities are emerging as instrumental constituents in consultancy services, particularly in the realms of analytics, data science, automation, machine learning (ML), and artificial intelligence (AI) [2, 3]. These technologies enable nuanced understanding of customer behavioral paradigms and consumption tendencies, thereby informing predictive models to optimize client engagement [4].

The assimilation of data-driven analytics into consultancy offerings augments value for the end-users while facilitating a paradigm shift in the business models of consultancy firms via digitalization and automation [2]. Such cutting-edge technologies confer a sustainable competitive advantage and distinct market differentiation [2]. Yet, the full potential of these data-centric strategies remains largely untapped, principally due to organizational constraints [5]. To secure market standing, consultancies must undergo a critical reassessment of their existing business models, instigate novel operational processes, and cultivate relevant competencies; this is further necessitated by evolving consumer preferences [2, 5].

The imperative for automation within the consultancy sector is underscored by several key developments. A seminal study by McKinsey [6] elucidates the accelerated trajectory of digital service delivery in the wake of the Covid-19 pandemic, with a pronounced impact on technology consultancy. Survey data corroborates the feasibility of virtual client interactions, a phenomenon attributed to growing consumer acclimatization to internet-based services [6, 7]. The authors posit an ongoing evolution of technology trends—comprising digitalization, automation, and robotization—with concomitant fluctuations in market dynamics and decreased predictive reliability [6].

In addition, ML and AI technologies have garnered profitable applications across diverse industries. For instance, in the domains of marketing and sales, automation technologies have been effectively deployed for tasks ranging from email campaigns to personalized offerings [8]. Furthermore, data analytic processes, such as keyword tracking, site visitations, conversions, and revenue streams, can be efficiently automated through AI and ML applications [8]. In administrative functions, Robotic Process Automation (RPA) technologies facilitate the automated execution of repetitive, time-intensive tasks susceptible to errors [9]. These observations catalyze the formulation of four pivotal research questions:

- RQ 1: To what extent is consumer receptivity manifest toward automated consultancy services?
- RQ 2: What specific attributes act as determinants in shaping consumer attitudes and acceptance vis-à-vis automated consultancy services?
- RQ 3: What opportunities and challenges do automated consulting services present for consumers?
- RQ 4: Which phases within the consultancy process are optimally suited for automation?

25.2 Literature Review

25.2.1 Consulting

In scholarly discourse, myriad definitions for the term 'consulting' prevail, reflecting the concept's inherent fluidity. As Broermann [10] articulates, a consensual definition has hitherto been elusive, largely attributable to the broad scope of application and the diverse utilization of the term. A compendium of extant definitional variations is encapsulated in Table 25.1.

The authors delineate 'consulting' as a transitory interactional process through which seekers of assistance acquire competencies for problem-solving, consideration of alternative decision-making pathways, and recognition of developmental

Definition	Explanation	Reference
"Consulting is the business of providing expert advice to a specific group of people"	This definition accentuates the specialized nature of consulting, delineating it as an expertise-driven service aimed at a targeted demographic grappling with complex issues	[11]
"Consulting is a process of guiding organizations to improve their performance through analysis of existing problems and development of plans for improvement"	This definition emphasizes the procedural aspects of consulting, involving systematic analysis, problem-solving, and tactical planning to bolster organizational performance	[12]
"Consulting is the art of influencing people at their request"	This interpretation focuses on the voluntary and receptive nature of the client, who actively seeks consultative intervention and is amenable to influence	[13]
"Consulting is helping clients identify and address their most important challenges"	This conception sheds light on the consultant's role in helping clients discern and address pivotal challenges or opportunities	[14]
"Consulting is about asking the right questions and helping clients find their own answers"	This explicates the Socratic methodology employed by some consultants to prompt critical thinking, leading clients to self-realized conclusions	[11]
"Consulting is a relationship business built on trust and expertise"	This underscores the importance of nurturing robust client-consultant relationships founded on trust, augmented by the consultant's expertise	[15]
"Consulting is a bridge between knowledge and action"	This captures the consultant's role in bridging the chasm between intellectual constructs and practical deployment, aiding clients in converting insights to actionable paradigms	[16]

Table 25.1 Divergent conceptualizations of consulting

prospects. A salient feature characterizing consulting is the distinct role demarcation between the consultant and the consultee, often mediated by informational asymmetry [10]. Böckelmann [17] elucidates that consulting manifests in various forms and formats. Given that the focus of the current study is predominantly on automated consulting, ensuing discussions will be tailored to this particular variant. Initially, however, the individual components constituting a consulting process will be examined in closer detail.

25.2.2 Artificial Intelligence

The terminology surrounding artificial intelligence (AI) lacks uniformity in scholarly literature [18, 19]. McCarthy [20] conceptualizes AI as the science and engineering of creating intelligent machines and computer programs [21]. AI endows machines with the capability to autonomously interpret, solve, and learn from complex problems [21].

Subfields of AI include machine learning (ML), deep learning, natural language processing (NLP), computer vision, and robotics [19, 22]. AI serves as a catalyst for innovation in the service industry, albeit with the caveat of threatening human employment [23].

AI development unfolds in sequential stages—mechanical, analytical, intuitive, and empathetic intelligence [23]. Rather than wholesale job displacement, AI incrementally automates tasks, thereby reshaping the skill-set importance within the service sector [23]. Intuitive and empathetic skills gain prominence as analytical abilities are increasingly subsumed by AI [23]. Ultimately, AI's potential to execute even intuitive and empathetic tasks opens avenues for enhanced human–machine integration but also portends job insecurity [23].

25.2.3 Automated Consulting and Acceptance

The literature lacks a cohesive definition of automated consulting. For the purposes of this discussion, it is described as the amalgamation of conventional consulting elements with technologies like AI and ML, aiming to provide automated advice, recommendations, and solutions tailored to end-users. The process is self-optimizing through experiential learning.

Bode et al. [24] surveyed participants regarding their expectations and requirements for digital consultations. Respondents anticipate digital consultations to be standardized, modular, and more cost-effective than traditional consulting. Enhanced service quality and customization are also anticipated [24]. Metrics of importance include measurability, user-friendliness, and seamless integration [24]. User acceptance of automated consulting hinges on trust and user expectations. Wewerka et al. [25] developed a user acceptance model for Robotic Process Automation (RPA) and identified crucial influencers like facilitating conditions, transparency, inclination toward innovation, and social influence [25]. Resistance to AI is not uncommon [26]. Garvey et al. [27] found that users respond more positively to suboptimal advice from machine-like AI than human consultants.

Trust remains a cornerstone for AI acceptance [28]. Sutherland et al. [29] demonstrated that trust in automated consultations surpasses that in human consultations. Asatiani et al. [30] argue for a hybrid human–machine collaboration as a prerequisite for successful automation. These insights underscore that trust, acceptance, and the consideration of user expectations are pivotal for the successful deployment of automated consulting.

25.3 Methodology

For the present study, a qualitative methodology was employed, primarily due to the scant existing literature on the subject matter of automated consulting. This is attributable to the nascent status of automated consultation services in both scholarly literature and practical applications. Emerging technologies evolve at an accelerated pace, increasingly challenging businesses and their operational models. This dynamism necessitates a certain level of flexibility in data collection and analysis. Qualitative methods, aimed at comprehending individual cases in as much detail as possible, offer this flexibility [31]. In this study, we employed guided interviews and subsequent content analysis following Mayring's methodology [32].

The interviewees consisted of either customers with experience in the field of digital services (15 participants), executives in consulting firms (11 participants), or corporate executives (20 participants). The interviewees from consulting firms are professionals and work with the topic on a daily basis. The people representing the corporate viewpoint come from different industries and work in companies of different sizes. Industry sectors or target demographics (B2B/B2C) were not a focal point of this study. A total of 46 in-depth interviews were conducted over a span of three months in the Spring of 2023. These interviews were executed either in-person or via Zoom, considering the often considerable geographical distance between the interviewers and the interviewees. Consent for recording and subsequent transcription was obtained at the onset of each interview. Absolute confidentiality was assured to all participants, and unanimous consent for participation was received.

25.4 Findings and Observations

The majority of respondents still consider human advice to be contemporary. However, they agree that the necessity for human involvement in the consultation process highly depends on the product or service and the specific situation. One end-user states, "I think it largely depends on the product you want to sell and its complexity."

Trust, emotions, and interpersonal aspects are crucial factors for all stakeholder groups in the consultation process. End-users, however, express greater reservations regarding trust compared to businesses and consultants. Half of the interviewed endusers equally trust both automated and human advice, while the other half has less trust in automated advice. One end-user prefers human advisors as she can better gauge individuals based on their gestures and facial expressions. Trust in automated consultation can be bolstered by transparency.

Data privacy is an essential element of automated consultation for all three stakeholder groups. The majority of respondents find data protection important but don't differentiate significantly between human and machine regarding data privacy. Some respondents are critical, citing that emerging technologies require a balance between protecting personal data and achieving high-quality, personalized AI results.

Respondents find it valuable to have a human contact in automated consultations. This ensures that people do not disengage if automated consultations don't meet their expectations. Quick responses are preferred, ideally via phone or chatbot, as emails are less appreciated due to delays. User-friendliness is pivotal, with preferences for ease of operation, comprehensibility, and intuitive handling. An automated consultation that acts human-like is positively rated.

In terms of consultation quality, competence and expertise are paramount. One entrepreneur argues, "Customers want to be taken seriously and advised openly and honestly." The consultation should be equal and assistive in the decision-making process. Individual customer needs are central. Respondents expect automated consultation to respond to their queries and wishes in a detailed and interactive manner.

The key advantages of automated consultation are higher efficiency, better availability, and less time and financial effort. The 24/7 availability is highlighted as a time-saver. Some end-users fear that businesses might reduce human consultation to cut costs. Automation is seen as an opportunity to store and process data and enable rapid information processing. Automation can be more objective and error-free than human consultation and is infinitely scalable. On the corporate side, automation can reduce costs and relieve employees, creating more time for individual consultations and handling complex tasks.

The main challenges lie in adapting to a broad user base and their acceptance, addressing individual customer needs, and the lack of experience with this new technology, which makes evaluating the results difficult. Factors that are not programmable, such as social norms and value systems, are considered a challenge. Trust-building is another issue, as algorithms are often opaque. Some participants worry that older or less tech-savvy individuals could be overwhelmed. Individual customization of automated consultation to suit each person's needs is problematic, as technology may not always precisely capture the customer's personality and needs.

The ability to evaluate haptic aspects of products poses a particular difficulty, especially for products where touch, smell, or taste plays a role. One end-user states, "Wherever the senses of touch and smell are involved, I see significant challenges."

Respondents discuss various phases of the consultation process suitable for automation. Some see potential in automating the initial contact, introduction, and problem definition, with human intervention later for validation or in-depth information. Others consider the initial human contact essential for building relationships and initiating the consultation process.

Services or products suitable for automation are primarily simple, standardized, and not overly complex processes. Financial and insurance services are frequently cited as appropriate. Complex consultations with human elements, medical consultations, and products requiring trials or tests are less suitable for automation.

Automated consultation will complement, but not replace, human consultation in the future. One entrepreneur emphasizes, "On a factual level, much can be done without humans. For emotional/personal matters, humans are still needed." The majority agree that automated consultation will simplify the process.

25.5 Discussion

The investigation of the first research question shows that the acceptance of automated consulting by end customers depends primarily on the context and the respective product or service as well as its complexity. Despite the enthusiasm for innovation and openness to technological innovations, a fully automated consulting process is currently viewed with skepticism.

With regard to the second research question, it can be said that numerous factors influence attitude formation and end-user acceptance. The most critical point is trust in automated advice. Clients approach automated consultation with skepticism initially, largely due to lack of experience. Consultants and businesses are less concerned about this. Trust is cited by Scheuer [28] as a central driver of AI technology acceptance. He explains that lack of trust in AI can result in distant behavior, thereby substantially limiting its use. According to the present study, trust in AI can be particularly built through transparency regarding the use of user data and the algorithms of automated advice helps. Here, customers and businesses express more concerns about data protection compared to consultants. Consequently, consultants must pay attention to data protection despite its lower relevance, as their clients value it. Another important factor reflects user-friendliness. If the automated advice is not easily accessible, intuitively understandable and fast, user acceptance and, accordingly, the intention to use the advice decreases. Also particularly relevant is the amount of time that must be spent to use advice. End-users want to get to the

desired product or service more quickly with automated advice than with a human advisor. Other influencing factors are the quality of the advice, the consideration of the individual needs of the customers, the social influence and facilitating conditions.

Contrary to findings by Dietvorst et al. [26], who found that consumers are more willing to use algorithms when unaware of them, the present study shows that users prefer transparency and want to know whether they are advised by a human or a machine. The study agrees with Waytz et al. [33], noting that users accept AI more readily when it has human-like features. This study, like Madhavans and Wiegmanns [34], indicates that users perceive mistakes made by automated consultation as more severe than those made by human consultation, as users expect automated consultations to be perfect.

The analysis of the third research question shows that efficiency and cost savings are the primary potentials of automated consultation for consultants and businesses, while end-users mainly see the benefit in the flexibility of time and location. This aligns with Nissen and Seifert [35], who highlight higher flexibility and lower costs as the main advantages of automating consultation services. The study also reveals that users expect higher efficiency from automated consultation, which is in line with findings from Consultancy.uk [36], suggesting that automated processes are more efficient and quicker than humans for standard tasks and data processing. Like Nissen and Seifert [35], this study also shows that automation of certain consultation steps can relieve employees, allowing them to focus on more complex tasks and better cater to individual customer needs.

The greatest challenges companies face include budget, data security, acceptance, emotions, and stakeholder engagement. Consultants emphasize employee engagement, costs, and data. Customers, on the other hand, fear that automated consultation could neglect their individual needs. Nissen and Seifert [35] also see the poorer quality of interaction as a risk factor, as automated consultation may not fully understand and accordingly personalize responses to customers' needs.

Participants further see a challenge in the inability of automated consultation to replicate human elements like empathy, emotionality, or interpersonal skills as effectively as a human can. Roboyo [36] expresses similar concerns, arguing that automated consultation cannot replace human ingenuity and empathy, no matter how intelligent it is.

With regard to the fourth research question, the three stakeholders agree that human consultation will retain its importance in the future. However, human involvement is not deemed essential at every stage of the consultation process, especially from the perspective of end-users and businesses. Consultants, on the other hand, value long-term relationships and consider human interaction indispensable. The context and product complexity dictate the necessity of human involvement in the consultation process. Both customers and businesses prefer human contact as the consultation process advances, since human instinct is often irreplaceable.

Currently, a hybrid form of consultation is preferred, where human characteristics are still valued. This is also in line with Cabello Ruiz et al. [37], who see hybrid collaboration between humans and machines as the most natural method for automating

processes. The study findings largely concur with the insights from existing literature and provide guidelines for the development of consultation software.

25.6 Implications

Previous scientific publications have scarcely dealt with process automation in the consulting industry and its user acceptance. The present study therefore contributes to the exploration of this phenomenon and its acceptance factors. The expansion of this research area is essential for companies today due to the increasing importance of process automations. Although process automations are already in use in certain industries, the consulting industry still operates very traditionally. This study fills a research gap by specifically analyzing automated consulting in the context of user acceptance.

There is no clear practical implication for the user acceptance of automated consulting due to the numerous influencing factors. However, the present study can help consultants better understand the factors affecting user acceptance of automated consulting services. Consulting firms can use the identified factors of user acceptance for the development of consulting software. Furthermore, the insights into the consulting steps suitable for automation serve as a valuable guideline for organizations. The checklist summarily outlines which factors must be met at the consulting level, at the company level, and at the customer level concerning user acceptance (Table 25.2).

The development of automated consulting requires a user-friendly interface to ensure easy operation and quick access to information. Personalization is crucial as end-users desire a tailored experience. Empathy, emotions, and interpersonal elements are essential, so the integration of human interactive elements is recommended. Data protection is indispensable, as is transparent information about data usage. Feedback mechanisms and regular monitoring are necessary for continuous improvement.

When introducing customers to automated consulting, patience and a human contact person in the initial phase are crucial. The choice between automated or human consulting should be left to the customer to include everyone. A good customer experience is essential, regardless of the form of consultation.

However, it should be noted that automated consulting is not suitable for all situations. The decision to automate should be based on the context and customer needs. Customer opinions on automation should be obtained before processes are automated. Consulting companies should be aware of AI developments and adapt their processes to remain competitive. The collaboration between human consultants and AI will be crucial in the future to gain competitive advantages and increase customer satisfaction.

Influence factor	Consultants	Companies	End customers
Context dependency	1	1	1
Emotions, empathy, interpersonal skills	1	1	1
Competence	1	1	1
Efficiency	1	1	
Cost Savings	1	1	
Resource Savings	1	1	
User-friendliness/simplicity		1	1
Trust		1	1
Transparency		1	1
Data protection		1	1
Customer focus		1	1
Visual language	1		1
Visualizations/animations	1		1
Long-term customer-consultant relationship	1		
Job facilitation	1		
Employee involvement	1		
Corporate DNA and image consideration	1		
Data quality	1		
System stability	1		
Budget/costs	1	1	
Inclusion of all stakeholders		1	
Convenience		1	
Personality		1	
Consistency		1	
Alternative options		1	
Individual needs/customized solutions			1
Objectivity			1
Time-saving			1
Time independence			1
Location independence			1
Facilitating conditions			1
Voluntary use			1

 Table 25.2
 Checklist of influencing factors concerning user acceptance

25.7 Study Limitations and Future Research

The insights are based on statements from 46 individuals. Due to the detailed and in-depth nature of qualitative research, the sample size may not be representative of the general population. The study surveyed individuals between the ages of 20 and 65 who are in the working age demographic and have used online services at least once. Age was not identified as a significant factor influencing user acceptance in this study. However, it would have been exceedingly intriguing to survey young adults under 20 years of age to reach theoretical saturation. This would have been particularly interesting because Generation Z (born between 1995 and 2010) has different needs and expectations for services compared to older individuals, according to Kaabachi et al. [38]. Additionally, it would have been desirable to interview individuals over the age of 65, as they may have greater reservations toward technology, having not grown up with it.

Furthermore, the study deliberately did not focus on a specific industry, making the interviewees' responses varied but at times somewhat superficial. For this reason, the applicability of the results to different contexts and specific industries should be approached with caution. Subjective influences from researchers and biases due to social desirability cannot be completely ruled out, thereby limiting the validity and generalizability of the findings.

The current study has shown that intelligent process automation, particularly due to the emergence and rapid proliferation of ChatGPT, is being recognized as an important topic. Therefore, further studies to validate these findings are considered valuable. For a follow-up study, it is recommended to address the above-mentioned limitations. Given the diversity across various industries, it is suggested to deeply explore specific areas within the consulting industry or consulting activities in particular sectors. It is also proposed to quantify the identified factors affecting user acceptance to determine their relative impact. Finally, given that employees can focus on more complex tasks through the automation of recurring tasks, it would be extremely compelling to examine how this will alter the skill requirements of the workforce.

25.8 Conclusion

The present study has been able to yield new insights regarding the opportunities and challenges of automating consulting services. It was possible to identify steps within the consulting process that are suitable for automation. Trust, emotions, and interpersonal aspects are important factors in consulting for all stakeholder groups. However, there are additional factors that companies and consulting firms should consider to ensure the best possible customer experience. Overall, this work aids companies and consulting firms in reviewing and improving their applications, or in incorporating the addressed points when conceptualizing new ones.

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Chapter 26 Undergraduate Candidate Experience and Engagement: Insights from a Case Using CRISP-DM and Machine Learning



Vitor Monteiro Pinto, Fernando Paulo Belfo, Isabel Pedrosa, and Lorenzo Valgimigli

Abstract Several channels throughout their journey choose a course to enroll. The institutional website is among these channels. The way it is designed might influence how engaged these visitors are. Web analytics tools allow collecting high amounts of user behavior data, which can generate insights that help to improve HEI website and then incentivizing prospective students to apply for a course. Techniques of data mining, with CRISP-DM method, were used to help generating insights with an applied HEI case study. The expected outcome of this research was to unveil the most relevant segment of users and behaviors. The tools applied to collect, store, transform, visualize and clustering model data using X-Means algorithm were Google

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Tag Manager, Analytics, BigQuery, Data Studio, and RapidMiner. The main results showed four relevant groups of users. The key outtakes were that course and course unit pages were relevant in terms of attracting volume of users, but not in inciting engagement. In comparison, the homepage and the "general undergraduate course page" brought less users and their sessions usually lead to more engaged experiences. This study presented insights of the impact of brand awareness and landing pages design on engagement rates of the HEI website.

26.1 Introduction

Professionals compete for jobs in the labor market by enrolling in and demanding more from higher education institutions courses (HEI). The HEI are encouraged to compete to provide what they require [1] as increasing the number of course applicants is an important goal of an HEI. It can bring a positive direct impact on its revenue levels, reputation, and the skills of its student body.

Building and communicating about university facilities, the quality of the teaching, reasonably priced tuition, and other added-value techniques are some of the strategies to draw attention to the institution. Gaining the public's trust may require enhancing the positive perception of the HEI's brand image, particularly among parents who intend to send their children to college. It is necessary to have prior knowledge of how this service is viewed by or used by the general public in order to continuously adapt and update its positioning in each channel [1].

According to Tiago and Verissimo [2], web platforms seem to be a relevant channel given how much this technology has affected human activities and interactions. As a result, it is crucial for HEIs to rethink how they will position their digital marketing initiatives. Business intelligence and customer insights support the investigation of visitor interactions using massive data created in this environment in order to comprehend and develop new marketing strategies. Data mining can be useful for performing analysis that is both effective and insightful [3].

This is a case study emphasizing undergraduate programs. An organization that faces typical opportunities and challenges of the sector regarding digital marketing has been selected. It is in the center of Portugal and offers courses from technical to master's level in a variety of subject areas, including agriculture, health, business, engineering, education, and the arts.

It was verified as 18 million sessions on the top 10 Portuguese HEI websites in November 2022. The investigated institution accounted for 4% of them. Besides that, it showed the fourth shortest average session duration among them. This information works as evidence that there is room for improvement on the experience when compared with its peers [4].

The main objective of the project was to increase the number of applications for the institution's courses to increase enrollment intentions, specifically, the percentage of users who checked course pages and engagement rates seen on the average amount of time spent on the website and the number of pages seen by users. This objective might be accomplished by considering the users' journey from their first contact with the HEI's brand, the difficulties and values they faced, to their eventual enrollment [5].

In this work, the concepts and methods applied by Pinto et al. [6] were used to contextualize the study followed by the results and discussions for the user segmentation of this work. The possibilities of digital marketing for HEIs have been described. In sequence, concepts of customer experience, web analytics, and data mining have been presented to contextualize the case study institution and to delimit the scope. The internal data of the case study HEI was mapped, scoped, gathered, transformed, and analyzed. The institutional website and its digital environment were both analyzed to set specific objectives for this work. Then, data mining tools were used to examine visitor behavior data to identify and compare groups users and journeys. The CRISP-DM methodology was applied to set directions to generate results. The data was collected using Google Tag Manager, stored and converted using Google Analytics and Google BigQuery, and statistically modeled using RapidMiner to identify the cluster of users with X-Means algorithm.

26.2 Literature Review

26.2.1 Digital Marketing for Higher Education Institutions

The extensive use of web technologies has significantly changed human environments, leading to the need to change in marketing tactics to incorporate digital channels [1]. The field that covers them, namely digital marketing, can be described in a variety of ways. Nurtirtaway et al. [7] focused on the innovativeness of moving past the traditional analogical interactions to reach consumers more successfully, with greater personalization, and at a lower cost. Digital marketing began with the Internet and search engines but has since expanded to include email, websites, blogs, and social networking, according to Forghani et al. [8]. Muller [9] places a focus on using the Internet for digital product promotion and sales.

Digital marketing can be helpful in HEI for several purposes, including recruiting prospective students, encouraging student engagement, providing placements, designing curricula, offering career counseling, creating alumni contacts, and creating professional student networks [10]. Online marketing enhances academic communication by offering a two-way collaborative channel that is free of space and time limitations [11]. Del Rocio Bonilla et al. study demonstrated that Instagram, an image-and-video-focused online social media, was more effective and successful in calling students' attention than posters, events, and sports [12, 13].

The importance of digital marketing in enhancing the outcomes of the admissions decision-making process for students was emphasized by Rajkumar et al. [14]. It was mentioned that recruiting candidates through digital media might entail "engaging user-generated content through text, images, infographics, videos, and podcasts".

Oré Calixto [15] emphasized the importance of content marketing for the educational sector in addition to analytical management. They focused on how these strategies enhanced customer relationship management (CRM) procedures during their investigation. Digital marketing had an impact on 62% of students' decisions about higher education institutions, according to research by Basha [16].

Another advantage of digital marketing is its capacity to gather more data on user behavior for the development of optimization techniques. Business intelligence and customer insights, according to Stone and Woodcock [17], are essential for comprehending and assisting new marketing engagements. Mapping their interactions and behaviors might hold the key to comprehending behaviors and defining improvement plans [16].

26.2.2 Customer-Centric Experiences and Web Analytics

When running a company with sales objectives, it is crucial to comprehend what can persuade customers to make a purchase. The same is true for potential students who are thinking about enrolling in a course. To encourage comparisons with general concepts, in this study, consumers and students were paralleled. If buyers or prospective applicants see the value they look for in an offer, they are more likely to purchase or apply to a course.

According to Sheth et al. [18], some values could be functional, such as facilitating a quick and reliable process; social, such as interacting with people who share a similar lifestyle; emotional, such as meeting family expectations of obtaining a higher education or feeling ready for a competitive job market; epistemic, such as satisfying one's curiosity in a field of interest; and conditional, such as meeting your expectations or needs regarding cost of goods.

It can be difficult to identify and prioritize value-driving improvements across an organization's channels, products, services, departments, roles, metrics, strategies, and goals. By creating a customer journey, the components of the business and the customer's journey can be seen in parallel steps. For example, it can help understand the effects of only marketing a specific event or of displaying important information for prospective students on less accessible website pages that few users see. It can be useful for visualizing when and how much they give value to applicants at each stage of the application process as well as to make it clear and pertinent for the organization on the big picture.

Kalbach [5] suggests that a customer map must have four specific elements defined. The protagonist's point of view includes a description of their personality. The order, which includes the start and finish of each phase, is the scope. The focus defines the factors you want to assess in each of these processes, such as clients from different categories, channels like websites, social media, online or offline events, and internal divisions like the admissions office or financial teams at universities or schools. Lastly, the diagram's structure was selected as the situation's most suitable visual framework.

A prospective customer experience can frequently go through several phases, according to the loop-shaped experience suggestion by Pedowitz Group [20]. Client acquisition and retention are divided into two separate but related parts. Studying the customer retention phase, which comprises the stages of onboarding, adoption, value realization, loyalty, and advocacy, can help to protect and improve brand value.

Before that, during the customer acquisition, a customer starts a relationship with the brand. This is the central phase of this work. It is comprised of three stages: unaware and aware, consideration, and evaluation or decision. In the first stage, the individual does not know initially the brand and occasionally sees content about it when there is no interest yet in the type of product advertised. In the second stage, the user is interested in the type of product and might be comparing different options offered by the market. Following to the third phase in sequence, the decision to purchase the product has been taken and the consumer might want to avoid any barrier to completing the transaction as restrictive payment methods and arrangements, and delivery options, among others.

To accurately describe the most pertinent users and their behavior throughout the entire journey, data from users' behavior both inside and outside the website is required. According to Palomino et al. [19], web analytics tools are used to analyze, collect, and present web usage data as feedback to what might be working or not, what might require fixing, and what should be improved or removed to increase results. Some examples of the data are clicks and pageviews. Given the variety of possibilities for analyzing data, data mining techniques are presented and considered for the case study.

26.2.3 Data Mining Techniques and Data Quality Concepts

As technology advances, the amount of data collected and stored grows quickly. It is believed that gaining useful insights from them is an essential part of any brand's development [3]. To successfully understand and analyze these enormous data sources, it is suggested that data mining techniques can be used in conjunction with collection, extraction, analysis, and statistical methodologies. It is essential to define the desired outcome to select the best technique to employ. The most used techniques are association, classification techniques, regression, neural networks, or clustering techniques. All these techniques can be useful to in a higher education institution's website context.

Association techniques are used to discover the relationship between variables that are present in the same datasets. For example, in a HEI, it would be possible to view the courses that users from each region see more often. Classification techniques, such as decision trees, Naive Bayes, or support vector machines are used to categorize data. Their objective is to predict how the subsequent cases will act. For example, they could be used to track down users who might return to the website to view additional courses. Decision trees may order the most important characteristics, such as those that result in a session with more pageviews, by analyzing which combinations of characteristics have the greatest influence on a chosen target. Regression is another important data mining technique. It is used to predict the numeric values in each dataset. A prediction is a tactic that stands at a target variable and suggests which value might occur given a combination of the other variables. An example of a prediction could be the number of courses a user views content about, depending on the average time spent on a visit, the type of device used to access the website, the hour of the day, or any other attribute.

Another technique is artificial neural networks. It applies if-case rule calculations shaped as multiple layers organized in complex arrangements of sequence and cyclical conditions. It can be used to learn based on past cases, such as historical students' enrollments. For example, they can be used to suggest to new users some possible courses that can match their profile. Clustering techniques aim to group dataset examples based on their similarity by identifying the most frequent behaviors. To determine which user profiles are most common in this investigation, clustering was used with X-Means algorithm, which is an evolution of the K-means clustering. The first one requires defining initially the number of clusters in the outcome analysis, whereas the evolved X-Means detects the maximum number of clusters.

Moreover, each example is categorized according to the possibility that they are all members of the same category. This measure is named likelihood. Individuals who had worse outcomes were divided into new clusters. This process is repeated until the maximum number is reached. The Bayesian Information Criterion (BIC) score is computed after selecting the fewest clusters within a predetermined range to determine the likelihood of each cluster [21].

These techniques can be used separately or in conjunction to generate insightful outcomes. They can, together with an orientation strategy, improve the final product's quality.

To apply those techniques, it is required to use datasets that have been prepared in terms of data quality. In this field, Mandalapu and Gong [22] present some key concepts to assess your raw data as correlation, ID-ness, stability, and missing values. They describe correlations as the linear correlation between attributes and the goal columns, whereas ID-ness represents how diverse are the values in a column, which might indicate that those attributes are unique identifiers. Unique identifiers do not add information to the analysis since it can be addressed to only one case of the database instead of grouping similar cases.

Another concept used was "Stability", which informs on the hyperconcentration of one attribution value in a dimension. It is represented by the percentage of the population that is labeled with the most representative value of the dimension. High stability rates lead the dataset to show an unbalanced amount of information of the majority value to the detriment of other groups. Thus, it would lead to the possibility of excluding the column from the analysis.

In sequence, missing values indicate the percentage of unrecorded value which does not present the information needed for the analysis. If the number of missing values is high, it is recommended to consider excluding the case dimension or the missing values individuals if the impact on the amount of information of other individuals is not high.

26.3 Methodology

Data science is increasingly designing solutions for handling large datasets. The purpose of this subject is to acquire "valuable insights through mathematical and analytical models and applications". By concentrating on success criteria, these projects make good use of process approaches, as CRISP-DM, for example. It has gained popularity, in large part because it is de-facto standard, widely accepted, easy to use, reliable, well-organized, and a process model that is independent of any specific industry [23].

Six stages form CRISP-DM methodology. In the first stage, "business understanding", the company's current state is assessed, the data sources that are available are described, specific data mining goals and techniques are discussed, and a project schedule is made.

"Data understanding" refers to comprehending the data source, extracting the data, describing it, and assessing its quality to meet the need for data transformations prior to applying models. To assess the quality of the data, the variables ID-ness, missing values, stability, and correlation were used [22]. In sequence, the dataset was cleaned up by removing low-quality features, adding new attributes as categories, and integrating tables during the "Data Preparation" stage.

In the "modeling" phase, the modeling technique is selected with sufficient justification, taking evaluation standards and predetermined parameter settings into account. It is possible to employ several strategies. In this study it was applied the X-Means clustering algorithm.

During the "evaluation" step, the results are discussed while keeping the business objectives in mind. The "deployment" step includes the deployment of a user manual, software components, and the planning of performance monitoring. This step has not been included in this study because the model is being used only to generate insights.

26.4 Results

26.4.1 Business Understanding

In November 2022, the top 10 Portuguese HEI presented about 18 million sessions. According to SimilarWeb [4], a platform that gathers data about competitor websites, the first university accounts for 23% of them in terms of the number of sessions in November 2022. According to the number of sessions held during the period, the

case-study university is ranked in the 10th place with 4% of those sessions, just behind the 8th and 9th places with 5% each.

The 10 Portuguese HEI sessions lasted 2.3 times longer than the global average of 2:25 min in terms of session length [3], which might suggest that Portuguese HEI audiences give more importance to higher value online content than audiences in other regions.

In terms of average session length and average pageviews per session, the case study HEI placed 7th place out of the top 10 Portuguese HEI websites. It highlights that it is possible to create more engaging user experiences on the website. The fact that Portuguese users spend more time on websites on average than users from other countries suggests that improving the case study HEI's content can have a positive impact on the brand's value and results.

The institution has several additional online and offline channels for communicating with potential and current students in addition to its main website. These channels include the academic service offices of each faculty (both in-person and via email), the university communications office email, higher education events, the university website, the student space website, websites for each of the six faculty websites, and their respective social media accounts on Facebook and Instagram.

The website provides details about the university, the courses offered by iy, student organizations, extracurricular activities, city facts, facilities, and services. For more information, interested parties are given the email address and phone number. To provide a more direct approach to the visitors who expressed the greatest interest in the course at the time the study was conducted, the website did not have features to collect their contact information. It did not allow guests who were curious about a course from actively leaving a note or requesting to be contacted by a school representative to find out more about it or to do any part of the application process. So, it can be categorized as a channel used during the consideration and evaluation stage from the perspective of a prospective student. As a showroom, it aims to increase user engagement.

Given that the institution was starting to use data to define its digital strategy with this project, it was decided to use only the central website as a data source to be evaluated because it is the one with the highest user traffic volume. According to all users who viewed a course's pages during the study period, undergraduate courses had 37% of the most active users. The period from April to June 2023 was chosen for this study because it can be viewed as long enough, yet brief enough, to generate the initial insights with the potential to be expanded in later studies.

It is believed that those who have accessed undergraduate course pages are the most interested in them. The project's goals were to use cluster analysis to know and compare user traffic and engagement levels among the most relevant groups as much as the most common journeys within the website. As an output, it is expected to learn from the more and the less successful characteristics associated with each group considering the goal of the website.

26.4.2 Data Understanding

To fully map the dimensions and metrics in Google Analytics and Google BigQuery, the data understanding phase aimed to describe report extraction possibilities from the tool. This analysis was helpful in addressing the need for removing or transforming those metrics and dimensions as much as the limitations of data extraction among other data quality issues.

The case institution's Google Analytics account is the web analytics tool used as a data source. The number of users, sessions, and event counts such as clicks and pageviews are examples of metrics stored in this tool. Some of the dimensions collected by the tool are user acquisition, device, content, geography, demographics, and user and event types. During the period there were 1,855,874 events in total, 123,724 active users who had engaged sessions or had visited the website for the first time. Another measure of the volume of traffic was 140,781 engaged sessions. They are defined as those who spent at least 10 s in a session, performed at least one conversion event, or viewed at least two pages [24, 25].

The website traffic is made of 85 percent of visitors who accessed the website from Portugal. Sessions made from other countries were ignored to focus on the behavior of the largest country group. Future research may investigate prospective international students.

According to the weekly total of user evolution, there were typically between 10,000 and 15,000 users per period, with stable engaged sessions per user of about 1, and pageviews per user of around 4 or more.

These indicators were combined into a group of users focusing on the following dimensions:

- "Device category", specifically, the desktop, mobile, tablet, and smart TV, with 50%, 49%, 9%, and 1% of users, respectively.
- "Region", the target audience for the courses are users from Portugal, who account for 82.3% of the total. The districts with the highest concentration of active users are "Lisbon" (35%), "Coimbra District" (20%), "Porto District" (16%), "Setubal" (13%), "Aveiro District" (5%), "Leiria District" (4%) and "Braga" (3.5%), and others (3%).
- "Medium of the first session", which can be described as which type of platform was used to arrive to the website in the first place. If the URL was entered directly into the browser search bar, as indicated by (none), when accessing the website for the first time or when using a link on another website to access the website for the first time. The most representative mediums of the first session, in order of the total number of active users, are "organic" (78%), "(none)" (11%), "referral" (11%), "email" (less than 1%), and "Website" (less than 1%).
- "Source of the first session", which can be defined as the named platform used to reach the website in the first place. If the URL has been entered directly into the browser's search bar as instructed by (direct), as it was when accessing the website for the first time. The top values for this dimension include "Google"

(74%), "(Direct)" (11%), "esec.pt" (6%), "Bing" (4%), "isec.pt" (2%), and others (3%).

- "Medium of the session", unlike the "Medium from the first session", considers the medium that was used for that specific session regardless it is the first one or not. The groups "organic" (75%), "referral" (13%), "(none)" (11.85%), and others (0.15%) have the highest proportions of active users.
- "Source of the session" differs from the "Source of the first session" because it recognizes the source of each individual session instead of only the first one. The most frequently used values were "Google" (70%), "(Direct)" (12%), "education school website" (6%), and others (12%).
- "Landing pages", which mean the first page that they arrive at on the website, via the link they clicked on or the URL they searched for in the browser. The landing page URLs with the most users are the "Homepage" (10.3%), the contact page for the health school (3.3%), the general page for technical courses (3.05%), the page for the university canteens (2.9%), the page with the full list of courses the university offers (2.48%), and other less popular landing pages (77.7%).

The quality of each dimension has been evaluated using the number of values, percentage of missing values, ID-ness, and stability. The "Landing page", the "source of the initial session", and the "source of the session" all provided more than 150 values, which might suggest categorizing these values is needed. The "Medium of the first session" and "Medium of the session" showed higher degrees of stability. It means that the most predominant values cover such a large proportion of the population that the other values might not achieve sufficient representativity to allow analysis. Thus, it might be suggested to group less representative groups into an "others" category. Any analyzed dimension presented more than 0.56% of missing values. Grouping the 21 regions that make them up is an option. Table 26.1 displays the analysis.

As further described in the section on data preparation, the values with fewer active users were grouped together to reduce the number of values. This transformation has been applied to the dimensions of "Region," "Source of the first session," and "Source of the session". Another transformation on the data was categorizing "Landing Page's Page Path" values based on an analysis of the website sections.

Dimensions	Number of values	ID-ness (%)	Stability (%)
Region	21	< 1	19
Source of the first session	154	< 1	58
Medium of the first session	5	< 1	65
Source of the session	173	< 1	63
Medium of the session	5	< 1	72
Landing pages' page path	5341	14	2
Device category	3	< 1	60

Table 26.1 Quality of data of dimensions

The metrics have undergone the same investigation about the quality of the variables. It is possible to see that some groups have a concentration of users, as given in Table 26.2, where the deviation from the average number of users per group is 5.2.

Negative correlations may reveal groups of attributes that shouldn't be united and categorized in the same group because they show divergent behaviors. On the other hand, positive correlations may reveal groups of attributes that show more likelihood of being combined.

The analysis of correlations over 0.4 revealed that when the search feature was used, the main positive correlations for the "Course Offer Page" and "No Course" filters were 0.73 and 0.82, respectively. However, the most popular filter (correlation = 0.63) is to only show "technical courses".

The "Type of course" pages, as "All undergraduate courses", "All technical courses", and "All masters courses" are most frequently accessed for those who access "Undergraduate course pages" (correlation = 0.75). Undergraduate courses appear to be the primary course pages used as landing pages when compared with other course types (correlation = 0.58). The groups with the most active users frequently view the most pages (correlation of 0.72), have the most sessions (0.54), and view the fewest course pages (0.6). This shows a profile of users who visit more pages and have more sessions, but who do not access many course pages. Users who arrived to be the first time via the mediums of "(none)" or "referral" tend to return using the same medium when they return to the website (correlations, respectively, 0.65, 0.61).

The landing pages for undergraduate courses offered by the engineering school are the most frequently used (correlations = 0.5 and 0.4, respectively), followed by undergraduate courses offered by the education school.

The negative correlations below -0.4 were considered to be relevant as well. There were clear differences between the experiences on desktop and mobile, with a poor correlation of about -0.96 between the two. Additionally, the "Medium of the First Session" and the "Medium of the Session" revealed that the values "(none)", "organic", and "referral" behave differently with unfavorable correlations lower than -0.4".

Metrics	Avg	Max	Deviation	Stability (%)	Deviation/average
Active users	3.728	1298	19.5	62	5.2
Avg. session by user	0.789	45	0.7	55	0.9
Avg. pageviews by user	3.179	390	6	43	1.9
Pct. of users who saw course	0.31	0.31	0.4	62	1.4
pages					

Table 26.2 Quality of data of metrics

26.4.3 Data Preparation

At the data preparation phase, it was addressed the requirement to transform the source data into a final dataset to be modeled. This stage aims to enhance the quality of the variables used in terms of relevance determined in the data understanding stage by removing less significant variables, aggregating less significant features, or performing samplings.

The "Landing Page—Page attribute" showed a large range of values. By identifying patterns in the URLs and comprehending the website's sections, these values were categorized. The categorizing started by separating the URL into "*f*". The resulting new columns were named, respectively, according to their order "Page path 1", "Page path 2", and so on. Only Page Paths 2, 3, and 4 presented stability rated below 90% and less than 70% of missing values. "Page Path 1" and "Page Path 5" or higher were excluded.

By analyzing the website's pages sections, it was possible to identify four dimensions to classify them, each of them with 20, 30, 31, and 26 values, respectively.

The values with less active users were then grouped in "others" up to a maximum of 15%, except for "Medium of the session" being "(none)" because it showed a positive correlation with the value "(none)" of the "Medium of the first visit" and a negative correlation with the attribute's "referral" and "organic" of the same variable. The variables "Page Subcategory 1" values "education school" and "engineering school," which showed positive correlations with the value "Course Page" for "Page Category," were also notable exceptions.

26.4.4 Modeling

The final transformed dataset was then subjected to the algorithms during the modeling phase. The X-Means algorithm identified seven clusters (A to G), with four of them having more than 5% of the active users (A to D). They will serve as the primary focus of this analysis. The results of the centroid table have been used to compare them, including the weight of each dimension for the dimensions and the average value assigned to each metric in the model.

The key trait that they had in common was the common use of "Google" as an organic search engine, which accounts for 60–70% of all active users in the four most significant clusters. Lisbon appears to be the most relevant region, where 30% of all active users were based in at least one of the most relevant clusters. The second most predominant region among all clusters is Coimbra, which has at least 20% in each of them. The results are summarized in the Table 26.3.

Cluster A, which comprises 50% of all active users, has the lowest percentage of active users who viewed course pages (9.68%). The centroid table indicates that they arrive via residual landing pages with few visitors, course unit pages (22.70%), and course pages in general (22.70%). It might imply that even though course unit pages
Cluster	А	В	С	D
Users (%)	50	30	15	5
% of active users that saw course pages	9.98	94.07	34	37
Avg. number of sessions per user	0.8	0.8	0.9	1.21
Avg. pages per user	2.7	2.7	4.8	11.55
Source—medium	Organic—Google	Organic—Google; Referral, specially from the education school website	Organic—Google	Organic—Google
Device (in ord	Desktop and mobile	Desktop and mobile	Mobile and desktop	Desktop and mobile
Regions	Lisbon; Coimbra	Lisbon; Coimbra	Higher concentration of Lisbon users; Coimbra	Higher concentration of Coimbra users; Lisbon
Landing pages	Course pages of different type of courses, course unit pages and residual pages	Undergraduate course pages, respectively, from courses from the schools of education, engineering, and health	Contact page, course pages and homepage	Homepage and general undergraduate course pages

Table 26.3 Clusters and results

serve as landing pages, they still need more work and a redesign to entice users to view course pages.

The Cluster B contained 30% of all active users. They showed that the most users (94.07%) had accessed undergraduate courses pages. They went straight to the undergraduate course pages (80%), more specifically for the education school (37%), which was followed by the engineering (14%) and health (13%) schools. Compared with cluster A, 26% of them come from "referral", which is when users access the case-HEI through links on other websites, and 14% come from the website of the education school.

In sequence, Cluster C represents 15% of users, whose 34% viewed course pages. Their main distinguishing feature was that 17% of visitors arrive via the contact page, 13% via the course pages, and 33% via the homepage. The biggest distinction is that most of these users (61%) arrive via mobile as opposed to the other groups. It is evident that a greater proportion of users in this category are from Lisbon (50%) and the Coimbra District (27%), respectively.

Cluster D sums up to 5% of active users, by which 37% saw course pages. Their most important feature is arrival via the homepage or general undergraduate course page (28% of users). The proportion of users from the Coimbra District is higher (35%).

26.4.5 Evaluation

It was verified that Portuguese HEI website visits last longer than the global average and that peer HEIs perform better in traffic volume and engagement. Thus, it needs to meet these requirements to remain competitive.

The case study HEI counts several digital assets, but they are isolated and generalist channels can be useful for applicants in the consideration stage. There are few reference links among them and no personalization for each public. It means that those prospective students who want to know more information or to apply to the course must be willing to jump from one channel to another and start a new experience that is not prepared for their context and interests. It leaves room for creating omnichannel personalized to the needs of the prospective undergraduate applicant in every stage of digital contact with the brand as in display ads, social media, and messages.

When focusing on the central website of the institution, it can be suggested that it could be more useful by providing information on which users are engaging more with the website, and thus, showing a higher probability of applying to courses. This information can be used to focus online campaign efforts by collecting the contact of users who want to know more about the institution. One more use could be used to indicate website content and design for engagement improvements. These uses were the focus of this investigation.

Four relevant clusters were identified. Clusters A and B represent more traffic of users, but they are not engaged. In contrast to clusters A and B, which showed an average of 0.8 sessions, clusters C and D showed an average of 0.9 and 1.21 sessions per user, indicating that many sessions do not reach the number of interactions to be considered engaged. When comparing "pages per user" the disparity becomes clearer: A and B reach 2.7 versus 4.8 and 11.55 for clusters C and D. This might indicate that C and D may represent a better route for a user interested in courses. This route started with the homepage or general pages for the different types of courses, such as undergraduate courses, technical courses, and master's courses.

On the other hand, it can indicate that the path chosen by most users, represented by clusters A and B, should be improved. It means that the landing page of the course page and course unit page design should incite the user to continue checking for more information.

Another aspect found was that users who search the case-HEI by the name of the institution engage more than those who arrive by the course pages. It makes clearer the importance of brand awareness for this type of institution and the direct positive results on engagement.

One more finding was that cluster B counted users who arrived via referral links from the education school and that they presented higher engagement rates. It might indicate that creating an experience design that considers that users go through more than one website of the institution might generate improvements in engagement.

Additionally, it was possible to notice that users who are familiar with the institution's brand spend longer time on the website. This could be identified by seeing that those who arrived on the website via the homepage or via pages that are generalist about course types as "undergraduate courses", "master courses", and so on do show higher engagement rates. Thus, it may be worth exploring how to raise that brand's visibility as an effort to attract more students who have been previously in touch with the brand.

26.5 Conclusion

HEI need to attract a large number of applicants in their programs to improve the quality of the student body, revenue, and notoriety. Digital marketing appears as a solution for that. The candidate experience needs to be contextualized with data such as that from the website of institutions. Data mining can help generating insights with this data using the CRISP-DM method.

This case study was based on a HEI's central institutional website. It was considered as the most relevant channel, with the objective to bring information for the consideration stage of the undergraduate course applicant. The website data has been collected, prepared, and modeled with X-Means cluster algorithm to identify the main groups of users using Google Tag Manager, Analytics, BigQuery, and RapidMiner.

The most common traits of users and their behavior were that they arrive using "Google" as a source to reach the website, that around 30% of all visitors do their visit from Lisbon and that at least 20% come from Coimbra in all clusters identified.

The users were grouped around four most significant profiles, named clusters. The cluster A represents 50% of users who arrive by course and course unit pages mostly and that leave very quickly the website. Cluster B represents 30% of users, who arrived by course pages, more specifically to education school courses coming from referral links from this and that school. In sequence, the cluster C accounted for 15% of users, who arrived mostly via the homepage among others using mobile and coming from Lisbon and Coimbra regions. Finally, cluster D summed up to 5.5% of users, who started their sessions with the homepage and the general undergraduate pages and many of them come from Coimbra.

Clusters C and D have showed higher engagement rates when compared with clusters A and B. It might indicate improvement aspects on the experience of clusters A and B while showing that there are behaviors of clusters C and D that can be incentivized.

As overall conclusions it was possible to see that:

- The most common landing pages, the course page, and the course unit page can be improved to generate sessions that generate more engaged experiences.
- The users who arrive via the homepage and the overall undergraduate course page show higher levels of engagement. It is possible to infer that those users who know the case institution before searching for the website see more content about it.
- Those users who arrive to the website on the homepage and the general undergraduate course page are from Coimbra and Lisbon regions.

Referral links from the websites of the education school lead to more engaged sessions, which might indicate that providing an experience for the user that is orchestrated between the main website and the faculties website might result in positive results in engagement rates of users.

This work underlined that data mining can help identifying the most relevant types of users for the HEI website. Among the uncountable possibilities to extend this study there are investigating tactics to understand how to enhance brand awareness to generate more engaged sessions, how to create more engaging course and course unit pages, which users show higher propensities to return to the website, how to attract more users from regions other than Lisbon and Coimbra regions, how orchestrating the experience on the faculty website with the main institutional website might lead to higher levels of engagement, the application segmentations of different types, as school segmentation and, finally, contrasting the behavior of national students with international ones, which have been excluded from this investigation.

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Chapter 27 Using Linguistic Features to Predict Social Media Engagement: Proposing an Approach Based on Machine Learning and Natural Language Processing



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Abstract Social media customer engagement plays a crucial role in B2B companies' growth and success. Thus, knowing if a social media post will engage customers can be of great value for B2B companies. In this research, using 51,615 Facebook posts from 121 B2B companies, we develop machine learning-based models that classify social media posts into successful and unsuccessful posts in engaging the customers. First, using a score obtained from the number of customer reactions to a post (likes, comments, and shares), we label the data and extract features from the most frequent words of the training dataset. Then we employ three well-known supervised machine learning algorithms (support vector machine, Naïve Bayes, and multi-layer perceptron) to classify the labeled data. The best models show moderate performance in predicting the success of a Facebook post, achieving an accuracy and F1-score of 72.2%. Additionally, our results show that the presence of inspirational and positive words and the words related to time and date has a positive impact on user engagement.

27.1 Introduction

The recent revolution in the fields of artificial intelligence (AI), data science, and information technology [1] has affected numerous academic and managerial fields, including marketing. In fact, AI is taking a more central role in marketing [2] where it is now on the cusp of radically transforming it. Social media has been one of the main focuses of studies in this regard for Business-to-Business (B2B) companies [3–6]. In fact, with the invaluable data provided by social media platforms about their users and the new advances in AI and its implications in B2B marketing [2], the tendency

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to build AI-based, data-driven, decision-making models to improve B2B marketing effectiveness is increasing dramatically [7–10]. This is even more important since social media engagement can increase sales [11].

Many studies in this area have followed either descriptive approaches and inferential statistics [12–14] or different types of regression-based approaches [15–18]. For example, there have been studies focusing on the evaluation of B2B companies' social media activity on different social media platforms [19] and the usage, measurement practices, and barriers in digital marketing in social media [4–6]. Moreover, there are studies that propose models for predicting engagement metrics [20], extracting trends from social media data [21], and analyzing interactive conversations among customers and service providers [22]. However, there have been a lack of scientific studies on the application of machine leaning and natural language processing (NLP) to the classification of textual posts of B2B companies, which probably is due to the lack of large, annotated datasets in this area that allows generalization.

In this research, using textual Facebook posts from 121 B2B companies, we address the gap discussed above by developing and annotating a suitable dataset for machine learning-based models. Moreover, we build five classifiers based on three well-known machine learning algorithms (support vector machine, Naïve Bayes, and multi-layer perceptron) for the classification of our data. Finally, we make a brief analysis of the linguistic features (most frequent words) used in the successful observations in the dataset. In fact, the main purpose if this research is to investigate if it is possible to use linguistic features and machine learning to predict the success of social media posts in engaging users, measured by likes, comments, and shares.

27.2 Related Work

There have been many studies that used small to medium size datasets containing social media users' reactions to posts (e.g., likes, comments, shares) to investigate the effect of content type and quality on user engagement in social media [17]. In [17], the authors used 1038 Facebook and Instagram posts and their number of likes and comments to conclude that emotional contents have a significantly negative effect on liking behavior. Dolan et al. [23] used data from 12 wine brands' Facebook pages to show that social media users are either active or passive toward rational content, while emotional content receive passive rather than highly active engagement behavior. In addition, in [24], over 1000 respondents were participated in a scenario-based experiment with vignettes to study the role of a specific emotion, anger, with respect to the choice to comply in a B2B context. The study showed that anger reduces compliance and skews important decision criteria.

In [25] 1086 Facebook posts from 92 global brands were classified by media richness (text, photograph, or video) and content orientation (task, interaction, and self-oriented). The study reported that global brands generally use photographs and interaction-focused content to secure user engagement. In [26], the authors analyzed 1143 Facebook messages from 193 Fortune 500 companies to conclude that posts

receive higher reactions if they include corporate brand names and avoid a "hard sell" approach or explicitly commercial statements. The study also suggested to include emotions in posts to generate engagement.

Deng et al. [27] used 229,272 tweets collected from 156 B2B brands within 10 industries. They reported that linguistic features that facilitated the central or peripheral route processing had positive effects on brand engagement, but the ones that impeded the processing had negative impacts on brand engagement.

In [28], the authors suggested using employee-generated content rather than firm-generated content to get higher social media engagement. Moreover, the study showed that employee-generated messages containing emojis had a greater impact on customer engagement than firm-generated message with emojis. Robinot et al. [29] investigated the effect of "celebrity-generated ads" to "consumer-generated ads" on viewer participation and showed that celebrity authors received more response in comparison to the adds whose sources were unknown.

However, none of the above studies followed a machine learning-based approach for the classification of the social media posts. In this research, we fill this gap by automatically extracting linguistic features form the social media posts based on the reactions they received from the users and using them in machine learning-based models to predict if a post will be successful in engaging the users.

27.3 Methodology

27.3.1 Data

The data used in this research is a collection of 51,615 Facebook posts collected from public Facebook pages of 121 B2B companies (Table 27.1), mostly located in the USA, Canada, and Europe, and within various industries, including Technology, Logistics and Transportation, Chemical Manufacturing, Agricultural and Farming, and Food.

Data Preprocessing: In the first step, we normalized the collected posts by detecting all the posts that were written in languages other than English and translating them into English automatically. To do so, we used the Googletrans Python library [30] that uses Google Translate API for translation. More specifically, our Python code detected the texts that were not written in English and replaced them with their

Table 27.1 Descriptive statistics 1	Number of companies	121			
staustics	Total number of posts	51,615			
	Total number of words	2,381,572			
	Average posts per company	426.57			
	Average post length (words)	46.22			

English translations. Then, using the English stop words provided by Scikit-learn Python library [31], all the stop words were removed from the posts.

Data Annotation: In order to classify the collected social media posts using supervised machine learning algorithms, we needed to label the posts. To this aim, we used the summation of the likes, comments, and shares of each post, obtaining a score s_i (Eq. 27.1) per post p_i . In the next step, a criterion was needed to segregate successful posts from unsuccessful ones based on their scores. To do so, we followed a trial-and-error approach [32] by testing different thresholds and choosing the best one as the final threshold for labeling the data. First, we obtained the mean and the quartiles Q1, Q2, Q3 (Eqs. 27.2–27.4) of the scores. Then the highest performance was achieved by selecting Q1 as the low threshold and Q3 as the high one: A label $label(s_i)$ (Eq. 27.5) was assigned to each company's Facebook posts using the Q1 and Q3 as the thresholds. If the score of a post was smaller than Q1, it was considered as an unsuccessful post and labeled with 0, and if the score was greater than or equal to Q3, it was considered as a successful post and labeled with 1 (the observations whose scores lied between these 2 thresholds were not used). By evaluating each company's posts based on its own post score, the effect of different number of company followers was neutralized.

$$s_i = \text{likes}_i + \text{comments}_i + \text{shares}_i,$$
 (27.1)

$$Q1 = s_{\lceil \frac{n+1}{4} \rceil},\tag{27.2}$$

$$Q2 = \begin{cases} s_{\frac{n+1}{2}}, & \text{if } n \text{ is odd} \\ \frac{1}{2} \left(s_{\frac{n}{2}} + s_{\frac{n}{2}+1} \right), & \text{if } n \text{ is even,} \end{cases}$$
(27.3)

$$Q3 = s_{\left\lfloor \frac{3(n+1)}{4} \right\rfloor},\tag{27.4}$$

$$label(p_i) = \begin{cases} 0, & \text{if } s_i < Q1, \\ 1, & \text{if } s_i \ge Q3. \end{cases}$$
(27.5)

As a result, we built a dataset containing 27,204 observations (Facebook posts), whose scores were either smaller than Q1 or greater or equal to Q3. The statistics of this dataset are shown in Table 27.2.

Features: The features used in our classifiers were the most frequent words of the training data in each of the classes. We collected the 1000 most frequent words of each class separately and combined them with each other, obtaining a feature set of 1212 most frequent words of both classes. Moreover, for the vectorization of the data, term frequency (tf) and term frequency-inverse document frequency (tf-idf) were used as the numerical statistics for measuring the values of our features in

Table 27.2 Binary data statistics

	Training		Testing	
Label	0	1	0	1
Staistics	12,907	12,396	973	928

the text documents. Tf-idf is used in NLP and machine learning to determine how important a term is in a document [33], so if the tf-idf of a term in a given document is higher than in other documents, this term may be a more important feature for this document [33]. The formulae for the calculation of tf and tf-idf are:

$$\mathrm{tf}_{ij} = n_{ij}, \tag{27.6}$$

tf-idf_i j =
$$\left(0.5 + 0.5 \frac{n_{i,j}}{\max_{k} n_{i,k}}\right) \log\left(\frac{N}{|i:t_j \in d_i| + 1}\right).$$
 (27.7)

In the equations above n_{ij} is the count of feature j in a sample belonging to class i, max $n_{i,k}$ is the maximum number of times a term appears in class i, N is the number of documents, and $|i:t_j \in d_i|$ refers to the number of documents where term t appears.

Analysis of the features: To investigate the relationship between the features and if they are connected syntactically and semantically, GloVe pre-trained word vectors [34] were used. Word vectors obtained from the word embedding techniques used in GloVe can detect the syntactic and semantic relationships between the words [35], so, when mapping these vectors in a continuous space, similar words will be close to each other (Fig. 27.1) and will most probably be in the same cluster. Therefore, the features were replaced by their corresponding word vectors in GloVe and automatically clustered to obtain the group of words that are similar in meaning and/or syntax. For clustering the word vectors, k-means clustering algorithm [36, 37] was used, which is calculated as follows:

Minimize
$$\sum_{i=1}^{k} \sum_{x \in C_i} \|x - \mu_i\|^2$$
, (27.8)

where k is the number of clusters, C_i is the *i*-th cluster, x represents a data point, μ_i is the centroid of the i-th cluster, and $\|\cdot\|$ denotes the Euclidean distance.

The clusters obtained from k-means clustering showed that there were six main clusters or groups of similar words among the most frequent words of the training data used as features in this research (Table 27.3). These clusters were related to: (1) time and date; (2) products, business supply, and improvement; (3) certain verbs and



Fig. 27.1 Visualization of the word vectors of the features

Cluster	Features
1	Week, next, last, month, days, weekend, following, ago, end, first, starting, year, early, since, latest, opening, fall, September, April, March, June, November, January, October, July,
2	Business, product, cost, use, available, include, provides, account, businesses, purchase, plans, customer, supply, offer, services, corporate, company, options, source, distribution,
3	Come, turn, even, put, way, sure, coming, take, well, make, going, kind, keep, bring, need, find, look, get, see, give, better, able, follow,
4	Remember, happy, luck, brings, fun, moment, thanks, true, watch, dream, friends, loved, perfect, inspired, favorite, amazing, inspiring, love, tune, moments, welcome, thrilled, passion, enjoy, newest, incredible,
5	Dairy, feed, meat, ingredients, food, milk, organic, feeding, meal, farm, eat, chicken, pet, coffee, delicious, cooking, taste,
6	Knowledge, learning, focus, approach, critical, future, experience, ways, essential, purpose, development, planning, introducing, success, view, progress, initiatives, significant,

 Table 27.3 Examples of the features existing in each cluster

adjectives; (4) inspirational and positive words; (5) foods, drinks, and cooking; and (6) education and research, as presented in Table 27.3.

In addition, to compare the value of the clusters in each class, we collected the tf-idf of each of the features in the clusters and calculated the average of the tf-idf values for each cluster (Table 27.4). The analysis showed that the average of tf-idf values of the features in five clusters was higher in class 1 (successful posts) than in class 0 (unsuccessful posts). In particular, in clusters one (words about time and date) and four (inspirational and positive words), the difference of the average tf-idf was greater between the classes, and those features had a much higher value in class 1. In

Cluster	Close 0	Close 1
Cluster	Class 0	
1	0.0207	0.0261
2	0.0228	0.0243
3	0.0174	0.0179
4	0.0128	0.0163
5	0.0155	0.0149
6	0.0234	0.0233

 Table 27.4
 Comparison of the average tf-idf of cluster features for different classes

other words, in the successful posts, companies used a higher number of features that were in clusters one and four. As a result, it was expected that the selected features were discriminative enough to classify the data.

27.3.2 Models

In this research, five models based on three well-known machine learning algorithms were built: (1) support vector machine, (2) multinomial Naïve Bayes, (3) Gaussian Naïve Bayes, (4) Bernoulli Naïve Bayes, and (5) multi-layer perceptron. In fact, we selected support vector machine to use its ability to handle high-dimensional data and it has good generalization performance when working with unseen data [38, 39]. In addition, Naïve Bayes is a good choice when resources are limited, and it has a simple probabilistic framework, which is easy to understand and interpretable, so this was another good choice for us [40, 41]. Finally, we decided to also build a classifier based on multi-layer perceptron to use its power to learn complex relationships in data [42].

(1) **Support Vector Machine (SVM)**: A linear SVM, which is a powerful classifier used for both data classification and regression [38, 39], was used for the classification of the data. SVM tries to build a hyperplane, known as the decision boundary, where the distance between two classes of data points is at its maximum. In fact, this hyperplane separates the classes of data points on either side of the plane [39]. In other words, if we define the data as $\{(x_i y_i), i = 1, ..., l\}$ where $x_i \in R$ and $y_i \in \{-1, +1\}$ there must be a $w \in R$ and $b \in R$ for describing the hyperplane which can be defined with the following formula [39]:

$$\min_{\mathbf{w},b} \frac{1}{2} ||\mathbf{w}||^2 + C \sum_{i=1}^n \max(0, 1 - y_i(\mathbf{w} \cdot \mathbf{x}_i + b)).$$
(27.9)

In the formula above, w represents the weight vector, b is the bias term, $||\mathbf{w}||^2$ is the squared Euclidean norm of the weight vector, and C is the regulariza-

tion parameter. **Naïve Bayes** Naïve Bayes algorithm is a frequently used supervised learning method that examines all its training input and applies the Bayes Theorem (Eq. 27.10) with the "Naïve" assumption of conditional independence between features given the value of the class variable [31].

$$P(A|B) = \frac{P(B|A) \cdot P(A)}{P(B)}.$$
 (27.10)

There are three types of Naïve Bayes classifiers: multinomial Naïve Bayes, Bernoulli Naïve Bayes, and Gaussian Naïve Bayes, and all of them can be used in text classification tasks, especially when there is a large number of features.

(2) **Multinomial Naïve Bayes (MNB)**: This algorithm is one of the Bayes variants that can show a strong performance when the data is multinomially distributed [40]. In other words, this algorithm is well-suited for text classification tasks and other scenarios where the data is represented as discrete features. The formula can be expected as:

$$P(y|x_1, x_2, \dots, x_n) = \frac{P(y) \cdot \prod_{i=1}^n P(x_i|y)^{x_i}}{Z},$$
(27.11)

where $P(y|x_1, x_2, ..., x_n)$ is the probability of class y given the observed features $x_1, x_2, ..., x_n, P(y)$ represents the prior probability of class y, $P(x_i|y)$ is the probability of feature x_i given class y, and Z is the normalization constant or evidence factor that ensures the probabilities sum up to 1 over all possible classes.

(3) Gaussian Naïve Bayes (GNB): In comparison with multinomial Naïve Bayes, Gaussian Naïve Bayes classifier assumes that the distribution associated to each term is a Gaussian distribution for each class y and considers that the values of the attributes are independent in each class. Gaussian Naïve Bayes classifier uses continuous features by representing the frequency of the terms in an input [31, 43]. The likelihood of the features in this kind of classification is assumed to be Gaussian:

$$P(x_i|y) = \frac{1}{\sqrt{\pi\sigma_y^2}} \exp(-\frac{(x_i - \mu_y)^2}{2\sigma_y^2}).$$
 (27.12)

In the formula above, μ is the mean and σ is the standard deviation representing the parameters which will be estimated based on the data.

(4) Bernoulli Naïve Bayes (BNB): When data is distributed according to multivariate Bernoulli distributions, where there may be multiple features but each one is assumed to be a binary-valued (Bernoulli, boolean) variable, Bernoulli Naïve Bayes can be an appropriate algorithm for the classification of data [31]. In fact, Bernoulli Naïve Bayes makes the decision based on equation below:

27 Using Linguistic Features to Predict Social Media Engagement

$$P(y|x_1, x_2, \dots, x_n) = \frac{P(y) \cdot \prod_{i=1}^n P(x_i|y)}{P(x_1, x_2, \dots, x_n)},$$
(27.13)

where $P(y|x_1, x_2, ..., x_n)$ is the posterior probability of class y given features $x_1, x_2, ..., x_n$, $P(x_i|y)$ is the probability of feature x_i given class y, and $P(x_1, x_2, ..., x_n)$ refers to the probability of the observed features $x_1, x_2, ..., x_n$ [31, 43]. In other words, the Bernoulli Naïve Bayes formula calculates the posterior probability of a given class y given a set of binary features $x_1, x_2, ..., x_n$. It is based on the Naïve Bayes assumption that features are conditionally independent given the class label.

(5) **Multi-layer Perceptron** (**MLP**): MLPs are one the strongest classifiers based on artificial neural networks. The architecture of this classifier is designed in a way that it consists of multiple layers of interconnected nodes (neurons), and each connection between neurons has an associated weight, which determines the strength of the connection. MLPs use an algorithm named backpropagation to make the weights adjustments relative to the error that can be measured in a variety of ways, including by root mean squared error [37, 44, 45]. In fact, the difference between the actual output (y_j) and the network output (t_j) is calculated as:

$$E := \frac{1}{2} \sum_{j=1}^{J} (t_j - y_j)^2.$$
(27.14)

According to this error (E), the amount of modification on the weight connecting a node in layer k to a node in layer jth will be calculated.

$$\Delta w_{kj} = -\alpha \frac{\partial E}{\partial w_{kj}}.$$
(27.15)

27.4 Experimental Results

To evaluate the performance of our models, we used four evaluation metrics: accuracy, precision, recall, and F1-score. Accuracy is the set of labels predicted for a sample that exactly match the corresponding set of actual labels [31] or the fraction of correct predictions, in simple words. Precision is a measure of the accuracy of only positive predictions (successful posts) made by the models and evaluates the ability of the model not to label negative samples (unsuccessful posts) as positive [31, 46]. In fact, precision tells us how many of all the instances predicted as positive were actually positive, while recall measures the models' ability to correctly identify the actual positive instances and tells us how many of them were correctly predict by the models [31, 46]. Finally, F1-score is a harmonic mean of the precision and recall

Model	Numerical statistics	Precision	Recall	F1-score	Accuracy
SVM	tf	0.661	0.688	0.674	0.677
	tf-idf	0.671	0.651	0.661	0.675
MNB	tf	0.687	0.615	0.649	0.677
	tf-idf	0.703	0.592	0.643	0.680
GNB	tf	0.604	0.722	0.658	0.635
	tf-idf	0.653	0.592	0.621	0.649
BNB	tf	0.683	0.677	0.680	0.690
	tf-idf	-	-	-	-
MLP	tf	0.711	0.732	0.722	0.720
	tf-idf	0.725	0.681	0.703	0.714

 Table 27.5
 Experimental results

and is used when we want to have the balance between precision and recall [31, 46]. Equations 27.16–27.19 show the formulae for the calculation of these metrics:

$$Accuracy = \frac{TP + TN}{TP + FP + TN + FN},$$
 (27.16)

$$Precision = \frac{TP}{TP + FP},$$
(27.17)

$$\text{Recall} = \frac{\text{TP}}{\text{TP} + \text{FN}},$$
(27.18)

$$F1\text{-score} = \frac{2 \cdot (\text{Precision} \cdot \text{Recall})}{\text{Precision} + \text{Recall}},$$
(27.19)

where True Positive (TP) and True Negative (TN) refer to the correctly predicted successful posts and correctly predicted unsuccessful posts, respectively, and False Positive (FP) and False Negative (FN) are the incorrectly predicted successful posts and incorrectly predicted unsuccessful post, respectively.

As shown in the comparison of results we obtained from our models (Table 27.5), all the models developed in this research achieved a moderate performance in classifying the data into successful and unsuccessful Facebook posts, based on their accuracy and F1-score. Among our models, the best performance was achieved by the model based on MLP classifier, having an F1-score and accuracy of 72.2%. In fact, the feature set we developed could support the models to successfully classify the data, and moderate performance of our models was expected given the limitations of data size and quality.

27.5 Conclusion and Future Work

In general, the main contributions of this research were: (1) developing machine learning-based classifiers that could predict the success of B2B companies' Facebook posts and (2) analyzing the linguistic features (words) used in Facebook posts and identifying those that generate the most engagement. In more detail, we developed machine learning-based models that achieved an *F*1-score and accuracy of 72.2% in classifying Facebook posts of B2B companies between successful and unsuccessful posts, showing that models based on machine learning algorithms can be used to predict if B2B companies' social media posts will receive a large number of reactions. Moreover, similar to [17, 23–28], our results also confirm that using specific terms in social media posts can affect a B2B company's user engagement. More specifically, our results showed that the tf-idf of the features in the inspirational and positive word cluster was higher in the successful social media posts class. Apart from that, in this research, we found that words related to *time and date* also had higher tf-idf value in the successful posts. Therefore, we encourage B2B social media managers to use these words if they want to increase the level of engagement in their post.

Unlike studies like [28, 29], which focused on the source of content, this research focused on the content itself and showed that the linguistic aspect of B2B companies' Facebook posts can play an important role in their user engagement. However, performing the study based on data captured from different social media platforms might reveal different findings, which could lead to the question as to whether different platforms also influence user perception. In addition, even if we collected more than 50,000 posts, a larger dataset from different social media platforms could provide more information about which linguistic features positively influence engagement and to observe if there are any differences between platforms.

While this study has provided valuable insights into the usage of machine learning in the prediction of the success of B2B companies' Facebook posts and the impact of linguistic features in user engagement, some of the key areas for future work include:

- Studying data collected from different platforms (e.g., Instagram, LinkedIn, etc.) and comparing the results with the results of the present research
- Studying the effects of different variables (e.g., time, multilingualism, different types of emotional words, etc.) and identifying which ones have more impact
- Building classifiers based on fine-tuning large language models, as one of the most state-of-the-art approaches in artificial intelligence and natural language processing.

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Chapter 28 Using Extended Reality and Machine Learning in Digital Marketing Focusing Tourism



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Abstract Technology has shaped the way in which all economic sectors evolve and reinvent themselves in order to achieve a high level of competitiveness. The tourism sector, being information-intensive and globalizing, at a time when never before have so many people traveled to so many destinations, needs to be competitive in the way it promotes destinations and assists visitors, providing useful and effective information. In order to achieve this goal, it is necessary to innovate in the way visitors are reached before they decide to choose one destination, as well as understand the aspirations of visitors throughout the entire visiting process—before, during, and after the visit. This reality has made the tourism ecosystem more complex and more dependent on the use of technology which, today and in the future, does not only focus in the support of operational management issues, but increasingly requires the use of technology for anticipate visitors' aspirations and innovation in information and service delivery mechanisms. In this context, Extended Reality and Machine Learning are two emerging technologies with an enormous potential. This paper, after an introduction, reviews the Extended Reality and Machine Learning technologies and presents a conceptual model that aims to combine both, so that the tourism sector can better understand in advance the needs and visitors' aspirations and can distribute information and services in an immersive and contextualized way, improving digital marketing strategies. Finally, some scenarios for using the conceptual model are presented and ongoing work is outlined.

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28.1 Introduction

The tourism industry represents a very relevant source of income, generating strong competition between different countries that, with different arguments, explore their tourist potential and trust this sector as an important source of wealth [1]. According to [2], a growing number of destinations are taking advantage of smart technology to enhance the travel experience. In this context, the use of Extended Reality (XR) such as Augmented Reality (AR) and Virtual Reality (VR) has created valuable opportunities for the tourism sector [3]. Being an information-intensive and highly interconnected ecosystem, according to [4], the tourism sector seeks more realistic and satisfactory chain solutions as a result of ICT innovation, and Machine Learning (ML) technology and its algorithms can identify patterns in data and predict future occurrences, with consequent improvements in planning and real-time response capacity. In fact, according to [5], Artificial Intelligence (AI) has received a lot of attention in tourism and hospitality literature and practices.

Understanding customer behaviors and their purchasing patterns, anticipating behaviors, contributes to generating profit for companies, so developing efficient customer segmentation based on AI to improve and make digital marketing more efficient is a challenging task [6], but which could greatly contribute to the competitiveness of tourist destinations.

The ecosystem of tourist destinations and tourism is comprised three moments: before the visit, where the visitor needs to understand the destination and understand the extent to which they should choose it; during, where the visitor wants to obtain information and access services that help them make the most of the destination; and finally, after the visit, where the visitor intends to consolidate their tourist experience, whether through a narrative of remembrance, sharing, or simply a sedimentation of the lived experience. However, the three moments must be as immersive as possible. And for this immersiveness, XR has enormous potential to transport the visitor to the destination (i.e., before the visit), to innovate in the provision of access mechanisms to information and services (i.e., during the visit), and finally, in the ability to remember and feel the fruition again in the most sensorial way possible (i.e., after the visit).

Despite all the potentials of XR to innovate in these three moments, its use will tend to be somewhat limited if it is not accompanied by the combination of XR with ML mechanisms that will allow the study and understanding of the entire neuroscience component that an immersive experience entails for the human brain. Providing highly immersive experiences, at the same time that these experiences are tailored to each user and allow them to study their reactions in each scenario they face, will be an invaluable asset to be at the forefront of digital marketing for tourist destinations.

According to our best knowledge, the combination of XR and ML in the context of tourism and in particular in supporting the digital marketing of destinations is still little explored, requiring further research and contributions.

This article proposes a conceptual model based on the combination of the use of XR and ML that takes advantage of the fact that the tourism sector is information intensive, and as such, generates a gigantic amount of information by citizens around

the world, who continuously produce data valuable information about everything they experience in the context of the tourist destinations they visit and which feed the various social networks that gravitate toward the exploration of tourist destinations, as well as the way they influence digital marketing strategies that promote tourist destinations, which operate in a strongly competitive environment to attract visitors/ tourists.

Some considerations on application scenarios for the model are also presented, as well as some experiences that are been developed in the implementation of ongoing prototypes, inspired by the proposed conceptual model.

28.2 Extended Reality and Machine Learning in Digital Marketing of Touristic Destination

This section aims to provide a brief state of the art on the use of XR and ML in the context of tourism and, specifically, the digital marketing of tourist destinations promotion. It's also made some brief notes about digital marketing.

28.2.1 Extended Reality Overview

The concept of XR brings together different technologies, such as Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR). The concept of XR aims to create a reality that extends the real world, either through recreation (or creation of a non-existent world), in the case of VR; the addition of digital content in the context of the real world, the case of AR; or a perfect fusion between a world of coexistence of objects that contain real components and digital components, the case of MR. In either case, there are more or less immersive experiences in worlds that do not exist, as they are made available to the user, but in which the user interacts with greater or less realism and immersiveness, but, however, creating sensory experiences that can be explored in many different contexts.

VR offers a new medium for communication, where users are immersed in technologically synthesized "real-use" experiences [7]. VR and Augmented Reality (AR) applications, given their various possibilities for entertainment and education, have been increasingly developed, becoming increasingly common in applications related to tourism and heritage [8].

The use of VR can boost tourism in its various aspects. The process of dematerializing tourism promotion materials and supporting heritage interpretation is a growing challenge. Organizing innovative ways to promote tourist destinations and help tourists in their interpretation experience must be an imperative for all entities related to tourism. In this field, VR, together with other technologies, plays a key role as it supports the creation, for tourists, of innovative experiences that promote, support, and allow memorialize a specific visit of a touristic destination.

VR has undeniable potential in promoting tourist destinations. This is significantly more effective than traditional media in evoking positive emotional responses to stimuli. In this context, the development of VR solutions must take advantage of their ability to allow users high involvement, interactivity, and control over their experiences; this will tend to positively influence the emotional response and the intention to advertise the VR experience itself among their contacts [9].

The use of AR is increasingly used as a marketing, information, and experience channel by the tourism industry [10]. In [11], the concept of "Augmented Reality Marketing" is defined as a new, strategic, and potentially disruptive sub-discipline of marketing. In [12], it is mentioned that several researchers have explored the role of mobile AR in influencing tourist intention to visit a particular destination, as well as, emphasizing consumers' perceptions of the usefulness of AR and potential opportunities for future improvements.

The use of AR can also be a tool for the virtual reconstruction of buildings that no longer exist today or allow a view of the original state of buildings, allowing better knowledge of the past, as is the example of the reconstruction of the original view of cathedrals, which can be found in [13].

AR allows for the enrichment of real spaces, with enormous potential for providing information and facilitating access to services, in the context of pre-visiting and visiting tourist destinations, where the visitor is typically thirsty for information and expects easy access to services.

The concept of MR is relatively recent, but it brings new possibilities when compared to other alternative reality concepts such as VR and AR. However, according to [14], there is still some confusion in the clarification and distinction of what MR really is and its understanding is based on the context to which it refers.

As a generator of cutting-edge mediated environments, MR integrates AR and VR into an intelligent interface, using a set of technical capabilities, such as visualization, presence, interactivity, and liveliness [15]. According to [16], MR devices allowed consumers to interact with artificial three-dimensional visual environments, representing a huge opportunity for the provision of services to take on an alternative form in terms of interaction.

This XR represents enormous potential for re-engineering the way tourist destinations are promoted, as well as how access needs are supported information that tourists typically present in the context of a visit. Innovating in the way digital marketing of tourist destinations is carried out, whether before, during, and after the visit, is essential to obtain competitive advantages in an environment as competitive as the tourism sector.

28.2.2 Machine Learning Overview

ML gives computers the ability to learn in a different way than methods that explicitly program them [17]. The current dominant ML paradigm learns in isolation—from a training dataset, and using an ML algorithm on the dataset, produces a model that is then used in some application context [18]. In this way, ML allows learning through data, being able to detect patterns that will later allow the characterization of new future data, meaning that it becomes possible to work with large amounts of data and make inferences about them.

Thinking in a more applied way, and in the context of this work, according to [4], ML is a subset of Artificial Intelligence (AI) that can understand and adjust the data structure based on consumer knowledge and use models that can be used to prepare data inputs for factual searches in order to produce results within a specific range.

Regarding the promotion of tourist destinations, ML is used to analyze big data from social media to forecast tourist demand [19]. With the massive amount of data that is generated and which materializes the concept of Big Data, it has become imperative to find new methods to treat these data in order to obtain answers, patterns, and above all, effective forecasting systems that allow the definition of winning strategies. The potential that ML demonstrates to achieve this goal makes it a technology of choice for digital marketing. In the context of tourism, where a visitor begins to produce an immense amount of data even before starting their visit, but also during the visit and even after the visit, in an industry made up of many millions of people, it creates an extremely valuable set of data where ML can operate and contribute to more effective, contextualized, and innovative digital marketing. This vision represents a huge step forward for tourism agents, as well as visitors.

28.2.3 Digital Marketing Overview

Marketing activity has faced a major transformation thanks to the development of new technological solutions that are now being used in people's daily lives. Likewise, there were profound transformations during the COVID-19 pandemic that devastated the world. This reality acted as an accelerator of digitalization both for ordinary people (customers) and for companies [20].

28.3 Proposed Conceptual Model

The promotion of tourist destinations has been a growing challenge. There are numerous channels available to players to execute their digital marketing strategies, as well as enormous competition on the supply side and an increasingly demanding target audience in the technology-based mechanisms that are at their disposal to: get to know destinations and choose to visit, be supported in the act of fruition of the destinations, as well as, in the way of sharing the results of their visiting experiences, shares that are highly valued by the people who consider these destinations.

Among a countless set of technologies, that have been adopted to innovate in the way destinations are promoted, digital marketing strategies have been developed.

The conceptual model presented focuses on XR technologies combined with the use of ML and presupposes that cities in the future will increasingly be smart spaces where the Internet of Things (IoT) populates physical spaces, offering visitors the possibility of a true physical-virtual fusion.

This growing reality will turn destinations into more complex ecosystems but with even more opportunities to innovate in the definition of marketing strategies and the way in which visitors' needs are met, in the three moments that make up the visit to a destination.

In Fig. 28.1, the proposed conceptual model is presented. In this model, XR technology presents itself as a technology that has not yet reached its full maturity, although there are several applications already developed that use it. However, it is still somewhat experimental and is not widespread in the main tourist destinations. In this work, XR is explored not only in its "classic" form—a mechanism for providing information and interact with services, but above all as a valuable tool for characterizing the visitor's profile.

The use of XR allows, at the same time that an immersive experience is provided to the visitor, the recording of all interactions that the visitor has with the virtual, augmented, or mixed world, even those that are not explicit interactions, for example: where the user is looking, the time he focused on each object, the order in which he decided to interact. This information should be explored in the field of neuromarketing. Furthermore, XR technologies can provide contextualized (and increasingly contextualized) experiences with each new interaction that the user performs. These interactions will automatically create a user profile that can be dynamic, according to the interests of each visitor and the way in which, each time, he interacts with the world provided by XR-based solutions.

The proposed model represents a wealth of opportunities to increase the level of satisfaction of visitors, as well as their perception of how tourist destinations innovate, which will tend to weigh on the choice of putative visitors when choosing one destination over another. However, the model also presents itself as a valuable resource for players responsible for promoting destinations, public management of territories, and business agents operating in these destinations. All stakeholders benefited from the information that can be obtained and which allows to characterize the visitor and create an explicit and implicit profile (i.e., interactions not perceived by the user, such as the aforementioned choices, times and order of interaction) of the visitor.

The proposed model is composed of a set of components that are presented below and characterized their main objectives and logic of action:

• **Tourist**: It translates a visitor or putative visitor who at least acts at the level of the moment "before the visit" or, in addition, at the moments "during the visit" and



Fig. 28.1 Proposed conceptual model

"after the visit". It is a central element in the management of tourist destinations and the element on which all efforts aimed at understanding their (volatile) profile and all resources aimed at increasing their level of satisfaction are focused, leading them to choose a given tourist destination for a first visit and/or return visits. This is a demanding actor, technologically demanding, and thirsty for information.

- **XR**: It represents the set of technologies that support the concept of XR, such as VR, AR, and MR. They provide immersive experiences that cover the three moments of a visit, allowing a virtual visit to a destination (i.e., getting to know a destination in order to decide whether to visit it), supporting information needs during the visit (i.e., obtaining useful information in an open or closed space, for example, to facilitate the interpretation of the tangible and/or intangible heritage of a destination), and finally, to assist the visitor in sharing their visiting experience. XR allows not only the creation of immersive environments but also the collection of useful information, which is stored, about all interactions that we want to value and that contribute to a better understanding of the tourist/visitor profile.
- **XR Engine**: This module is responsible for being a broker between the various XR applications and the ML Engine module. This module is responsible for

receiving data that you want to monitor during the use of XR applications that are important. These data are delivered to the ML Engine module. In addition, it is also the responsibility of the XR Engine module to receive contextualized information from the ML Engine that will allow the XR experiences to be personalized according to each user's profile and in real time. In this way, the experience of using a given XR application is a personalized moment where virtual and/ or augmented or mixed worlds are adapted in real time to the user's profile, as well as dynamic depending on the interactions that the user has in the experience XR. Finally, it is also up to the XR Engine module to use information from the "Marketing Knowledge" database to embed appropriate information, according to the marketing strategy defined for the user in question. In this way, we will be providing the user with a dynamic experience depending on the initial binomial profile (i.e., known at the beginning of the XR experience), and at the same time, through the analysis of user interactions, we will be able to collect important data that help to adjust the user profile and the digital marketing strategy delivered to them in XR applications.

- **Raw Data DB**: Represents the entire set of data collected during experiences using XR applications. These data are vital for creating datasets that will be inserted into the ML Dataset database, which is a fundamental element for ML processes.
- ML Dataset: Represents the dataset database that is created from the Raw Data database. The transformation is the responsibility of the ML Engine Module and the use of Extract, Transform, and Load (ETL) mechanisms.
- ML Models DB: It is a database that contains different files that have been trained to recognize certain types of patterns, allowing the extraction of decisions from data sets.
- ETL Mechanisms: It represents a mechanism capable of combining data from different sources and is used to combine data from different sources, being able to Extract, Transform, and Load information that can then be analyzed. Although the proposed model does not make external sources of data explicit (i.e., only data obtained from XR applications is considered), the vision of the conceptual model includes the possibility of using external sources of information that are considered important to improve experiences of XR (context of this work).
- ML Engine: This module is responsible for managing the Raw Data, ML Models, and ML Dataset modules, generating decisions that will be delivered to the XR Engine module that will deliver them to the XR applications. It is the intelligence engine that allows the integration of important data that contributes to dynamically improving the user's profile and, conversely, generating the best set of information to provide to the XR Engine to later be included in XR applications. In this way, this module contributes decisively to generating immersive and contextualized experiences for each user and, at the same time, allowing real-time knowledge of the user's profile and the best way to approach it during their XR experiences.
- Marketing Knowledge DB: It represents a database that contains information to support digital marketing strategies and that will help to reach the user with XR applications, information, and services in accordance with the strategy defined by tourist destinations and their players.

The proposed conceptual model also represents the three moments of a visit and some of the players who could benefit from its use, such as stakeholders, digital marketing strategies: political decision-makers, public or private entities responsible for promoting territories, as well as agents who can, during XR experiences, promote their businesses and generate business opportunities, among other actors.

28.4 Conclusion and Final Remarks

XR technologies are not yet at a mature stage of mass adoption, especially the use of MR. However, they are technologies used in different contexts, such as, for example: entertainment, such as VR and AR, to support digital games; as well as supporting tourism where implementations emerge that allow visitors to obtain information that allows them a better interpretation of heritage.

Despite this reality, implementations are still scarce and existing ones are typically dispersed and not very unified around a given destination and its integrated promotion. Scarcer, are implementations that take advantage of the way these technologies are used by their users.

The work presented focuses on the potential of XR combined with ML, since the combination of these two technologies allows not only to provide immersive mechanisms for promoting tourist destinations, but also to obtain precise information to understand the profile of visitors or putative visitors.

It should be noted that understanding the visitor profile, their expectations, and the way they perceive the offer of a given destination is a critical source for the success of defining digital marketing strategies to promote tourist destinations, territorial management, and the potential for business creation in these territories.

In a sector as competitive as the tourism sector, an innovative approach is essential to differentiate tourist destinations and their attractiveness. Tourism is an increasingly democratized global phenomenon where the volume of people traveling for tourism is growing, as is the tourist offer. The proposed conceptual model is an approach that generates competitive advantages for destinations and satisfaction for visitors.

The proposed model has been tested using prototyping in micro-scenarios, showing that combining XR with ML allows us to generate knowledge—key to the success of all strategic plannings.

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Chapter 29 Modular Prototype of Artificial Vision for the Detection of Fatigue and Anti-drowsiness in Drivers of Land Vehicles



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Abstract The purpose of this work was to build an artificial vision device that helps safeguard people's lives from traffic accidents related to fatigue and anti-drowsiness, through an alarm that makes the driver react in time. This is an applied research with a quantitative approach. The iterative methodology was used as the basis of the research; in the first iteration, information was collected to define the requirements and associated risks. Subsequently, the system was built in four iterations, the first consisted of image acquisition and detection, the second the database was built in SQLite and the model was trained, the third consisted of sending alert messages, through the 4g module, and the fourth, referring to the activation of the different audible and visual peripherals to obtain the driver's reaction. The Cascade Trainer GUI platform was used. Additionally, the model was trained with the same tool. Python was used for the face and eye detection programs, as well as the playsound library for the messages. The electronic design includes high-power LED lights, amplifier circuit for LED lights, GPRS or GSM module, Raspi (infrared camera), Raspberry PI 3B, speakers, power supplies. The design of the electronic detection was carried out in PCB Wizard and the design of the casing was developed in Freecad. The system was validated using the confusion matrix, from which indicators of accuracy,

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precision, specificity, and score above 90% were obtained, with which a device could be presented whose detection speed was determined in 1.2 s.

29.1 Introduction

Road safety is an issue of great importance due to the consequences that are reflected from its inadequate management and the growing vehicle mass that exists in cities as a means of transportation [1]. According to the World Health Organization (WHO), named by [2], each year, car accidents contribute to more than 1.2 million deaths worldwide. A high percentage of them is due to human error where driver drowsiness and fatigue are the protagonists. For example, in the USA, accidents related to driver fatigue caused more than 800 deaths in 2014 and 37,000 injuries per year between 2005 and 2009 (National Highway Traffic Safety Administration (NHTSA), cited by [2]).

In Ecuador, the causes of death recorded by the Traffic Accident Investigation System, in 2016, 1632 road accidents were recorded, where 98% were caused by human error (Comercio, 2017). The Confirmado website explains that, among the failures caused by humans, the WHO indicated that lack of sleep or its poor quality causes between 10 and 20% of traffic accidents, and in Ecuador, it is the cause of 0.6% of fatal accidents, being one of the 13 most frequent causes of road accidents [3].

Lack of sleep produces a phenomenon called microsleep, which consists of a very short period of time, between approximately 2 and 5 s, where a person loses consciousness, due to tiredness and fatigue. Microsleep during the activity of driving vehicles, by producing a momentary lack of attention, can be fatal because the reflexes and concentration necessary for this activity are lost, which is a risk for the safety and physical integrity of the passengers drivers, passengers, and other vehicles that circulate on the roads [4].

Successful detection of drowsiness is a crucial step in reducing the cost to society of traffic accidents. In order to prevent this type of accidents, it was proposed to create a device for the detection of microsleep and fatigue by applying artificial vision technology to alert and prevent the driver. Although there are driver alert devices available in the national market, these only act by detecting head movement due to fatigue, but do not detect microsleep [5], which made the study feasible.

29.2 Literature Review

The world of artificial intelligence (AI) is impacting the way humans can use the power of computers to perform tasks much faster, more efficiently and with minimal effort. Artificial intelligence techniques, particularly the deep learning method, have shown superior performance in solving problems in many areas as computing, storage, and human–computer interaction technologies have accelerated in recent years, and it has been shown to have improved learning algorithms that can effectively distinguish specific scenarios. Deep learning is a machine learning technology that incorporates neural networks with multiple layers in its structure to approximate the properties of the nervous system of the human brain [6].

Artificial intelligence techniques have been used to study road safety. There is published research that has attempted to solve the problem of detecting drowsiness in the driver [7], some of it relying on AI. The author summarizes them in subjective, physiological, vehicular, and artificial vision techniques.

Due to their low cost, non-invasive nature, and reliability, computer vision-based driver drowsiness detection methods are the most widely accepted. Sandoval [8] mentions that computer vision considers the concepts of deep learning, where deep neural networks are used to complete tasks such as object detection, image classification, word embedding, and more. Computer vision-based measurements mainly detect the driver's eye movement, blinking, head movement, and head position. Morena et al. [9] indicate that computer vision can be defined as a set of methods used to acquire, analyze, and process images and transform them into information that can be valuable for analysis by a computer. This means that the collected information is transformed into numerical data, so that the computer can work with it. Machine vision can be carried out through different solutions: smart cameras and integrated vision systems, area scanning or line scanning cameras, code reading cameras, 3D cameras, and machine vision devices.

Different and varied research projects have been developed to analyze the driver's sleep and fatigue status. [10] in their work published in the "International Journal of Engineering and Advanced Technology" (IEJEAT) developed a system whose purpose is to detect driver drowsiness based on the movement of the eyelids and the presence of yawning, that is reliable and emits an audible alarm in real time, using HAAR Cascades methodologies and OpenCV libraries, in which two essential factors are considered, which are facial and mouth identification by establishing various coordinates, in three progressive stages such as: tracking human face extraction and evaluation. But the researchers noted that the model degrades if the eye frames are not captured clearly due to any type of obstacles, such as protective glasses that have reflections.

Similarly, researchers [11] studied face recognition and its geometric patterns by capturing video, frame by frame, and by using the dlib library, a set of tools for machine learning and programming in Python and OpenCV to recognize facial contours when the driver is awake or drowsy. Hashemi [12] carried out a real-time driver drowsiness detection algorithm based on a method with Convolutional Neural Networks, which includes high precision and speed, in which three (3) networks are used, represented as: network potential for eye state classification, fully designed neural network (FD-NN), and another network using Transfer Learning on VGG16 and VGG19 with extra designed layers (TL-VGG). Knapik and Cyganek [13] developed a device to detect the driver's eyes using thermal images processed by the image bag method, so that they would work in any environment. Knapik [14] designed a neural network model based on facial video that can quickly identify the opening

and closing states of the driver's eyes and mouth, calculate PERCLOS (percentage of eyelid closure over pupil) and FOM (open mouth frequency) of the driver, and evaluate the driver's fatigue status. Siam [15] built an artificial intelligence-based driver assistance system (AI-DAS) to identify mental stress in car drivers using a group of physiological signals, which are easily captured from the driver. These signals are electrocardiogram (ECG), electromyogram (EMG), hand galvanic skin response (GSR), foot GSR, and respiratory rate.

The topic has also been investigated in Ecuador. Lovato [16] proposes a microsleep detection system using a Raspberry Pi module, V3, which incorporates a camera that captures images of the driver, which are taken in real time to the Python programming language and using the OpenCV library, the sent data are processed by algorithms that will detect the degree of drowsiness, and if it is greater than 80%, a visual alarm and a constant beep will be issued. Armijos [17] developed an electronic alert system to detect drowsiness in drivers, based on the use of artificial vision to monitor facial features such as the coordinates of the face, eyes, and blinking.

29.3 Materials and Methods

The central purpose of this work was to implement an artificial vision device to help safeguard people's lives from traffic accidents related to fatigue and anti-sleepiness, through an alarm that can make the driver react in time. Driver and be aware of taking a short break in your journey to continue. It is an applied research with a quantitative approach. The iterative methodology was used as the basis of the research; in the first iteration, information was collected to define the requirements and associated risks. The system was subsequently built in four iterations. As it constitutes an embedded system, the waterfall methodology was used, distributed in three phases: requirements and design, implementation, and validation testing. The classification training is based on the waterfall method, with OPEN CV as the main module.

For Phase I—requirements and design, observation techniques, surveys, and interviews with the personnel involved were used. Once the requirements were identified, the design of the device was carried out, which involved the following aspects.

29.3.1 Conceptual Design of the Device

According to the requirements, the design of the device was carried out. This system involved four stages, the first was the acquisition of images and detection, the second was the establishment of the data in SQLite, the third was the sending of alert messages, through the 4g module, and the fourth is corresponded to the actions of the different audible and visual peripherals to get the driver's reaction, so that he can enable himself and maneuver in a way that can avoid any accident. In the flow



Fig. 29.1 Device operation flowchart

diagram represented in Fig. 29.1, you can see the different processes that involve the operation of the prototype and which are specified below:

Data collection: The driver must notify by means of a switch that a long trip is going to be made. The images are received when the camera stream encodes each frame to reach the device, through frames, encoded in matrices.

Verification of posture or face detection: The position of the driver in front of the camera is checked in order to generate the detection with the cascade face, generating a cut of the face, otherwise a timer will pass and the alarm will be generated, since it would mean that the driver is having symptoms of microsleep.

Eye detection: In this consecutive process of face detection, the cropped image is received and eye detection is implemented. It is evaluated whether the eyes are open or closed, and if the eyes remain closed for a certain amount of time, the alarm will be activated.

Alarm: This process will be activated as long as the previous processes activate it, it consists of visual and audible triggers, and at the same time it includes within the process the sending of an SMS alert (Text Message) and an alert call to the person in charge of monitoring of transport.

29.3.2 Electronic Device Design

For the electronic design, the connection diagram in Fig. 29.2 was configured that allows the integration of the different modules occupied by the embedded card, with which the technical requirements will be met. The characteristics of each of the modulars are specified below:

High-power LED lights: 1 W LEDs with high-power heatsink were used, power: 1 W, maximum nominal current: 300 mA, viewing angle: 120° , operating temperature: $-35-60 \,^{\circ}$ C, number of terminals: 4, shell material: aluminum.

LED light amplifier circuit: A transistor circuit configured as a common collector amplifier was used to help manage the LEDs. The NPN TIP41C was selected, with the parameters of I_c collector current (DC) of 6 A, I_b base current of 2 A, β or DC current gain of 30 with a load of 0.3^a. Taking these data into account, the calculations for the circuit design were carried out and it was determined that a Raspberry with a resistance range of 100 Ω was suitable.



Fig. 29.2 Conexion diagram

GPRS or GSM Module: The SIM800L GSM/GPRS module is a miniature GSM modem, which was used to send SMS text messages and make emergency phone calls to the operations' supervisor.

Night camera 2 I_r 5mpx ov5647 for Raspberry: This is a compatible camera for the Raspberry embedded card, it is designed with 5 MP OV5647 night vision with a resolution of 1080p and adjustable focus, it also has two infrared LED sensors which allow the camera to have night vision, and to activate this parameter, it has two photoresistor sensors that activate this ambient light.

Modular speakers with USB amplifier: To obtain the audible alarm, the black minicomputer speakers were used, which work with USB for Raspberry Pi 3B+. These have the following features: DC power supply, 2 speaker boxes, R, 90 Hz–20 kHz frequency, S/N Ration \geq 60 dB.

DC source: For the fixed power supply of the device, the consumption of the different units (Raspberry Pi 3, Tip41C, LEDs) was counted to designate the value of the voltage and current. According to this analysis, we set out to obtain a 5 V and 3.5 A source.

29.3.3 Printed Circuit Board (PCB) Design

The PCB design was carried out in PCB Wizard, on one side, with lines for 1 A and in 45° turns, so as not to affect the impedance (Fig. 29.3).




29.3.4 Case Design for the Device

To design the casing, free Computer-Aided Design (CAD) software called Freecad was used to recreate the modeling in order to assemble all the elements. This modeling involves a mechanical arm with which the perspective of the angle at which the driver's profile is focused while driving can be regulated, and it also contains a housing with the respective ventilation and ergonomics for easy use.

29.3.5 Dataset for Computer Vision Algorithm

For the creation of the dataset and the detection of faces and eyes, the Cascade Trainer GUI platform was used, which offers a graphical interface which facilitates the use of OpenCV tools for training and testing classifiers. This program allows you to train, test, and improve cascade classifier models.

Data preparation for algorithm training: A sample of 1500 images was used, of which 600 images were positive and 900 were negative as shown in Fig. 29.4. The size of the images was 38 pixels wide and 46 pixels high; each group was housed in folder p for the positive ones and folder n in the case of the negative ones.

Training of the cascade classifier: Having the images from the previous step ready, the interface was accessed and the data requested in the Train tab were filled out; in this we had the "Sample Folder" space, where the PATH or the address where the data



Fig. 29.4 Directories with the photographs corresponding to the training of the algorithm

is stored, after this there was the choice between "Positive Image Usage" where the percentage of positive photographs was chosen, and "Force Positive Sample Count" where the specific number of images was set with which the training is generated; Finally, there is the "Negative Image Count" space in which you can enter the specific number of negative images used in training.

After having prepared these configuration parameters, we continued to the "Common" section of the software where the number of training stages was established at 20 iterations. Consequently, we proceeded with the section called cascade, in which the "Sample Width" and "Sample Height" parameters were filled. It is worth emphasizing that this procedure was carried out twice, since the cascade was designed to detect faces and the cascade was designed to detect eyes. The resulting model was saved in the cascade.xml file within a folder called classifier located in the folder corresponding to the training (Fig. 29.4).

29.4 Results

This section presents the implementation of the device and the tests carried out (Phases 2 and 3).

29.4.1 Hardware

The implementation of the electronic circuit was developed the sequence shown in Fig. 29.5.

29.4.2 Implementation of the PCB for the GPRS-GSM Module and the LED Module.

To implement the device, the designed electronic circuit was screen printed (design of the Printed Circuit Board (PCB). It was then passed through ferric acid, with which the copper that was not covered by the screen printing ink was diluted. Then, the pins were drilled and each of the electronic components was soldered (Fig. 29.6).



Fig. 29.5 Electronic diagram



Fig. 29.6 PCB for the GPRS-GSM module and the LED module

29.4.3 Circuit Assembly for Testing

The assembly was carried out in accordance with the connection diagram defined in the electronic design, which included the PCB that was built to manage the power LEDs for the different alerts.



Fig. 29.7 Application testing

29.4.4 Software

For the software, a script or test program was made in Python, in which through the coding of face_detection.py, as well as with the eye_detection.py script, in which the sensitivity was calibrated, positive results were obtained such as it can be seen in Fig. 29.7.

After obtaining good results in real tests, the script "tesis.py" was developed that integrates the two waterfalls with their configurations. The RPI.GPIO library was used to facilitate the use of pins on the Raspberry Pi and digital outputs were configured to activate LEDs in the amplification circuit according to time parameters. An audible alert was incorporated through the "playsound" library. The GPRS/GSM module was programmed, activating the serial port and sending AT commands to send text messages and make calls. With these settings, the process was successfully completed.

29.4.5 3D Printing of the Case and Device Assembly

For 3D printing, the material called PETG was chosen, since it meets the mechanical properties of resistance to shocks and environmental humidity. Each of the pieces of the housing and the modular electronic devices were assembled, taking into account good connections and structuring, leaving the product with all the processes shown in Fig. 29.8.



Fig. 29.8 Application testing

29.4.6 Device Reliability Testing

The method that was used to validate the face and eye detection algorithm was the confusion matrix, which is a tool that is applied in the field of artificial intelligence and machine learning, to evaluate the performance and performance of the system developed through different indicators (Table 29.1).

To calculate these indicators, a sample of 300 images was taken, of which 150 were positive images, that is, they contained the object to be detected, such as a face and eyes, and 150 corresponded to negative images because they did not contain the object to be detected. Table 29.2 presents the confusion matrix with respect to the face cascade and the eye cascade.

Having the elements of the confusion matrix, the indicators for each detection model are determined using the formulas established in Table 29.3.

In this way, the indicators for each detection model corresponding to face and eye detection are shown in Table 29.4.

Table 29.1 Generic confusion matrix		Example	Positive	Negative
	Real values	Positive	TP	FN
		Negative	FP	TN

Table 29.2 Confusion matrix—face and eye detection models		Example	Positive	Negative
	Face detection	Positive	137	5
		Negative	13	145
	Eye detection	Positive	128	1
		Negative	22	149

Indicator	Formula
Accuracy (ACC)—represents the percentage of correct predictions compared to the total	ACC = (TP + TN)/(TP + FP + TN + FN)
Precision (PPV)—refers to how close the result of a prediction is to the true value	PPV = TP/(TP + FP)
Sensitivity (TPR)—it is the proportion between positive cases well classified by the model, compared to the total number of positive cases	TPR = TP/(TP + FN)
Specificity (SPC)—it is the proportion between the negative cases well classified by the model, with respect to the total negative cases	SPC = TN/(TN + FP)
F1-score ($F1$)—this parameter makes it easier to compare the combined performance of precision and completeness between various solutions	F1 = (2)/(1/precision + 1/Recovery)

Table 29.3 Indicator formulas

Table 29.4	Device reliability
indicators	

у	Indicator	Face	Eyes
	Accuracy (ACC	0.940 = 94%	0.9176 = 91.7%
	Precision (PPV)	0.9648 = 96.4%	0.9922 = 99.2%
	Sensitivity (TPR)	0.8124 = 81.2%	0.8533 = 85.3%
	Specificity (SPC	0.9880 = 98.8%	0.91761 = 91.76%
	F1-score (F1)	0.9383 = 93.83%	0.91761 = 91.76%

29.5 Conclusions

The results show that the two detection algorithms (faces and eyes) have adequate performance parameters because they are greater than 70%, which means that they are in optimal conditions. Likewise, the detection speed in the tests was determined at 1.2 s in execution mode, which represents an acceptable period as an alarm system. Finally, the device has an ergonomic, functional design that meets the requirements of the beneficiaries; however, it was determined to use another microcontroller that helps to disaggregate functions of the raspberry, having a better processing speed.

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Chapter 30 The Impact of Digital Transformation on Innovation in European Companies: A New Generation of AI Predictive Model Test Against Predictive Machine Learning Algos



Victor Santos D and Pedro Malta D

Abstract In recent years, the global business landscape has witnessed a profound shift driven by the relentless march of digital transformation. This research provides an overview of the impact of digital transformation on innovation within European companies, shedding light on the key drivers, challenges, and outcomes of this transformative process. Digital transformation is characterized by the integration of digital technologies into all aspects of business operations. It has fostered a culture of continuous adaptation and creativity, driving firms to explore novel solutions, products, and services. From finance to healthcare, manufacturing to retail, companies are leveraging technologies like artificial intelligence, the Internet of Things, and cloud computing to streamline processes, enhance customer experiences, and create new business models, using a machine learning approach to analyze the impact of digital transformation (DT) on innovation in European companies. Based on Eurostat datasets of different technologies were identified to consider which ones have more impact on digital transformation strategies by country and which one is evidence of asymmetries. This way it is possible to advise the better strategy per country and what model should be used to predict the future impact on different countries simulating different values of DT appliance adjusted to each country's needs. The outcomes of European companies are witnessing improved efficiency and productivity through

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automation and data analytics. Customer-centric approaches driven by digital technologies are enhancing customer satisfaction and loyalty. Moreover, several aspects of digital human skills should be improved and be acquired to reach the European Union goals.

30.1 Introduction

In recent past, digital transformation has been a major driver of innovation and competitiveness in many organizations. Small and medium-sized enterprises (SMEs) are particularly susceptible to the impact of digital transformation, as they often face the challenge of limited resources and the need to quickly adapt to changing market conditions [1]. Some authors refer to three major factors as relevant elements of digital transformation, digital technologies, employees' digital skills, and digital transformation strategy [2]. As digital technologies provide more information, computing, communication, and connectivity, they enable new forms of collaboration across distributed networks of diverse actors. In doing so, they also create dependencies between actors whose interests may not be fully aligned. This new reality offers great potential for innovation and performance in organizations and extends beyond the boundaries of the company to affect individuals, organizations, and society [3]. This study aims to examine the impact of digital transformation on the innovation of European companies using quantitative data analysis and trying to answer several questions that emerge. What is the current level of digital transformation among companies in Europe? What is the relationship between digital transformation and innovation in European companies? How do the different dimensions of digital transformation (e.g., digital infrastructure, digital skills, and digital culture) impact innovation in companies in European countries?

This paper is structured as follows: Sect. 30.2 delivers the literature review on the subject; Sect. 30.3 goes through the main underpinning assumptions on the methodology employed; Sect. 30.4 provides the description of the implementation of the models; the discussion of results is given in Sect. 30.5. Finally, conclusions are drawn, highlighting the main limitations found and future work developments.

30.2 Literature Review

For this section the scientific database Web of Science was used to address the topics of digital transformation, for small and medium enterprises facing innovation. The time bound was according to Fig. 30.1, 30.5 years from 2019 to present year, where a considerable and increasing interest to these topics is proved by the number of publications and citations.



Fig. 30.1 Number of publications and citations of the research topics

It was obtained a total of 33 documents between articles, early access, proceeding papers, and review articles. The outstanding authors are presented in Fig. 30.2 followed by the main keywords in Fig. 30.3.

The Web of Science categories were restricted to management, business, economics, and green and sustainable science technology.

The COVID-19 crisis has underscored the imperative for small and mediumsized enterprises (SMEs) to embark on digitalization efforts and embrace emerging technologies [4]. This shift is essential for their survival and competitiveness within the continuously evolving contemporary business landscape, as emphasized by [5].

Based on the European business statistics and Eurostat's website at https://ec.eur opa.eu/eurostat together with a range of online articles from this literature review [4]



Fig. 30.2 Outstanding authors of the research topics



Fig. 30.3 Keywords of the research topics

it was possible to collect the values achieve to be analyzed and model with different artificial intelligence algorithms [6] to better evidence the different country strategies.

The review was not restricted to European companies to better understand and compare with all over the world small and medium enterprises. This way [7] addresses DT in India how small and medium-sized enterprises (SMEs) engage in the adoption of digital technologies during crisis situations to cultivate resilience capability, which can be considered a second-level dynamic capability. Additionally, the dynamic interplay among sensing, seizing, and transforming capabilities is a crucial part of the orchestration process within the entrepreneurial ecosystem. Another concept is SME resilience and was found in Indonesia [8] calling attention to the entrepreneurial ecosystem and digital transformation have a significant impact on collaboration capability. DT and collaboration capability and innovation value have a significant effect on SME resilience.

30.3 Methodology and Methods

A sample from Eurostat was analyzed in relation to a survey, where data was collected meaning the number of SMEs of each of the 27 countries using that technologies. The data was prepared using descriptive statistics and regression analysis to determine

the relationship between digital transformation and innovation, using a RapidMiner data mining tool. The approach uses RapidMiner data preparation tool to identify where "machine learning" algorithms are used to identify the best model to apply. Accordingly it is possible to define an estimation model in order to aggregate and evaluate web and cloud computing technologies.

Based on the technologies presented on Table 30.1 it is important to explicit that each technology has a different impact on innovation and consequently on DT. Depending on the industry, organization, and specific use case. For example, cloud computing can enable scalable and cost-effective infrastructure for digital transformation initiatives. AI can enhance decision-making and automate processes. IoT can enable data collection from physical objects for analysis and automation. Big data can provide insights from large datasets. 3D print and robotics can transform manufacturing and prototyping. CRM Auto can streamline customer relationship management. Process integration can enhance workflow efficiency. So, DT represents the broader initiative of transforming an organization digitally using these technologies; although in the realm of marketing, several technologies have a significant impact on companies; and their effectiveness can vary depending on the industry, target audience, and marketing goals. Here are a few key technologies that often have a substantial impact on marketing efforts:

- 1. Data Analytics and Big Data: analyzing large volumes of data allows marketers to gain insights into customer behavior, preferences, and trends. It enables datadriven decision-making, personalized marketing campaigns, and better Return on Investment tracking.
- 2. Artificial Intelligence (AI) and Machine Learning: powered tools that can automate tasks such as lead scoring, chatbots, and content recommendations. Machine learning algorithms can optimize ad targeting and predict customer behavior.
- Customer Relationship Management (CRM): software that enables companies to manage customer interactions, track customer journeys, and provide personalized experiences.

It is important to note that the impact of these technologies can vary based on the specific industry and marketing strategy. Successful marketing often involves a combination of these technologies to create a cohesive and effective marketing ecosystem. Additionally, staying up-to-date with emerging technologies and trends is crucial for maintaining a competitive edge in the marketing landscape.

To determine which technologies from the "Digital Transformation vs Technologies in Europe 2023" dataset could have a significant impact on digital transformation and innovation, it is essential to consider the potential implications of each technology. Here is an analysis of some of the technologies that could have a substantial impact:

Cloud Computing: Cloud computing provides scalable and cost-effective infrastructure, enabling organizations to adopt digital transformation initiatives more efficiently. It allows for flexible data storage, processing, and application deployment, which can lead to innovation in various industries.

Countries	CC	IA	IoT	Big data	3DP&R	CRM auto	PI	DT
Belgium	38.0	10.6	28.2	22.9	25.6	25.1	22.5	91.1
Bulgaria	6.5	2.8	15.0	6.3	8.1	7.7	8.0	54
Czechia	21.5	4.2	31.4	9.1	19.0	17.0	16.2	118
Denmark	49.0	27.3	20.0	27.0	32.1	31.1	27.5	214
Germany (until 1990 former territory of the FRG)	20.2	9.4	35.6	17.8	21.7	20.9	21.1	147
Estonia	31.4	2.8	17.4	9.9	17.2	15.7	12.6	107
Ireland	46.6	8.5	34.0	22.7	29.7	28.3	24.6	194
Greece	11.6	5.6	22.8	12.9	13.3	13.2	13.6	93
Spain	18.8	7.5	27.5	9.0	17.9	16.2	15.6	113
France	18.3	5.5	22.0	21.7	15.3	16.6	16.2	116
Croatia	26.0	8.4	23.2	13.6	19.2	18.1	16.5	125
Italy	36.0	6.7	32.3	8.6	25.0	21.7	18.9	149
Cyprus	17.7	1.9	33.3	6.2	17.6	15.3	14.9	107
Latvia	12.3	2.6	28.4	8.5	14.4	13.3	13.4	93
Lithuania	21.2	5.1	28.4	10.5	18.2	16.7	15.8	116
Luxembourg	22.6	12.6	22.2	18.7	19.1	19.1	18.3	133
Hungary	14.9	4.0	22.3	7.0	13.7	12.4	11.9	86
Malta	28.0	7.3	28.0	30.0	21.1	22.9	21.9	159
Netherlands	37.1	12.5	20.7	27.2	23.4	24.2	21.6	167
Austria	22.1	9.8	50.8	8.7	27.6	23.8	24.1	167
Poland	12.7	2.3	18.6	8.5	11.2	10.7	10.3	74
Portugal	17.6	19.1	23.4	10.6	20.0	18.2	18.3	127
Romania	8.7	1.2	10.5	5.1	6.8	6.5	6.0	45
Slovenia	25.6	12.4	49.5	6.6	29.2	24.6	24.5	172
Slovakia	21.4	5.3	27.4	5.6	18.0	15.5	14.4	108
Finland	67.0	17.2	40.5	21.6	41.6	37.6	31.7	257
Sweden	55.4	9.5	40.3	19.2	35.1	31.9	27.2	219

 Table 30.1
 Digital transformation by country and technologies

Artificial Intelligence (AI): AI, including machine learning and deep learning, has a transformative effect on digital transformation. It enables automation, predictive analytics, and personalized customer experiences. AI-powered insights and automation can drive innovation in business processes and decision-making.

Internet of Things (IoT): IoT connects physical objects and devices to the internet, facilitating data collection and automation. It can drive innovation in product development, supply chain optimization, and smart city initiatives, contributing to digital transformation efforts.

Big Data: Big data analytics provides valuable insights from large datasets. It can inform strategic decisions, improve customer understanding, and enhance operational efficiency, supporting innovation and transformation efforts.

3D Printing and Robotics: These technologies can revolutionize manufacturing and prototyping processes. They enable rapid prototyping, customization, and automation, leading to innovation in product design and production.

Supply Chain Management Automation (SCM Auto): Automation in supply chain management streamlines operations, reduces costs, and improves visibility. It can drive innovation in logistics, inventory management, and demand forecasting.

Customer Relationship Management Automation (CRM Auto): Automated CRM systems enhance customer interactions, personalize marketing, and improve customer satisfaction. Innovations in customer engagement and loyalty can result from CRM automation.

Process Integration: Integration technologies allow for the seamless flow of data and processes across an organization. They can lead to process optimization, innovation in workflows, and improved collaboration.

Digital Transformation (DT): Digital transformation itself represents a holistic approach to innovation. It encompasses the integration of various technologies and the transformation of business models and operations to stay competitive in the digital age (Fig. 30.4).

The impact of these technologies on digital transformation and innovation will depend on how effectively they are integrated into an organization's strategy and how well they align with its specific goals and challenges. Often, a combination of these technologies is necessary to drive significant transformation and innovation in various industries. These will have a huge impact on the result for each country. As an example, let us consider cloud computing evolution from 2014 through out 2021 on the 27 countries as presented directly from the Eurostat.

At the source there is a missing year for all countries, and that is 2019. As it can be seen on the table above there are some missing values but hopefully the majority could be used to achieve an average value because there is an increasing trend on the use of cloud computing for each country by interpolation. Unless like Belgium where data is missing for all over the years, we must adopt another data preparation strategy. For the other technologies it used the same approach by interpolation on missing data. As a result for cloud computing to each country could be (Fig. 30.5):

Table 30.1 allows the analysis by country of each technology and for each technology the countries with more SME using them. For example, it is easy to identify the significant lack of application of these technologies in Romania. On the opposite way Finland leads the head of the countries with most use and with digital transition

53.0

53.2

 Data extracted on 03/02/023 19:37:36 from [ESTAT]

 Dataset:
 Cloud computing services by size class of enterprise [ISOC_CICCE_USE\$DEFAULTVIEW]

 Last updated:
 05/01/2023 11:00

 List opurous.
 Annual Time frequency
 Annual 10 persons employed or more Statistical classification of economic activities in theAl activities, without financial sector Information society indicator
 Buy cloud computing services used over the internet Percentage of enterprises

 GEO (Labels)
 11/2
 2016
 2016

 Belgium
 21.2
 24.6
 28.5

 Bulgaria
 7.7
 5.4
 6.7

 Czechia
 15.1
 :
 18.0

 Demmark
 37.7
 36.6
 41.6

7,7	5,4	6,7		8,0	8,3	10,9		12,8	
15,1	1	18,0	2	22,0	26,5	28,9		43,8	
37,7	36,6	41,6	5	50,5	55,6	66,9		64,8	
of the FRG)11,3	1	16,3		:	22,4	33,3		41,6	
14,9	1	22,8		1	33,9	56,3		57,5	
27,6	35,2	36,1		:	45,2	50,9		58,8	
7,6	9,4	9,2	1	1,0	12,8	16,7		20,7	
14,0	14,6	18,3	2	23,5	22,0	26,2		30,9	
11,9	1	17,1		1	19,4	26,9		29,4	
22,2	22,4	22,6	3	31,2	30,7	39,0		39,2	
40,1		21,5	b	:	22,5	59,1		60,5	
10,2	13,0	15,3	2	21,7	26,6	34,6		50,3	
5,7	8,3	8,4	1	2,0	14,5	21,3		28,5	
13,5	16,2	16,6	2	23,2	22,6	30,8		33,6	
12,5	1	18,8		1	24,5	29,1		33,5	
8,1	10,6	12,2	1	6,3	18,0	25,2		26,4	
17,4	24,6	28,4		1	36,5	52,2		57,1	
27,7	:	34,5		:	48,2	52,6		64,9	
11,7	1	17,0	2	21,0	23,3	38,1		40,4	
5,8	7,3	8,2	1	0,0	11,5	24,4		28,7	
12,6	1	17,9	2	22,6	24,7	29,0		34,7	
4,9	8,2	7,3	1	0,8	10,3	15,7		14,1	
15,4	17,5	22,2	2	22,1	26,3	38,6		42,7	
19,3	20,4	17,9	2	22,2	21,1	25,6		36,1	
50,8	53,5	56,9	6	65,6	65,3	75,5		75,3	
39,4	1	48,2		:	57,2	69,5		75,4	
43,1		:			:				
29,3	37,6	39,7	4	18,0	50,7	63,7		64,0	
24,0		34,7		1	41,9	53,0			
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11,9	1	6,9		1	1	14,4		13,5	
:	1	:		:	:	1		20,1	
3,7	1	1		9,2	15,4	18,6		28,9	
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39.6

40.2

Fig. 30.4 27 European countries' cloud computing evolution from 2014 to 2021

being well applied. The resulting column of DT by country uses different weights resulting on a pondered final sum with different contribution for each technology.

Based on Table 30.2 DT for each country results from the average contribution and participation of SMEs on their country for each technology and the weight it represents for DT. This way it results the following formula to be applied for each country and to be tested on the predictive machine learning models as well as the predictive generative AI models:

$$DT = 0.8 * CC + 0.7 * AI + 0.6 * IoT + 0.6 * BD$$
$$+ 0.5 * 3DP\&R + 0.3 * CRM + 0.1 * PI$$

Meaning that if we take a regression analysis approach the weight of each independent variable will vary.

From [0, 1] as a percentage we have the following weight technologies table:

			-			-	-	-	
	CountrylYear	2014	2015	2016	2017	2018	2020	2021	Average
1	Belgium	28	29	30	34	40	53	53	38,0
2	Bulgaria	6,2	4,4	4,3	5,1	7,0	8,7	9,7	6,5
3	Czechia	13,2	14	14,7	19,4	23,4	26,8	38,9	21,5
4	Denmark	34,3	34,5	40,3	48,4	55,7	66,6	62,8	49,0
5	Germany (until	10,1	12	13,8	17	19,3	30,8	38,8	20,2
6	Estonia	12,7	16	19,5	26	32,4	54,9	58,2	31,4
7	Ireland	30,3	35,9	40,5	44	47,6	60,5	67,4	46,6
8	Greece	6	6,7	8,6	10	15	17	18,7	11,6
9	Spain	12,8	12,7	16,5	18,9	18,3	24,6	27,9	18,8
10	France	9,7	13	16,7	18	18,4	25,1	27,7	18,3
11	Croatia	19,4	19,4	18,5	26,7	23,2	40,0	34,8	26,0
12	Italy	38,6	29	20,3	21	21,3	59,4	61,9	36,0
13	Cypres	7,2	6,0	6,3	14,6	18,8	27,1	43,9	17,7
14	Latvia	5,2	7,7	6,8	8,6	12,2	19,1	26,7	12,3
15	Lithuania	11,6	14,5	14,7	19,2	22,4	30,6	35,3	21,2
16	Luxembourg	13,6	17	19,5	22	24,3	26,4	36,2	22,6
17	Hungary	5,8	3,4	10,0	13,7	17,4	23,3	24,8	14,9
18	Malta	16,0	19,9	22	23	24	38	53,4	28,0
19	Netherlands	22,8	25	26,2	34	41,7	48,7	62,0	37,1
20	Austria	10,8	13	14,6	19,4	21,9	38,4	37,1	22,1
21	Poland	4,9	6,3	7,2	8,3	10,7	23,3	28,2	12,7
22	Portugal	8,7	11	12,7	17,1	20,5	24,2	29,4	17,6
23	Romania	4,5	6,0	5,8	10,2	7,5	15,7	11,2	8,7
24	Slovenia	11,6	16,2	18,4	25,5	25,6	38,9	42,9	25,6
25	Slovakia	14,0	19,4	14,5	22,3	21,1	24,5	33,8	21,4
26	Fisland	48,2	52,3	59,0	70,0	71,2	83,0	85,2	67,0
27	Sweden	36,9	41,7	46,4	52,25	58,1	75,4	76,9	55,4

Fig. 30.5 Cloud computing linear interpolation

Acronym	Technology	Weight
CC	Cloud computing	0.8
AI	Artificial intelligence	0.7
ІоТ	юТ	0.6
BD	Big data	0.6
3DP&R	3D print and robotics	0.5
CRM	Customer relationship management—CRM auto	0.3
PI	Process integration	0.1

Table 30.2 Weight technologies

30.4 Prediction Analysis with RapidMiner

To test the most used and recommended predictive methods when data is scarce it used RapidMiner as a data science platform that allows data engineering, model building, machine learning operation, among others. It has a two-phase automation tool, TurboPrep for data preparation and Auto Model to test and simulate the different prediction models both in an automatic way. However, it was not possible to use these



Fig. 30.6 RapidMiner process area with predictive models' performance analysis

two tools since the source data table results in less than one hundred total data. This challenge forced both stages of the CRISP-DM, data preparation, and model building to be done manually.

Authors like Kumar [9] and Diao [10] utilize hierarchical generalized linear models (GLM) or enhanced principal component analysis (PCA) in combination with adapted support vector machines (SVM) for the purpose of discerning the primary factors associated with both quantity and quality prediction. Reinforcing this algo utilization SVM for better predictions [11] has compared several supervised ML algos to achieve this conclusion.

As shown in the Fig. 30.6, Table 30.2 was retrieved and added to the process area as the data source. After the identification of the main attribute, in this case was naturally DT—digital transformation, the data source was injected into the different three models to be tested for performance and accuracy, as shown in Fig. 30.6.

30.5 Results Analysis and Model's Comparison

For each technology it is possible to evaluate measures of central tendency and range factors that represent the discrepancy for each technology in use by SME of each country. Figure 30.7 represents these conclusions for CC—cloud computing.

The PerformanceVector for the first model random forest presents a root_mean_ squared_error of 10.712 ± 0.000 and for DT the lowest is Romania with 44.7 and the highest is Finland with 257.1.

If we compare with the second model, generalized linear model, the performance vector presented a root_mean_squared_error: 28.825 ± 0.000 and for DT



Fig. 30.7 Statistics for cloud computing in the 27 EU countries

with Romania 44.7 but with a prediction value of 92,1. On the opposite way Finland achieved 257.1 and a prediction value of 181.6.

For the third model, SVM—support vector machine presented a root_mean_ squared_error: 34.828 ± 0.000 with DT for Romania with 44.7 and a prediction of 97.2. As expected Finland presented 257.1 with a prediction of 158.5.

As can be stated random forest achieves a better performance with the lowest root mean squared error.

The question that naturally arises is about the behavior of the generative AI predictive models to DT compared to the machine learning models presented before.

Using the OpenAI GPT [12] for every country with the same equation to calculate DT prediction it was obtained for Romania 17.7 the lowest value and 314.7 for Finland the highest one from all the 27 countries. The root mean squared error (RMSE) for Romania is approximately 12.97, and for Finland, it is approximately 53.98.

30.6 Conclusion

Besides the restrictions and limitations of the data sources, only 9 years maximum with minimum of 3 years for each technology. Most technologies do have missing data also by country.

There are numerous machine learning algorithms used for prediction tasks, and the choice of algorithm depends on the nature of the problem, the data we have, and the desired outcomes were explained for this specific case. On a different approach we have generative artificial intelligence (AI) prediction models as a subset of AI models that aim to create new data points or predictions based on patterns learned from existing data.

Comparing the results and the performance of all the models presented before even with few data the machine learning models do have a better performance and a lower error rate. Generative AI models need to be more tested and sources controlled for results. Further developments should try the effect of synthetic data on generative AI models to be compared with the reality of the evolution of each technology in each country.

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Part VII Mataverse and NFT applied to Marketing

Chapter 31 Brand Management and Metaverse: A Data Mining Exploratory Approach



Rui Pedro Ferreira, Amélia Brandão, and Bruno Veloso

Abstract Integrating emerging technologies, such as AI, the Metaverse, and IoT, revolutionizes management and brand practices. Brands can create captivating virtual experiences within the metaverse, including virtual storefronts and interactive events. Scientific data on brand management in the metaverse must be improved due to the concept's early-stage development. While virtual environments exist, they do not fully encompass the metaverse's scope. So, this research bridges this gap by exploring the relationship between brand management and the metaverse, focusing on consumer perceptions and their contribution to brand equity in this virtual realm. Netnography with a data mining approach was the methodology followed in this paper. Data were extracted by a metaverse community on the Reddit platform and, in total, 696 posts and comments were analyzed from June 2022 until May 2023. The results highlighted a positive and favorable consumer perception of brand management in the metaverse reality. This research contributes to the emerging field of metaverse brand management, investigating the impact of consumer perceptions on brand equity.

31.1 Introduction

Integrating new technologies, such as artificial intelligence (AI), metaverse, the Internet of Things (IoT) and blockchain, is leading to a shift in the management and brand management paradigm [45]. These technologies are changing how businesses operate and fundamentally altering how work is organized. This leads to the development

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of new organizational structures, business models, and job roles. Companies must stay current on these developments to remain competitive in today's rapidly changing business environment.

Brand management creates, communicates, and delivers brand value to consumers [1]. It involves various activities such as developing a brand strategy, managing the brand's image, and implementing marketing campaigns that effectively communicate the brand's value proposition [30]. Inside Brand Management, there is Brand Equity, which refers to the value that a brand adds to a product or service [32]. It is the differential effect that brand knowledge has on consumer response to the marketing of that brand [1]. High brand equity can increase customer loyalty, brand awareness, and positive associations, translating into higher sales and profitability [11].

With the latest technology developments, we are entering the era of Web 3.0. It is also called the "Semantic Web", a vision for the future of the internet in which data is more interconnected and more manageable for computers to understand [5]. One example of the possibility of Web 3.0 is the concept of the "metaverse" a virtual shared space created by the convergence of virtually enhanced physical reality and physically persistent virtual space [23]. This includes the sum of all virtual worlds, augmented realities, and the Internet, and the metaverse has the potential to change the way we interact with the world and each other, leading to new forms of entertainment, education, and even work [3].

With this being said, the emergence of the metaverse has significant implications for brand management. In the metaverse, brands can create immersive and interactive virtual consumer experiences. This can include virtual storefronts, events, and other interactive experiences. Brands must adapt their marketing strategies to engage consumers in the metaverse effectively. This may involve creating virtual versions of physical products, developing interactive experiences that showcase a brand's values or mission, and using data analytics to understand and target specific audiences within the metaverse. Effective brand management in the metaverse will also involve managing a brand's reputation and customer interactions within the virtual space. This may include responding to customer inquiries and complaints and addressing any negative feedback or reviews promptly and professionally.

According to the literature presented and reports of trustworthy companies, like McKinsey & Company, we can tell that metaverse represents an immense opportunity for brands. Until 2021, the internet searches of the term "Metaverse" increased by 7200% [40]. Moreover, according to them, in 2021 alone, metaverse related companies reportedly raised upward of \$10 billion, more than twice as much as they did in the previous year. The global value creation opportunity from the metaverse could be in the trillions. The market size of the metaverse was over \$38.5 billion in January 2022 and it was expected to exceed \$47 billion at the end of 2022 [12]. In 2030 the worldwide market revenue is expected to reach \$678.8 billion. Regarding the metaverse's market capitalization, the combined market cap of all Web 2.0 (entering Web 3.0) metaverse companies totals \$14.8 trillion. With this, more and more individual and corporate users are entering the digital world of the metaverse.

One reason for the lack of scientific data on brand management in the metaverse is that the metaverse is still largely theoretical and has not yet been fully realized. While some virtual environments could be considered part of the metaverse, such as video game worlds and virtual reality platforms, these environments still need to be expanded in scope and fully embody the metaverse concept. Another reason for the need for more scientific data on brand management in the metaverse is that the metaverse is expected to be a highly dynamic and constantly evolving space, as we saw in past references. As such, it is difficult to predict how brands will be managed within the metaverse and what strategies and tactics will be most effective in this environment.

This proposal explores the adoption of machine learning algorithms to identify topics of discussion of potential consumers. The key contributions of this work are:

- application of LDA-Topic and Bert Topic models to identify topics of discussion
- applied to a brand equity model.

The rest of this paper is organized as follows. Section 31.2 reviews brand management, brand equity and metaverse. Section 31.3 describes the proposed methods for identifying topic discussed by potential consumers. Section 31.4 reports the results of the experiments and tests performed. Finally, Sect. 31.5 summarizes and discusses the outcomes of this work.

31.2 Literature Review

First, we will approach the concept of brand management and brand equity, which has gained significant attention in the marketing field. With the rise of digitalization, how brands are managed, and their impact on a company's financial performance has undergone significant changes. The relationship between the metaverse and brand equity is fascinating. As the metaverse becomes more prevalent in modern society, it is essential to understand how it can impact the value of a brand and how brands can effectively leverage the metaverse to enhance their equity. In addition to the metaverse, various technologies are associated with brand equity, including social media, artificial intelligence, and augmented reality. These technologies have the potential to significantly impact how brands are perceived and can be used to enhance the customer experience, ultimately leading to increased brand equity. This literature review aims to explore the current state of research on brand management and brand equity in digitalization, focusing on the relationship between the metaverse and brand equity and the role of emerging technologies in this process.

31.2.1 Brand Equity

Brand equity refers to the value of a brand in the minds of consumers [32, 33]. It is the positive or negative perceptions, associations, and emotions that consumers have toward a brand, and it can affect their purchasing behavior and loyalty to the brand

[56]. Brand equity has its roots in the early 20th century, with the development of the concept of brand personality [2]. The idea was that brands had distinct personalities associated with human traits and that these associations could affect consumer perceptions and behaviors toward the brand [2]. Over time, brand equity has evolved and become more refined. In the 1980s and 1990s, researchers such as Kevin Keller and David Aaker developed more structured approaches for measuring and managing brand equity [2, 32]. One popular method for measuring brand equity is the brand asset valuator (BAV) model, which identifies four components of brand equity: brand awareness, perceived quality, brand associations, and other proprietary brand assets [32]. Researchers and practitioners have widely used this model to assess the value of a brand and identify areas for improvement [32]. Other methods for measuring brand equity include consumer-based approaches such as choice-based conjoint analysis and multi-attribute attitude models [56] and financial approaches such as the brand valuation method [31]. Research has also shown that brand equity can be enhanced through effective branding strategies, such as building brand awareness and creating positive brand associations through advertising and marketing communications [2]. Strong brands also tend to have higher customer loyalty and price premiums, which can lead to higher profitability for [31]. Recently, the concept of brand equity has continued to evolve and be refined. Researchers have examined the impact of various factors on brand equity, such as the role of social media in building brand awareness and associations [26], the impact of corporate social responsibility on consumer perceptions of a brand [10], and the role of customer experience in building brand equity [8]. Various factors can impact brand equity, including the quality of the product or service, the customer experience, and the overall reputation of the company [31]. For example, a company with a strong reputation for producing high-quality products is likely to have higher brand equity than a company with a reputation for producing low-quality products [31]. Additionally, the customer experience can significantly impact brand equity, as customers who have positive experiences with a brand are more likely to develop positive associations with it and be loyal to the brand [8]. Brand equity is a valuable asset for companies, as it can lead to higher sales and profitability [32, 33]. It is essential for companies to carefully manage and nurture their brand to maintain positive brand equity in the minds of consumers [56]. This can involve effectively managing the various factors that can impact brand equity, such as the quality of the product or service, the customer experience, and the overall reputation of the company [31].

31.2.2 Brand Digitalization and Future of Brands

The digital era has brought about significant changes in brand marketing and customer relationships, known as brand digitalization [15]. Brand digitalization involves the integration of digital technologies into various aspects of branding to cater to the evolving consumer expectations shaped by the proliferation of social media, mobile apps, and other digital channels [39]. To meet these expectations, brands are leveraging digital technologies to gather and analyze valuable customer behavior and preferences data, enabling them to deliver personalized marketing messages and services [41]. Consumers increasingly rely on digital platforms for interactions with brands, so their perception of brands has evolved accordingly. Consumers now anticipate brands to be accessible and responsive through digital channels while also providing tailored experiences that align with their individual needs and preferences [28]. Establishing a solid and loyal customer base depends on brands ability to effectively leverage digital technologies to connect with their target audience and deliver personalized experiences [21]. The role of brand engagement in the digital landscape has gained further significance with the emergence of metaverse commerce and the introduction of branded non-fungible tokens (BNFTs) [38]. The study by Lee, Ho, and Xie [38] emphasizes the importance of BNFTs in building brand engagement within the metaverse commerce environment. BNFTs enable brands to create unique digital assets that enhance customer interactions, foster brand loyalty, and provide immersive experiences within virtual worlds. While brand digitalization offers numerous opportunities, it requires brands to effectively integrate digital technologies into their marketing strategies and customer relationships for optimal results. This necessitates a comprehensive understanding of the preferences and needs of target customers, as well as the ability to leverage digital technologies authentically and transparently [15]. The work of Keller [34] discusses the future of brands and branding, highlighting the significance of multiplicity, heterogeneity, and integration in navigating the evolving landscape. Brands must embrace diversity, cater to customers' individuality, and integrate digital technologies seamlessly to foster meaningful and long-lasting relationships. In the ever-changing consumer marketplace, brands face the challenge of adapting to new dynamics and staying relevant. Campbell and Price [9] identify three key themes for the future of brands in this context. These themes include the importance of sustainability and ethical practices, the rise of experiential marketing, and technology integration in brand-customer interactions. Brands must consider these themes to align with consumer expectations, create differentiated experiences, and stay competitive. In summary, brand digitalization reshapes how brands engage with consumers in the digital age. Integrating digital technologies enables brands to deliver personalized experiences, establish strong connections, and build loyalty. The role of BNFTs in metaverse commerce enhances brand engagement, while considerations of multiplicity, heterogeneity, sustainability, and technology integration shape the future of brands. By effectively balancing digital strategies with traditional marketing approaches, brands can thrive in the evolving digital landscape [21, 34, 38, 41].

31.2.3 Metaverse

The concept of a metaverse has garnered significant attention in recent years as virtual and augmented reality technologies have become more prevalent, and the Internet has become increasingly interconnected [25]. The metaverse, which is a virtual shared space created by the convergence of virtually enhanced physical reality and phys-

ically persistent virtual space, including the sum of all virtual worlds, augmented reality, and the Internet [52], has the potential to fundamentally change the way we live, work, and interact with one another. One potential application of the metaverse is in the realm of education [14]. Virtual reality and augmented reality technologies have the potential to revolutionize the way we teach and learn, providing immersive and interactive learning experiences that were previously unimaginable [48]. For example, virtual field trips could allow students to visit and explore distant locations without leaving the classroom. At the same time, augmented reality could provide contextual information and enhanced learning experiences [14]. The metaverse also has significant potential for use in commerce and marketing [38]. Virtual reality could allow consumers to try on clothes and accessories or test out products before purchasing. In contrast, augmented reality could provide real-time information and recommendations to shoppers [49]. This has the potential to change the way we shop and make purchasing decisions fundamentally. In addition to education and commerce, the metaverse has significant potential for use in the entertainment industry [51]. Virtual reality and augmented reality technologies have already been used to create immersive and interactive experiences in movies, music, and video games [25], and the potential for these technologies to be used in live events such as concerts and sporting events is vast [51]. While the potential for the metaverse is significant, some challenges must be addressed. These include issues related to privacy and security [54], as well as the need for more research to fully understand the potential impact of the metaverse on society [48]. However, the future of the metaverse is bright and full of possibilities.

31.2.4 Metaverse and Brand Equity

Metaverse has the potential to revolutionize the way brands engage with consumers and create value [55]. The metaverse can enhance brand equity through immersive brand experiences [55]. Brands can create virtual spaces within the metaverse where consumers can interact with their products and services in a more meaningful and engaging way [17]. This can help to build a stronger emotional connection with consumers and increase brand loyalty [55]. Another way that the metaverse can impact brand equity is through the creation of virtual goods and services [20]. In the metaverse, consumers can purchase virtual items or experiences representing a brand, such as virtual clothing or accessories [17]. This can help extend a brand's reach and influence beyond the physical world and create new revenue streams [20]. Ultimately, the success of the metaverse and its impact on brand equity will depend on the willingness of consumers to engage with and support [55]. As the metaverse grows and becomes more mainstream, it will be necessary for brands to understand the needs and preferences of their target audience and create compelling and relevant experiences that meet those needs [18]. Doing so can build stronger, more valuable relationships with their customers in this exciting new digital landscape [20].

31.2.5 Relationship Between Consumers and Brand Equity in Metaverse

Consumers play a central role in shaping companies brand equity in the metaverse. Brand equity, which referred to the value and perceived quality of a brand, is influenced by various factors, including consumer attitudes and behaviors [32]. In the context of the metaverse, where virtual experiences and interactions are paramount, consumer engagement, participation, and purchasing behaviors significantly contribute to brand equity [18, 20]. Consumers engagement and participation in virtual brand experiences within the metaverse profoundly impact brand equity [20]. Brands that create immersive and engaging virtual spaces are more likely to attract and retain consumers, leading to stronger emotional connections and increased brand loyalty [17]. These captivating virtual experiences not only meet the needs and expectations of consumers but also foster positive brand associations, enhancing brand equity [20]. The dimensions of experiential value, including hedonic, utilitarian, and symbolic importance, play a significant role in the relationship between consumer experiences and brand equity in the metaverse [44]. Hedonic value, associated with enjoyment and positive experiences, is necessary to attract users to engage with virtual worlds [44]. As consumers enjoy the branded virtual world, they recognize the utilitarian and symbolic values it offers, leading to positive brand attitudes, consumption intentions, and loyalty behaviors [27, 44]. Consumers purchasing behaviors significantly impact brand equity in the metaverse [20]. When consumers purchase virtual goods or experiences that represent a brand, they contribute to its overall value and perceived quality [17]. Virtual purchases increase brand awareness and recognition and foster positive associations, as consumers perceive the brand as desirable and valuable [32]. Consumer-brand engagement (CBE) is a crucial factor in shaping brand equity in the metaverse [47]. CBE refers to customers participation and connection with a brand's offerings and activities throughout the customer journey [53]. It encompasses cognitive, affective, and physical resources devoted to brand interactions, such as word-of-mouth, social media participation, and feedback [53]. CBE contributes directly and indirectly to the value of a company and influences brand perception, purchase intent, and behavioral engagement [47]. By understanding the needs and preferences of their target audience and creating relevant and compelling experiences, brands can build strong, valuable relationships with customers in the metaverse [17]. Such relationships foster customer engagement and support, enhancing brand equity [20, 38]. Additionally, the study by Lee, Ho, and Xie [38] explores the effects of customer brand engagement on brand equity in the metaverse. They find that customer brand engagement significantly predicts brand equity, indicating that engaged customers contribute to the overall value and quality perception of a brand in the metaverse. By understanding the needs and preferences of their target audience and creating relevant and compelling experiences, brands can build strong, valuable relationships with customers in the metaverse [17]. Such relationships foster customer engagement and support, enhancing brand equity [38].

In addition, the emergence of Web 3.0 and the metaverse has presented important marketing and branding opportunities for organizations to enhance brand image, especially among young customers [36]. Companies are attempting to build a firstmover advantage in the metaverse to be relevant with new generations of consumers, create brand awareness and bring them into the stores in the future. However, the widespread adoption of the metaverse also poses many challenges related to governance, ethics, safety and security, acceptable behaviors, privacy, and potential disenfranchisement of sections of the population unable to access the necessary infrastructure to access the metaverse [19]. Overall, these recent discoveries in the field of AR Marketing and the metaverse demonstrate the potential for new and exciting levels of interaction between the virtual and physical worlds, but also highlight the need for further research on the ethical and societal implications of these technologies.

31.3 Methodology

The main focus of this research is to investigate how consumer perception influences brand equity in the metaverse. Through the collection and analysis of data, the aim is to understand how consumer perceptions shape the value and reputation of brands operating within the virtual world of the metaverse, as explained more deeply before. By examining the factors that impact consumer attitudes and behaviors toward brands, this study aims to shed light on the role of consumer perception in developing and maintaining brand equity within this digital environment. Ultimately, the goal is to contribute to a more comprehensive understanding of the complex relationship between consumer perception and brand equity in the metaverse. To effectively study the online community or culture within the metaverse, it is crucial to consider relevant variables that align with the research question and the aspects of the online community under investigation. Variables identified as pertinent for studying online communities include their behaviors and activities, attitudes and beliefs, social and cultural dynamics, and outcomes or consequences of community participation [46]. These variables provide a comprehensive framework for exploring the complex dynamics within the metaverse online community and their influence on brand equity. For reproducibility purposes, the code and data is available.¹

31.3.1 Objective and Research Question

This research aims to investigate the intricate relationship between consumer perception of brands within the metaverse and its powerful impact on brand equity. The study aims to determine how consumer perception of brands in the metaverse influences

¹ https://drive.google.com/file/d/1uDDcrF7Q8KI0QSkKol-FV_2iKaWimhzj/view? usp=share_link.

overall value and equity. Understanding consumer perception and attitudes toward this emerging trend is crucial for businesses seeking to navigate this new frontier successfully. In this regard, Reddit [13], a popular social media platform, stands out as an invaluable resource for conducting investigations and gathering insights. Reddit's user base is diverse, encompassing various demographics and interests, which makes it an ideal platform for studying consumer behavior [24]. Subreddits dedicated to virtual reality, gaming, and technology attract passionate and engaged communities that offer valuable perspectives on the intersection of brands and the metaverse. Researchers can tap into this diverse user base to obtain a broad range of insights from consumers with different experiences and opinions. Reddit's platform allows users to remain anonymous, creating an environment conducive to open and honest discussions [42]. Anonymity encourages individuals to share genuine thoughts, experiences, and concerns related to brands entering the metaverse. Researchers can obtain authentic insights that may not be readily available through other channels, leading to a more comprehensive understanding of consumer perceptions. Furthermore, anonymity helps protect participants privacy, addressing ethical considerations in research [22]. Its design facilitates dynamic conversations through threaded discussions and an upvoting system [37]. This structure ensures that the most relevant and valuable content rises to the top, enabling researchers to identify critical trends, sentiments, and concerns. The upvoting system also provides a quantitative measure of emotion within the community, allowing researchers to gauge the popularity and consensus around certain view-points.

The research question that guides this study is as follows:

• RQ1: What are consumers perceptions regarding brand equity in the metaverse?

31.3.2 Netnography Approach and Web Scrapping

Netnography is a research methodology that systematically analyzes online communities and virtual spaces to understand social interactions, behaviors, and opinions [35]. It provides valuable insights into the digital realm and allows researchers to explore the dynamics of virtual communities. Web scraping involves extracting and collecting data from websites or online platforms automatically. The web scraping process involved accessing relevant discussions, threads, and comments within the metaverse community on Reddit. Specific keywords related to brands entering the metaverse were used to retrieve relevant data. By analyzing these data, the study aimed to understand the feelings and perceptions of consumers toward brands in the metaverse. By employing netnography and web scraping techniques, this study aimed to capture the real topics in discussion and opinions within the metaverse community, providing valuable insights into consumer-brand interactions and their impact on brand equity.

This section begins with an explanation of the data collection process and further processing, highlighting the methods used, the sources of data, and the rationale

behind their selection. By delineating the data acquisition process, we can understand the foundation for the subsequent analyses and findings.

Gather Data and Pre-processing After scraping all the information related strictly with the "metaverse" community we got 696 posts and comments during a period of June 2022 until May 2023.

To improve the quality of the data, we applied several pre-processing techniques like: (i) merging all the comments to the respective post; (ii) remove punctuation; (iii) remove symbols and numbers; (iv) remove redundant words; and (v) remove stopwords. We enforce that all the remaining words are described in English dictionary.

31.3.3 Models

The data is analyzed using several topic models and visualizing tools like the pyL-DAvis in the Analysis step.

Latent Dirichlet Allocation (LDA) [7] is a statistical model used to discover the hidden thematic structure in a corpus of text. It is a generative model, assuming a specific process generated the data. In the case of LDA, the process is that each document is a mixture of topics, and each topic is a distribution over words.

NeuralLDA [50] addresses the topic modeling problem using autoencoding variational Bayes, but it has yet to prove easy to apply to topic models. This model tackles the problems by the Dirichlet prior and by component collapsing.

Embedded Topic Model (ETM) [16] is a generative model that marries traditional topic models with word embeddings. In particular, it models each word with a categorical distribution whose natural parameter is the inner product between a word embedding and an embedding of its assigned topic. The model discovers interpretable topics even with large vocabularies, including rare and stop words.

Contextualized Topic Models (CTM) [6] replaces the input BoW in NeuralLDA with pre-trained multilingual representations from an extended version of a BERT model. The model learns topics in one language and predicts them for unseen documents in different languages (transfer learning).

31.3.4 Evaluation Metrics

Coherence Metrics (Metric₁) [43] The coherence measure is based on cooccurrences of word pairs. Given an ordered list of words $T = \langle w1, \ldots, wn \rangle$ the UMass-coherence is defined as:

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$$c_{\text{UMass}}(T) = \sum_{m=2}^{M} \sum_{l=1}^{m-1} \log \frac{p(W_m, W_l) + \frac{1}{D}}{p(W_l)}$$
(31.1)

A boolean document model is assumed to estimate word probabilities p, i.e., $p(W_m, W_l)$ is the ratio of number of documents containing both words W_m , W_l and the total number of documents in the corpus D. The smoothing count 1/D is added to avoid calculating the logarithm of zero.

Diversity Metrics (Metric₂) [16] Topic diversity is the percentage of unique words in the top 25 words of all topics. Diversity close to 0 indicates redundant topics, and close to 1 indicates diversity.

$$TD(k) = \frac{\#Unique_words \in Top_k_words}{\#Top_k_words * \#Topics}$$
(31.2)

Similarity Metrics (Metric₃) [29] Pairwise Jaccard similarity is a measure of similarity between two sets (A, B). It is calculated by dividing the size of the intersection of the two sets by the size of the union of the two sets and can be computed as follows:

$$J(A, B) = \frac{|A \bigcap B|}{|A \bigcup B|}$$
(31.3)

Topic significance Metrics (Metric₄) [4] Kullback-Leibler Divergence (D_{KL}) is a distance measure based on the KL divergence. Thus, the distance of the topic distribution over words $\phi^{(k)}$ and the distance of the topic distribution over documents $\vartheta^{(k)}$ from D_{KL} -BGround $\Omega(B)$ can be computed as follows:

$$B_k^{KL} = D_{KL}(\vartheta^{(k)}, \Omega(B)) \tag{31.4}$$

31.4 Results and Discussion

We evaluated the described models according to the common evaluation metrics for topic modeling. In Table 31.1, we boldly highlighted the best results for each evaluation metric. Observing the results, we can say that the CTM is the best model in terms of diversity in the Top_k words and has the lowest similarity between topics. The ETM model is the one that achieves a better coherence between topics. Finally, the LDA model has a better topic significance. This metric uses the Kullback-Leibler Divergence to measure the distance between the distribution of words in two topics. For this study, we are interested in topics with distant word distributions, i.e., how likely each word appear in that topic and how divergent the topics are. Based on this assumption, we adopt the LDA model to produce the topic visualization and analyze the results.

Model	Metric ₁ [43]	Metric ₂ [16]	Metric ₃ [29]	Metric ₄ [4]
LDA [7]	-0.845	0.250	0.464	2.121
NeuralLDA [50]	- 12.428	0.870	0.021	0.262
ETM [16]	-0.759	0.190	0.683	0.158
CTM [6]	- 10.738	0.990	0.001	0.348

Table 31.1 Topic models—comparison results



Fig. 31.1 LDA topic visualization

In the results of Fig. 31.1, we chose to focus in the analysis of the "Topic 1" statistics and the top four terms. One of the reasons is because the "Topic 1" is much more prominent than the others and because in this analysis there are still several stop words. The term "metaverse" emerges as highly significant, with an overall term frequency of approximated 1618 and an estimated term frequency of 539 within the selected topic. This highlights the transformative potential of the metaverse as a virtual shared space where brands can create immersive experiences for consumers. The increasing prominence of the term "metaverse" aligns with the growing interest in this concept, as evidenced by the exponential increase in Internet searches and the substantial investments in metaverse-related companies [40]. The term "people" holds moderate importance, with an overall term frequency of 559 and an estimated term frequency of 196 within the selected topic. In the context of brand management in the metaverse, "people" likely refers to the individuals who engage with brands within the virtual space. Understanding the preferences, behaviors and needs of people in the metaverse is essential for effective brand management. It entails adapting marketing strategies to resonate with the target audience and creating immersive

experiences that capture their attention and engagement. While the term "like" has a moderate overall term frequency of 662 and an estimated term frequency of 174 within the selected topic, its specific relevance to brand management in the metaverse requires further analysis. The context in which "like" is used in the comments of consumers, needs to be explored to determine if it pertains to general preferences or if it carries a more specific meaning in the metaverse context. In our analysis, we noticed that the term "think" exhibits a relatively lower overall term frequency of 290 and an estimated term frequency of 140 within the selected Topic 1. While it may not be as frequently mentioned as terms like "metaverse" and "people," its presence in consumer discussions within the metaverse context is noteworthy. The utilization of the term "think" in this context likely signifies a deeper layer of cognitive reflection and contemplation within the virtual world of the metaverse. It may encompass various facets, including user experience, brand perception, virtual decision-making and engagement strategies.

These findings underscore the transformative potential of the metaverse in the context of brand management. To further deepen the understanding of brand management in the metaverse and its implications, additional research is necessary. This includes exploring the nuances of the terms "people", "like", and "think" within the specific social media comments and analyzing their influence on brand perception and consumer behavior in the metaverse.

31.5 Conclusions

Our research sought to unravel consumers perceptions concerning brand equity within the metaverse. To this end, we evaluated various topic models, ultimately selecting the Latent Dirichlet Allocation (LDA) model for in-depth analysis. Foremost among these findings is the overwhelming significance of the term "metaverse". With an astounding overall term frequency of approximately 1618 and an estimated term frequency of 539 within "Topic 1," it underscores the metaverse's profound transformative potential. This virtual shared space emerges as a dynamic arena where brands have the opportunity to craft immersive experiences that resonate deeply with consumers. Furthermore, the increasing prominence of "metaverse" mirrors the surging interest in this concept, corroborated by the exponential rise in Internet searches and substantial investments in metaverse-related companies. Our investigation into "Topic 1" within the LDA model unearthed pivotal insights illuminating the complex interplay between consumers and brand equity in the metaverse. Specifically, we extracted salient terms that offer profound glimpses into how consumers perceive and engage with brands within this virtual domain. In essence, our data mining exploratory approach unraveled the intricate tapestry of consumer perceptions regarding brand equity in the metaverse. The metaverse's transformative potential, consumer engagement dynamics, and cognitive dimensions in this digital realm came to light through our analysis.

These findings serve as a foundation for illuminating the metaverse's profound implications for brand management. As our journey continues, further research will delve deeper into the nuanced meanings of "people", "like", and "think" within social media comments. This ongoing exploration will provide a richer, more nuanced understanding of how these perceptions wield influence over brand perception and consumer behavior within the dynamic metaverse landscape.

31.5.1 Limitations and Future Research

Our research, rooted in online metaverse communities, provides insights. Diversifying data sources to include social media platforms and virtual worlds can broaden our perspective on consumer perceptions. Applying our effective data mining to brand equity models holds promise. Using specific brand equity metrics could deepen our analysis. Given the metaverse's dynamism, longitudinal studies are vital to track evolving consumer perceptions and trends. To better understand consumer impact on brand equity in the metaverse, avenues like qualitative and quantitative analysis, comparative studies, user segmentation, cross-platform analysis, and brand equity metrics are promising. These efforts empower scholars and practitioners to navigate the metaverse effectively, ensuring brand success in this dynamic digital landscape.

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Chapter 32 Metaverse for Sustainable Marketing Toward Circular Economy



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Abstract Metaverse is a novel technology which remain a call for a universal accepted concept but its implications in Marketing have been widely discussed since Facebook started focusing their investment and re-named their company as Meta. When coping with challenges of sustainability and the future business model, known as circular economy, metaverse potentially becomes a tool to optimize user or customer experience, prevent any waste or excessive cause, and promote sustainable ideas, products, and practices in more vividly interactive environment, also known as a mixed reality. Deriving from education applications, metaverse is expected to emerge in commercial field as a strategic competitiveness, however, most of its practical implications has been under developing and the circularity promotion was rarely mentioned. Therefore, this paper aims to unveil the extension of metaverse's possibilities and capabilities for sustainable marketing integration in the circular economy transition.

32.1 Introduction

The development of innovative technologies has quickly changed the operational methods of businesses in communication and cooperation. From the digital socialization with social media platforms to the virtual reality (VR) and augmented reality (AR) technologies that has transformed how people connect with each other and with the rest of the world [1, 2]. The development of web3, decentralization, then, the metaverse has been discussed in most of tech-related conversations. The metaverse is a blended environment between virtual and real worlds that exists in real-time and allow users to maximize their experiences with an immersive virtual or augmented reality which driven by digital assets, nonfungible tokens (NFTs), or cryptocurrency

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[3, 4]. Although the technologies for metaverse is still at infancy stage of development, the potential implications of such interconnected virtual and real worlds open very promising transformations in every day human life as well as business models and other practices [1, 4].

As starting points of metaverse focus on communications and entertainment, its applications are directly associated with marketing activities to improve customer experiences and engagements with campaigns and contents across media channels [5–7]. The virtual reality environment of metaverse is obtained much attention in marketing practices along with the popularity of virtual reality (VR) games and the availability of such VR devices for enhanced experiences with the applications of blockchain technologies for quick and trustworthy transactions [8, 9]. The business now can employ virtual facilities to allocate their resources in optimal methods, from researching and understanding market demand to designing and creating their omnidistribution channels effectively and efficiently to end-users' hand and driving value co-creation [10]. In addition, the metaverse open for the potential of transformation in customer's landscape with an enhancement of end-to-end customer experience journeys in an open space of extensive creativity [6, 11].

Undoubtedly, the metaverse is attracted users since the idea has launched last decades as more convenience and accessibility more than ever before. This hybrid environment is also highly potential for sustainability and circular business models [12, 13]. The adoption of such technological phenomenon can well support for the alternative physical interaction or experimentation and replace with more visualization and pre-design or in-design recommendations for a holistic closed loop value chain of materials, products, and upcycled ones [14]. As a new technology, the research on metaverse and its applications is quite limited and fragmented although some research has toughed the idea of sustainability [2, 13–15]. As a result, this paper aims to produce a holistic approach on how metaverse can contribute to the circular economy transition through the lens of sustainable marketing focusing on customer experiences' enhancement toward sustainable consumption and practices.

32.2 What the Metaverse Is

32.2.1 Brief History

The name of "metaverse" was first mentioned in a friction novel named Snow Crash written by Neal Stephenson in 1992, in which, the author described it as a dystopian virtual environment where users can exchange virtual properties with 3D experiences through goggles [16]. In the mid-1990s, Jaron Lanier successfully developed affordable VR glasses that now used in games widely. During those years, researchers at the University of Illinois Chicago launched the Cave Virtual Environment VR system at a room-size with images' projection on walls and bring a sense like immersion [17].

This technology has been used in museums and exhibitions like in the Van Gogh experience events nowadays. The first virtual world used in games created in lab, known as Second Life, can be tracked in 2003 by Phillip Rosedale and his colleagues. In 2000s, other platforms, such as, Traveler, Croquet, ActiveWorlds, Open Simulator or Blue Mars, also used integrated a graphical user interface and VR technology [3]. But only since Blockchain Technology invented in 2009, a decentralized online virtual world platform was able to launch in 2015 [18]. After that one year, the popularity of Pokémon Go game has been significant changing the awareness of a virtual environment over a real-life setting. After the success of Nintendo (the Pokémon Go game company), the more application of metaverse in entertainment has used, such as, Epic Game's Fortnine has employed the metaverse for virtual concerts and tours. In the challenges of quarantine during recent pandemic, the potentials of the metaverse had great opportunities to perform with all replacement activities, for example, online learning, meetings, conferences, exhibitions, fashion shows, and others. The demand of virtual platform has emerged, been identified, and become "new normal" to many users worldwide [19]. The history of the metaverse goes along with the development of immersive technologies that turn futuristic science friction images to virtual media supported sophisticated hardware that even prove its efficient practices in some certain restriction conditions like in Covid-19. The number of events that significantly promoted for the emergence of the metaverse is listed in the Fig. 32.1 as follows.

32.2.2 Definitions

The name as metaverse, in fact, is a combination of prefix in ancient Greek "meta" ("implying transcending") and suffix of the English word "universe". In other words, the name implies the new universe which can beyond imagination with a 3D space with interactive people and objects like a real world [2]. Thanks to the development of innovative technologies, the imagination world now can be come true in life with the support of Extended Reality or Cross Reality (XR) which includes Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR) [5, 21]. While VR is digitally artificial environment that can be operated like physical surrounding world, AR uses digital inputs and virtual elements into physical environment. On the other hand, MR is reflected as an advanced AR iteration where the physical environment interactions can be real-time and projected digital data [22]. These immersive technologies will replace 2D environment with multisensory interactions in the metaverse and open much more virtual experiences like real life and beyond human's fantasy [23]. In most of research, the metaverse was mentioned as a network of virtual world with the facilitation of VR, AR, MR, blockchain and the Internet to create a fully immersive, 3D experiences for users. However, the actual definition of the metaverse has been evolving due the development of digital technologies and still calling for a universal accepted concept based on the user's perspective and the possible implementations (Fig. 32.2).



Fig. 32.1 Historical events that led to the development of the metaverse (CNBC) [20]



Fig. 32.2 The informal metaverse architecture [17]

32.2.3 Implications of the Metaverse

The possibilities of the metaverse have been discussed the last decade with more and more applications in everyday life activities. A several most popular usages of the metaverse can be named as follows.

Meta Entertainment. Entertainment is the first industry adopted the metaverse as see in a number of applications in game development because it is the most easily identifiable utility. The usage of the metaverse has been extended in many entertaining activities, e.g., film production, concerts, or event organization. In which, the technology aids in virtualizing real-world performance without any limitation in term of time, space, number of participants, or settings [24].

Meta Education. The metaverse is highly potential for education due to its radical innovation, simulation-based that ensure for health and safety or skills training and development. AR or VR is well support learning process with spectacular journey with better accurately and objectively education that also enhance students' engagement and performance [25].

Meta Tourism. Metaverse advances travelers' experience from e-tourism and smart tourism. The technologies like brain-machine interface (BMI), head mounted display (HMD), and blockchain in metaverse allow tourists have extensive simultaneous experiences that are closer to touristic reality, at the same time, can avoid negative environmental impacts [10, 26].

Meta Retailing and Leisure. The idea of the metaverse retailing started quite earlier any other marketing application of metaverse [27]. The revolution has been happening when most of big brands in the fashion industry has adopted the technology to provide seamless experiences for their customers. Virtual fitting or virtual shopping can offer much convenience and fun engagement, especially for young audience [28]

Meta Health Care. Similar like education, the advantage of safety is a huge potential for applications of metaverse in health care. However, it is not just limited from training activities, the extended reality can open a live virtual place that allows more people to accessible medical solutions. Diagnostic and therapeutic practices can happen from distance and avoid any unnecessary transmission [29, 30]. In addition, it also can improve mental health and well-being [31].

Meta Office. Hybrid working system become common after Covid-19 but remaining with challenges on productivity and mental health condition. Metaverse create an interactive environment like real office with face-to-face connection regardless time zone and space. Therefore, it is promising in resource efficiency but still remain high effectiveness on working performance [32].

Meta Design. Beyond 3D design, metaverse enables a mutual environment for both designers and users to share and exchange ideas. Similar to entertainment, virtual showrooms, galleries, and events can be opened for exploration and co-creation at higher levels [33].

Meta Cities and Transport System. The development of smart cities can be well supported by the metaverse. The core advantage lies on the seamless data exchange across cities to forecast, manage, and maintain quality of life for citizens. Thanks to big data and predictive analytics, dangers or challenges can be minimized, at the same time, resourceful efficiency, and waste solutions are expected to be improved [34].

Moreover, there are limitless applications in other industries, such as, manufacturing with the emergence of Digital Twins and Artificial Intelligence (AI), supply chain management with Intelligent Decision Support Systems (IDSS) and geographical mapping or so. The integration of metaverse could support to solve the current challenging issues on risk management and disruptive preventions by higher interactive information exchange with vivid, real-time, virtual reality.

32.3 Metaverse for Sustainable Marketing in Circular Economy

32.3.1 Metaverse for Sustainable Marketing

Since the Internet and Web3 technologies has changed our behaviors nowadays from individual personal life to how we communicate and work with other people, so do the metaverse and the future of shifting behavior in consumption [4, 35, 36]. As a result, sustainable marketing is no more a choice but the must for surviving and competitive strategies as it is a market-driving phenomenon [37]. Megatrends in marketing and much recent research has been focused on macromarketing aspects of sustainability and consumption that contributed to our knowledge and understanding of the value of integrating environment and social issues with opportunities in commercial marketing approaches.

The existing literature underlines the role of digital technologies as a transforming factor and the metaverse keeps enormous potentials for immersive customer experiences. First, the 3D environment well support in creating lifelike simulations that allow customers to see full options, to try on and to improve grasp on interested products before making decision in purchase [35]. This benefit is also good practice for new product concept development and market research that ensure for successfully launching and drawing big attention from pre-launching stage [38]. Secondly, the metaverse's existence helps brands or companies to maintain their online presence with less investment on advertising [39]. In such virtual environment, marketing content is originally created and managed by organizations to foster customers' loyalty and develop their own truthful communities. In addition, the multi-dimensional connections in a metaverse platform open for more direct communications, facilitate value co-creation, and nurture as well as reinforce customers relationship [40].

In several market research, the higher intention to make purchase to try new product in the metaverse is higher than traditional channels. Such research also reveals the capabilities of metaverse in building a robust presence which call for more engagement and open for value co-creation which traditional advertising or branding campaigns are hard to achieve. In other words, instead of one-way communication (B2C), the metaverse extend information flows to B2C2B that allow direct and faster communication between brands and customers regardless time and space, thanks for virtual assistants and AI technologies. The role of influencers or celebrities can be actively closer with target audience; however, risks of security and negative user generated content should also be aware and prevented [41].

In the lens of sustainability in business, it can be easily highlighted the employment of virtual environment is more efficient and attractive to customers from branding to customer relationship management and considered as a cost-effective investment rather than other digital paid advertising. In fact, even with paid advertising campaigns, if they are launched in the metaverse, distinctive features of users can be identified in much detail and support enhancement of customized interactions with customer at personalized level for retaining loyalty [42, 43].

The metaverse is an integrated environment for delivering emotional experiences combine with virtual AI assistant, known as recommendation systems that allow an effortless journey in decision making and increase satisfaction level from customers [44, 45]. Besides, the access to global via the metaverse's application is unlimited with high acquisition potentials [46, 47].

32.3.2 Metaverse as an Accelerate Enabler for Circular Economy

The metaverse is an advanced digital platform that acts as an enabler in circular economy transitions. The virtual environment allows quicker and higher efficiency to promote sustainable consumption and production. The physical consumption can be reduced through virtual experience or test or speedy exchange [36]. Sharing economy or deeper awareness and actual practices can be extensively diffused in virtual environment [48, 49]. Alternatively, the setting of unsustainable compliance alarm can notify or reminder people for shaping good behaviors toward circularity. As a result, the metaverse grows as a potential tool for circulating excessive materials, recycle, and upcycling as well as attracting actively participation in closed loop value chains [14, 15]. The hype about the metaverse last several years emerge more concerning about safety and how to employ the technology in effective and efficient ways for long term development. Even the metaverse is considered as an accelerate tool for sustainability, the problematic issues related to commercial infrastructure and visual attractiveness could associate with unsustainable consumption (Table 32.1).

32.4 Conclusion

The metaverse is not just a phenomenon in sustainable marketing and circular economy but a future of immersive world where nothing is impossible. The metaverse will enable multiple activities, at the same time, foster deeper and longer lasting knowledge and memories. It is noteworthy to both entrepreneurs and individuals to enjoy its benefits but still aware the limitations and challenging issues in order to implement such virtual environment in more realistic ways. Since the metaverse is still a novel concept and not yet widely implemented in everyday life activities, the concerns regarding to its impact on human mind and body as well as security issues should be solved beforehand, then, the development of the metaverse could sustainably reach customers and users. In sum, metaverse is an inevitable enhancement application toward sustainability and circularity.

Benefits	Challenges
Improved circular promotion through prediction and analytics with high personalized levels	Economic gaps may not be solved and could worsen inequality between urban and rural areas
Reduced physical materials in marketing with better cost effectiveness	Ethics, privacy, and security issues may arise, hindering adoption
Reduced energy consumption and carbon emission as well as time and effort	The actual impact on human life and well-being as well as the threats from cyber
Enhanced social interactions and engagement for closed loop value chains	The usability may be challenging for different users due to age, background, health conditions,
Potential for improved urban planning, transit, energy generation, health, education, entertainment, and other dimension affecting quality of life and holistic control for circularity	Required explicit process and practices for public security and safety control

 Table 32.1
 Benefits and challenges of the metaverse in sustainable marketing toward circular economy

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Chapter 33 How Can Businesses, Low-Tech Businesses in Particular, Benefit from the Metaverse? A Delphi Perspective from Academics



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Abstract Two years ago, Meta was born, accompanied by the announcement of the Metaverse. The Metaverse would be a collection of 3D immersive ecosystems for people's socialization. This innovative idea should allow one to live in the Metaverse as in real life without physical barriers. Attending shows, concerts, virtual travel, and caring for one's health or education should be possible. In sum, a new marketplace

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is born. Amid such newness, the question of how businesses may benefit from the Metaverse arises. Albeit tech businesses must be comfortable and adapted to the potentialities of the new marketplace, the entrance of the low-techs may be more problematic. The study brings together a panel of academic experts to reflect on these questions. They agree that there is a myriad of potentialities in the new marketplace, not only for B2C but also for B2B. Low-techs may be less adapted to benefit from the Metaverse. A following-the-wave strategy must be avoided. On the contrary, investing in understanding the new paradigm and careful planning is essential. The Metaverse has no physical barriers, which tend to limit low-techs' actions. Their nonexistence creates new opportunities and must be where customers are, after all. The Metaverse, however, still needs development to gain critical mass. Hardware easy to use, its cost, speedy and cheap Internet, and mainly, trustable and recognized currencies are still required. Nonetheless, the Metaverse may be a new world full of opportunities.

33.1 Introduction

Two years ago, Mark Zuckerberg announced the Metaverse, "an embodied internet where you're in the experience, not just looking at it" [1]. Immersive is the adjective that describes the new world of experiences. He continues, "The defining quality of the metaverse will be a feeling of presence — like you are right there with another person or in another place. (...) In the metaverse, you'll be able to do almost anything you can imagine — get together with friends and family, work, learn, play, shop, create — as well as completely new experiences that don't really fit how we think about computers or phones today".

The buzz created was notorious, academia included. Forty-two scholars expressed their views of Metaverse "beyond the hype", covering fields such as business, marketing, tourism, manufacturing, governance, and sociopsychology [2]. Marketing received a second reinforcement focusing on the future of consumer research [3]. A pervasive presence of business is anticipated. Thinking that the Metaverse is confined to gaming is a shortsighted view of its potentialities as it is estimated to impact enter-tainment and consumer products, health care, education, B2B, etc. [4]. The Metaverse is an immersive and interoperable collection of virtual ecosystems replicating the real social world [4–6]. Schöbel and Leimeister identify four structuring perspectives, innovation, production, transaction, and social interaction and foresight "the metaverse offers vast opportunities for digital innovations beyond traditional social media or computer games and creates new infrastructures for add-on innovations in all areas of the digital economy" [6].

Hollensen, Kotler, and Opresnik identify eight building blocks in Metaverse: (1) hardware, (2) networking, (3) compute, (4) virtual platforms, (5) interchange standards and tools, (6) payment, (7) content, services, and assets, and (8) consumer and business behavior [4]. Based on these elements and others from the pertinent literature [2, 3, 6], we brought together a panel of academic experts to reflect on how businesses may benefit from the Metaverse, particularly low-tech businesses, as these will probably be the least prepared for the potential of the Metaverse.

33.2 Method

The study grounds on the method Delphi as formalized in [7]. Besides it is an intrinsic forecasting method, and the time of the study's theme is in the future, taking into account the actual state of affairs, Delphi gets together the perspectives of a group of experts in the field, but without them facing each other. Such particularity contributes to obtaining opinions freely expressed without involving eventual authorship oppositions, contributing to a richer portrayal of the situation and range of solutions.

33.2.1 The Delphi Method

Theodore J. Gordon formalizes the method Delphi in one plus four stages [7]:

- compose the panel of experts;
- the first stage, exploratory questionnaire;
- the second stage, confrontation with extreme opinion holders;
- the third stage, synthesis, and its reassessment;
- the fourth stage, subsequent synthesis, and respective reassessment.

The process aims to achieve consensus among the panel of experts [8]. Within this practice, the reasons that sustain extreme positions are revealed so they are attenuated or polished during subsequent iterations. Nonetheless, consensus is not an objective in the present study. Instead, "The value of the Delphi method rests with the ideas it generates, both those that evoke consensus and those that do not. The arguments for the extreme positions also represent a useful product" [7]. Thus, the second stage is avoided, favoring the emergence of a maximal range of perspectives, extreme or central, leaving up to the reader to consider the relevance and reasonableness of each one.

Nonetheless, this is a not-yet-finished ongoing study. At this time, some perspectives from academics are analyzed. These perspectives pertain to the first round of questions.

Because the nature of the study is exploratory, a qualitative approach was preferred instead of quantitative. Structured questionnaires could facilitate the alignment of opinions and data analysis. However, exploring and make emerging the range of perspectives is more consonant with the aim of the study, which led to the option for a qualitative study.

A structured questionnaire was out of option, then. An unstructured questionnaire with loose questions fits better with the study's exploratory nature. However, too many degrees of freedom for the panel of experts could have eased multiple disparate directions, missing assorted perspectives over critical facets of the problem. The option was then for semi-structured, open-ended, in-depth interviews. Some interviewees, however, preferred to give written answers.

In the first stage, the initial questions are prospective, i.e., they envisage future scenarios or the paths and means to achieve a certain future state, considering the actual situation. The exploratory key ideas were extracted from the academic and business literatures and are ten:

- definition of Metaverse;
- the Metaverse as a new marketplace;
- who benefits from the Metaverse;
- the industrial Metaverse;
- low-tech businesses and the Metaverse;
- the future of the Metaverse;
- hardware influence;
- Meta controversies impact;
- competing platforms;
- extra comments.

Definition of Metaverse. Although the idea is not entirely new, the myriad of opportunities that recent technological advancements have enabled contributes to new conceptual expansions and redefinitions. It imposes, therefore, to probe and collect the evolution of the concept from experts. The opening question is, "What is your definition of Metaverse?" Depending on how the experts address alternative realities, or not, complementary questions may be "Considering various types of reality technologies (e.g., virtual reality - VR, augmented reality - AR, extended reality -ER, and mixed reality - MR), what does the Metaverse have that these 'realities' do not still have?" and "Is there any differentiation or added value that Metaverse can bring?".

The Metaverse as a new marketplace. Talking about businesses is talking about markets. Thus, after the introductory concepts, the topic begins to delve deeper into the markets side. Possible questions are "Can the Metaverse be considered a new marketplace?" or "With the arrival and evolution of the Metaverse, can we consider that there is, or could there be, a new marketplace?". The experts are motivated to investigate: "How is it characterized, and what distinguishes it from other marketplaces?".

Who benefits from the Metaverse? With the eventual new marketplaces addressed, the following steps focus on the players, i.e., the businesses. Firstly, it is important to identify which are at the forefront actually: "What sectors or business areas can most benefit from the Metaverse?".

The industrial Metaverse. Next, the experts are invited to address a not-so-obvious player, the business-to-business. The question is ample, targeting opportunities and challenges: "What are the main opportunities and challenges for companies with

business-to-business (B2B) models that intend to enter and develop commerce in the Metaverse?" A comparison with B2C is prompted: "Will the 'industrial metaverse' progress faster than the 'consumer metaverse'?".

Low-tech businesses and the Metaverse. Finally, the study's primary objective, low-tech businesses, is tackled. The interviewer has several types of questions at hand: "How can low-tech businesses take advantage and create a successful strategy in the Metaverse?" or "What are the main opportunities and threats that non-tech companies may face in the Metaverse?".

The future of the Metaverse. Although businesses and markets are expected to shape the future of the Metaverse, it is equally important to understand which other forces may have a role and which directions the Metaverse may have. The questions should be loose and with no inducers: "What is your overall prediction for the future of the Metaverse?".

Hardware influence. The experts may have had considerations about the hardware in the previous question. As many authors highlight, it influences the Metaverse massification. This is the opportunity to explore such an aspect. Several approaches are possible, depending on the previous answers, for instance: "Will the hardware (e.g., VR headsets) become a limitation to the future adherence to the Metaverse?" or "Considering the hardware, for example, the VR headsets or AR devices, would they be a limitation to the future adoption of the Metaverse?".

Meta controversies impact. Because of many reasons, Meta has been systematically in the news recently. Therefore, it needs to be included in the equation: "May the latest issues and controversies involving Meta hurt, perhaps annihilate, the progression of the Metaverse?".

Competing platforms. Meta is investing hard in hardware and their platforms, but there is competition, which must be considered, too. A few varieties may limit massification, but excessive diversity may trigger dilution and weaken critical mass. The suggested question here identifies explicitly the actual competition: "The development of other platforms (i.e., Meta Horizons, Fortnite, Infiniverse/Multiverse, Roblox, Decentraland, Sandbox) can disperse the adherence to Metaverse?".

Extra comments. The interview ends by giving space to the interviewee's imagination and will. The proposed question reflects this purpose: "Is there anything else you would like to add that has not been covered in this questionnaire?" However, there may be aspects that deserve some insistence. The interviewer enjoys the opportunity to bring up such subjects again. A possible example is (it depends on the interview course): "What about the risks that the Metaverse can bring?".

33.2.2 The Panel of Experts

Although the complete study is much broader, touching the academic and business worlds, this initial partial research involves six scholars. The Delphi panel must include subjects that have established expertise in the field. Therefore, standard probability sampling is not adequate. Thus, in the beginning, two strategies were assumed for expert recruitment, convenience sampling and purposive sampling, and next snowball sampling was introduced, also [9].

The authors' contact networks were first contemplated for the convenience sampling. In parallel, the LinkedIn social network was searched. In either case, the expertise in Metaverse and related technologies, such as VR or AR, was scrutinized, for example, looking for publications or participation in scientific conferences for the academics, or looking for products or services related to the Metaverse for the potential participants from the business and markets world. Those who accepted to participate in the study were asked to indicate other professionals who could join the experts panel, as described in snowball sampling [9].

The following sections identify, alphabetically, and characterize the six academic experts who participated in this first part of the study. They were randomly numbered from S01 to S06 for quoting purposes, preserving, thus, anonymity.

Atefeh Yazdanparast. Atefeh Yazdanparast is Associate Professor of Marketing at Clark University in Worcester, MA, USA. She studies the social psychology of consumer decision-making. Her research focuses on sensory marketing and the interplay of consumers and digital technology. She studies how digital technology changes, shapes, and challenges traditional consumer decision-making. Her current research focuses on ways to compensate for the lack of haptic information in digital contexts and examines the role of cross-modal correspondences between the sense of touch and vision in shaping consumer perceptions.

Carlos Flavián. Carlos Flavián is Full Professor of Marketing at the University of Zaragoza, Spain. His research focuses on the analysis of the interaction of people with technology, studying both the particularities of technology (e.g., usability) and the perceptions, behavioral intentions, and actual behaviors of consumers (e.g., adoption, recommendation, eWOM, satisfaction, loyalty, etc.). The technologies studied have evolved from studying online relationships through the Internet to the context of Industry 4.0 technologies (artificial intelligence, service robots, virtual assistants, virtual reality, augmented reality, etc.). He founded AIRSI, the Metaverse conference, which has been held since 2019.

Jennifer Barhorst. Jennifer Barhorst is Associate Professor of Marketing at the College of Charleston, SC, USA. She is Marketing Professor specializing in augmented/extended realities and other digital brand experiences (e.g., brand experiences using voice assistants and wearable technologies, including smart glasses). Her research focuses on experiential marketing, brand management, and MarTech. She explores the amazing world that can be created, fostered, and managed using technology, leading to novel consumer experiences. For example, her work has been

awarded at the International Augmented and Virtual Reality Conference with the paper "Exploring the antecedents and consequences of augmented reality on brand experiences – A longitudinal perspective".

Katarina Šikman. Katarina Šikman is Master's E-Business Technologies Student at the University of Belgrade, Serbia. She grounds on the theoretical lessons she receives to translate real and virtual applications in the Metaverse into practice. This year, she presented "Application of 3D modeling in the fashion industry" at the EBT conference, which addressed 3D modeling garment design. She produced a digital twin, a real and virtual purse, wearable in both worlds, i.e., in "real reality" and used by an avatar in the Metaverse. The purse is tradable in NFT markets.

Marianna Sigala. Marianna Sigala is Full Professor of Marketing at the University of Newcastle, Australia. She has been coauthoring seminal articles on the Metaverse, as "Shaping the Metaverse into reality: A holistic multidisciplinary understanding of opportunities, challenges, and avenues for future investigation" (J.Comput.Inf.Syst.) and "Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy" (IJIM), giving a perspective from Tourism. Her primary research interests are service operations management and ICT applications management in Tourism and Hospitality.

Seth Ketron. Seth Ketron is currently Assistant Professor of Marketing at the University of St. Thomas, Minneapolis, MN, USA. In 2023, he coauthored "The Reality of Virtuality: Harness the Power of Virtual Reality to Connect with Consumers", a practice-oriented book, published by De Gruyter, on virtual reality in Marketing. Previously, he has published several articles in this domain. This is the case of "Can you smell the (virtual) roses? The influence of olfactory cues in virtual reality on immersion and positive brand responses" (J.Retail.), "Prioritizing marketing research in virtual reality: development of an immersion/fantasy typology" (EJM), and "A dual model of product involvement for effective virtual reality: The roles of imagination, co-creation, telepresence, and interactivity" (JBR).

33.2.3 Data Analysis

Data analysis follows the method proposed by Braun and Clarke, named Thematic Analysis [10]. The six sequential steps are pursued:

- 1. data acquaintance;
- 2. initial codes;
- 3. emergence of the themes;
- 4. themes reviewing;
- 5. naming the themes;
- 6. reporting.

The interviews were audio recorded, and the transcripts were obtained directly from the audio files with MS Word. In NVivo, release 1.7.1 (Windows and Mac), the initial codes were generated by three data analysts (authors). No codebook was previously built. Coding was inductive, i.e., the analysts started with a blank list filled as codes were remarked in data. Then, they proceed to the emergence of themes. In the fourth step, themes reviewing, the data analysts cross each other, so a different one analyzes the data. Thus, the codification and theme emergence process is serial, where two data analysts, at least, view or review the data, codes, and themes. Although sequential, it goes forward and back in an iterative refining procedure. Finally, in the two last steps, the themes are named and summarized in a table for easy reading.

The 15-point checklist criteria [10] are considered in detail. The fifteenth point deserved special attention, ensuring that the analysts had an active intervention during the whole process, which was not just limited to finding recurrences in the data for theme emergence and providing the active intervention passed by delving into the literature, not only the academic but also the existing in the business and consumers world. In addition, it was enforced to feel the sensations of living the Metaverse experiences on the inside, as real players do. Such knowledge provision equipped the analysts' minds for an insightful interpretation of the data and code and themes generation.

33.3 Findings

The following sections describe in detail the outputs of the analysis. They are organized by theme, each corresponding to one exploratory key idea.

33.3.1 Theme 1: Definition of Metaverse

This theme encompasses five main subthemes, which are as follows:

- subtheme 1: Metaverse as an "all-encompassing term": the convergence of multiple realities and technologies and an immersive experience;
- subtheme 2: Metaverse as a new social media;
- subtheme 3: Metaverse as a virtual experience;
- subtheme 4: Metaverse as a 3D Internet;
- subtheme 5: Metaverse is a rebranding of Facebook to "mask" the lack of innovation.

Subtheme 1. Metaverse as an "all-encompassing term": the convergence of multiple realities and technologies and an immersive experience. Most experts mention that the Metaverse can be considered as an all-encompassing term, as it allows the convergence of various technologies and realities (virtual and physical), which, in turn, promotes the development of positive brand outcomes, effective and

efficient marketplaces, and a more immersive experience for users. S05: "Metaverse is the merging of many worlds, whether they are physical or virtual, with technology. The Metaverse is very various worlds together, whether it is a physical or virtual world (...) Moreover, bringing together physical and virtual worlds as brands enable us to create and foster positive brand outcomes, whether we are a nonprofit, selling a physical good or even in a services industry such as consulting"; S04: "The Metaverse is a totality of many technologies that create a persistent immersive world that blurs physical and digital worlds"; S03: "The Metaverse will be a new immersive environment in which we can interact realistically with people, objects or contexts physically located where we are".

Indeed, for some experts, implementing the Metaverse can bring an extraordinary added value that derives from the fact that through the Metaverse, physical barriers will be eliminated and even time barriers. S03: "We can enjoy realistic recreations of past realities that no longer exist today as could be an experience in classical Rome".

Augmented reality (AR) and virtual reality (VR) are seen as critical technological tools that could be used with Metaverse's capabilities. Regarding AR, it allows the introduction of virtual elements in the real world and can be fruitful for helping beauty customers within the Metaverse. S02: "An augmented reality is taking our real world and projecting virtual elements into it. Thus, it is like we do not leave the real world. For instance, AR is excellent as it can help beauty customers, allowing them to see how different things might look before even trying them. It makes Metaverse a good platform for using these tools and technologies"; S03: "There is some discussion in academia regarding the immersive technology used in the Metaverse. In my view, it will be primarily virtual reality".

Furthermore, VR also plays an important role and might be considered the leading technology to be integrated into the Metaverse sphere. S02: "So, the Metaverse I think of as like a place, a virtual place, while VR is a vehicle to get to, to log in to access it".

Even though these strengths of Metaverse are reported, experts also highlighted that immersive technologies still lack the transmission of sensorial information, such as touch, smell, and taste. S03: "Currently, immersive technologies only allow the transmission of visual and sound information. However, incorporating information from other senses, such as touch, smell, and taste, is necessary".

Subtheme 2. Metaverse as social media. Some experts see the Metaverse as a "new social media", which will be our reality in 5 or 10 years. S06: "I want to describe the Metaverse as the new way of social media. You need to have innovation in social media now. Metaverse will be the new way of social media and generally whole virtual reality".

Subtheme 3. Metaverse as a virtual experience. In contrast to the perspective of Metaverse as an "all-encompassing term", Metaverse is considered by some experts as a virtual world/space that exists apart from our physical and offline world. S01: "I would say the Metaverse is the virtual world that exists apart from our physical, offline world and could encompass anything from reality spaces... you know... avatars that

we might create in different software platforms or programs. It is just this idea of virtual existence. So, it is all about virtual experience".

Subtheme 4. Metaverse as the 3D Internet. Experts also consider the Metaverse as the 3D Internet, another layer added to the Internet that makes it a 3D version. S01: "The 3D is the main keyword to describe Metaverse. The regular Internet we use is 2D, but in the Metaverse, because it is like all the avatars and things you deal with, it is more like 3D".

Subtheme 5. Metaverse is a rebranding of Facebook to "mask" the lack of innovation. Lastly, an opposing perspective of the experts is that the Metaverse was an initiative of rebranding (Facebook) due to the need for more innovation and to distract consumers from a declining business. S05: "There needed to be more innovation; therefore, the Metaverse was a way to rebrand and distract and detract from the fact that his business was losing market share. So, we are talking about using technology to bring physical and virtual worlds together".

33.3.2 Theme 2: Metaverse Marketplace

This theme encompasses three main subthemes, which are as follows:

- subtheme 1: Metaverse marketplace as a source of commercial opportunities and added value;
- subtheme 2: Metaverse marketplace versus traditional markets;
- subtheme 3: Metaverse marketplace with unique characteristics.

Subtheme 1. Metaverse marketplace as a source of commercial opportunities and added value. Firstly, the marketplace created by the Metaverse presents much potential and is a source of commercial opportunities for the fashion industry. Experts mention that artists and designers may benefit from the Metaverse as it may be a proof-of-concept or outfit-testing platform. S01: "It could be a more sustainable way for artists and for people to experience new designs. They have a better feel about the appeal, how it looks, and so forth, then move into real-life creation of it or even stay within that virtual platform and sell a virtual costume that could be worn by, let us say, a celebrity or to a virtual event happening at Metaverse. Some designers are doing this, so they are creating designs for fabrics and an outfit in the Metaverse platform, and their clients see that first in the Metaverse platform, and then they decide they want to go ahead and have something like that designed for them in the real world".

In addition, it can be a solution for waste reduction in the whole fashion industry and child labor. S06: "The fashion industry is the most significant industry in the world that makes much waste. Moreover, what they do is horrible because it is not sold like some fashion garments, especially fast fashion. They throw that, and they do not recycle it! If every fashion brand can see the opportunity that, at worst, brings them. The problem will be minor because they will know how their customer thinks, what they need, know, and work, and they will need to make fewer garments".

Secondly, this new marketplace is a way to bring new and young customers, especially Gen Z and Millennials. S06: "Metaverse is an easy way to bring new customers, especially Gen Z and the Millennials. A new generation because they live in technology! For example, bringing something new to their customers and keeping up with new technologies is fun".

Thirdly, the new marketplace created by Metaverse also enables the exchange of products, information, services, and experiences. S03: "Of course, the Metaverse is a new context to live new sensory experiences in parallel to the real physical world. Undoubtedly, this will open very interesting doors for exchanging information, products, services, or simply experiences".

Subtheme 2: Metaverse marketplace versus traditional markets. Experts compare the Metaverse marketplace with other traditional markets by arguing that traditional markets will be secondary when technology has been implemented. S03: "When the technology necessary to implement the Metaverse has been adequately implemented, the traditional markets will be secondary markets used in minority situations. The fundamental market will be the one associated with the Metaverse. The Metaverse marketplace will probably be the marketplace of reference, and there may continue to be other marketplaces of more residual use".

To contrast this idea, other experts argue that traditional markets remain primary markets despite the evolution and progression of the Metaverse marketplace. S06: "We discussed whether it is better for NFT to have value in a physical product or whether a physical product can bring value to NFT. We have different types of thinking! It is better to have value in NFT because NFT is generally not so popular. Okay, it is popular. Okay, it was the first type, but it is still fashion; it is a physical garment that is still better than virtual garments! So, having a physical product to value in NFT is better".

Another perspective regarding this comparison—between the Metaverse marketplace and traditional markets—is the need for an omnichannel strategy. The underlined idea here is to integrate and complement those types of marketplaces. S02. "I would not consider it separate as it is one part of the broader set of tools or channels you use to interact with consumers. It is good to build an omni-digital strategy. In summary, Metaverse gives you more ways of doing business, and you would want it to be integrated with the other ways you do business. It still might offer benefits or things to people that other channels would not necessarily do".

Subtheme 3: Unique characteristics of the Metaverse marketplace. Thirdly, some experts consider that a new marketplace exists within the Metaverse. Such marketplace is described as follows:

- it remains undefined and unclear in terms of specifications and configurations;
- it still needs critical mass to expand in the future because of its current limitations, which are the need for more technology and the higher technology costs for the critical mass of users; S02: "When will this kind of market placement share or

expand? To be accessible to the masses, the question is still up. It can be an entirely new way of doing business. It needs to reach a critical mass"; S05: "We could have a new marketplace. What does that Marketplace look like? It depends on the world that you are in and the technology you are using. That is different from the physical world, whether virtual and physical are coming together or one or the other, but yes, we could have a different marketplace. What that looks like, I do not know";

- it is blockchain-based and cryptocurrencies and NFTs-based;
- it is decentralized, persistent, and enables new forms of ownership and trade;
- goes beyond the concept of e-marketplaces due to the enhanced 3D immersive experience promoted by Metaverse; S01: "We have the e-marketplace, where the transactions happen in the virtual setting; it is still virtual. So, it is still an e-marketplace, but the nature is different because the experiences are different, like again because of that 3D aspect because of the more immersive aspects of the experience of the entities participating in the transaction in the marketplace would be different".

33.3.3 Theme 3: Beneficiaries of the Metaverse

This theme encompasses three main subthemes, which are as follows:

- subtheme 1: B2B companies will be the primary beneficiaries;
- subtheme 2: B2C companies will be the primary beneficiaries;
- subtheme 3: every business sector can benefit from the Metaverse by fostering positive brand outcomes.

Subtheme 1. B2B companies will be the primary beneficiaries of the Metaverse. Regarding the B2B context, experts mention some uses of the Metaverse, such as:

- meetings and trade fairs; S01: "It could be meetings that could happen in that setting. It could be like trade shows where the business-to-business companies want to showcase their designs and their product types and then find leads for future business transactions";
- develop digital twins to foster innovation;
- monitor supply chains;
- new product development;
- training human resources—HR.

Subtheme 2. B2C companies will be the primary beneficiaries. Regarding the B2C context, future opportunities emerge specifically in the services-based sectors. S03: "The Metaverse will revolutionize all markets related to providing services and experiences. It will probably be able to develop into the technology needed for the translation of products".

Experts identify critical areas in which the Metaverse can add value, namely:

- cultural events, e.g., concerts, art shows, conferences; S02: "Events, concerts, art shows. The pandemic escalated this. People having concerts or large-scale events could include conferences or art shows. During the pandemic, virtual environments allowed people to have that experience still. Thus, I think these events will continue to benefit from this";
- entertainment and gaming industry; S01: "So, I think gaming, entertainment, and design when you talk about clients and fashion design and developing a collection";
- retail; in this domain, Metaverse can be fruitful for consumers who seek expensive goods shopping, shopping that involves multi-sensorial experiences, high involvement, and needs interaction; S02: "Shopping and the kinds of products that people tend to be shy about purchasing online are usually those that are more expensive and that they want to interact with first. Moreover, some things require high involvement, like vehicles or expensive equipment. Well, there are also things like clothing that people would want to try on virtual platforms. They allow people to have a better sense of feelings and perceptions about how clothes might look on them"; in particular, the fashion and design industry has more potential within the Metaverse as it can serve as a proof-of-concept platform; S01: "It may be too early for now, but in the future, people may decide that they may want to dress up and be more fashion-oriented or, like, out-of-the-box in terms of their outfit in the middle. You could portray it the way you want in the Metaverse, which could be different from the real world, where you decide to be more sustainable and be more cautious about your consumption";
- tourism; S02: "Tourism is another one I was going to mention, being able to travel and go to places. Some people obviously cannot afford to spend \$5000 or whatever to go worldwide. However, they may be able to afford a digital virtual ticket to a virtual tour. There are possibilities of opening the world to people";
- other focus areas with great potential to benefit from the Metaverse are education, healthcare services, hospitality, and leisure.

Subtheme 3. Every business sector can benefit from the Metaverse by fostering positive brand outcomes. In this discussion, a different perspective emerges from the panel of experts. Both business sectors, i.e., B2B and B2C, can take advantage of the Metaverse since they can foster positive brand outcomes; S05: "So, every business sector can benefit from it. I will say everyone because we are bringing worlds together. We are bringing worlds together, whether they are virtual or physical. Moreover, bringing together physical and virtual worlds as brands enables us to create and foster positive brand outcomes. Every single entity, whatever it is, has a brand. As a brand, there is an opportunity to use technologies that bring physical and virtual worlds together to engage your customers or your stakeholders in some way. So, they all can".

33.3.4 Theme 4: Industrial Metaverse

This theme encompasses three main subthemes, which are as follows:

- subtheme 1: opportunities and outcomes for B2B companies in the Metaverse;
- subtheme 2: challenges for B2B companies in the Metaverse;
- subtheme 3: industrial Metaverse (B2B) versus consumer Metaverse (B2C).

Subtheme 1. Opportunities and future outcomes for B2B companies in the Metaverse. Experts mention that the industrial market (B2B companies) can progress faster than the consumer market (B2C) in the Metaverse, mainly due to the increased benefits associated with the interconnection of business partners; S03: "Undoubtedly, the increased benefits associated with the interconnection of business partners will motivate a much faster acceleration and creation of the Metaverse at the B2B level". Regarding the opportunities and future outcomes to the industrial sector, it is said that B2B companies can benefit from the fact that Metaverse allows:

- the generation of new market segments and new business models; however, not all types of B2B companies will be prepared to change of doing business; in this respect, it is highlighted that new B2B startups will be more likely to risk and invest in the Metaverse; S01: "The startup companies, tech-oriented companies, and those that younger or risk-taking individuals run";
- to establish long-term relationships and engagement with customers;
- to save time, for example, customers traveling for B2B meetings; S02: "Saves time if there is any relationship with customers that requires to travel to specific locations or to see products or raw materials. These are opportunities that cut down on the need to have to travel to the physical location";
- to create showcases in B2B; S02. "So, businesses doing business with other businesses can create virtual environments where they can showcase what they have to offer their clients virtually. It will open their competitiveness and give buyers a better sense of what it is".

Subtheme 2. Challenges for B2B companies in the Metaverse. Regarding the challenges that B2B companies might face in the Metaverse, experts mainly mention the actual low adoption; S01: "More established companies might have decision-makers at the top who are less familiar with the Metaverse and more cautious about switching things from how traditionally they have been (...) Generally, it could be older or more conservative, which might create a small amount of resistance to wanting to explore new ways, such as the Metaverse", as well as the lack of standard technology and platforms, privacy/security issues, and a legal framework.

Subtheme 3. Industrial Metaverse (B2B) versus consumer Metaverse (B2C). For some experts, there will be no substantial differences among industrial or consumer Metaverse. They recognize similar challenges and opportunities for both markets; S03: "The challenges and opportunities in B2B commerce are like those in B2C"; S05: "You are putting across a brand message. Whether you are B2B or B2C is

the same. The opportunities are the same. You just have a different set of prospective customers trying to communicate with your brand", reinforcing that the existence of scale economies will determine what market will drive Metaverse; S02: "It depends on where the economies of scale are. So, when you think about B2B, fewer people might buy from you but maybe spending much money. Let us say you spend \$5,000,000 to develop a virtual warehouse or showcase and invest in it on Metaverse. Is it going to be faster? It could be faster if the ROI is there".

33.3.5 Theme 5. Low-Tech Businesses

This theme encompasses five main subthemes, which are as follows:

- subtheme 1: strategies and approaches of low-tech businesses;
- subtheme 2: opportunities for low-tech businesses;
- subtheme 3: weaknesses/internal limitations of low-tech businesses;
- subtheme 4: threats for low-tech businesses;
- subtheme 5: low-tech in and out of the Metaverse—the same challenges and opportunities.

Subtheme 1. Strategies and approaches of low-tech businesses. Because of its size and nature, low-tech companies must develop approaches to face the opportunities that Metaverse brings. From an analytical perspective (market research/analysis of the external environment), low-tech companies must monitor competitors and their approaches to Metaverse and measure the potential of their businesses for the selected target audience; S03: "It will be necessary to observe the behavior of other more advanced competitors and develop benchmarking strategies to identify the aspects that allow these companies to take advantage of relative competitive advantages. It will also be necessary to understand how to make tangible the potential presented by the development of the Metaverse for the specific type of business in which the organization is engaged". From a strategic and operational perspective, it is essential for them to:

- define clear objectives; S03: "It will also be necessary to establish clear and specific objectives instead of trying to 'play the game'";
- create new business models;
- go where the customers are; S05: "Wherever your customers are is where you have an opportunity to sell your product";
- develop immersive experiences linked to any brand;
- form partnerships and get access to know-how; S01: "I think for them the challenge is even higher because then they need first to have somebody on board who has an understanding and can plan for something meaningful in the new platform to be known";
- invest in co-creation with customers to leverage the brand on the Metaverse;
- test marketing campaigns;

• create showrooms to let customers see and experience the product or service before purchasing; S01: "Create virtual showrooms and let customers experience a product before they purchase it. I think the starting point could be to establish their place in the environment, with showrooms giving customers the experiences, creating avatars, creating these virtual items, letting people explore them".

Subtheme 2. Opportunities for low-tech businesses. Due to its specific features and specifications, Metaverse represents plenty of opportunities for low-tech companies, according to the experts. The first and the most expressive opportunity is the inexistence of physical and logistic limitations, which allows the elimination of geographical barriers to the provision of new services; S02: "Physical locations used to be one of the most significant sources of sustainable competitive advantage because good location versus lousy location in the real world means a lot to people. However, in the Metaverse, location is not a big concern since it does not physically require resources to travel; they can do so virtually. Companies that might have based their strategy on that now need to rethink. These are things that need to be figured out early on".

The second foremost opportunity is that Metaverse can be considered a "new game" with different rules for low-tech companies; S02: "The competitive advantages such companies have now may be different in the Metaverse because the physical limitations of the Metaverse are not there like they are in the real world. It would help if you rethought your strategy. So, you want to go into it? Think about how I build sustainable competitive advantage in an environment with a very different set of parameters where you know barriers to entry may not be as high".

The wine industry is specially referred to as an essential industry to be explored by low-tech companies. Indeed, Metaverse allows the development of events for promoting new products (such as wine brands), contributing to the awareness and recognition of the new brands at a lower cost; S06: "It is expensive to present wines at festivals! When you are a small winery, you do not have money to go to every festival to represent, and if you do not represent your wine, you will not get customers because nobody will hear about you, especially from mouth to mouth. That is this type of marketing; I think it is the best. However, it is a small way to increase customers. With Metaverse, you can participate in a wine festival and - okay, it will be difficult for you to taste the wine, I know that - but it is critical to hear about some wineries that you have not heard about before; it is in a much cheaper and easier way! So, I also think that the Metaverse can bring so much value to another business if it is implemented right in the right way".

Subtheme 3. Weaknesses/internal limitations of low-tech businesses. From the perspective of experts, low-tech companies face more limitations than tech-based companies, as the transition to the Metaverse is understood as a natural next step for more tech-savvy companies. The main internal limitations recognized by the panel are related to the lack of budget, lack of effective digital marketing, and the lack of expertise; S01: "Many of these types of companies are not very much incorporating technology into their operations; they might be smaller companies that do not have the expertise or the budget to be able to do so. When talking about small businesses, many need help with social media to run it properly. They are struggling with having

good digital marketing analytics; they need to know where to collect their data. So, they are less tech-savvy than you asked, so it would be harder for them to add another layer of complexity".

Subtheme 4. Threats for low-tech businesses. The main threat identified by the panel is related to the privacy and information security issues (need for a secure encryption system) that characterize Metaverse now; S03: "Among the main threats, all the problems associated with privacy and information security will be particularly noteworthy. Authenticating people's identities or exchanging confidential information will be a significant challenge. This will require the use of particularly secure encryption systems. The problem is that the knowledge used to generate more secure encryption systems is also known to those trying to decrypt them".

Subtheme 5. Low-tech in and out Metaverse-the same challenges and opportunities. For some experts, challenges are the same in and out of Metaverse for non-tech companies. The final purpose is to develop a solid online brand, regardless of the communication channels used; S05: "They have the same challenges they have today or the same opportunities they have today. So, if we are an ice cream company that's not a technology company, we still need to have a presence online. We still need to drive traffic to our website! We still need to build our brand on a website. Moreover, the same is true; we still have opportunities to, for example, create a billboard in a virtual reality experience. We still have an opportunity to do some augmented reality experiences through your mobile phone. So, opportunities and challenges for those brands are different? They aren't any different than they are today in that you need to use the technology that's there for your consumers. I always tell my students that you need to go where your customers are. So, wherever your customers are, you can sell your product, whether you are an ice cream product, dry cleaner, or tech company. Wherever your customers are, you need to be in their lives trying to sell the product. So, do they have unique opportunities, different opportunities, or challenges? No different than they would in the digital marketing world that they do today; they need to learn their market".

33.3.6 Theme 6: Metaverse: Future, Present, or Past?

Regarding the future of the Metaverse, the experts' opinions diverge. Some consider it is rooted in the past (e.g., Second Life), who say that it has a (partially) present perspective such as investment and technology, and lastly, who express that if it will be a reality, it will only happen in a distant time. Therefore, this theme encompasses three main subthemes, which are as follows:

- subtheme 1: past;
- subtheme 2: present;
- subtheme 3: future.

Subtheme 1. Past. Second Life anticipated Metaverse but failed due to missing the necessary hardware. One expert mentioned that S01 "The term Metaverse was coined in Neal Stephenson's 1992 science fiction novel Snow Crash, where humans, as programmable avatars, interact with each other and software agents, in a threedimensional virtual space that uses the metaphor of the real world. And so that was. The first kind of Metaverse that was created in 2003 was called Second Life. But it didn't take off because the technological infrastructure was not there yet. You need to have powerful hardware and very high-speed internet. So, we are now in the 5G generation, but it might be that we need even the 6G to take it off".

Subtheme 2. Present. This subtheme results from the combination of several subcategories that are related to the current perspective because:

- technology (e.g., VR) is already developing;
- companies (namely Apple) are already investing in it, but;
- the pace is still slow (S02: "And Apple just came out with their devices. So, it's like I see it growing and becoming more popular, but I don't think it's going to happen as quickly as some companies are hoping it would".

Subtheme 3. Future. This subtheme was the most complex one since most experts think that the Metaverse is not still a reality, and if it is, it will be consumer-centered. It will only happen in a distant time with incertitude in how the Metaverse will evolve. The characteristics of the future Metaverse are as follows:

- virtual and physical blending or ubiquity; several experts mention that the Metaverse will either become seamlessly blended; S02: "our virtual and physical worlds are so interconnected that you know, we are just blend seamlessly between one and the other"; or that it will enable ubiquity by doing several things at the same time because it will be a "totally parallel virtual world... enabling shopping from our couch" (S06);
- consumer-centered, primarily youngsters, whose demand (not businesses') will drive the progress of Metaverse, but they will need to be educated about the Metaverse possibilities; S05: "So, for example, Tony the Tiger could come to life in front of my eyes as I walk past the cereal box in the grocery store aisle, you know, he will say, hi [name removed], it's been a while! It would be very personalized";
- incertitude includes considering that we are still far from the Metaverse to estimate how it will evolve (e.g., what platforms and technologies will dominate and persevere), but it won't follow the models of the diffusion of innovation and adoption; S04: "We just do not know on what version and form and what platforms and technologies will dominate and persevere".

33.3.7 Theme 7. Technological and Other Requirements of Metaverse

Regarding the future of the Metaverse, the experts' opinions are focused on technological and other requirements that will have to be available so it gains critical mass.

Subtheme 1. Technological development (hardware and networks). Technological development is critical for the future Metaverse, and the requirements seem to be yet not attained; S03: "Undoubtedly, one of the main limitations that currently exist for developing a Metaverse is the technological limitation".

Hardware is critical for the future of Metaverse. Dealing with hardware is precluding faster progress in dissemination; S02: "You know, so that timeline might be hastened a little bit if companies are willing to invest in getting people just to become aware of, or get them to try it out because breaking down that awareness, and that barrier of seeing what the value is in the technology, is really the biggest thing with people. But it will be interesting to see what happens". The evolution should be toward wearable technology for better brand experiences. The case of the headsets is paradigmatic. Headsets are an important component in Metaverse, and, although their usability has been improving in recent times, the current ones are still inadequate; S06: "I think in five years you will put on sunglasses. I will put on sunglasses; we will be in the Metaverse. We will be OK mentally in the same place, sitting around the table talking". So far, Metaverse devices are not as easy as smartphones. In addition, Metaverse must run on personal computers to reach more users (customers).

Current or forthcoming networks are necessary for the future of Metaverse; S01: "You need to have powerful hardware and very high-speed Internet. So, we are now in the 5G generation, but it might be that we need even the 6G to take it off".

Subtheme 2. Finance. If Metaverse aims to be a marketplace, then currencies are mandatory. Cryptocurrencies actually occupy such a role, but this is a limitation. Cryptocurrencies are not widespread among the general public. Thus, much work must be done to implement a generally accepted payment system that consumers trust. NFTs suffer from the same. Lay consumers may not know what that is, which may severely limit the marketplace functioning in Metaverse; S01: "I think there is still room for development and then in terms of the payment system. As the more natural lifer payments would be cryptocurrency and use of NFTS, but again, those are not well adopted yet either".

Expensive hardware needs improvement and is critical for the future massification of the Metaverse; S01: "what I'm saying is that, right now, the price is not something that everyone can or is willing".

Subtheme 3. Holistic sensorial experience. Experts await that the most impactful improvements will not come from the hardware, like CPUs or GPUs, but from sensorial hardware. Sensorial hardware research may pull other senses (e.g., smell, touch,

taste) into the Metaverse; S02: "I do a lot of sensory marketing research, and for me, the biggest one of the biggest challenges is how do you get people to be able to smell and feel temperature and wind and, you know, smell, taste...those things are very difficult to achieve right now"; S03: "develop equipment that will allow us to significantly improve our perceptions through the five senses in these virtual environments".

33.3.8 Theme 8. Meta's Controversies

Mark Zuckerberg initiated the Metaverse resuscitation two years ago, which implicated Meta rebranding in the meantime. However, such a path has not been without controversies, which may have influenced the Metaverse's progress. Although with different arguments, the experts agree that impacts will be minimal if they exist.

The experts are aware of Meta's controversies; S03: "Meta had ethical and legal problems with data privacy and with the use of the information available to them". Even so, some experts predict no impacts; S04: "No. The fact that one company made an error will not affect the whole industry and technological advances". Although Meta was the launcher that resuscitated the Metaverse, there has been a snowball effect, and now the Metaverse already overflowed the Meta realms. Thus, some existing distance between Meta and the Metaverse is preventing contamination; S02: "That is a name that a company has chosen but also aligns with a common concept you know. And I think about products like, you know - Cleanex - is a brand of faces issue, and if something bad happens with the Cleanex company, does that mean people are going to stop using face tissue? No, I don't think so". A similar argument is that Facebook's rebranding to Meta "and the firm commitment to speed up the development of this new virtual environment has been a strategy of escape forward" (S03). Maybe such acceleration received extra pace from the markets, and the Metaverse gained autonomy from Meta, preventing negative influences. In sum, when asked if there may be damaging contamination, "On the contrary. In my view, there are still many years and even decades to go before we can take advantage of the possibilities that the theoretical concept of Metaverse could offer" (S03), i.e., the shapes of the "thing" are far from being defined, which means that individual players have not the power to be determinant.

33.3.9 Theme 9. Other Platforms

Regarding how other platforms can influence the Metaverse, the experts' opinions mainly focus on the ones that are, or will be, interconnected. After all, that is one of the core ideas in the Metaverse.

The gaming market is at the forefront. Gamers are already familiar with Metaverse and avatars; S01: "The people that have been gaming... it is easier for them to get

into purchasing virtual goods and stuff within the environment of the game, or in general they are perhaps more familiar with the process". Thus, Metaverse-related gaming platforms may have the way already paved.

Despite this, there is the perception that there is fragmentation, and interconnectivity is necessary; S02: "Thinking about these different environments is thinking as kind of pieces of a larger puzzle. So, we think about the Metaverse as a puzzle where only a few pieces have been created yet. And over time, you know, hopefully, we'll get the full puzzle or full picture. But right now, we it's just so fragmented that we need more interconnectedness".

33.3.10 Theme 10. Extra Comments

When asked about anything else to add, the experts focus on themes mostly related to adverse risks of the Metaverse or effects on real life, even though some are only potential.

Subtheme 1. Negative risks. The adverse risks are potential and already effective:

- excessive immersion may lead to alienation; S01: "We talked about like some of the good things, but the risks that it can bring, in my opinion, would be that people get so immersed in, in networks that they may forget about the physical world";
- harassment in Metaverse contributes to bad image; S01: "I'm sure you've heard
 of some unfortunate things that happened in the environment of Metaverse, like
 women being sexually assaulted and harassed in the Metaverse. So again, these
 have not happened in the physical world, but they have happened in the Metaverse,
 which could create a bad kind of image for the platform".

Adverse risks may become effective if they are not opposed. The Metaverse is perceived as an outlaw land, and the experts call for the need of etiquette or policing to control; S01: "There should be some sort of etiquette, or some sort of policing as well involved to make sure that people are safe or feel safe for wanting to participate in them in terms of the transactions and the financial transactions. I see it more from the risk for consumers, especially those who get very much immersed in that world, and then they might not be able to separate that from the real world".

Subtheme 2. Impacts on real life. The reversed impacts on real life are an open question. They may be optimistic. For instance, there is the opinion that the Metaverse could also enable healing from addictions; S06: "you can heal from addiction, for example, by your avatar smoking a cigarette when someone is addicted to smoking the cigarette and wants to break that addiction".

More consensual, more things would be possible in the Metaverse than in real life; S01: "Because in the Metaverse more things would be possible, and they could be different avatars. Or they could do or practice things that maybe in the real world is not possible". The Metaverse may be a new world full of opportunities.

33.4 Discussion and Conclusions

Certainly, Zuckerberg's Metaverse resuscitation aimed to extend the Facebook/ Instagram business by adding a third dimension to social networks. Immersive social experiences may define what was envisaged, and so far, it seems like this is being achieved using VR headsets in virtual worlds or AR devices in the fusion between virtual and real. However, at least concerning consumer markets, social interaction, and marketplaces go hand in hand.

The experts agreed that, if the Metaverse gets critical mass, it will be a new marketplace full of opportunities. This is not just adding one more dimension to actual e-commerce. These are immersive marketplaces where, more than mere customers, consumers may consume, i.e., buy and use products and services. In addition, the door is also open to digital twins, for instance, in fashion markets. Social events such as concerts, art shows, conferences, entertainment, gaming, or tourism, education, and health care are other consumer markets that the Metaverse may leverage into another dimension.

Nonetheless, the Metaverse opportunities are not limited to B2C. B2B may benefit, too. Meetings, traveling, in fact, teleporting, interconnecting with partners, suppliers, and customers, and showcasing are among the immediate advantages. However, low-tech businesses may be at risk due to scarce resources and competencies in the digital sphere. The approach strategy to Metaverse must be well reasoned out and planned. Just following the wave and "playing the game" is not a solution. Nonetheless, the Metaverse may be a compelling opportunity for low-techs if well-targeted. Logistics are not an issue anymore in the Metaverse. There are no geographical barriers. Literally, one may trade with anyone on Earth. It just must be where customers are.

Much work has yet to be done for Metaverse massification. More players are joining, but technological development is an issue in Metaverse's success. The hardware must improve usability and financial accessibility. The same with the Internet. Then, 5G is there, but is it enough for all the ambition? The core of every market, money, is also an unresolved issue. Cryptocurrencies and NFTs are unknown jargon for the common people, which precludes the Metaverse growth. The multitude of platforms and no interoperability is an additional hurdle. It contradicts the soul of the Metaverse: interconnected worlds. Although such barriers, some deviant behaviors, such as harassment, were already "exported" to the Metaverse, a world where etiquette and policing are still missing. Nonetheless, the Metaverse may be a new world full of opportunities.

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Part VIII Mobile Marketing and Wearable Technologies

Chapter 34 Too Good to Go: Acceptance Factors of an Application to Combat Food Waste



Liliana Sousa and Bráulio Alturas

Abstract Food waste is a national and international scourge. It is estimated that, for each person in Portugal, between 20 and 30 kg of food are thrown away per year, and the theme of waste is common from the producer to the consumer, including the distributor, and that about 17% of the edible parts of food produced for human consumption are lost or wasted in Portugal. This research work consists of a quantitative and descriptive study in which 107 participants who resided in the national territory participated, to understand the role of IT in combating food waste. The results reflect that the population is aware of the dimension of the scourge of food waste in Portugal, knows several reduction strategies (including IT, such as the TGTG app) and identifies several advantages and disadvantages in the TGTG app, which are presented as points of improvement for a possible process of development.

34.1 Introduction

The era we are currently experiencing has been marked by various concepts linked to sustainability, such as recycling, reduction, and reuse.

The focus of this study is to determine how information systems can support the fight against food waste, which is necessary, in a first analysis, to understand the origin of this waste.

Organic waste is the most representative of food waste, since many of these products are already made or unmade foods, often discarded before reaching their expiration date or end of life, leading to greater waste, the scarcity of resources, and the increase in CO_2 emissions, causing strong negative impacts on the environment.

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It is, therefore, imperative to rethink and introduce a way to enhance its reduction, reeducating the consumer so that he starts to choose to reuse the product, instead of discarding it.

In this sense, it is therefore necessary to study and understand the behavior of consumers when choosing products and the effective use of the mechanisms at their disposal to reduce waste and, consequently, the ecological footprint.

It is in this reasoning that companies introduce new products, taking advantage of changing consumer needs, and thus shortening replacement intervals.

However, awareness of the urgent need to reduce the environmental impact of consumption has become evident, so it is necessary to study and introduce new ways to encourage consumers to move away from a society that discards and does not know how to reuse [22].

It is considered interesting to follow this approach, especially at a time when the theme of sustainability and the debate around environmental issues have become more important, as well as the urgent need to combat climate change, changing the habits, and practices of all citizens. In global terms, a topic discussed at the highest levels and more recently at the 2022 Climate Summit, held in Egypt.

The present research explores the issue of changing consumption habits, more specifically the reduction of food waste, regarding the role played by the use of IT, and in particular the use of the application Too Good To Go. For this purpose, a study was carried out consisting of a quantitative and descriptive study using a questionnaire survey.

The study will be based on the TAM model, so the focus will be on analyzing and understanding the perceived ease of use (corresponding to the degree to which a person believes that the use of a given tool can be performed effortlessly) and the perceived usefulness (corresponding to the degree to which a person believes that the use of a certain tool can improve performance, in this case, the reduction of food waste) by users and potential users of this type of App, as well as its value proposition for the respective customers, in this case, the users.

The TRA model is also present, in a way, since it is intended to understand and explain the rationality of the user's choice, applying metrics to assess their attitude toward the App.

Thus, when developing this study, the following objectives were established:

- Explore the population's knowledge and behavior regarding food waste in Portugal;
- Understand expectations and level of adoption and the characteristics of the use of technology in relation to food waste, namely the Too Good To Go;
- Analyze the users' perception of the Too Good To Go app and compare it with other similar apps;
- Analyze the users' perception regarding the ease of use of the Too Good To Go app and determine how the Too Good To Go App can have a good level of acceptance and trust from the target group;
- Understand what the main expectations regarding the systems are and understand if their use is considered discreditable and could be associated with social need.

The following starting question is considered: "What factors can contribute to the use of an application that contributes to the reuse of excess food, to significantly reduce its waste?"

34.2 Literature Review

34.2.1 Food Waste

Food waste is a topic that concerns the entire world population, which has been addressed over time, and on which numerous studies have already been carried out, and there is still no consensus on the most efficient, clear, and coherent approach to what defines food waste or quantifies food waste, thus giving rise to different opinions.

According to the Food and Agriculture Organization of the United Nations, the FAO, which in 2017 defined what it means by food loss and by food loss and waste, resulting in the idea that food loss is a decrease, not only in quantity, but also in of quality agricultural, forestry, and fishing products intended for human consumption, and that food loss and waste were defined by the reduction, from production to consumption, of the quantity and quality of food initially intended for human consumption, regardless of the cause that gave rise to it. FAO also clarified what, in its opinion, are the causes of food loss, which occur along the supply chain, from production to harvest, as well as post-harvest handling, from storage to processing and during transport.

In 2014, the High-Level Panel of Experts on Food Security and Nutrition (HLPE) defined food waste as food fit for human consumption discarded or left to deteriorate at the level of the consumer, regardless of the cause and since there is no right or wrong definition, the definition that we will consider throughout this investigation will be the HLPE, as it seems to us the most appropriate.

Regarding questions of what may or may not be avoidable waste or what part of that food waste would already be destined for waste because it is not edible, these questions are a little dubious since we were unable to answer them clearly. Inevitable food losses originate from parts of food that cannot be consumed, such as the bones and shell of eggs or pineapples [2], however, each culture, with its characteristic habits, makes the definition of what is edible, or not, distinct, once again there is no consensus on the volume of food waste that comes from edible foods, which is why, in most cases, the studies and values presented are presented considering simultaneously what whether it would still be edible and what was already considered waste due to its initial predisposition as no consumable.

34.2.2 TGTG Application

Application is defined as software designed through programming language to perform a set of functions, tasks, or programming language to perform a set of coordinated functions, tasks, or activities to be installed on a mobile electronic device, administered by a manager, and used by several profiles that access the available functionalities, through the permissions assigned to them [17].

This specific application will be the focus of our work. TGTG was founded in 2015, having started operating in 2016, when, for the first time, it saved its first meal in Copenhagen, where it is currently headquartered, having already managed to save an impressive 29 million meals, translating into the reduction of 72,000 tons of polluting greenhouse gases.

Initially, the idea would be to focus only on losses and waste of food from buffets, an idea that has spread to other sectors, with TGTG now having 18 million registered users and 38,000 partners, including restaurants, supermarkets, bakeries, hotels, and cafes in 14 countries, where it has local offices, the company manages to save one meal per second and continues to expand year after year.

The vision behind the TGTG has remained the same since the beginning, the dire need to tackle food waste, inspiring and empowering everyone to fight together against food waste and Sweden became the latest country to join in January 2020.

Although present in many countries, TGTG remains one entity, with everything brought together under a global umbrella, and this means that the company has no franchises and that all local entities are part of the global structure, where each entity has a country manager, who coordinates operations with a local team.

The company generates revenue in two main ways through business partners active on the platform, such as the partner paying an annual subscription or paying a small commission fee to TGTG for each meal sold.

TGTG is currently considered the business-to-consumer (B2C) platform with the largest business-to-consumer platform in the world with the aim of combating food waste, all through a mobile application where companies can add surplus food they have, and consumers can see the available offer.

The application is mainly intended for restaurants, bakeries, supermarkets, hotels, and canteens, as already mentioned, where the business perspective is that of a "win-win solution," as it allows companies to make money with food that otherwise way would be wasted while reaching new customers, and consumers to access food at affordable prices to reduce food waste, all parties having a positive impact on the environment and since food waste is a problem that takes place at different times, TGTG decided to establish its objectives taking into account 4 basic pillars, namely households, business, education, and politics.

Given that the assumption behind TGTG is that there is a way to turn an environmental issue such as food waste into a win–win situation for all, creating jobs, generating revenue, reducing food waste, and lessening its impacts on the environment, the business model turns out to be profitable and today TGTG is a growing company. According to its earnings release, it has grown exponentially, not least because revenues increased by 200% in 2019 compared to 2018. The company makes a positive gross profit and a positive operating profit in the most mature markets.

34.2.3 Technology Adoption

The Technology Acceptance Model (TAM) aims to evaluate the behavior of technology use by analyzing the attitudes to the use of Information Systems (IS) from usefulness to ease of use, consists of adaptation of Theory of Reasoned Action (TRA), originally proposed by [5] assumes that the acceptance of the information system is mostly linked to two variables: perceived usefulness (PU) and perceived ease of use (PEU) [1].

According to [9], the Technology Acceptance Model (TAM) is considered the most influential and applied theory to describe individual acceptance of an information system [9].

According to TAM, users first consider the functions performed by computer systems (PU), and subsequently examine the ease or difficulty in using them (PEU). The behavioral intention of use (BI), is thus, defined by the person's attitude (A) in relation to the use of the system, as well as by the conviction that the IS will enhance performance [16]. This analysis can be represented in the diagram of Fig. 34.1 [4].

Several analyzes have concluded that this model gives a dominant role to behavioral intent, in the use of technology, compared to the perception of usefulness or the perception of ease of use. However, among these two variables, the one that best predicts the acceptance of use and technology is the perception of usefulness [10, 21].

Basically, the PEU is represented as the degree to which the person believes that the use of IS is effortless and the PU seeks to measure how much the person believes that the use of technology will contribute to an improvement in their performance. This perception on the part of the user appears to have a positive influence on the behavioral intention to use this technology [16].



Fig. 34.1 Technology acceptance model [4]

Davis [5] presented the TAM model with the intention of focusing on why users accept or reject information technology and how to improve its acceptance, thus offering a support to predict and explain acceptance.

The TAM is useful for predicting, but also for characterizing, so that researchers and others can recognize why users do not accept a particular system or technology, and consequently implement the appropriate corrections [4]. The TAM model is still the most popular among researchers engaged in Acceptance and Use of Technology [1].

According to Dwiyana Putra [7], perceived utility is defined as "the degree to which an individual believes that using a particular system will increase his or her performance." This definition was generated from the word "utility," which elucidates for an advantage in use. However, perceived ease of use defines the degree to which the user believes that using a given system will not require physical and mental effort [7].

According to Dulipovici and Vieru [6], TAM cannot be used as it was because it does not consider the nature of shared knowledge [6]. Venkatesh and Davis [23], using the foundation laid in TAM, developed TAM2 and TAM3 which elucidate perceived usefulness and usage intention in terms of external variables, namely, social influence processes and the instrumental cognitive process [23].

TAM has already been applied in different technologies, having also been applied to mobile applications, for example by Tavallaee et al. [19].

Nowadays, the smartphone is much more than a simple mobile phone that people use to make calls. Is a device used by different age groups that allows to be used as a work tool, for leisure, among other tasks [3].

Data from the 2018 "Marktest Telecommunications Barometer" study, showed that the smartphone penetration in Portugal continues to increase and is in the hands of 3 out of 4 mobile phone users. In the July 2018, this study counted about 6.9 million people who have a smartphone. This study also indicates that the penetration rate of smartphones is higher among males, residents of Greater Lisbon, the younger population, and higher social classes [13].

According to data from the Statista website, it appears that the age group that most adopts smartphones in the United States of America are the ages between 18 and 29 years old, and the one with the lowest values is the age group of individuals over 65 years old [18].

One of the factors that may relate to this difference in age groups may be social needs, which is one of the main factors for consumers' dependence on smartphones. These consist of an individual's social interaction needs. Represent the need for communication with friends, family, groups, clubs, churches, and at work [20]. This need happens to smartphones because they have become much more versatile, allowing consumers to use them more to communicate and maintain relationships between individuals [11]. This statement can be complemented by the fact that some studies show that most people using smartphones are teenagers and young adults [3].

Another of the dependencies that can be mentioned, in addition to social needs, is the current dependence on the Internet and the modernization of mobile devices, where it was found that the smartphone, together with the ease of mobile connection, can also cause dependency [14].

34.3 Methodology

The objective of this investigation was to determine the impact of IT in the fight against food waste, since most of the population has access to a smartphone and as such, become eligible as potential users of the TGTG App.

In the present study, it is verified whether the population is aware of the App and its potential, the reason why they use it, or not, as well as the frequency of use, as well as other varied aspects, analyzed through the questions posed and which are present for consultation in Annex A.

The questionnaire participants who would or would not already be used by the TGTG App are established as a sample.

The questionnaire was answered 165 times, of which 107 of the responses obtained were considered valid. From the validated responses, the corresponding age groups varied between 19 and 60 years or more, with different academic degrees and with different types of occupation, ranging from students to retired people.

After the analysis, it is expected to find out how effective the App is in supporting the fight against food waste, how it can be improved and, in general, which way to go and what measures to take so that the reduction of waste is effective.

The data collection method used was the survey method by applying an online questionnaire that was later analyzed using the SPSS statistical data processing program.

This was the method chosen because it was the most found in similar studies, because it was the one that best suited the intended sample size and because it was the most conclusive. The quantitative method provides numerical information about consumer behavior.

The questionnaires were sent via e-mail or social networks, and participants were asked to collaborate in forwarding the questionnaire to other known contacts.

For the author [15], a questionnaire is a set of questions carried out to conceive the necessary data to reach the objectives of the study.

In quantitative research, the result is based on samples that can be taken as conclusive answers to make a definitive decision. The sample data collection approach may vary depending on the type of sample structure search. The most common in quantitative research is highly structured research, such as when the questionnaire questions are multiple choice, which is more accurate and more reliable when collecting data [12].

Since this study was carried out on the availability of a questionnaire, with a quantitative methodology, it was made available in a single moment of time, whose group of questions is divided into essentially two groups.

In the first block of questions, the first 5, we tried to determine the age, gender, educational qualifications, occupation, and district of residence of the respondents.

In the second block of questions, this can be subdivided, and in the first part questions related to food waste were asked, namely, what is the level of food waste that citizens consider to exist in Portugal, what practices they consider important for the fight against this same waste, how they evaluate their individual contribution, whether they consider the use of IT useful to combat waste, whether they still consider the existing applications, designed for this purpose, effective, and whether they are still aware of the role of retail companies. In this theme, and in the second part of this same block, we first tried to understand what the citizens' knowledge of existing applications was, and which applications were best known by the population. Being Too Good Too Go the most popular application among citizens, it then became the focus of this study, trying to find out if they had the App installed on their mobile device, and for how long, how often they use the application, or, for on the other hand, why they don't use it and if, after answering the survey, they would feel willing to use it. This set of questions allowed one to understand the level of interest of individuals in relation to the application.

In the questionnaire presented, there were no open response options, to condition the responses to the existing options and thus ensure that the validity of the responses could not be in question. Response options ranged from various concepts, reasons or opinions, and Likert scale, from 1 (Completely disagree or Extremely Dissatisfied) to 5 (Completely agree or Extremely Satisfied).

34.4 Analysis and Discussion of Results

Objective 1: Explore the knowledge and behavior of the population regarding food waste in Portugal.

Within the scope of the analysis of results regarding the knowledge and behavior of the population regarding food waste in Portugal, it appears that most participants (n = 61) consider the current level of food waste verified at national level to be high.

With regard to the practices considered important for the fight against food waste, the majority considered the following options very important, namely planning meals and reusing food leftovers (n = 59), choosing to freeze ready-made products and monitoring the expiry dates of products they have at home and ensure their rotation (n = 52), take prepared meals with them when they travel (n = 50) and resort to take-away food leftovers at commercial food outlets (n = 38). Regarding the practice of shopping more frequently and in smaller portions, 43 considered it relatively important in combating food waste.

Regarding the knowledge and behavior of the population regarding food waste in Portugal, the results obtained confirm the antecedents of openness to changing consumption habits and show a broad perception of the level of food waste in Portugal. Additionally, this perception converges with statistical data that reflect the national reality, since it is estimated that, for everyone, between 20 and 30 kg of food are thrown away annually and that around 17% of edible parts of the food produced for human consumption are lost, or wasted [8].

The fact that participants recognize the high level of waste in Portugal is an antecedent that promotes a change in consumption habits that will positively influence their perception of the value proposition and usefulness of strategies to reduce it, and, in the same sense, their actions (based on the rational consideration that waste is indeed high and that they can act to minimize it).

Regarding the practices considered important for the fight against food waste, and in conjunction with the perception of the dimension of this scourge evidenced by the participants, the identification, by them, of various waste reduction practices whose responsibility falls on them is relevant, reflecting not only their awareness of the problem and its dimension, but also recognizing their role in reducing it.

Regarding the perception of their contribution against food waste, the participants effectively recognized the usefulness of information technologies to reduce food waste, considering them an effective tool for this purpose. These results are in line with the current technological evolution, considering the growing adoption of digital tools to streamline processes that individuals prioritize (in this case, the fight against food waste). At the same time, most of them are unaware of the role of retail companies in combating food waste.

Objective 2: Understand expectations and the level of adoption and the characteristics of use of technology regarding food waste, namely the app Too Good To Go.

Within the scope of the analysis of results regarding the expectations and the level of adoption and the characteristics of use of technology regarding food waste, namely the App Too Good To Go, it was found that the majority (n = 73) of the participants do not have the application installed on your mobile device. Of the 34 that have the application installed, 4 have had it for less than six months, 12 for more than six and less than twelve months, and 18 for more than a year and less than three. In addition, 17 indicate having used the application one to three times a month, 6 four to six times a month, and 2 more than twelve times a month.

Objective 3: Analyze the users' perception of the Too Good To Go app and compare it with other similar apps.

As part of the analysis of results regarding the users' perception of the App Too Good To Go, it appears that most participants indicate being partially satisfied with the application (n = 15) and extremely satisfied with the concept of the application and the Magic Box (n = 12).

With regard to the users' perception of the Too Good To Go and comparing it with other similar applications, it was found that the majority of participants fully agreed that they would recommend TGTG to their acquaintances and indicated that they were partially satisfied with the application and extremely satisfied with it. The concept of the app and the Magic Box. In the same sense, most participants partially agree that the TGTG application facilitates access to various types of products, has an impact on sustainability, improves the quality of life of citizens, has a positive impact on the environment, causes an effective reduction of waste food and contributes to the promotion of various commercial spaces. Most of the members agreed that the

purpose of its use is associated with a lower cost of products and the reduction of food waste. These conclusions show the participants' perception of the value proposition of TGTG (TAM model).

Objective 4: Analyze the users' perception regarding the ease of use of the Too Good To Go App and determine how the Too Good To Go App can have a good level of acceptance and trust by the target group.

Within the scope of the analysis of results regarding the users' perception of the ease of use of the Too Good To Go App, it appears that the majority neither agree nor generally disagree with the reasons given for not using the application, with disagreement (partial or total) is more significant with regard to the lack of knowledge of the existence of the application, which indicates that this will not be the origin of non-adherence to the application. In turn, for the remaining reasons, agreement (partial or total) is more significant than disagreement, which indicates that these tend to undermine the use of TGTG, namely the fact that it does not provide home deliveries, that the window of time for collection to be short, of not being able to be someone other than the one who ordered to collect the Magic Box and of not being possible to choose boxes with specific characteristics (for specific moments of feeding, such as lunch, dinner, dessert, snacks; vegetarian and/or meet dietary restrictions (e.g., gluten-free)).

Objective 5: Understand the main expectations regarding the systems and understand whether their use is considered discreditable and can be associated with social deprivation.

Within the scope of the analysis of results regarding the main expectations regarding systems such as TGTG, the majority partially agreed that they expect it to provide information to users about food waste (n = 18), to be active in policy about food waste (n = 17) and organize events about food waste and promote educational packages in schools (n = 15). Only 12 participants said they did not expect additional activities in the field of food waste from Too Good To Go.

Regarding the main expectations regarding the systems and understanding whether their use is considered discreditable and may be associated with social deprivation, regarding systems such as TGTG, the majority partially agreed that they expect it to provide information to users about food waste, be active in food waste policy, and organize food waste events and promote educational packs in schools. Given these expectations, it is suggested that the TGTG app invests not only in the developments mentioned in the previous paragraph but also in the aspects just mentioned, namely the sharing of reliable information on food waste, political intervention about food waste, and the organization of awareness-raising events in contexts such as schools. These conclusions show the participants' perception of (the expectations of) usefulness of the TGTG (TAM model).

Additionally, it was decided to carry out a principal components analysis (PCA), since having applied a Likert-type scale from 1 to 5, the intervals obtained between each value were short and equidistant from each other.

Considering the 34 respondents who have the application installed and answers to questions 23, 24, 26, and 27, which make it possible to evaluate the degree of acceptance of the technology, in this case, the TGTG App, five components were

defined, named as: Perception of Usefulness (consisting of 4 items with a Cronbach's Alpha of 0.83), Effective Use of the System (consisting of 5 items with a Cronbach's Alpha of 0.86), Attitude (consisting of 4 items with a Cronbach's Alpha of 0.83), Behavioral intention (consisting of 3 items with a Cronbach's Alpha of 0.71), and Perception of Ease of Use (consisting of 2 items with a Cronbach's Alpha of 0.70).

Finally, a correlational analysis was carried out (Table 34.1), where we can infer that the levels of correlation between the variables under study are high, that is, they have a strong correlation, and in all of them it appears that when one of the variables varies the other with which it is related varies in the same direction.

The highest correlation observed is the correlation of the variable "Perception of Usefulness" with the variable "Effective Use of the System," and it is expected that when evaluating the acceptance of the technology, the perception of usefulness that using the TGTG App has will make so that, in this case, its effective use increases.

In the opposite direction, the variables that register a lower level of correlation are "Behavioral intention" with the variable "Perception of Ease of Use." By observing the responses obtained to the questionnaire carried out, we can deduce that this could be due to the limitations imposed by the platform and its associates, including the periods of time in which Magic Boxes can be collected, their contents being completely unknown to whoever is purchasing them and as such may be completely inappropriate to the type of meal the user will have or even the impossibility of adjusting their content to specific dietary needs, as is the case of some food intolerance or even vegetarianism, for example.

		Perception of usefulness	Effective use of the system	Attitude	Behavioral intention	Perception of Ease of Use
Perception of usefulness	Pearson Correlation	1				
	N	34				
Effective use of the system	Pearson Correlation	0.667**	1			
	N	34	34			
Attitude	Pearson Correlation	0.502**	0.500**	1		
	N	34	34	34		
Behavioral intention	Pearson Correlation	0.453**	0.707**	0.355*	1	
	N	34	34	34	34	
Perception of ease of use	Pearson Correlation	0.567**	0.596**	0.351*	0.453**	1
	N	34	34	34	34	34

Table 34.1 Pearson correlation between components

** Correlation is significant at the 0.01 level (2 tailed)

* Correlation is significant at the 0.05 level (2 tailed)

34.5 Conclusion

The present investigation work allowed to conclude that:

- There is a wide perception of the level of food waste in Portugal, which is an antecedent that promotes a change in consumption habits that could positively influence their perception of the value proposition and usefulness of strategies to reduce it and, in the same sense, their actions (based on the rational consideration that waste is indeed high and that they can act to minimize it);
- The vast majority of participants are familiar with the TGTG, but this is not reflected in adherence to it, results that translate the result of the iterative process of analyzing the value proposition, ease of use and usefulness (TRA model);
- Most participants partially agree that the TGTG application facilitates access to various types of products, has an impact on sustainability, improves citizens' quality of life, has a positive impact on the environment, causes an effective reduction of food waste, and contributes for the promotion of the various commercial spaces. These results reflect the participants' perception of TGTG's value proposition (TAM model);
- The following disadvantages were identified, in which intervention is suggested with a view to improvement: the fact that home deliveries are not available, that the time window for collection is short, that it cannot be anyone other than the one who ordered the lifting the Magic Box and not being able to choose boxes with specific characteristics (for specific meal times, such as lunch, dinner, dessert, snacks; vegetarian and/or that meet dietary restrictions (e.g., gluten-free)). These results reflect the participants' perception of the TGTG value proposition (TAM model), regarding the improvements to be made. However, the majority fully agreed that to date, the purpose of its use is associated with a lower cost of products and the reduction in food waste;
- The majority partially agreed that they expect it to provide information to users about food waste, be active in policy about food waste and organize events on food waste and promote educational packages in schools. Given these expectations, it is suggested that the TGTG app invest in these areas, which highlight the participants' perception of (the expectations of) the usefulness of the TGTG (TAM model).

From the study's conclusions, a clear contribution emerges for the business community, namely an improvement action plan for the TGTG app or similar ones, to improve the way they meet user expectations. In fact, it is suggested:

- Development of new app features:
 - Provide home deliveries;
 - Extend the time window for picking up orders;
 - Enable the collection of orders by several people;

- Enable the choice of options with specific characteristics (for specific mealtimes, such as lunch, dinner, dessert, snacks; vegetarian and/or that meet dietary restrictions (e.g., gluten-free)).
- Development of actions in the community on waste:
 - Act as a provider of reliable information to users about food waste;
 - Actively intervene, in the political dimension, on the issue of food waste;
 - Organize events on food waste;
 - Promote educational packages in schools.

The study presents as a limitation its reduced geographic range in relation to the location of the participants, who were concentrated in certain cities/national areas, which may have biased the results obtained through certain contextual variables (as discussed in point 4.1, regarding the programs that exist in those regions on which the participants focused).

For future work, the following proposals are presented:

- Use other methodologies to analyze data, such as structural equation modeling, in order to test a model.
- Develop research by area of the country, in order to consider contextual variables related to the region (namely the existence and implementation of local policies to reduce food waste).
- Gather information on applications other than TGTG, to enable comparative analyzes on the interaction between value proposition, utility, ease of use, and result (adherence).

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Part IX Neuromarketing Technologies

Chapter 35 Technological Innovations Applied to Neuromarketing: Systematic Review



Carlos Ramos-Galarza (), Patricia García-Cruz (), and Jorge Cruz-Cárdenas ()

Abstract Neuromarketing allows us to understand the relationship between brain function and consumer buying behavior. Various technological innovations have been developed to influence the individual's brain functioning and increase the likelihood of purchase. In this context, this article presents a systematic review of research that has developed technological innovations to be used in neuromarketing. After applying the inclusion and exclusion criteria, 10 studies were identified that allowed us to analyze the most relevant technological developments in the area. The main devices found are encompassed in technology for visual tracking, neuroimaging, and new neuromarketing developments. We conclude this research by highlighting the benefit of these devices in neuromarketing and the need for future studies to analyze their effectiveness.

35.1 Introduction

Neuromarketing relates brain sciences to the processes of buying and selling products. It is interested in knowing how the image of the brand, products, advertising, or marketing campaigns influence the human brain, since this organ is responsible for making decisions to buy any type of product offered [1, 2].

In recent years the use of technology has been very beneficial in understanding the relationship between the human brain and the buying and selling process, for

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example, devices have been developed that can measure physiological responses of the body or neurological activity when a participant is in front of a product [3, 4].

Among the main technological developments applied in neuromarketing are devices that detect temperature, heart rate, respiration level, dermal conductance, sweating, body emotions, somatic markers of brain activity, neuronal electrical activity, glucose consumption, among others (Fig. 35.1) [5, 6].

Within this context, it is proposed to carry out a systematic review of the different technologies that have been developed to be applied in Neuromarketing. To achieve this objective, the Scopus database will be searched for recently published research in the area.

35.2 Method

A quantitative systematic review process was applied in the study. The Scopus and Web of Science databases were included in the article review process.

The inclusion criteria for the articles were: (a) research on technological developments in favor of neuromarketing, (b) articles published between 2015 and 2023, and (c) articles with quantitative data. Exclusion criteria were: (a) articles dealing with classic strategies without technological innovation, (b) theoretical reflection studies, and (c) papers published outside the established time range.

At the beginning of the search we started with 176 papers and after reviewing the phases of indetification, duplication of articles, eligibility and selection based on the inclusion/exclusion criteria, we determined a sample of 10 articles with which we worked on the data analysis.

In the statistical analysis of the articles, measures of central tendency and dispersion, frequencies and percentages were used. The quantitative parameters extracted from the articles were (a) sample size, (b) country in which the research was conducted, (c) educational level of the participants, (d) type of participants included in the studies, (e) technological development addressed in the study, (f) limitations of the research analyzed, (g) contributions to neuromarketing, and (h) time of interventions.

35.3 Results

Regarding the average number of participants found in the studies, an average a sample size of M = 39.2, SD = 47.24 was calculated. In most investigations, a higher frequency was found between 1 and 50 participants. This data can be seen in Fig. 35.2.

In reference to the countries where the selected studies were carried out, it found that Spain is the country with the most neuromarketing technological investigations development. Figure 35.3 shows these results.

Regarding the education level of the participants, the present study found 2 investigations that use secondary school population, 3 researches with university education level volunteers, and 5 studies without level education specified. Figure 35.4 shows the education level of the participants.

All the participants of the studies included in this investigation are healthy adults without neurological or mental diseases, and have technological access. Figure 35.5 shows the characteristics of the participants.

In reference with the neuromarketing technological developments, this research found that there are two technological developments that are most commonly used in neuromarketing, which are neuroimaging and eye-trackers. In addition there are a few new technological developments in favor of neuromarketing. Figure 35.6 shows this statistic.

The technological developments found in the articles were:

1. A biofeedback system based on the implemented generator of HMIs (HMI-GAN-1); this system seeks to produce changes in the HRV of subjects in a differentiable manner by using HMI sounds as a control/regulator element.



Fig. 35.2 Study sample size ranges



Fig. 35.3 Countries that have neuromarketing technology developments



Fig. 35.4 Education level of the participants

The HMI-GAN-1 generator is used here to transduce HRV signals into HMIs (HMI-T). The HMI-T serves as a reference for a generator of HMI sequences (HMI.sequencer). Finally, these sequences will be presented as sound to the subjects.



Healthy adults with access to technology

Fig. 35.5 Characteristics of the participants



Fig. 35.6 Technological developments in neuromarketing

- 2. *Emotiv Epoch + headset + PsychoPy v3.0*; they set the Emotiv Epoch + headset in the participant's head and ensure the electrode conduction is good to collect EEG data. Afterwards they used PsychoPY v3.0 to show the stimulus to the participants and collect EEG data simultaneously.
- 3. *E-prime* 3.0 + *EOG-based eye-trackers*; this technological development is composed of 3 phases (calibration, eye-tracking test with instructions, and free eye-tracking test), and all the instructions and pictures are displayed on the monitor using E-prime 3.0.
- 4. Support Vector Machine classifier (SVM); it helps to understand the EEG signals.
- 5. *HTML link* + *computer* + *webcam-based eye-tracker*; a tent is presented in which the participants are shown 3 different images of each product category,

during which webcam-based eye-tracking measures participants' gaze behavior and emotional expression.

- 6. *LCD screen* + *EEG*; the LCD screen is used to show a video advertisement and during this the EEG is used for 2 sessions.
- 7. *Drones* + *eye-tracking*; drones are used to take pictures and the eye-tracking is used to analyze the emotional and attention effects of the pictures.
- 8. *Functional Magnetic Resonance Imaging (fMRI)*; It is used to study the frequency waves of the MRI scanner as participants view different stimuli.
- 9. *EEG*; this is used with a questionnaire to complement the EEG results with data obtained from traditional marketing research techniques.
- 10. *Eye-tracker (TOBII T60 model)*; is used to analyze visual attention based on the recording of eye movements and eye movements during the visualization of the stimulus.

Regarding the limitations found in the articles, it was found that in most of the studies the limitations were not discussed, in other studies the population used for the research was very limited and in some technological developments limitations were found in relation to their application, for example, for the use of drones it is necessary to have a wide area. Figure 35.7 shows the results.

The different technological developments in neuromarketing have several contributions, most of which seek to improve traditional marketing (Fig. 35.8). Other contributions in neuromarketing due to these technologies have been the prediction of consumer preferences and purchasing behavior, as well as the analysis of emotional responses to visual stimuli.

According to the duration of the different interventions, it was found that most of them lasted from 11 s to 3 min, or did not specify their duration. Figure 35.9 shows the statistical graph.



Fig. 35.7 Limitation found in the articles



Fig. 35.8 Contributions in neuromarketing



Fig. 35.9 Time of interventions

35.4 Conclusions

In this article we have reported a systematic review of the Scopus database in which we have retrieved 10 research articles that have developed some kind of technology in favor of neuromarketing. Technological developments made from 2015 to 2023 were used as inclusion criteria and non-development of technological devices in favor of neuromarketing were used as exclusion criteria.

In the research results, three types of technologies relevant to neuromarketing were found: visual tracking, neuroimaging, and innovative technology. These technologies contribute to the understanding of the process that an individual follows to make a purchase. For the Latin American context, in which this research was conducted, it is important to apply these technologies to better understand consumer behavior and to be able to generate the ideal conditions for consumers to gain access to the product on offer [7, 8].

As future research, we intend to conduct experimental research in which we apply the technologies described in this article and understand their effect on the consumer. In addition, we are interested in generating a technological device to be used in the context of neuomarketing.

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Chapter 36 Psychological Factors that Influence Decision Making at the Time of Purchase



Carlos Ramos-Galarza (), Micaela Silva (), Jorge Cruz-Cárdenas (), and Mónica Bolaños-Pasquel

Abstract In the buying process there are several factors that determine consumer behavior, which is a central topic of interest in the Neuromarketing research line. In this article we reflect on psychological factors that influence this context: Following fashion stereotypes, the role of the frontal lobe, product purchase anxiety, the psychology behind colors, and personality traits that influence the buying process. The methodology followed was the review of classic research and theories that allowed us to analyze the psychological factors involved in the buying process. The article ends by discussing the need to understand the factors discussed in this research in order to better understand consumer behavior.

36.1 Introduction

The purchasing process involves a series of variables, among which psychological factors play an important role in understanding it. The first of these is following a stereotype promoted by fashion, which makes the individual seek to achieve these standards of beauty and buy the products needed to do so [1].

A second factor is the role of the frontal lobe when the consumer must buy a product. Since, if the human being has this immature brain structure, he will not be able to make a purchase with the awareness of knowing if he really needs the product or if he is doing it impulsively [2].

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The third psychological factor involved in the purchasing process has to do with the anxiety that the person suffers at the time of purchase, since several studies have described that people who suffer from anxiety tend to have a more common behavior of unnecessary products. With this type of consumerist behavior, the person usually channels his anxiety, however, it is an impulsive behavior that does not have an absolute awareness of what he is acquiring [3].

The psychology of color in the purchase intention determines to a great extent the consumer's behavior, since each color has a different meaning and must be taken into account at the moment of offering a product to the consumer as well as at the moment of purchase [4, 5].

Finally, personality traits are another psychological factor involved in the buying process. The 5 major personality traits that are influential are extraversion, agreeableness, openness, conscientiousness, and neuroticism. Depending on which personality trait is more or less developed in a person determines his or her buying behavior [6].

In this context, we are interested in analyzing how the psychological factors described above influence consumer behavior. The following is a review of theories that allow us to identify their impact on the purchasing process: the role of stereotypes, frontal lobe, anxiety, product color, and personality traits.

36.2 Psychological Factors

36.2.1 Following the Stereotypes Promoted by Fashion

This factor is related to several aspects of consumer psychology. At first, it must be considered that buying involves making a decision, and in turn, this process encompasses both cognitive and emotional components [7]. More specifically, the decision-making process is influenced by external and internal variables, such as culture, customs, values, beliefs, norms, assumptions, socio-economic position, gender, education, and other factors [8]. Within these variables we find stereotypes, which are understood as a model to be followed that is imposed by society.

Stereotypes are very relevant in the fashion and make-up industry, both related to the image that one wishes to display to others, since clothing is considered a visible expression of personal and gender identity [1]. In this sense, stereotypes associated with having a slim body, keeping youth, or hiding imperfections such as acne, stretch marks, under-eye circles, are promoted. In addition, the body is sexualized and women are the most affected by these factors [9]. Therefore, the consumer will be more inclined to buy products that allow him or her to get closer to that stereotype; for example, anti-aging products, clothing that enhances the body shape, makeup that covers imperfections, etc. On the other hand, men are also affected by stereotypes mainly related to maintaining a "masculine" image and are more likely to buy clothes with specific colors and patterns associated with masculinity, as well as personal hygiene products "for men" [1].



Fig. 36.1 Graphical representation of McLean's brain organization model and the interaction between limbic system and prefrontal lobe. *Source* Prepared by the authors of this article

Another line of reflection on this topic is that human beings have social bonding needs such as social validation and recognition from others. Following stereotypes allows us to get closer to those needs, since it is more likely to value those who follow stereotypes and fashion trends. This is more noticeable in young consumers. According to a study, young people who buy online have the feeling that they are fashionable and ahead of others, because they are able to find trendy products more quickly on the Internet. They also feel validated by others because of the clothes they wear [10].

These psychological factors would be related to emotional processes that, according to McLean's model of brain organization (Fig. 36.1), have their brain center in the limbic system. This structure is associated with feelings of conviction about beliefs and what is assumed to be important, and is also necessary to maintain a sense of personal identity [11]. We can conclude that the subjective understanding of stereotypes and their importance is closely linked to the limbic system and emotional processing, being the latter an important factor at the moment of purchasing. It should not be ignored that emotional regulation and inhibitory control are executive functions [12] that can have an influence on making less impulsive purchases that do not only follow the stereotypes imposed by fashion, but also personal values (core values) and more rational factors such as economy and priorities at the time of purchase. The influence of executive functions, located in the frontal lobe, will be explained in more detail in the next section.

36.2.2 The Role of the Frontal Lobe at the Time of Purchase

The human brain is the organ that allows decision making and the frontal cortex (Fig. 36.2) plays a very important role in the behavior that humans exhibit when shopping [13]. In this part of the brain there is a set of high-level mental abilities known as executive functions (inhibitory control, working memory, decision making, emotional regulation, planning capacity, cognitive flexibility, error correction, and





internal language regulating behavior) which will determine whether the person makes a purchase impulsively or consciously to satisfy real necessities [14].

In several investigations it has been found that people with frontal lobe involvement, as a result of acquired brain damage or immaturity, show impulsive behavior without greater awareness of the consequences of their actions. It is precisely in this situation where the decision process to make a purchase is influenced and the person could buy something that is only for an impulse and not because it is really significant in his life [12].

36.2.3 The Relationship Between Anxiety and Shopping

Anxiety is understood as a complex and unpleasant emotional phenomenon of response to stimuli where three main systems interact: cognitive, physiological, and motor. Another important element is that anxiety is also considered as a personality trait that characterizes people with a higher tendency to react with anxious responses. In general, anxious states are characterized by the presence of worry and preparation for future dangers [15]. In this section we will analyze different ways in which this element influences shopping decisions.

According to Rivera, the motivational process of purchase begins with the appearance of unsatisfied necessities after a stimulus, which subsequently generates a feeling of tension, anxiety, and desire to buy. Once the purchase is completed, the process ends with the perception of satisfaction and the reduction of tension by the consumer [16]. As can be seen, this process can be present in all types of people, regardless of whether or not they are predisposed to anxiety.

The situation is more complex when it comes to people with a stronger tendency to anxious symptoms, since they may present compulsive buying behavior (CBB), where buying is used as a negative reinforcer to escape from unpleasant emotions such as anxiety, sadness, tension, or boredom; this behavior is accompanied by a lack of self-regulation capacity [17, 18]. It should be emphasized that the appearance of these emotions is not related to an unsatisfied need, as in the previous case, but to the individual's own psychological difficulties. Similarly, it has been found that people with CBB (understood as a psychological disorder) present comorbidity with other disorders, such as anxiety, depression, addiction, obsessive–compulsive, and borderline personality disorder [17].

During the COVID-19 pandemic, it was possible to observe directly how the presence of anxiety influences purchasing behavior. The situation at that time was marked by uncertainty about the future and concern, therefore, people panicked and bought basic hygiene and food products, to such an extreme that supermarkets were out of stock. The psychological basis of this behavior is based on accumulating at home everything necessary for the emergency situation, in other words, to be prepared and ensure survival [19, 20].

But why do we find it so difficult to self-regulate our behavior when we feel anxious? The neurobiological process of anxiety may provide an answer. The cerebral amygdala is considered to play an important role, as it coordinates and regulates alarm, fear and anxiety reactions. In order to fulfill its function, it sends projections to various structures: the prefrontal cortex, which explains why executive functioning is delayed; nucleus accumbens and ventral tegmental area, both related to reward conditioning; and finally brain stem parts associated with respiratory and cardio-vascular control [21]. The process can be appreciated in Fig. 36.3. All this has a purpose: to ensure survival by avoiding danger. It is known that in situations of life or death, the cerebral cortex (the seat of higher functions) loses leadership and gives it to structures with a more instinctual or primitive functioning.

36.2.4 Color Psychology and Purchasing Intention

Color is considered an attribute that we perceive in objects when they receive light, it belongs to the category of visual stimuli and its influence on purchase intentions has been widely studied by marketing and neuromarketing. It is estimated that 83% of the information retained by people corresponds to visual stimuli and that, within this category, color is one of the most relevant and influential [4, 22]. Color psychology has established different ways in which this attribute affects perception and behavior.

Firstly, colors modify the interpretation we make of products or advertisements, since each color acquires a different meaning that depends on learned associations. Such associations are mainly due to socio-cultural factors, but can also be shaped by nature and by the life history of each individual [4, 5]. In general, warm colors (yellow,



red, and orange) are linked to aspects such as closeness, enthusiasm, dynamism, joy, hunger or danger; and cold colors (blue, violet, black, and green) to night, winter, tranquility, freshness, elegance, peace or sadness [23].

On the other hand, several studies show that colors can promote emotional bonds that lead to and facilitate aspects such as: differentiation between brands, attention capture, an increase in the time spent in a store, reinforcement of customer loyalty, enhancement of pleasurable emotions, and the customer-brand relationship [5].

It must be taken into account that these associations do not occur at a conscious level, since they respond to underlying brain processes that happen very quickly and escape our perception. The brain mechanism of color perception begins in the optic nerves and travels to the Peristriate region of the occipital lobe, responsible for receiving visual stimuli. Subsequently, the visual cortex will make this perception conscious. The information is then processed and associated with other data in the temporal lobe, where it is assigned a meaning. The emotional charge is processed by the limbic system and, finally, the frontal lobe is also involved until a decision is made or a purchase conduct is issued. As can be seen, all brain structures work together almost simultaneously [22]. Figure 36.4 illustrates the previous statement.

36.2.5 Personality Traits and Shopping Behavior

Personality is a complex psychological concept that has been described in different ways. It generally refers to behavior patterns (including thoughts and emotions) that characterize a person and define the way he/she adapts to the life situations he/she faces. Although it has been determined that personality has a significant influence on purchasing behavior, efforts to include this aspect in marketing strategies have not been productive [6].



For this section we will use the theoretical model of personality called the Big Five, which has been built over the years until reaching five basic and recurrent factors that can explain many variants of personality. It should be emphasized that this theory uses the concept of traits, which are understood as those stable patterns of response and decision making. The five factors or traits that comprise the Big Five model are the following [24, 25]:

- *Extraversion*: predilection for others' company, more attention to the exterior than to the interior, search for sensations.
- Agreeableness: solidarity, altruism, empathy, openness, trust.
- *Consciousness*: organization, planning, self-control, discipline, objective orientation, need for achievement.
- *Neuroticism*: anxiety tendency, emotional lability, reduced tolerance to stress and frustration.
- *Openness to experience*: greater contact with emotions, search for new experiences and ideas, curiosity, imagination, creativity, easy adaptation to change.

Several research studies have found that the Big Five have an influence on purchasing behavior and motivations [26]. For example, Openness to Experience, Agreeableness, and Extraversion have been found to correlate positively with the hedonic value of shopping; whereas emotional stability (opposite of Neuroticism) and conscientiousness are associated with the utilitarian value of shopping. Market mavenism and shopping frequency are positively related with Openness to Experience, Extraversion, Agreeableness, and Conscientiousness [27].

On the other hand, impulsive, compulsive, and utilitarian purchases are more frequent in people with Openness to Experience and Neuroticism traits [28]. In contrast, the conscientiousness factor is related to better control of expenses, less

impulsivity, and greater involvement in purchasing decisions [25]. However, most of these studies agree that there is a lack of research regarding the topic and the specific relationships between the Big Five and purchasing behaviors.

36.3 Conclusions

In this article we have worked on a group of psychological factors that allow us to understand to a great extent the buying process of a human being. The analysis began with the stereotypes that consumers follow at the time of purchase, which influence the appearance, fashion, way of being, and other aspects that motivate the purchase of a product.

The second psychological factor analyzed has to do with the role of the frontal lobe when a person makes a purchase. This section analyzes the role of inhibitory control at the time of making a purchase, which, if it is in an adequate state, will allow the person to make a conscious purchase of a product, whereas if inhibitory control is affected, the purchase will be impulsive and of something that is probably unnecessary.

The third factor analyzed in the article is the relationship between anxiety and purchasing behavior. This part of the article highlights how this behavior, characterized by high levels of stress and worry, influences a person to make an impulsive purchase. The fourth factor has to do with the psychology of color, which highlights the influence of colorful visual stimuli when buying a product.

Finally, the last factor analyzed has to do with human personality traits. This section analyzes how the characteristics of extraversion, agreeableness, openness, conscientiousness, and neuroticism influence the buying experience. As future research we are interested in conducting empirical studies to test the described psychological factors in virtual technological environments in which we can see their influence at the time of making a purchase.

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Chapter 37 Eye-Tracking and Pictograms: Improving Communication and Accessibility for Senior Adults

Hugo Arias-Flores , Kevin Valencia-Aragón , and Sandra Sanchez-Gordon

Abstract An important factor in exploring the world around us and understanding the cognitive process of individuals is analyzing the characteristics and behavior of the eyes, as they provide reliable information. Improving communication processes with users through visual communication environments can create an accessible environment for virtual interaction. In this context, the global population is aging at a faster rate, leading to social transformation. This population segment may face challenges with language skills, health issues, psychological disorders, and traumas that can limit their ability to speak or move. The purpose of this study is to investigate whether eye-tracking, using the eye-tracking device, will enable senior adults to interact with their caregivers through a pictogram-based interface, allowing them to generate messages and communicate their needs. The research method involves the conceptual development of an experiment designed for senior adults, including the use of an eye-tracking device, calibration tests, and interface responses. This research aims to better understand and promote the importance of meeting the needs and expectations of the elderly segment.

37.1 Introduction

The aging of the population worldwide is transforming society. Most countries are experiencing aging populations. By the year 2021, 761 million people were over 65 years old, and this number is projected to increase to 1.6 billion by 2050. The COVID-19 pandemic highlighted the vulnerabilities and the need for long-term care

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for this segment of the population [1]. Furthermore, the boundaries that define old age will continue to change as older people live longer and take better care of their health [2].

To adapt to the metaverse era, bridging the digital divide among senior adults is a necessity that the COVID-19 pandemic has made evident. An important factor in exploring the world around us and understanding people's cognitive processes is analyzing the characteristics and behavior of the eyes, as they provide reliable information [3, 4]. In this sense, the availability of eye-tracking devices, capable of measuring eye data, allows for the reliable detection of gaze direction, and measurement of user eye data on a screen [5].

Eye-tracking is a standard physiological technique [6] that provides objective data while people perform a specific task. Integrating gaze detection features into wearable devices that help select an object on a screen, such as a letter, a menu item, or an image, is an easy and natural means of human–computer interaction [7]. This eye-tracking technique is commonly adopted to analyze human visual behavior in various fields, such as marketing, education, and communication [8].

Thus, eye-controlled interaction is direct and natural when selecting objects with eye-tracking. This selection requires practice time [9] and a fixation time on the object for activation. The minimum limit for human visual fixation (the time required to stabilize the eyes) ranges from 200 to 600 ms [10].

In summary, the estimated optimal dwell time for each visual object is around 600 ms, 400 ms for alphanumeric characters, and 800 ms for visual icons [11]. Additionally, regardless of the object type, gaze-based object selection with dwell times of 200–800 ms is faster for users without glasses than for those with glasses [11, 12].

To meet the needs of an aging population, improving communication processes with individuals through gerontechnology [13], which combines gerontology and technology, can provide real-time information to identify their needs and how to fulfill them [14]. These needs consciously aim to improve aspects of health, nutrition, hygiene, emotions, among others [15]. Attracting consumer attention through product design or appearance can motivate purchase and consumption [16]. Similarly, when a product is presented online, the design of the virtual environment can capture the user's attention and motivate them to seek information [17].

The senior adult segment may experience difficulties with their language skills, health issues, psychological disorders, and traumas that can limit their ability to speak or move. To understand the needs of this consumer group, this study aims to identify whether eye-tracking, using eye-tracking technology, allows users to interact with a pictogram-based interface, enabling them to generate a message by selecting pictograms that convey their needs to their caregiver. This solution could lead to initiatives that emphasize the needs of senior adults in areas related to their motivations, such as ordering food from a friend or going to a restaurant to eat.

The segment of older adults may experience problems with their linguistic abilities and health issues, psychological disorders, and traumas that can limit their ability to speak or move. As a result of the aging process, changes occur in cognitive functioning, particularly in more complex functions. These changes manifest as a slowing down of information processing, decreased attention capacity, declines in memory, and in what are known as executive functions. Specifically, the executive functions most affected by aging are attention, working memory, and verbal fluency, which are involved in information search and updating; cognitive flexibility, responsible for generating behavioral, thinking, and reasoning modifications, fundamental to efficient cognitive functioning [18].

To understand the needs of this group of consumers, this study aims to identify if eye-tracking using eye-tracking technology allows the user to interact with a pictogram-based interface in such a way that they can generate a message by selecting pictograms that convey their needs to their caregiver. In this process, their needs are identified, followed by planning to meet them, and finally their execution. This solution would lead to the development of initiatives that emphasize the needs of older adults in relation to their motivations, seeking their satisfaction, such as asking a friend for food or going to a restaurant to eat.

37.1.1 Related Studies

Currently, technological devices such as computers, smartphones, and tablets are widely used in people's daily activities. However, not everyone can access and utilize these technologies effectively, which puts individuals with limitations at a disadvantage. In a research study conducted by Ramos et al. [19], an interface called EMKEY was developed to emulate mouse and keyboard functions using computer vision and voice recognition concepts. This interface aimed to replace the use of hands for individuals with disabilities. In the first stage of the study, 30 participants without disabilities were involved, and significant correlations were found between the usability of the emulator and factors such as adaptability, execution time, and participant age. In the second stage, four participants with disabilities, particularly one with cerebral palsy, utilized the interface more effectively, highlighting the importance of interface design in terms of ease of use, practicality, and accuracy. These technological advancements enable people to access information more effectively through devices, leading to increased user satisfaction [20].

Pictograms play a crucial role in the design and development of applications across various formats. In a study aiming to determine appropriate combinations of text and pictogram sizes for senior adults using eye-tracking, a repeated measures methodology was employed. Different combinations of pictogram and text sizes were considered, along with factors such as legibility, familiarity, and visual search performance in senior adults. The results suggested that the size of pictograms and text significantly affects visual search performance. Larger sizes of pictograms and text were found to improve the legibility and visual search performance of pictograms in senior adults [21].

Visual search and the sequence of fixating on the desired object can sometimes lead to the "Midas touch" problem, where users unintentionally fixate their gaze on the wrong object without proper attention, potentially selecting the unintended object as the target. To address this issue, research has been conducted on using eye blinking as a triggering mechanism for interactive objects. The findings concluded that two blinks can result in low task load and a high success rate of 95%. Additionally, it was observed that larger diameters of interactive objects (with an optimal configuration of 55.5 mm) led to shorter response times and higher interaction success rates for users [22].

Aligned with this, a study employing the multiprocess parameter ratio methodology focused on using eye blinking to select functions in the touch menu of a smart wheelchair used by individuals with motor disabilities, specifically hand and foot paralysis. Eye gaze was utilized to execute menu commands through blinking the left eye, considering two screen sizes, 14 and 17 inches. The results demonstrated an accuracy rate of 91.48% and 90.68% for the 14-inch and 17-inch screens, respectively, among users without glasses. For users wearing glasses, the accuracy rates were 89.55% and 86.99% for the respective screen sizes [23].

Finally, we can point out the existence of platforms that generate pictograms such as Pictotraductor [24] and ARAWORD [25]. These interfaces are intuitive and easy to use. To obtain a phrase using pictograms, you enter the text and the associated images appear. The images linked to the text can be modified, and it is also possible to upload custom images, adjust the size of the pictogram, change the size of the accompanying text, modify the typography, and customize the border colors, among other options. These interfaces facilitate the creation of materials to support augmentative and alternative communication, as well as the adaptation of texts for individuals who experience difficulties in functional communication.

37.2 Method

The research design encompasses a comprehensive conceptual development of an experiment, which comprises two distinct phases aimed at obtaining robust and reliable results. The initial phase, vital for setting up the experiment, focuses on the calibration of the interface, ensuring optimal performance. In this phase, careful attention was given to the selection and configuration of the hardware components. A desktop computer was employed, featuring an LG Flatron E2241 21.5-inch LCD monitor, boasting a high-resolution display of 1920×1080 pixels. This choice of monitor was crucial for providing participants with a clear and immersive visual experience throughout the experiment.

To enhance the accuracy of eye-tracking, a cutting-edge Tobii Eye Tracker 4C device was meticulously installed on the bottom edge of the monitor. This compact yet powerful device, with dimensions measuring $17 \times 15 \times 355$ mm, operated flawlessly at a distance ranging from 50 to 95 cm. The Eye Tracker was strategically positioned approximately 10 cm above the base of the monitor and maintained a consistent 30° angle with the user's eye level. This setup ensured precise eye movement detection while simultaneously minimizing any potential discomfort for the participants.
The computer utilized for the experiments regular specifications, including an Intel Core i5 processor, 8 GB of RAM, and a 64-bit Windows 10 operating system. These specifications were carefully chosen to meet the specific requirements for seamless integration and optimal functioning of the Eye Tracker device. It was crucial to provide a reliable and efficient computing environment to support the demanding tasks of gaze tracking and data processing.

Before commencing the actual tests, it was essential to configure the Tobii Eye-Tracking application to access the device's settings and functionalities. This involved the creation of user profiles, registration of users' eyes, and performing a meticulous calibration process to ensure accurate and reliable gaze tracking. To provide participants with visual feedback regarding their eye movements, the "gaze trace" function of the application was activated. This feature generated a visually intuitive trace of the user's gaze in the form of a bubble overlaying their focal point, facilitating a deeper understanding of the eye-tracking process.

Furthermore, the device's interaction menu was customized to assign specific functions to the "space" key, enabling seamless cursor movement and effortless clicking on designated areas of interest. These thoughtful configurations played a crucial role in executing various tests involving the random selection and opening of files on the desktop, which not only facilitated proper calibration of the device but also ensured intuitive and straightforward interaction with on-screen objects. A visual representation of this interaction setup can be observed in Fig. 37.1, illustrating the seamless integration of the Eye Tracker and the desktop environment.

By meticulously configuring and integrating these components, the experimental setup created an optimal environment for conducting empirical tests with senior adults. The comprehensive calibration process, coupled with the sophisticated hardware and software configurations, aimed to provide accurate and reliable data for analyzing the participants' gaze patterns and interactions with on-screen elements.



Fig. 37.1 Experimental environment

The resulting findings from this research endeavor hold significant potential for advancing our understanding of human–computer interaction in the context of senior adults, ultimately contributing to the development of more inclusive and user-friendly technologies.

Calibration and interface response tests were carried out using the eye-tracking device. These tests aimed to assess human–computer interaction by employing a pictogram-based interface. The interface comprises two distinct profiles: (i) caregiver and (ii) user (senior adult). Within the caregiver's profile, options for user configuration and interaction are presented. Figure 37.2a illustrates the areas in which the caregiver assigns the user to interact. This section allows the caregiver to create categories and subcategories, associating specific pictograms with each of them. Later on, these assigned options will be presented to the user for selection in order to generate a message.

Figure 37.2b provides an example of the categories assigned by the caregiver to the user. The user will be required to fixate their gaze on the desired category and subsequently select the corresponding pictogram to compose and send a message to their caregiver.

In a second empirical phase, the experiment will be conducted with senior adults, where participants will access the user profile and begin with the planned activity. For example, they will select the menu (Food), enter the subcategory (Sweet Food), and then choose the pictogram (chocolate) before sending the message to the caregiver.



Fig. 37.2 a Caregiver interface—presents assigned categories. b Programmed categories for the senior adult

37.3 Results

Participant accounts were set up, providing personalized access to the platform's features. Within these accounts, a well-organized system of categories and subcategories was established, ensuring efficient navigation and ease of locating relevant pictograms. Specifically, two essential subcategories, namely "daily activities" and "food," were meticulously configured to enable participants to select the appropriate pictograms and craft their messages.

To create a seamless user experience, great care was taken to avoid any abrupt or jarring movements. Instead, the interface relied on the precise control of the cursor's position through gaze tracking. Participants effortlessly directed their gaze toward the desired pictogram, and with a simple press of the "space" key, they were able to select their choices. This intuitive interaction, as demonstrated in Fig. 37.3, allowed for a natural and fluid communication process.

As depicted in Fig. 37.3, the proposed solution relies on a pictogram-based communication mechanism facilitated by the Tobii Eye Tracker 4C device, enabling senior adults to effortlessly express their specific needs. In the provided example, the evident desire for sweet food serves as an illustration, yet this approach can be easily adapted to address various other types of requirements.

Moving forward, Fig. 37.4 displays the message received by the caregiver, who plays a crucial role in assessing and responding to the user's needs. Based on the received message, the caregiver has the opportunity to determine whether to fulfill the stated need or, if deemed necessary, provide alternative recommendations that prioritize the individual's well-being, such as suggesting healthier food options.

In order to further enhance the user experience and cater to individual preferences, the platform can integrate an extensive selection of additional pictograms. These supplementary pictograms can be readily accessed from the ARASAAC website at no



Fig. 37.3 Pictogram menu for generating a message

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Fig. 37.4 Message received by the caregiver

cost, offering a diverse library that encompasses a wide range of pictographic representations. By incorporating these resources, the platform ensures a more comprehensive and personalized communication experience for older adults, addressing their unique requirements and preferences with greater accuracy and relevance.

37.4 Conclusions

The COVID-19 pandemic disrupted family life, highlighting the need for the use of technology to maintain adequate communication, as many individuals had to take on roles as teachers, therapists, and caregivers [26]. This unprecedented situation emphasized the significance of technological interventions in addressing the challenges faced by families. By leveraging technology, we can effectively identify the needs of senior adults and subsequently develop and implement tailored programs that align with their preferences and expectations.

Moreover, the digital divide exacerbated the issue of exclusion among senior adults, particularly in terms of communication with their family, caregivers, and friends. In this context, the use of a communication interface can play a vital role in bridging the gap and enabling senior adults to express their needs and emotions more effectively. Such technology undoubtedly contributes to promoting a healthier and more fulfilling life for seniors, reducing frustration and improving overall wellbeing. Notably, this intuitive and user-friendly communication interface presents information in a simple manner, employing layers of information, plain language, and pictograms, as recommended in the study conducted by Bogza et al. [27].

At present, the interface is available in Spanish, but there is immense potential for future translation into other languages. Expanding the accessibility of the interface would enable a broader range of senior adults to benefit from its features and functionalities. However, as we proceed to the next stage, which involves data collection with senior adults, an intriguing research question arises: would senior users evaluate the interface's usability in the same manner as younger individuals? Age-related factors, such as visual search accuracy, may impact the overall usability evaluations. Exploring these aspects will provide valuable insights into optimizing the interface for the diverse needs of senior users and enhancing their experience with technology.

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Chapter 38 The Impact of Advertising on Self-medication: Considerations for Project Management and Leadership in the Health and Wellness Industry

Luis Cuyan-Paiz, Edsson García-Canizales, and Janio Jadán-Guerrero

Abstract Self-medication refers to the act of taking medications on one's own initiative without the supervision or recommendation of a healthcare professional. Although in some cases it may be appropriate and safe, self-medication can have several problems and risks associated with it. This article addresses the impact of advertising on self-medication in the health and wellness industry. It highlights the prevalence of pharmaceutical companies using advertising to influence consumers and the potential risks associated with self-medication. The study conducted surveys and interviews to gather data on the effects of advertising on consumers in Guatemala. The results showed that a significant percentage of consumers have been influenced by advertising in their medication choices. The main conclusion of the research is that stricter regulation of drug advertising is necessary to prevent self-medication. Additionally, the implementation of information campaigns to promote proper medication use and improve health literacy among consumers is suggested.

38.1 Introduction

Currently, advertising in television, print, radio, and digital media is one of the strategies most used by the different pharmaceutical companies to publicize their products and influence their purchase by the end consumer. Persuasive and attractive advertising can create the perception that medicines are quick and easy solutions to various health problems. However, it is essential to remember that medicines are not common

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consumer products, but medical interventions that require a professional and responsible approach [1]. This phenomenon is widely observed in several Latin American countries, despite the existence of regulations designed to supervise and control drug advertising. A study carried out in Panama revealed worrying conclusions, highlighting that promotional material aimed at both patients and health professionals does not comply with the technical and ethical criteria established by the World Health Organization and national regulations [2]. In addition, the study revealed that advertising exerts a significant influence on drug purchasing decisions. These findings raise the question of what is happening in Guatemala, which is the focus of this research [3].

The promotion of medicines through the media in Guatemala is considered a market strategy aimed at boosting economic activity for both the local and foreign pharmaceutical industry. Its main objective is to increase sales by mass promotion of products to the entire population. Since health is a fundamental aspect in the lives of all people in the country, the promotion of medicines must guarantee their quality, efficacy and safety, in strict compliance with local legal requirements. Drug advertising is subject to strict regulations to avoid excessive persuasion and credulity among users, which can lead to irrational use of drugs and put consumers' health at risk, resulting in unnecessary expenses. In Guatemala, there are regulations issued by the Department of Regulation, Surveillance and Control of Pharmaceutical and Related Products, such as Technical Standard 39-2003, which establishes requirements for the authorization of advertising messages for pharmaceutical products and household pesticides. These regulations seek to protect consumer health by regulating information on over-the-counter drugs and ensuring that they are promoted within the indications for which they are authorized. In addition, there are international standards that specify how the promotion and advertising of medicines should be carried out [4].

The research aims to gather the opinions of 71 consumers and 48 people linked to the health and wellness industry to understand the risks associated with Direct-To-Consumer Advertising (DTCA). We seek to propose strategies that encourage healthy practices, promote the prevention and treatment of diseases, improve the quality of life of consumers and promote the creation of projects that prioritize the safety and health of consumers in the Guatemalan industry.

38.2 Background

Self-medication refers to the use of medications without prior medical prescription to address symptoms or conditions perceived or identified by an individual. This phenomenon encompasses various forms, such as the use of over-the-counter medications, refilling medications, suggesting medications to friends and family, using medications left over from previous prescriptions, or modifying the dosages of prescribed medications. In addition, self-medication includes the use of traditional home remedies, nutritional supplements, and over-the-counter pharmaceuticals, which, although

authorized in most countries, may carry risks of adverse effects. In Latin America, these practices are widely common, as evidenced by studies conducted in the region over several years.

A study conducted in eight Latin American countries interviewed 5251 consumers about the use of over-the-counter (OTC) medicines. The results indicated that Latin American consumers perceive OTC products as safe and less risky than prescription drugs, considering them equally effective in certain conditions. Consumers are cautious when using these products, as they read labels and seek information about their efficacy, side effects, and contraindications. They have a positive attitude toward their health care. Comparison of the results of this pioneering study with similar studies conducted in the United States and six European countries shows that Latin American consumers are just as responsible as their counterparts in those countries, demonstrating correct attitudes and practices in the use of OTC products [5].

In Peru, the drug market is highly concentrated and insufficiently regulated. The pharmaceutical industry also allocates considerable resources to the promotion and advertising of its products, encouraging self-medication with brand-name drugs through various incentives. This represents a significant challenge in a country where access to medicines in health centers is deficient. As in other countries in the region, self-medication is a common practice among the Peruvian population. One study revealed a 51% prevalence of inappropriate self-medication, and this was associated with factors such as male gender, age over 40 years and lack of health insurance [6].

The sudden and surprising onset of the COVID-19 pandemic put immense pressure on health systems worldwide. The rapid increase in cases overwhelmed emergency services and intensive care units, resulting in a significant increase in illness and death rates, especially in developing countries, where mortality rates soared to alarming levels. The rapid spread of the SARS-CoV-2 virus in the early stages of the pandemic created an unprecedented global health crisis. Several factors contributed to self-medication among the general population and the prescription of drugs without medical justification by health professionals. A study conducted in Ecuador investigated trends in the purchase and sale of medicines during the period of the COVID-19 pandemic (2020–2022). The results of the study highlight a significant consumption of medicines by the Ecuadorian population throughout the pandemic. The sale of several active ingredients without clear therapeutic indications was observed, suggesting that lack of information and anxiety could have led to inappropriate prescriptions by physicians and self-medication with ineffective drugs by patients. These practices point to poor regulation and control in pharmacies, particularly considering the lack of established therapeutic indications [7].

As in other countries in the region, Brazil, which stands out for its vast territorial extension and complex healthcare system, has seen the emergence of self-medication as a common practice, with rates ranging from 16.1 to 35.0%. Importantly, this trend is particularly pronounced for over-the-counter medications, with a staggering 65.0% of the population engaging in this practice without a prescription [8].

These statistics highlight the need to comprehensively address the issue of selfmedication in Latin America, considering its widespread prevalence. Significant efforts in health education and regulation are required to encourage a more responsible use of medicines and ensure the safety of the population. In addition, it is essential to promote consultation with health professionals for proper medical care, which could contribute to reducing the rates of self-medication and its potential risks to public health.

38.3 Method

The research takes an exploratory and descriptive approach with the aim of addressing a research question related to pharmaceutical product marketing and its impact on the population, focusing on project management and leadership. To achieve this, existing regulations in Guatemala were reviewed, relevant studies were examined, and other scientific sources supporting this research were consulted. Additionally, an online survey was conducted using a questionnaire to gather data from a sample of 71 consumers. In addition a physical survey was used to know the criteria of managers and director of pharmaceutical industry. The data collected from the survey were analyzed, evaluated, and interpreted through descriptive statistics.

38.3.1 Participants

The study focused on a sample of 71 people between the ages of 18 and 60. Participants included consumers of pharmaceutical products, as well as 48 individuals related to the field of health and wellness, including managers and project managers. Figure 38.1 illustrates a detail of the first group, where 9.81% of the sample corresponds to individuals under 20 years of age, 60.62% is in the 20–40 age group, and 32.29% belongs to the over 40 age group.



Fig. 38.1 Age range of respondents

38.3.2 Instruments

Data were collected through surveys using two structured questionnaires validated by experts. The first questionnaire was prepared in Spanish and included all relevant variables according to the objective of this research and was divided into three sections: (1) sociodemographic data, (2) marketing, and (3) medication consumption habits. The tool used was Google Forms, which was sent by e-mail to 100 participants, achieving 71 responses. The second questionnaire was more related to the management and project management of pharmacy and pharmaceutical industry managers.

38.3.3 Procedure

The different phases allowed us to collect relevant information that would allow us to show the effects that advertising has on the Guatemalan consumer are shown below.

Phase 1. In the first stage of the phase, digital surveys were carried out using an electronic form that would allow us to reach the previously established sample objective more quickly in order to obtain concrete data on how advertising affects the end consumer and how this translates into self-medication. The form consists of a series of questions that allowed us to collect consumer data, practices related to the consumption of medicines, as well as questions related to the management and direction of projects. As a second step, after observing the results reflected in the electronic forms, it was decided to confirm this information by means of a physical survey of one of the most important elements in the drug marketing process, the pharmacy and pharmaceutical industry personnel. These surveys were conducted in person in the most important pharmacy chains in Guatemala City and with the greatest presence in terms of points of sale; this allowed us to confirm and complement information relevant to the impact of marketing on self-education.

Phase 2. In this phase, it was decided to interview representatives of the pharmaceutical industry who were involved in the promotion and marketing of these products, in order to understand first-hand what the objective of the advertising was and whether they were aware that it could encourage the final consumer to self-medicate. These 48 interviews were generated in a neutral environment and in an informal way so that the interviewees did not feel compromised and forced to answer the key questions that were asked in these interviews.

Phase 3. In this observation phase, we decided to collect 50 advertising pieces in different media that would allow us to understand how drug advertising is transmitted to the final consumer.

38.4 Results

Surveys were conducted to find the results regarding the impact of self-medication due to the published. Some of the results are as follows:

Regarding the results obtained, in response to the first question on whether they have consumed medicines that they have seen in newspapers, on billboards or on television, 56% of the population surveyed stated that they have had contact with some advertising medium where they saw medicine advertisements. Regarding the second question on whether they have purchased medicines through advertising displayed in pharmacies, 50% of the respondents indicated that advertising on drug displays influences their purchasing decisions. Regarding the third question on frequency of medicine consumption, the surveyed consumers mostly indicated that they try to consume medicines only when prescribed by a physician; however, there is also a considerable group indicating that they consume medicines at least once a month, and it is very likely that this group includes consumers influenced by advertising in various media. These results suggest a significant impact of advertising on consumers' perception and behavior in relation to medicines. This means, seen from the company's side, that each time its marketing project management has results to be able to influence the population [9].

On the other hand, the results of surveys directed at individuals linked to the pharmaceutical company and industry revealed that 90% of respondents were aware of the regulations governing advertising in Guatemala, although unfortunately, these regulations are not effectively enforced. This situation raises the need for the government to conduct a more thorough analysis of digital economy models, assessing both risks and opportunities, with the goal of achieving balance in the healthcare sector [10]. In addition, it is essential to ensure effective enforcement of existing regulations for the benefit of the population.

Finally, in our field research we were able to find a sample of 30 advertising pieces that directly violated the regulations on drug advertising in Guatemala; 60% of these pieces were material that was within the reach of any consumer, regardless of age range, 20% of the pieces were found in medicine points of sale so the final consumer trusts that if the point of sale sells it, it is reliable and can be used without medical prescription, and the last 20% of the pieces found were found in hospitals and public and private medical offices, which allows us to conclude that there is a bombardment of advertising that encourages self-medication.

In summary, the research findings shed light on a concerning scenario in Guatemala's pharmaceutical landscape. The surveys highlighted the substantial impact of advertising on consumers' perceptions and choices regarding medications, with a significant portion of the population influenced by pharmaceutical marketing. Moreover, the awareness of advertising regulations among industry insiders contrasted sharply with the lack of effective enforcement, calling for urgent governmental intervention to strike a balance in the healthcare sector. The discovery of numerous advertising pieces in violation of drug advertising regulations, particularly those easily accessible to consumers of all ages, underscores the urgent need to



Reasons for medication consumption

Fig. 38.2 Reasons for medication consumption

address the prevalence of self-medication promotion in the country. In conclusion, these findings emphasize the critical importance of regulatory reform, consumer education, and responsible advertising practices to safeguard public health and promote informed medication choices (Fig. 38.2).

38.5 Conclusions

Non-compliance with drug advertising regulation criteria by pharmaceutical companies and the lack of control by the government has led to an increase in self-medication in Guatemala. Traditional advertising is responsible for 80% of over-the-counter drug purchases, suggesting that there is an urgent need to strengthen the Governmental Agreement to reduce advertising that encourages self-medication. The creation of new projects in the health and wellness industry should focus on the implementation of stricter regulatory measures to ensure that drug advertising is accurate and does not promote self-medication.

We will focus on developing information campaigns that highlight the importance of following medical indications and prescriptions when taking medications. We will seek to raise awareness of the dangers of self-medication and how this practice can negatively affect people's health. In addition, we will work closely with health professionals, such as physicians and pharmacists, to disseminate clear and accurate messages about the proper use of medicines. This will include providing information on the benefits, side effects and possible interactions of medicines, so that consumers can make informed decisions and avoid unnecessary risks. Another important aspect of our project will be to promote health literacy and empower consumers to be critical consumers. We will provide them with tools and resources that will enable them to objectively evaluate the information they receive from advertising and make decisions based on scientific evidence and in consultation with health professionals.

We can envisage a marked improvement in health conditions within the country. Strengthening the Governmental Agreement to curb self-medication-promoting advertising would help reduce the prevalence of uninformed and potentially harmful self-medication. By focusing on informational campaigns emphasizing the importance of following medical guidance, we can expect individuals to make more responsible choices regarding their healthcare. Raising awareness about the risks associated with self-medication is a crucial step toward curbing this practice and mitigating its negative impact on people's well-being. Collaborating with healthcare professionals to provide accurate information about medications, including benefits, side effects, and interactions, will empower consumers to make informed decisions, ultimately improving their health outcomes. Furthermore, promoting health literacy and critical thinking will equip individuals with the tools they need to evaluate advertising messages objectively, fostering a healthcare environment that prioritizes evidence-based decisions and consultation with healthcare experts. These measures together can pave the way for a healthier and more informed population in Guatemala (Figs. 38.3 and 38.4).



Fig. 38.3 Comprehensive strategy for medication education and health empowerment

Fig. 38.4 Infographic. The impact of advertising on self-medication



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Chapter 39 Visual and Textual Elements of Board Game Packaging, What Do Children Prefer?—An Eyetracking Study



João Pereira, Ricardo Gouveia Rodrigues, Ana Gouveia, and Leonor Sousa

Abstract Games and toys represent a significant component of a child's life throughout their childhood, contributing to fun and socialisation. Nowadays, more and more companies and brands of these products are studying and testing ways of attracting the target audience of children in order to captivate their desire to purchase these products. This study aims to determine which textual and visual stimuli are most appealing to children in the context of consumption behaviour. To this end, quasiexperimental research used eye-tracking and stimuli consisting of images of board games (Uno, Operation, Pictionary, Cluedo, and Monopoly). By analysing variables such as gaze fixations, stimulus revisits and average time viewed, it was concluded that the visual component is the most captivating, specifically in Uno, Cluedo and Operation. However, Monopoly showed its importance in the textual features within the five games. Lastly, future research avenues, experiment limitations and final remarks are presented.

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39.1 Introduction

Toys and games are significant in children's lives, fostering socialisation through their connections when playing with other children, parents and family members [1, 2]. Children are one of the main influences on family consumption, starting from an early age to define their preferences and make their first purchases with assistance [3]. Therefore, the children's market segment has become significant, attracting the attention of companies [4]. From 6 months, babies are already beginning to form mental images of brand logos and mascots [5].

Communication and packaging strategies are seen as a means children's brands use to communicate with consumers, thus becoming increasingly important. Brands are creating new needs to keep up with the times, aiming not only to establish closer communication with different consumer segments but also to emotionally satisfy the expectations of these consumers in the direction of their satisfaction [6]. Branding, graphics, illustrations, colours, instructions for use, product composition, warnings and recommendations, and indications, among many other information, should make up this marketing element [7].

Our brain perceives the environment in which we are involved, processes external impulses, produces our memories and activates emotions, thus driving behaviour, including consumption behaviour. Understanding the human brain is, therefore, crucial to the success of any marketing strategy. Marketing is about working on the stimuli that can influence consumers' decision-making processes, both consciously and unconsciously, to evoke certain emotions or associations that enhance the shopping experience [8].

In this way, this study aims to understand and identify the characteristics of packaging that can create greater interest in children and to understand the playful demands on educators to create strategies aimed at more attractive packaging that is developed in line with children's preferences. Accordingly, this study aims to look at children as consumers of toys and realise which components are the most attractive. To this end, this study focuses on board games' visual and textual attributes, using eye tracking to understand this phenomenon better.

39.2 Literature Review

39.2.1 Children as Consumers

According to Solomon [9], this is the process involved when individuals or groups select, buy, use or dispose of products, services, ideas or experiences to satisfy wants and needs. To understand consumer behaviour, it is necessary to study consumption activities, i.e. mental activities when people think about the product and consequently

evaluate the price, emotional activities, which refer to the interest shown in the development and the factors that influence actions, whether personal or environmental [10].

Based on cognitive and social development theories, Roedder-John [11] states three crucial phases. The first, the perceptual stage, involves children between three and seven. At this stage, the child seeks gratification and demonstrates familiarity with some easily observable market concepts. Still, decisions are made based on limited information, such as the colour or size of the object. Influencing strategies are simple here, as the child cannot think from their perspective and that of others simultaneously. In the second phase, the analytical stage, from the age of seven to eleven, the child's information processing capacity increases considerably, and they become capable of thinking from the perspective of others. In this way, the child consumer better understands the market and can make choices based on their experiences and influences in obtaining the desired items. In the reflective stage, from the age of eleven, the child clearly understands the concepts of brand and price and the social meanings of consumption and has strategies for influencing their parents' purchases.

McNeal [12] states that as children grow up, they are surrounded by decisions when purchasing products and services, expressing their wishes to their parents long before they can buy them. According to this author, there are five stages during the child's growth. The first stage occurs when children up to age 2 have the first opportunities to assimilate the stimuli in commercial supermarkets in the shopping trolley. They can retain perceptions by observing their parents' consumer behaviour and unconsciously engaging with consumption. The second phase involves requesting and communicating wishes to parents. At this stage, children begin to have a conscious perception of advertising through the media they consume. The third phase marks when children start to select and collect products, with permission, while shopping with their parents. Participating with parents when shopping, interacting with supermarket or shop staff and starting to handle money, indicates the fourth phase. This stage represents the beginning of the child's independence as a consumer. The fifth and last phase represents the first time the child buys something independently. After this breakthrough, the child begins to have consumption behaviour that resembles an adult's.

The child consumer is no different from any other consumer type; they also want products that fulfil their needs. There are then two levels of satisfaction, satisfaction with the products purchased or recognition of the act of purchase, in which the child feels mature [13].

Accordingly, to achieve fulfilment of consumer needs, four factors influence consumer buying behaviour: cultural, social, personal and psychological [14]. Among the agents of socialisation, parental influences are the most important. According to Moschis [15], the family influences both the content, i.e. what the child learns from communication with their parents, and the process of how they know. These interactions, stimulated by the child's growing awareness and desire for more influence over consumption decisions, form the basis for positive or negative experiences, the nature of which will contribute to the establishment of behavioural norms

and consumption patterns. Open communication from early childhood to adolescence reduces children's exposure and increases parents' attention to talking to their children about the role of advertising and commercial interactions during childhood [16]. As Grønhøj and Thøgersen [17] point out, the broader title of consumer socialisation is a phenomenon known as intergenerational influence (IGI), which exists within the family and denotes the transfer of market resources, preferences, values, attitudes and behaviours from one generation to another, both directly and indirectly, with a lasting effect that can extend over many generations. Therefore, open family communication about consumption is positively linked with children, shaping socially desirable consumption practices and behaviours [18].

According to Calvert [3], parents are greatly influenced by their children when purchasing products for the family and themselves. Passive influence also occurs when parents know the products and brands their children prefer and buy them without being asked or informed [14]. Families that involved preschool children in family consumption decisions and allowed them to make independent choices promoted more critical engagement with messages linking brands to happiness, popularity and quality, even at this early age. The influence of peers also plays an important role in the socialisation process. This influence happens naturally but is accentuated during adolescence [19]. Children tend to act more under social and cultural aspects, as they need to form and be part of social groups [20]. This explains the influence of the school environment since when children start school, they begin to take on the role of consumer, making their first purchases and having more autonomy regarding their choices. In this environment, children share experiences and opinions and try to match the dynamics of the group with their classmates and friends, being indirectly influenced [21] by appealing to the easy recognition and naming of brands [22].

For McNeal [12], the groups to which children belong and relate are an important source of information about products and brands. Children talk about products and brands and learn about their favourite brands from their peers, considering this in their learning and the future relationships they develop with products. Most children request parental figures using tactics such as having seen the product on television, pointing out that a classmate already has the effect, or agreeing to a task in exchange for the product [23]. Gunter [24] states that children's brand preferences are motivated by observing their friends using specific brands, and they want to imitate a pattern, being influential.

39.2.2 Brand Awareness and Toy Packaging

A child's perception of a product brand is a significant matter in the consumer socialisation process. Understanding brands and using these meanings in making consumer judgements and decisions is an important part of consumer socialisation as a child [11]. When it comes to determining children's brand awareness, there are two dimensions: "knowing the brand" and "remembering the brand" [25]. The first refers to the fact that the consumer knows the brand they have seen or heard about. The second distinguishes between the consumer's ability to recall the brand name in their memory when presented with a product category [26]. McNeal [27] stated that children who could not yet read could recognise product names when presented in symbolic forms.

Age benefits recall performance because as we get older, we gain more experience and greater knowledge of the world [24]. The study by Wang and Li [28] conclude that up until the age of nine, the brand did not matter to the child. However, from that age onwards, up to the age of eleven, the brand becomes a dominant feature in product categorisation compared to other attributes. According to [29], brands are growing concerned about creating and maintaining a close relationship with the child to manage a long-term relationship. The study by Marques and Pinho [30] concluded that children have high levels of naming and recognising brands, revealing brand awareness, assumed to have a materialistic value due to the value children place on owning and using brands. Therefore, children use cognitive cues to recognise the brand, which can be the colour of the packaging, the size and shape of the product itself [31], the brand logo [25], or the brand character and his appearance in adverts [32, 33].

Play stimulates children's creativity, language and memory, making them the protagonists and enhancing the positive aspects of their personality and decisive experiences for their healthy growth and formation [34]. The toy industry is paying increasing attention to the packaging surrounding toys [35]. As Lawrence et al. [36] point out, this element plays a fundamental role in toys because, as well as protecting the product, it plays a role in communicating the product's value and philosophy to parents and children.

One of the most important international organisations of marketing professionals, the American Marketing Association [37], defines packaging as a container used to protect, promote, transport and/or identify a product. Packaging can range from plastic to a wooden steel box or a drum. It can be primary (contains the product), secondary (includes one or more primary packages) or tertiary (has one or more secondary packages). Therefore, this element is the fundamental part of the product because, as well as containing, protecting and preserving, it is also a promotional and sales tool, so it has a visual function and conveys information [38]. As such, packaging must make a difference to highlight and increase the product's value to be memorable and unique so that consumers want to share it on their social networks [39]. Tur-Viñes et al. [40] argue that packaging is a silent communicator and, therefore, a trigger for purchase that communicates with our visual sense. Thus, [41] and, therefore, a competitive advantage for a brand, as it is its face. Consumers respond to the emotions that packaging conveys at the point of sale. Packaging, therefore, uses designs, colours, shapes and materials to influence consumer perception and purchasing behaviour [42]. The design emphasises the mental image of the product in the consumer's mind. In the study carried out by Suzianti et al. [43], it was concluded that the packaging design preferred by children is a package that has a cut-out handle, presents the product information in a simplified way, uses contrast and a mixture of colours, a natural ornament shape and the position of the information products are located at the top of the side of the package. In the recent study by Esmer and Basak [44], the characteristics that stand out are ergonomics for the child's hands, being a differentiated product, being reused as a toy after use and the fact that it is sustainable packaging. Sensory attributes can contribute to product communication and increase brand value [45]. As Lawrence et al. [36] emphasise, toy packaging must be efficient, economical and attractively displayed on shop shelves to capture the child's attention. Another factor in influencing children to buy, according to Karsaklian [46], is advertising strategies that use amusing adverts, the use of cartoons, jingles, the presence of animals or older people and evidence of important values, such as the heroic side and the meaning of friendship.

39.2.3 Visual and Textual Attributes

According to Coutinho and Lucian [6], the most important packaging attributes are visual. Packaging has shape, images, text, colours and size. All these components give the product personality and add brand recognition. Garrán [47] emphasises that the visual characteristics of packaging should address quick visual messages, i.e. communicate and explain to the consumer what the product is and what it consists of, have elements that are legible and easy to perceive, should provoke interest, stimulate desire through images and always be following the tendency of the eye, i.e. position the elements according to the direction of the gaze. As children get older, they already analyse the symbolic value of the brand. What is said about it, and even before they can name the brand, they already seem to recognise it by its essentially visual signs [48]. In short, packaging uses visual grammar to organise signifiers and meanings [49]. With the discourse focussed on the optical part of the packaging, brand anthropomorphism stands out as one of the most widely used marketing techniques [50]. This describes the tendency to attribute human characteristics, motivations, intentions and emotions to something non-human, such as the brand [51]. This process improves consumers' mental attributions to brands [52] and, by creating personalisation, triggers emotions and consumers' affinity for a product through the personalities that anthropomorphism makes [53]. Focusing on packaging, Williamson and Szocs [50] propose that adding a smiley face to food packaging can activate consumption behaviour in children and parents who consume to see the child happy.

The textual elements—product name, composition, recommendations and instructions for use—are some of the written information we are used to reading on the products we consume. Because of their importance, the packaging must have the written elements properly positioned so they can be decoded in the correct order of information, with each component emphasised according to its importance. According to the only study to date using the eye tracking tool on toy packaging, carried out by Juarez et al. [35] on Educa packaging, it was concluded that the most important elements are the specifications of the cover themes, i.e. the background of the cover, which in this case is the child's hands and the play scenarios, as well as the recommended age. So, little attention is paid to the brand or the game's name.

39.3 Method

This study was carried out in a quasi-experimental context using an eye-tracking device. This methodology prioritises techniques based on neuroscience since the brain has become a protagonist due to its connection with consciousness, thus achieving a more in-depth notion of human decisions [54]. Eye tracking is being increasingly exploited in market research. Greenbook [55] reports that fifty-eight per cent of marketing research companies use this technology or are considering using it within a year. Eye tracking records fixation points and eye movements when consumers are exposed to visual stimuli, such as adverts, websites, product packaging or shelf layouts in shops [54]. The Pupil centre corneal reflection (PCCR) emits infrared rays towards the user's eyes, causing reflection patterns on the cornea and pupil. Eye movement redirects the cornea, modifying these reflection patterns [56]. Therefore, a camera captures the eye's image based on angles and distances.

The fundamental data that eye tracking processes are saccades, also called fixation points, i.e., the movements the eyes make between two focal points, the fixation time of the focal point and microsaccades, the small actions made within a focal point. This data is reflected in heat maps, which show the specific fixation points of a participant's gaze path while viewing stimuli [57, 58]. Eye fixation provides insights on attention and memory. According to the IMotions manual [56], eye tracking indicates which elements attract immediate visual attention, which features attract above-average attention, whether there are elements to be ignored or neglected and in what order the features are noticed. This technique is ideal for quantifying perceptions and analysing implicit responses expressed in media advertisements, products, packaging and the consumer-user experience [59]. This device allows us to explore unconscious reactions during consumption, concluding what grabs consumers' attention and thus ensuring marketing effectiveness, as we can predict consumer behaviour. This method was chosen because the aim is to study visual attributes, and the eyes are the main channels of stimulation and sensitisation, as they are the most sensitive organs through which we receive the greatest number of stimuli.

Furthermore, as Frank et al. [60] point out, eye tracking is very suitable for assessing developmental changes in different aspects of social attention in young children. The eye-tracking device I used was the Gazepoint [61] GP3 Eye-Tracker. This device was placed on the computer with the Gazepoint Analysis software to check the participant's gaze on the computer screen during the task. The data was analysed using the software JASP, and the analysis of the Wilcoxon sign test for paired samples will be used to analyse the average time, fixations and revisits for packaging with visual elements and packaging with textual parts.

Regarding the procedure, the study was carried out in a school in an inland region of Portugal. The selection method of participants consisted of contacting the school's primary classes, explaining the experiment to the students and appealing for them to take part. From there, a group of 22 children aged between 9 and 10 was selected beforehand. The school made it possible to communicate with the parents

and guardians a Declaration of Free and Informed Consent, stating that they authorised their children to take part in the study. One of the children who integrated the sample was excluded due to the lack of a signed Declaration of Free and Informed Consent, totalling the final sample with 21 participants.

Additionally, the study was approved by the Ethics Committee of the University of Beira Interior to ensure that all ethical procedures. The choice of sample is justified because, at this age, the child has close contact with consumerism, knows how to identify the characteristics of a product and is beginning to be influenced by friends. Thus, taking McNeal's [12] study into account, the child is at the stage of Independent Acquisition, as they are autonomous consumers, displaying behaviour that resembles that of an adult, in line with the analytical background addressed by Roedder-John [11], in which the child begins to think from the other person's perspective, with a greater perception of the market. Furthermore, as Silva and Vasconcelos [62] point out, from the age of seven, there is a recognition of the brand and an understanding of the relationship with the commercial objective.

The experiment was conducted in a school room, isolated from the rest. When prepping the room, it was ensured that it was a comfortable and sober space for the participants, favouring natural light. Firstly, the procedure was explained to each child individually, and an initial test was carried out to see if the participant had understood what was intended through the device's calibration. Several points were then displayed on the screen, the aim of which was to follow them with the gaze so that the eye-tracking was connected to the participants' eyes. The child was informed that they could ask questions anytime or withdraw from participation if they wished, and no harm was done. All the participants had the objective of observing the images presented to them, and after this task, they had to decide which stimuli they preferred.

The stimuli were designed on the computer-images of the packaging of the Cluedo, UNO, Operation, Pictionary and Monopoly games. The choice of these toys suited the age of the participants since, according to Scarlett [63], between the ages of seven and twelve, children begin to establish their own rules and regulations a priori and take part in games with rules, such as board games. Another aspect we considered when choosing the stimuli was the recognisability of the game, opting for classics and unisex games. Packaging with different aesthetics has been selected to find more answers and patterns. Currently, the packaging sells and attracts children's attention, and in the first instance, the choice on the shelf is based on its attractiveness [36]. The participants then visualised a set of 15 images of the packaging. Each pack has three image versions: one with visual elements, another with textual elements and the complete pack. These stimuli were displayed according to the target audience, children. To avoid boredom and fatigue, each image was shown for a maximum of two seconds, with a one-second separation from a black image for rest. As such, the visual and textual images were randomised, and the complete packs appeared in a predefined order. The face they visualised was the front, as this is how the packs are positioned on the supermarket shelves. Next, some of the stimuli displayed on the computer were randomly shown on paper, the image of the visual elements and the appearance of the textual aspects of each packet, and the participant was asked to select which of the two was more appealing to them.

Regarding data analysis, areas of interest (AOI) was determined using the Gazepoint Analysis software, which belongs to the same company that provided the eyetracker device. The researcher selects the AOIs, and in this case focussed on each stimuli's textual and visual elements.

39.4 Results

The data were analysed to compare visual vs. textual elements on toy packaging. JASP version 0.16.3 was used to statistically analyse the data obtained by the Gazepoint GP3 Eye-Tracker [61]. In the first instance, a general analysis was carried out, and to support these observations, the nonparametric Wilcoxon sign test for paired samples was chosen. This study aims to analyse the average time, fixations and revisits of packaging with visual elements and packaging with textual parts. Table 39.1 provides the variable codes used.

Table 39.1 shows that the significance level (p) revealed no significant differences between stimulus 1 and stimulus 2, i.e., visual and textual elements. It can be concluded that there is no significant difference in the predicted direction when analysing the results in general.

An individual analysis was therefore carried out on the images of the complete packs, prioritising visual and textual areas of interest (AOI) to obtain significant differences in the three metrics: average viewing time (AVT), fixations (AF) and revisits (AR). The Wilcoxon test for paired samples was used to compare means and see the significance between visual and textual. The binomial test was also used to test the first glance and analyse the favourite image. Without being exposed to eye tracking, the children chose their favourite image, which was presented to them randomly, from the visual versus textual images on each toy package (Table 39.2).

In the case of Uno, 60% of participants looked at the visual element first, while only 40% looked at the textual element, but there was no significant difference (p = 0.503). The same is true of Monopoly. Even though there was a slight emphasis on the visual, there was no significant difference (p = 0.665). However, when it came to Cluedo, 85.7% of the participants retained the visual elements in the first instance, with a significant difference revealing a preference (p < 0.001) (Table 39.3).

In Pictionary, 66.7% of participants preferred the visual elements at first glance rather than the textual elements, which accounted for 33.3%. Finally, Operation

Stimulus 1	Stimulus 2	W	z	р
AVT_Visual (sec)	AVT_Textual (sec)	10.00	0.67	0.625
AF_Visual	AF_Textual	11.00	0.94	0.438
AR_Visual	AR_Textual	10.00	0.67	0.625

 Table 39.1
 Wilcoxon test for paired samples

Variable	Level	Counts	Total	Proportion	р
Uno_FirstLook	Visual	12	20	0.600	0.503
	Textual	8	20	0.400	0.503
Cluedo_FirstLook	Visual	18	21	0.857	0.001
	Textual	3	21	0.143	0.001
Pictionary_FirstLook	Visual	12	18	0.667	0.238
	Textual	6	18	0.333	0.238
Operation_FirstLook	Visual	16	20	0.800	0.012
	Textual	4	20	0.200	0.012
Monopoly_FirstLook	Visual	12	21	0.571	0.664
	Textual	9	21	0.429	0.664

Table 39.2 Binomial test: first glance

Table 39.3 Average viewing time, Wilcoxon test

Stimulus	Element	М	Standard Deviation	SE	z	Coefficient of variation	р
Uno	Visual	4.698	2.278	0.497	2.311	0.485	0.019
	Textual	2.378	1.949	0.425	1	0.819	
Pictionary	Visual	2.997	1.637	0.357	1.307	0.546	0.198
	Textual	3.955	1.934	0.422		0.489	
Cluedo	Visual	3.703	1.928	0.421	1.755	0.521	0.082
	Textual	2.476	1.977	0.431		0.798	
Operation	Visual	4.853	2.075	0.453	3.111	0.428	0.001
	Textual	2.267	1.677	0.366		0.740	
Monopoly	Visual	1.853	1.400	0.305	3.424	0.755	< 0.001
	Textual	4.001	2.052	0.448		0.513	

emphasises visual elements, with 80% and p < 0.05. The results suggest that the participants were more interested in the visual elements at first glance.

Table 39.4 shows the results of the average viewing time for the visual and textual elements of each toy package. The mean evaluated the effects and standard deviation and the Wilcoxon test's significance, represented in the following table by the *p*-value. Three toy packs show significant differences. The first is Uno, where the visual is more prominent (M = 4.698, SD = 2.278) than the textual (M = 2.378, SD = 1.949). The Wilcoxon test indicates significant differences – 2.311, p < 0.05. The same logic is repeated for Operation, with visuals having higher values (M = 4.853, SD = 2.075) than textual elements (M = 2.267, SD = 0.677). The Wilcoxon test shows significant differences, with p < 0.05 = 0.001.

Conversely, Monopoly is more popular in the textual part (M = 4.001, SD = 2.052) than in the visual part (M = 1.853, SD = 1.400). The Wilcoxon test showed a

Game	Element	M	DP	SE	z	Coefficient of variation	p
Uno	Visual	12.810	4.976	1.086	2.520	0.388	0.012
	Textual	7.714	5.451	1.190		0.707	1
Pictionary	Visual	9.333	4.619	1.008	1.912	0.495	0.058
	Textual	12.429	5.546	0.422		0.446	
Cluedo	Visual	14.571	6.882	1.502	2.069	0.472	0.040
	Textual	11.905	5.476	1.195		0.460	
Operation	Visual	17.571	6.823	1.489	3.354	0.388	< 0.001
	Textual	8.857	5.304	1.157		0.599	
Monopoly	Visual	7.000	5.254	1.146	3.603	0.751	< 0.001
	Textual	14.238	5.813	1.268		0.408	

Table 39.4 Number of fixations, Wilcoxon test

significant difference, with p < 0.05. In Pictionary, (Z = 1.307) = 0.198, and Cluedo (Z = -1.755) = 0.082, we can conclude that there are no significant differences because p > 0.05. Therefore, three prefer the visual part and spend more time looking at these elements of the five games presented.

Next, Table 39.4 analysed the number of fixations the participants spent looking at a focal point using the Wilcoxon test.

Looking at Table 39.4, the visuals again stand out concerning the fixations. We can see a significant difference in almost all the toys, except for Pictionary, whose averages are insufficient to define a preference, p > 0.05. However, in detail, on the Uno packaging, the visual part (M = 12.810, SD = 4.976) is predominant over the textual part (M = 7.714, SD = 5.451), Z (Uno) = 2.520, p = 0.012, thus a significant difference.

The same perspective regarding the visual part occurs with Cluedo (M = 14.571, SD = 6.882), p = 0.040, and with Operation (M = 17.571, SD = 6.823), p = < 0.001. In both cases, the Wilcoxon test found significant differences. Even so, on the Monopoly packaging, the textual part (M = 14.238, SD = 5.813) is more relevant than the visual part (M = 7.000, SD = 5.254), in line with the average viewing time. Thus, there are significant differences in response to the Wilcoxon test, p < 0.01. From analysing this table, we can also highlight Cluedo as having the highest average number of fixations on the visual part. It can be seen that, on average, children have a significant preference for the visual part, although this preference can vary depending on the stimulus they are presented with.

Table 39.5 shows which packages had the highest number of revisits. Revisits refer to where children look again after seeing a particular image for the first time.

We can conclude that all the packages had significant differences, except for Pictionary. Concerning Uno, the visual values (M = 5.048, SD = 2.974) are higher than the textual element values (M = 3.238, SD = 2.508). The Wilcoxon test indicates significant differences, Z = -2.508, p < 0.05. Cluedo also shows higher values in

Game	Element	M	DP	SE	z	Coefficient of variation	р
Uno	Visual	5.048	2.974	0.649	2.508	0.589	0.012
	Textual	3.238	2.508	0.547	1	0.775	
Pictionary	Visual	3.762	2.528	0.552	0.000	0.672	1.000
	Textual	3.905	2.322	0.507		0.595	
Cluedo	Visual	7.571	4.749	1.036	3.099	0.627	0.002
	Textual	3.905	2.879	0.628		0.737	
Operation	Visual	7.524	4.412	0.963	3.285	0.586	0.001
	Textual	3.952	3.170	0.692		0.802	
Monopoly	Visual	4.095	3.923	0.856	2.113	0.958	0.035
	Textual	5.810	3.043	0.664		0.524	

Table 39.5 Number of revisits, Wilcoxon test

the visual part (M = 7.571 = 4.749) than textual (M = 3.905, SD = 2.322). The Wilcoxon test indicates significant differences because p = 0.002, i.e. p < 0.05. The Operation repeats the same pattern, with the visual part being more prone to revisits (M = 7.524, SD = 4.412) than the textual part (M = 3.952, SD = 3.170), so there is a significant difference. In Monopoly, the pattern changes, with the textual part being more revisited (M = 5.810, SD = 3.043) than the visual part (M = 4.095, SD = 9.923). The Wilcoxon test indicates that there were significant differences, p = 0.035. It can be concluded that, on average, the visual elements tend to be revisited.

In the final phase, the 21 participants, no longer subjected to eye tracking, were subjected to a final test. They were shown incomplete images (visual elements vs. textual elements) of each package in the game in a non-random way to decide which was their favourite, as seen in Table 39.6. However, there were no statistically significant preferences.

Variable	Level	Count	Total	Proportion	p
Favourite_Uno	Visual	10	21	0.476	1.000
	Textual	11	21	0.524	1.000
Favourite_Cluedo	Visual	10	21	0.476	1.000
	Textual	11	21	0.524	1.000
Favourite_Pictionary	Visual	13	21	0.619	0.383
	Textual	8	21	0.381	0.383
Preferred_Operation	Visual	12	21	0.571	0.664
	Textual	9	21	0.429	0.664
Favourite_Monopoly	Visual	14	21	0.667	0.189
	Textual	7	21	0.333	0.189

Table 39.6 Preferred image, binomial test

39.5 Discussion

To understand which elements of toy packaging stand out in the eyes of child consumers, visual vs. textual, we can say that the visual elements are more important in the eyes of these consumers.

Using the first glance metric, we were able to conclude that children look first at the visual elements on all the packaging, which is in line with what Coutinho and Lucian [6], Garrán [47] and Vilchis [49] state. Following the logic of Garrán [47], the packaging must offer quick visual messages to be interesting to the consumer, and this is where the Cluedo, Uno, and Operation packaging stood out.

Regarding average viewing time, the participants preferred Uno and Operation's visual elements and Monopoly's textual elements. Comparing these results with the observations made by the participants after they finished the eye tracking test, it is believed that this preference for the visual elements comes from the fact that the images make it clear in a simple way what you have to do in the game and also because of the amount of visual information that is displayed. As for the textual part may have something to do with the fact that the game's name is a familiar element, so they spend more time looking at it. These results are in line with those concluded by Coutinho and Lucian [6], who state that packaging with visual elements is more successful among children, and Macklin [48], who states that before children can name a brand, they already seem to recognise it by its essentially visual signs.

Regarding the metric of fixations, which denotes a period in which the eyes are immobilised in the direction of an object, it can be concluded that they are excellent measures of visual and sustained attention. This study indicates a high fixation on the visual elements of all the packs, supporting Vilchis' [49] approach.

There is also a great tendency to fixate on the characters, where there is recourse to the use of cartoons, confirming the theory of Karsaklian [46]. Following the line of thought of Williamson and Szocs [50], who state that a smiling face on food packaging can make a child happy, in this case, it is concluded that the same pattern is also repeated on toy packaging, given the importance that children attach to the characters' faces. Regarding revisits, from this metric, we could examine which areas repeatedly attracted the participant and which were seen but then moved on. The participant may be drawn to a certain area of an image because it is pleasant, confusing, or even frustrating. Although eye tracking cannot tell how someone feels, it can provide more detailed data on what should be examined [56]. All the packs had significant differences, except for the Pictionary. Because it is a pack with less information, its content was believed to be quickly understood and did not need to be revisited. Suzianti et al. [43] point out that the consumer's favourite design represents information.

In conclusion, the visual elements are distinguished by being more appealing to the eyes of child consumers, attracting them in the first instance to buy the toy. However, the textual elements serve as a linguistic message that adds information that may often not be represented in an image, and this is where they become important constituents of a package.

39.6 Conclusion

Looking at children as one of the main consumer segments in the market, increasingly autonomous, and with access to the world of consumption and advertising channels, it is important that toy packaging marketing increasingly develops strategies to understand the needs, desires and cravings of the child consumer. In this study, which focussed on board games, it was clear that the visual elements are the most attractive components of the packaging. Although the textual elements provide the brand, the minimum age of the game, and sometimes the instructions, children are immediately captured by the image.

Regarding limitations, administering a questionnaire before the experiment could provide more information about the sample, such as colour blindness and other vision-related issues, thus introducing more assertive inclusion and exclusion criteria. In addition, the age restriction is a delimitation, and the replication of this study in other age groups allows for comparison between groups. In addition, a longitudinal study could analyse how preferences for textual or visual elements vary as children grow up. Introducing other biometric techniques, such as encephalography and electrocardiograms, could provide more variables, such as the interpretation of the brain's electrical activity and variations in heart rate in the context of the stimulus, to obtain more conclusions. Furthermore, applying a questionnaire to this type of technique associated with biometrics could provide more detailed results through data triangulation. Conventional marketing techniques could give context to some variables, such as the type of shopping experiences you have with your parents, the importance of the game's instructions, the minimum age of the game itself, and the type of games you prefer. Finally, studying parents, older siblings, family members or friends who impact the child's socialisation via toys and games would add another dimension to the study of this subject.

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Part X Social Media and Networking

Chapter 40 The Three Congruence Perspectives and the Effects of Social Media Influencers on Consumer Behavior: A Belgium–Croatia Comparison



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Abstract Scientific research has been expanding around social media influencers, trying to identify and describe different mechanisms that explain their effects on consumer behavior. Several authors researched the importance of perceived congruence between social media influencers, brands, and followers and tried to establish the relationship between different congruence dimensions and consumer behavior. The purpose of this study is to explore the factors contributing to a strong connection between the three and analyze the effect of social media influencers engaged in the world of fashion on consumer behavior constructs such as brand attitude, intentions of forwarding and following, and buying behavior. Additionally, a crosscountry comparison was performed in order to define different consumer behavior patterns between consumers in Croatia and Belgium. A qualitative methodology was applied, and interviews were conducted with 20 participants, 10 from Croatia and 10 from Belgium. Findings suggest that a good match between social media influencers, brands, and followers is essential for followers to develop trust. The most highlighted characteristics that serve as a basis for the assessment of congruence between the three were authenticity, credibility, and honesty. Significant differences between Croatia and Belgium were found in consumer behavior patterns.

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The original version of the chapter has been revised: The family name and given name of the second author have been updated. A correction to this chapter can be found at https://doi.org/10.1007/978-981-97-1552-7_59

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40.1 Introduction

40.1.1 Research Context

Social media influencers have emerged relatively recently, following the growth of social media networks, as a new category of opinion leaders, landing somewhere in between celebrities and friends. Even though they still often get mixed up with celebrities, influencers are conceptually quite different in nature [1]. While celebrities are known for their expertise fields which are not directly related to social media, influencers are primarily characterized by their social media presence, where they create and showcase their main activities [2]. They build relationships with their followers, often comprising of people sharing similar interests and lifestyles. Because they seem much more accessible and closer to their followers, they are often regarded as more credible or trustworthy [3-5] and their audience looks for a piece of advice when informing their purchase decisions, which gives influencers the importance of impacting marketing outcomes [6]. Companies have also recognized this emerging trend and have been engaging with influencers to create compelling social media strategies in order to approach their target audience. Such an evolving landscape in practice highlights the need to explain influencers' impact on consumers' behavior and demands for deeper understanding of underlying mechanisms that drive those effects [6].

The scientific research has been expanding around social media influencers, primarily relying on and testing concepts developed a few decades ago in attempts to determine how the use of celebrities was influencing consumers' purchase behaviors. The influence of celebrities' attitudes toward products or services has been growing over time, and many studies have shown that many outcomes of marketing communication can depend on it, including brand valuation, and attitude toward the brand [2, 7, 8] and purchase intention [9, 10]. Several authors researched the impact of perceived congruence between social media influencers, brands, and followers [11–13] and tried to establish the relationship between different congruence dimensions and consumer behavior. However, it still remains to be answered what really makes a good match between the three and why is that good match actually important for followers when assessing the social media influencers engaged in the world of fashion. To help clarify the importance of congruence between social media influencers, brands, and followers, brands, and followers, brands, and followers when assessing the social media influencers engaged in the world of fashion. To help clarify the importance of congruence between social media influencers, brands, and followers, this paper proposes three main research objectives:

- 1. Through qualitative empirical research, investigating what makes social media influencers, fashion brands, and a consumer a good match in consumer opinion and why is it important.
- 2. Determining which perceived characteristics of social media influencers are important in followers' opinions and how having them or not having them influences consumer behavior.
3. Understanding the effect of social media influencers on consumer behavior (attitude toward the brand, intention of sharing a post with own network, trying out or buying a brand).

Additionally, besides expanding the existing knowledge on the importance of congruence between an influencer, fashion brand, and consumer, this research also intends to perform a cross-country comparison between Belgium and Croatia to draw conclusions on different behavioral patterns between those two observed markets. Consequently, the fourth research objective is:

4. Creating an overview of similarities and differences between Croatian and Belgian consumers in perceptions of social media influencers and consumer behavior through cross-country comparison.

40.1.2 Expected Scientific and Practical Contribution

Scientific contribution. This paper aims to enhance the existing scientific literature on the topic of social media influencers and their effects on consumer behavior brand attitude, purchase intentions, and specific behavior related to social media following and forwarding intentions. Furthermore, it is expected to establish new knowledge in assessing the importance of congruence between social media influencers, brands, and consumers and its influence on consumer behavior. Finally, it aims to create a framework of findings that summarizes the differences in perceptions and consumer behavior patterns between Belgian and Croatian followers as a result of social media influencers' activity.

Practical implications. This research will be beneficial when adapting global strategies to local markets, as many fashion brands present on the global market operate both in Belgium and Croatia, especially when deciding on collaboration with a selection of social media influencers.

40.2 Conceptual Background

40.2.1 Social Media Influencers and Consumer Behavior

The first studies connecting an endorser and consumer behavior, as previously mentioned, were based on analyzing traditional celebrities and their source characteristics to determine their impact on communication effectiveness. Concretely, the first ones of interest in the scientific literature were source credibility [14, 15] and source attractiveness [16]. Later on, [17] was the first one to study the effects of the congruence between the message source and the message receiver, which led to the development of a match-up hypothesis concept. The match-up hypothesis

claims that the degree of congruence between the source and receiver of a message positively affects the effectiveness of communication [9, 17]. The match between the celebrity and the consumer is also desirable because it has positive effects on advertising or recommendation effectiveness [12]. Choi and Rifon [12] also tried to determine, using the example of celebrities in traditional advertising, that the fit of the person engaged in advertising and the consumer's perceived self-image has a direct effect on brand attitude, but in the given environment the outcome was not confirmed. Lately, researchers have extended the principles established through studies involving celebrities to explore similar dynamics with the emergence of social media influencers as new focal points [2–4, 18–21]. Boerman [22] found that in the eyes of the followers, social media influencers represent an ideal self primarily because both have similar interests.

Consequently, a follower easily establishes a positive link with followed influencer, which can likewise translate to a brand endorsed by the influencer. Therefore, products and brands also play an important role. Friedman and Friedman [23] first stated that the type of product and the person advertising it should match. That idea was additionally explored later on and yielded a conclusion that the celebrity appearing in an advertisement or endorsement should match the product or brand to ensure credible and effective communication [24–27]. Kim and Kim [13] further analyzed the proposed concept on social media influencers' example and concluded that a greater fit between influencer and product encourages positive product attitudes. Additionally, influencer and product match should result in the consumer forming a positive evaluation of the product [11].

In consumers' minds, the selection of brands and products they buy represents a way of expressing themselves and they have a tendency to choose brands that have similar perceived characteristics and align with their actual or ideal selves [27]. In addition, the chosen brand or product helps them in an attempt to showcase their identity or indicates belonging to social groups [28, 29]. Based on the theory of brand congruence, consumers have a favorable attitude toward brands that greatly match their self-concept and that congruence determines attitudes toward products [30].

Overall, the different perspectives on congruence can be observed in interaction with each other. For example, [31] conducted a similar study on the example of social media influencers and found that in the case of high congruence on the leader–follower level, high congruence on the leader–product level leads to high congruence on the follower–product level. In light of this, it's important to understand how consumers comprehend the congruence on three different identified levels and how they feel it influences their purchase behavior.

40.2.2 Cross-Country Comparison: Croatia and Belgium

Each market has its own specificities, starting with political, economic, technological, environmental, and legal surroundings. Additionally, sociocultural factors can

shape the values, beliefs, attitudes, and behavior of individuals. Many companies are operating in multiple countries, especially in the fashion industry. Consequently, fashion brands offering their products in different markets need to have a broader understanding of culture and consumers' habits in order to approach their target groups successfully. Even though, for major fashion brands, Europe is considered as one market, there are still significant differences between European countries based on cultural and historical influences. Over the last decades, different approaches to defining the variables and measuring those variables to determine the differences between cultures have been developed. The most comprehensive study of cultural differences so far is a result of life-long research conducted by Dutch social psychologist and researcher Hofstede in the twentieth century. According to Hofstede [32], there are six major dimensions of national cultures-the power distance index, individualism versus collectivism, masculinity versus femininity, uncertainty avoidance index, long-term orientation versus short-term normative orientation, and indulgence versus restraint. De Mooij has dedicated her scientific career to studying consumer behavior and culture, among it also analyzing the application of Hofstede's findings in the field of global branding and advertising strategy [33]. Comparing Belgium and Croatia based on Hofstede's dimensions, as shown in Fig. 40.1., highlights the main differences between the two cultures, which also might influence the way consumers reflect on social media influencers, themselves, and last but not least, determine consumer behavior related to brands in the fashion industry.

According to Hofstede's cross-country comparison data, the most significant differences between Belgian and Croatian culture can be observed within two dimensions, individualism and indulgence. Individualism is defined as 'people looking after themselves and their immediate family only, versus people belonging to in-groups that look after them in exchange for loyalty' [33]. Translated to marketing language, in the promotion and sales process, for individualistic cultures the aim is to provide concrete information in a fast and clear manner and the main role of advertising is persuasion, while in collectivistic cultures relationship and trust establishment comes first [33]. The second considerable difference is in the indulgence dimension, which is



Fig. 40.1 Comparison between Belgium and Croatia based on Hofstede's dimensions. *Source* Hofstede Insights, https://www.hofstede-insights.com [22.05.2023.]

defined as 'the extent to which people try to control their desires and impulses, based on the way they were raised' (website of [34]). Based on that, Belgians generally 'exhibit a willingness to realize their impulses and desires with regard to enjoying life and having fun, acting as they please and spending money as they wish' while Croatians 'have a tendency to cynicism and pessimism and have the perception that their actions are restrained by social norms' (website of [34]). The latter might be the result of different economic circumstances, where in Croatia real GDP per capita in 2022 was 14.540 EUR, while in Belgium it was 36.860 EUR [35]. The third difference between the countries, which might be very interesting in a marketing context is the power distance dimension, which explains the extent to which less powerful members of a society accept and expect that power is distributed unequally. On that dimension, Croatia scores higher than Belgium, meaning that one's social status needs to be visible in order to get the respect of other members of the community. According to De Mooij and Hofstede [33], global brands often play the role of social status confirmation tools, especially luxury fashion brands.

Considering the previous cultural analysis, it would be beneficial to understand whether and which effect those differences might have on consumers' perception of social media influencers, attitudes toward social media influencers, the importance of congruence between themselves, social media influencers, and fashion brands, and finally, consumer behavior patterns in the context of social media influencers endorsing fashion brands.

40.3 Methodology

For the purpose of achieving previously outlined research objectives, qualitative empirical research was conducted through one-on-one interviews with followers of social media influencers.

40.3.1 Research Technique and Instrument

Interviews were organized in person, by phone, or with software such as MS Teams, Google Meet, or similar, depending on the location and availability of the participant. Each interview was held either with audio or, when the participant accepted, a video recording. The audio of each interview was recorded for transcription purposes. One half of the interviews were conducted in Croatian, the other half were conducted in English. Participants were asked multiple questions, based on a previously prepared interview guide relying on relevant literature [36, 37], and containing mainly openended type of questions to allow participants freedom in the length of answers. In total, the questionnaire was composed of 19 questions, where 2 of them were assessing the participation criteria and 5 of them were related to demographic data.

To ensure a good understanding of the prepared questions, the questionnaire was tested in the field with a few initial interviewees.

40.3.2 Sample

The target sample was determined as 20 participants, divided over two countries of interest (10 participants from Croatia and 10 participants from Belgium). Participants were chosen through purposive sampling and snowballing [37]. The first five participants from each country were chosen through non-random sampling and each one of the first five participants recommended one more potential interviewee. All interviewees had to satisfy a few criteria to be able to participate in this research. They had to be users of social media networks and follow at least a few different social media influencers active particularly in the fashion industry. Verbal consent was obtained from each participant to record the audio, clearly stating that everything said would only be used for the purpose of this study. The purpose of the study was explained to each participant and in order to respect their identity, each participant was assigned a unique code which was used to mark the responses in continuation of the paper. The code consists of the ordinal number of respondents in the research process (P1-P20), gender (male/female), home country (where 'BE' represents Belgium, and 'HR' Croatia) and participants' age (i.e., P1, F, BE, 33). Out of the 20 respondents, 65% were female while the remaining 35% were male. As for their age, majority of respondents were between 30 and 35 years old (70%), followed by respondents in the 25-29 age group (25%). Majority of participants' education level was Master's degree and higher (70%), followed by 20% with secondary education and 10% with Bachelor's degree.

40.3.3 Data Analysis

Once the interviews had been completed, data analysis was performed to translate collected raw data into interpretative information based on verbatim transcriptions. Transcriptions were saved in Microsoft Excel table format to allow easier comparison between answers obtained from different participants to different questions. Qualitative data analysis requires several procedural steps, including data coding, detecting data patterns, sorting, and interpretation [38]. Gathered data was first processed through the application of a framework for coding the transcripts. Research questions served as a guide for coding the transcripts using the constant comparative method, which involves identifying emergent themes in data [39]. The results of the data analysis are presented in the next chapter.

40.4 Results and Discussion

40.4.1 What Makes a Good Match and Why is It Important?

Based on the first research objective, participants were asked to answer a few questions to determine what makes social media influencers, brands, and followers a good match in followers' eyes and why is the presence of congruence important to them. In that context, the following questions were asked:

- 1. When you see a post by a social media influencer related to a fashion brand, is it important to you that the brand and social media influencer are a good match? Why?
- 2. For social media influencers whom you follow, how alike do you see them to yourself?
- 3. If you imagine a fashion brand as a person, would you say that your favorite brands have similar characteristics to you? Why?

Until now, scientific literature was more focused on the impacts of congruence on consumer behavior and less on questioning why is congruence important in followers' perceptions. As previously mentioned in Chap. 2, the effects on attitude and product evaluation have been found for specific products [11–13]. This research elaborates on the reasoning behind the noticed positive effect and the main findings reveal that a good match between influencer and brand is essential for followers to trust the influencer, but also the brand endorsed by the influencer. Participants claim that "*if you want to resonate to your public, to the people you're presenting as an influencer, there has to be a connection*" (P12, F, BE, 31) between an influencer and a brand. Additionally, "*it's important that there is a good synergy between an influencer and a brand to avoid misinformation and falsehoods*" (P9, F, HR, 24).

The connection between the followers and influencers has been identified as crucial to developing trust and belief in what is being presented on social media. For congruence on relation influencer—follower, one of the interviewees explains: "*I feel more close to someone who is more similar to me so I think I could project myself more easier as that person. I prefer if somebody is more like me because it helps me to trust him*" (P14, M, BE, 31). Furthermore, congruence influencer (...) you link your identity a little bit to them" (P11, F, BE, 31), and creates additional interest, as per one of the answers saying "*it makes me more interested. I'll trust more the brand and also the influencer if I could recognize and relate myself to them*" (P14, M, BE, 31).

Social media poses a fresh hurdle for both brands and consumer researchers due to its introduction of a new type of consumer–brand relationship [40]. Followers have confirmed in the majority that the connection between themselves and brands is of very high importance. The conclusions are mainly stemming from the feeling of recognition and identification—"*I can recognize myself and relate to*" (P15, F, BE, 25) the brand. "*I identify myself to those brands and I definitely feel like myself when*

buying and wearing them. Every time I do an experiment, I come to the conclusion I prefer brands that represent my personality more than experimenting with something new" (P1, F, HR, 33).

Existing research indicates that when a person looks similar to us, we tend to believe they are trustworthy [41]. In decision making, individuals might employ the extent of perceived similarity between themselves and the source of information, as people generally lean toward recognizing parallels between themselves and others [42]. In line with existing studies, all 20 participants answered positively to a question if they would rather believe a recommendation from a social media influencer whom they perceive as more similar to themselves. The accompanying explanations take two different directions, one more focused on physical characteristics, for example, *"if she has the same hair type as me I assume products she promotes would suit me better"* (P15, F, BE, 25) and the other one leaning toward non-physical characteristics, for example, *"I tend to believe their recommendations if we have similar lifestyle and values around fashion brands, if we prefer similar fashion brands"* (P4, F, HR, 34), or *"the overlap of interests is important"* (P16, M, BE, 32) to assess the similarity.

40.4.2 Based on What Characteristics of Social Media Influencers, Brands, and Followers is the Assessment of Congruence Made?

The existing literature on endorser's personality primarily relies on old models that describe the desirable characteristics of people in advertising, such as the source credibility theory [14, 15] and the source attractiveness theory [16]. Nowadays, more personal characteristics are being added and analyzed in relation to consumer behavior, such as authenticity, interactivity, and centricity, as these traits are more specific to social media influencers [43–47]. Limited research has been conducted on connecting the dots between the characteristics of social media influencers, brands, and followers. These characteristics form the basis for assessing congruence by the followers. To address this research gap, the interviewees were presented with the following questions:

- 1. If you imagine a brand having a personality, what key characteristics would you use to assess the compatibility between the brand and social media influencer?
- 2. Based on which personal characteristics of social media influencers do you choose to follow them? Do you see yourself having the same characteristics?
- 3. What is more important to you when assessing the social media influencer physical characteristics or non-physical characteristics? Why?
- 4. If you imagine a fashion brand as a person, would you say that your favorite brands have similar characteristics to you? Which?

In line with previous research on characteristics, the most mentioned ones throughout the interviews were authenticity with 7 mentions, followed by credibility

and honesty with 5 mentions. Authenticity refers to the quality of being genuine, real, and true (Arnould et al. [48], in Lee and Eastin [47]) and was mentioned as the basis of the assessment of congruence in all three different relations. "Influencers I follow are real, honest and authentic (...) and do everything from the heart. Just like me" (P9, F, HR, 24). "If I see myself as authentic, then my favorite brands also go in the same direction (...) and authenticity is very important, so that a brand and influencer differ from others" (P8, M, HR, 29). Credibility and honesty have been present in the scientific literature for a while already, with [15] elaboration on Hoyland and Weiss' [14] Source credibility theory, where credibility consists of the trustworthiness and expertise of the source. Ohanian [15] also developed a measuring scale for source attractiveness, which represents not only physical characteristics but also others that might impact the effectiveness of transmitting the message. In line with the concept of attractiveness, participants also mentioned beauty and elegance. Humor also plays an important role and it was mentioned 4 times. There are some other characteristics similar to those mentioned, such as playfulness and catchiness. Participants have the tendency to assess the similarity between themselves, brands, and influencers based on their inclusiveness, open-mindedness, accessibility, but also ethics, and morality.

40.4.3 What Effect Do Social Media Influencers Have on Consumer Behavior?

In this section, participants were asked several different questions to assess the effect of social media influencers on followers' behavior. These questions included the attitude toward the brand, intention to follow social media influencers, intention to share the content produced by social media influencers within their community, and, finally, the intention to try and purchase the brand or product in question. The analysis of participants' answers to the questions about the effects of social media influencers on followers' attitudes toward the brand yielded several interesting conclusions.

Social media influencers mainly have a positive effect on attitudes toward the brand, through various mechanisms [45]. Participants believe that "*that person is selected to be a replica of brand, actually of the values that brand wants to transfer to the customers*" (P6, F, HR, 30). The information oversaturation faced by customers nowadays can be alleviated by interacting with social media influencers. One interviewee says, "*there's a lot of brands so now you have to depend on information that you get from other people (...) and influencers are a good source of information*" (P12, F, BE, 31). Furthermore, "*majority of info comes from social media and I see influencers and a trustworthy source*" (P15, F, BE, 25), and "*it's good to have someone else's point of view to compare with yours and assess*" (P16, M, BE, 32). Consuming social media influencers' content about brands encourages the followers to learn more and get better acquainted with brands: "*influencers (...) positively affect my attitude towards the brand in a way that I go and search more about the brand*" (P13, M, BE, 33).

The effect that social media influencers have on brand attitude can sometimes also be negative, mainly in situations where followers feel that there is no good connection between the brand and social media influencer, or if they see that "*a brand suddenly proclaims values that are not consistent* (...) *and collaborates with some influencers that, based on characteristics, maybe aren't trustworthy*" (P6, F, HR, 30).

Several participants also addressed the situations where social media influencers publicly say something negative about a brand. In that case, based on the collected answers, followers are less willing to believe social media influencers unconditionally but are more careful and would still like to do their own assessment of that brand. *"It can also be in a negative way but I like to have my own opinion. If someone says this brand has bad quality, I would still go to this place but be a bit more careful and double check the items"* (P15, M, BE, 25). These findings are in line with the study by Reinikainen et al. [49] where it was concluded that influencer betrayal might slightly negatively affect brand attitude, brand trust, and purchase intention.

Regarding consumer behavior on social media as the response to social media influencers' activities, this study investigates why consumers decide to follow social media influencers, whether it is related to the brands they post about, and whether are they willing to share social media posts posted by influencers with their own communities. When it comes to following, participants are mainly willing to follow influencers if they see them publishing a brand they like or relate to. One participant explained it further: "I think that connection is important. If we like the same brand and follow it then we already have something in common" (P14, M, BE, 31). One more reason to start following new influencers, according to an interviewee, lies "in interest that they might publish some other new brands I haven't heard of so I can see and learn something new" (P10, F, HR, 30). However, clicking the follow button doesn't necessarily happen immediately, there is often an intermediary step of browsing further through the influencer's account and making sure there's more common ground between the influencer and potential follower. "It will make me check out their account and if I see I like their style and more of their posts, then I would follow them" (P11, F, BE, 31). "I would need to see that someone continuously consistently publishes the content I consider interesting in order to follow him or her, to see some added value from having that person's content in my news feed" (P6, F, HR. 30).

On the other hand, findings related to forwarding posts published by social media influencers reveal that followers are seldom willing to do so publicly on their social media accounts. Ketelaar et al. [50] was the first author to research the motivation for forwarding the ads in a social media context. According to his research, a favorable attitude toward the brand and a favorable attitude toward the pass-on intention overall had a significant impact on the pass-on intention. Only 5 out of 20 participants said they would sometimes share the posts with their community but only if "*it's something unique*" (P13, M, BE, 33), "*it's very wow and empowering*" (P15, F, BE, 25), or "*connected to a promotional activity to receive free products*" (P10, F, HR, 30). Nonetheless, 8 out of 20 participants would rather share that type of content in private conversations with members of their own networks. "*I have some other friends that are also really interested in fashion and I think if something looks really*.

cool, I'll show it to them. I almost never publish stuff on my account but I would send it privately or to a group" (P16, M, BE, 32).

According to Lou and Yuan [3, 4], one of the two essential purposes of posts by influencers is to enhance followers' brand and product knowledge. Consuming the content published by social media influencers sparks curiosity and encourages followers to seek further information about fashion brands mentioned in influencers' posts. "Very often I start following a fashion brand because it was recommended and I go to brands' website to read further and get to know the brand" (P1, F, HR, 33). "If I see (...) something I like, a piece of clothing, I become curious and look it up on the internet. Most often, influencers add tags of brands and shops where they buy products so I look it up" (P2, F, HR, 33). Information search extends from social media influencers' profiles and pages to brand pages on social media and, in the quest for more information, consumers also browse the internet, including official brand pages and other similar sources. Concerning the actual act of purchase itself, participants tend to be slightly more conservative in making their purchase decisions. Similar to following social media influencers, there is often an intermediary step of learning more about the brand and trying out the products in the store if they are available before making the final decision. "The curiosity part and information search about the brand definitely happens, purchase not in all the cases but sometimes ves" (P1, F, HR, 33). Certain importance is also given to the emotions toward the brand and the influencer. "It depends if I trust the influencer and the brand, if I do, it's easier to buy the product" (P14, M, BE, 31). Influencers also contribute to spontaneous purchases and developing a need for some products. "It inspires me to try if I like something and influencer presents is well, and of course, if I think it would suit me well, even though I necessarily don't need it" (P7, F, HR, 46).

40.4.4 Cross-Country Comparison: Croatia and Belgium

According to previously described differences between Croatia and Belgium, measured and established by Hofstede [32], the three main dimensions are being compared based on data collected this year.

The first dimension assesses individualism versus collectivism, which, in a marketing context, means that Belgians prefer to obtain concrete information from the source and save it for later when and if they need a certain product, while Croatians are more concerned about establishing trust with the source of the information. There are a few examples where Belgium participants answer confirmatively to this assumption, saying: "*I wouldn't look up but I remember it, so maybe in a few months later when I need that product, I would go back and remember I saw something*" (P13, M, BE, 33). "*There's that practical component when you need something, you go and search for info on their profiles*" (P17, M, BE, 35). Croatian participants did not refer to their needs, but were more concerned, emphasizing the importance of trust in the social media influencer and the product. "*In the world of online marketing,*

trust is the key component. That you truly trust somebody when they say something is good and you have trust in their recommendation" (P1, F, HR, 33).

The second dimension balances indulgence and carefulness. Based on the latest data retrieved from Hofstede Insights page, Belgians are more inclined to spend their money as they wish, while Croatians are cynic and skeptical in their purchasing journey. Croatian participants questioned the purpose of social media influencers much more than their Belgian peers, trying to answer one of the dilemmas—is it real or—"are they doing it only because of the job, throwing everything out just to earn something?" (P8, M, HR, 29). "Is it fake advertising, leaving them with money reward to endorse the product?" (P3, F, HR, 32).

Lastly, the third dimension bringing the significant difference between Croatians and Belgians is the power distance. In Croatia, visibility of one's social status is essential to enjoy respect from fellow community members, while in Belgium that is not so important. This posit finds a substantial amount of support in real-life circumstances, based on the data collected through the interviews. When asked a question about the importance of social media influencers' physical characteristics or non-physical characteristics, 8 out of 10 Croatian interviewees showed a clear preference for physical characteristics, while 9 out of 10 Belgians concluded that nonphysical characteristics were much more important than physical ones. Throughout answers to other questions, it's clearly noticeable that Croatians pay much more attention to the way people and things look. "People think that today everybody can be an influencer, but it simply isn't true, according to me you need to have a good concept, primarily look beautiful and sound good (...) the appearance is the most important" (P8, M, HR, 29). "Physical characteristics are the most important (...) when it comes to fashion, the style that they represent" (P4, F, HR, 34). The importance of esthetics prevails when assessing social media influencers' profiles and the assessment of social media influencers relies heavily on their appearance. "When assessing influencers on social media, (more important are) physical characteristics, if you see at first a beautiful woman with pretty clothes, with style" (P2, F, HR, 33).

40.5 Conclusion and Limitations

The purpose of this study was to gain deeper insights into the topic of congruence between social media influencers, brands, and followers and its effect on consumer behavior in the world of fashion brands.

Findings suggest that a good match between the influencer and brand is essential for followers to trust the influencer, but also the brand endorsed by the influencer, which is in line with the existing research [2, 51]. The connection between the followers and influencers has been identified as crucial to developing trust and belief in what is being presented on social media. Furthermore, congruence influences the perception of identity and creates additional interest. Followers have confirmed in the majority that the connection between themselves and brands is of very high importance. The conclusions mainly stem from the feeling of recognition and identification,

the latter being an important driver of influencer endorsement effects [52]. Therefore, all of the participants agreed that they would rather believe a recommendation from social media influencers whom they perceive as more similar to themselves.

Regarding the characteristics of social media influencers, brands, and followers which are a basis for the assessment of congruence, the most mentioned ones throughout the interviews were authenticity, credibility, and honesty, which aligns with the most prominent characteristics present in existing literature on this topic [21, 53].

In the following section, participants assessed the effect of social media influencers on their behavior. It was found that social media influencers play a role in prompting spontaneous purchases and creating a demand for certain products. They also influence the attitude toward the brand [3, 4, 54], and the results of this research indicate that their influence is stronger in positive situations and less strong in negative contexts. The intention to follow social media influencers depends on the similarity between the influencer and the consumer and the search for information. Followers are not convinced about re-sharing the content produced by social media influencers within their community, but influencers' posts will often intensify the intention to try and purchase the brand or product in question.

Significant differences between Croatia and Belgium have been found, based on Hofstede's country comparison dimensions. It has been concluded that Croatians are more concerned about establishing trust with the source of the information, and more cynic and skeptical in their purchasing journey than their Belgian peers. Croatian interviewees also showed a clear preference for physical characteristics of social media influencers when assessing the congruence, while Belgian participants were much more focused on non-physical characteristics.

In terms of scientific contribution, this work extends the existing scientific literature on social media influencers, with a special highlight on the importance of congruence between the influencer, brand, and follower. Joshi et al. [53] have identified that the comparative-related factors as congruence represent a noteworthy contribution to the literature that is worthy of additional attention in future research and reviews. Moreover, to speak to the practical contribution of this work, findings related to two different observed markets should be taken into account by marketing managers when constructing social media marketing strategies related to collaboration with social media influencers.

The limitations of this study relate to the nature of qualitative research, indicating that generalizing findings is not feasible. The insights collected reflect the perspectives of a certain age group, namely mainly Generation Y, so it would not be possible to extend these findings to other age groups. Future studies should extend the age scope of participants so the findings can be compared among different age groups. The sample size was determined at 20 participants, 10 of them from each of the observed countries, and although information saturation was broadly attained, something new might have emerged from additional participants. Additionally, the interviews were partially conducted via online platforms and not face-to-face, due to cross-country comparison, so some emotions relevant to data interpretation might have not been completely captured.

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Chapter 41 Sustainability Communication of Fashion Brands on Social Media: Language Abstraction and Digital Customer Engagement



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Abstract The aims of the study are threefold: (1) to examine the linguistic content of sustainability messages of the most valuable fashion brands on social media, (2) to investigate the language abstraction differences across sustainability dimensions, and (3) to explore the effects of language abstraction on digital customer engagement. First, Brand Finance Global 500 2021 list was examined to identify the most valuable apparel brands, providing 19 brands. After that, 458 sustainable messages shared by these brands on Instagram were analyzed according to the Linguistic Category Model. The results showed that the most valuable fashion brands share environmental and social sustainability messages on social media communications, whereas do not address economic dimension. It was also found that fashion brands use an abstract language in sustainability communications. Furthermore, a more abstract language was used in social sustainability messages compared to environmental themed communications. Finally, findings revealed that language abstraction does not affect customer responses to sustainability communications of fashion brands.

41.1 Introduction

Fashion industry is one of the oldest, most established, and fastest growing prolific sectors in the world [1]. On the other hand, it is also the second most polluting industry globally [2]. The environmental and social costs of the industry are notable [3–6]. Statistics demonstrate that 92 million tons of textiles waste is created annually and that number is expected to increase to 134 million tons a year by 2030 [7]. The

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apparel and footwear industries are responsible for 8% of the world's greenhouse gas emissions [8]. The apparel industry accounts for 215 trillion liters of water consumption per year [9]. Due to all these devastating consequences of the fashion industry, particularly fast fashion, the concept of sustainable fashion (here after SF) is of critical importance.

Research on SF has received a growing interest in marketing, communication, and management fields (e.g., [10–12]). However, there is still not enough information to comprehensively understand the phenomenon, such as how fashion brands communicate sustainability messages [2, 11, 13]. Moreover, although social media is an effective SF communication platform to, such as, increase awareness and stimulate innovative consumption practices, studies investigating the topic have been limited [1, 5, 12, 14]. Clearly, there is a need for more research to understand SF communication strategies of brands on social media and the effects on digital customer engagement. Specifically, examining the texts accompanying sustainability images shared by fashion brands on social media is a promising avenue for further research [14].

Language is a powerful tool that influences people's minds [15]. Although language abstraction has become an interest topic for scholarly research (e.g., [16–18]), to the best of the other's knowledge, no study has been conducted on language abstraction and digital customer engagement in the context of SF communication on social media.

Therefore, the following research questions are addressed in the current study.

RQ 1: What is the language abstraction level of sustainability messages of the most valuable fashion brands communicated on social media?

RQ 2: Are there any language abstraction differences among the dimensions of sustainability?

RQ3: Does language abstraction influence digital customer engagement?

41.2 Literature Review

41.2.1 Sustainable Fashion Communication

The Triple Bottom Line (TBL) defines three major pillars of sustainability as economic, social, and environmental elements [19]. Businesses often face conflicts between these three dimensions of sustainability. Differences between the elements of TBL have been widely studied in the literature [20].

Focusing on social and environmental bottom lines, SF refers to "ecological integrity, social quality, and human flourishing through products, action, relationships and practices of use" ([21]:18). Therefore, SF has a broad scope, including fashion items, production-consumption behaviors and business models to be environmental and social friendly [11]. For example, a garment to be sustainable, it is expected to be ethical, recyclable, made from organic resources or simply have gone through a circular process. The main purpose here is to use natural resources as little as possible, to prevent clothes from becoming a waste, to reduce carbon emissions and to be able to wear clothes for a longer period.

With the spread of the SF movement, brands have made a big change in both marketing and communication strategies [5, 10], such as focusing on sustainability or green advertising on social media [22, 23]. As the demand for eco-fashion increased, sustainable media communication became more significant. For example, to engage targeted customers and promote sustainable decisions, brands should provide clear information and explanations about their environmental and social products and practices [10, 24]. Social media seems to be one of the best tools to achieve this goal. Recently, Instagram has become a platform where global fashion retailers directly communicate sustainable messages to consumers [12, 14]. Therefore, fashion brands should pay attention to the interests of their target audience [25] and share sustainability messages to exchange value with consumers [26]. Previous research shows that the more favorably perceived the green campaign communications of retailers, the higher the levels of consumers' green consciousness and behavior. [27].

Compared to chain fashion brands, luxury brands share less sustainability messages on social media but these messages generate more consumer engagement [28]. Researchers suggest luxury brands to convey "responsible luxury" messages in social media communications [29]. More recently, it was found that sustainability communications stimulate e-WOM more for luxury brands, whereas promote purchase intentions more for non-luxury brands in sustainably aware cultures [25]. Thus, to develop effective sustainable communication strategies, fashion brands should consider cultural differences [30] and use more tangible frames referring to sustainable actions and benefits that are clear and viable [31]. In addition, perceived brand authenticity is a key factor prompting digital customer engagement for green advertising on social media [23].

Regarding the diffusion of SF on social media, fashion industry and brands are responsible for promoting the idea of SF by sharing information and sending clear messages to customers [1]. It is recently shown that the images related to environmental dimension of sustainability result in higher levels of digital customer engagement for SF companies [14]. To engage consumers with SF on social media, fashion brands should provide new, exciting information or prefer a unique way to deliver messages [12].

41.2.2 Linguistic Category Model and Language Abstraction

Based on the Linguistic Category Model (here after LCM), current study elaborates on the language abstraction of sustainability messages. According to the LCM model, there are four different word groups which are "Descriptive Action Verb" (DAV), "Interpretive Action Verb" (IAV), "State Verb" (SV), and "Adjective" (ADJ). DAVs can be observed and thus do not need an interpretation, such "fly", "dance", "walk", "open", and "play". However, IAVs are open to interpretation. Although used to describe behaviors, these words can have negative or positive connotations, such as "annoy" and "help" [32]. SVs have a much more abstract meaning and are used to express the emotional state of people rather than a situation. For instance, "hate", "love", and "envy". Finally, the most abstract ones are ADJs, and are completely open to interpretation and reflect the personal characteristics of the objects of the sentence. For example, "adorable", "aggressive", and "open-minded" (see Table 41.1).

In general, as one moves from DAVs to ADJs, the abstractness level of the reference of a linguistic category tend to increase [15]. For instance, DAVs refer to behavioral events or situations, whereas ADJs imply one's stable psychological dispositions or traits. Abstraction influences people's learning, judgment, and behavior [34]. For example, like abstract presentations, desired attitudes compared to actual attitudes are perceived to be more abstract and stable across time and context [35]. People with a positive mood prefer an abstract language, while people with a negative mood prefer a concrete language [17]. The linguistic categorization influences perceptual processes [18]. More specifically, abstract language causes a more global perceptual focus whereas concrete language leads to a more local focus.

The variation of linguistic abstraction in messages influences the inferences made by receivers [36]. For instance, a positive (negative) abstract feedback message compared to a positive (negative) concrete message results in perceived proximity (distance) to the sender. Using a concrete language in messages on recycling causes consumers to understand the process more clearly, reduces psychological distance and causes individuals to take action [37]. Previous research showed that mental presentations influence language and vice versa [16]. For example, luxury is associated with an abstract mental representation, and thus, causes consumers and advertisers to use an abstract language. On the other hand, language that is more abstract leads to higher levels of perceived luxury. However, a recent study shows that on

Category	Examples	Characteristic features	Classification criteria
Descriptive action verbs (DAV)	Call Meet Kiss Kick	Refers a behavioral event; can be seen by an observer; has a definite beginning and end	Require a physically invariant; generally, have a neutral meaning
Interpretive action verbs (IAV)	Help Cheat Hurt Excite	More than a mere description; refers to single behavioral events	Have a positive or negative meaning; require interpretation
State verbs (SV)	Explore Hate Admire Love	Refer to enduring states; refer to psychological state of the subject	Cannot be seen by an observer, they are situations that only the subject of the situation can know; no definite beginning and end
Adjectives (ADJ)	Happy Honest Helpful Reliable	Refer to highly abstract personal features; enduring states; high disputability	Have a general meaning; do not refer to a specific situation

Table 41.1 The classification of linguistic terms

Source Semin and Fiedler [15, 33]

websites luxury brands are more likely to use a concrete language in communicating sustainability practices and products, whereas use abstract language for branding concepts and values [13]. In addition, concrete language was found to be more common. All these studies on language abstraction have made a great contribution to the literature, but there has been no study examining language abstraction and digital customer engagement in the context of SF communication on social media.

41.3 Methodology

41.3.1 Sample

The sample was composed of textual sustainability messages of the most valuable apparel brands posted on Instagram between January 1 and September 30, 2021. The Brand Finance Global 500 2021 ranking was searched for brands operating in apparel sector, providing a total of 19 top brands (Nike, Gucci, Louis Vuitton, Adidas, Chanel, Zara, Uniqlo, H&M, Cartier, Hermes, Rolex, Dior, Tiffany & Co., Chow Tai Fook, Coach, The North Face, Anta, Victoria's and Omega). Brand Finance as a global, independent, specialist consultancy offers brand valuation, and evaluation service for more than 20 years in over 20 countries [38]. All sustainability messages posted were downloaded on the first week of October 2021.

41.3.2 Coding Process

Firstly, two coders individually reviewed all the Instagram posts of 19 most valuable apparel brands to determine sustainability messages having economic, environmental, and social sustainability keywords derived from previous studies (e.g., [39–42]) (see Table 41.2). Environmental sustainability refers to practices to prevent the depletion of natural resources and aims to ensure that future generations have the natural resources of today. Social sustainability refers to ensuring social equity, providing social support, or equal opportunities to all members of the society. Economic sustainability refers to supporting continuous economic development and aims to make the system economically sustainable.

The numbers of Likes on each sustainability post were also gathered. In the second phase, for each brand post, only sentence(s) referring to sustainability was (were) are divided into its basic units composed of a logical subject/target and some action, feeling, or trait attributed to that subject/target [43]. Then, verb classes referring to the logical subject or target person were categorized according to the LCM [15] (see Table 41.3). After that, following previous research (e.g., [16, 17, 44]), language abstraction score for each post was calculated. Language abstraction refers to the overall abstractness level of verb classes used in describing actions, feelings,

Coding categories	Keyword examples
Social	Disability, LGBTQ + , diversity, inclusion, racism, equity, unity, sexism, education scholarship, cultural representation, indigenous, disabled, vulnerable children, animal testing, endangered animals, non-animal materials, local communities
Environmental	Recycled, naturally-dyed, plant-based, marine conservation, refilled, carbon neutral, footprint, renewable, eco-solarized
General	Circular, responsible, sustainability

 Table 41.2
 Sustainability dimension coding examples

or traits ascribed to a subject/target. LCM model was used to determine language abstraction level of each post, ranging from 1 (very concrete, only descriptive action verbs) to 4 (very abstract, only adjectives). It was calculated by dividing the total sum of the frequencies of DAVs (multiplied by 1), IAVs (multiplied by 2), SVs (multiplied by 3), and ADJs (multiplied by 4) by the total sum of linguistic categories. As suggested by Neuendorf [45], to create a valid and reliable coding scheme, a pilot reliability assessment was done on a sample of 47 (among a total of 458) sustainability messages selected by using systematic sampling method. Two separate judges independently coded the entire units in the subsample. For both linguistic category and sustainability dimension codings, there was an excellent agreement beyond chance between the two coders, *kappa* pilot-linguistic category = 0.896 (95% CI, 0.831 to 0.960), p < 0.001, and *kappa* pilot-sustainability dimension = 0.961 (95% CI, 0.885 to 1.037), p < 0.001. Disagreements, if any, were resolved through discussion between the coders.

Coding categories	Coding examples
Environmental sustainability	A simple gesture for an everlasting freshness. The new (ADJ) Sauvage Eau de Toilette <i>refill</i> delivers (IAV) the right amount of fragrance and automatically stops (DAV) without losing (IAV) a single drop
Social sustainability	Dior opposes (IAV) all forms of <i>discrimination</i> and is committed (SV) to an <i>inclusive</i> culture
Unable to determine (Sustainability)	Working (IAV) toward <i>sustainability</i> . At Zara, we understand (SV) <i>sustainability</i> as an ongoing effort. We develop specific programs from a holistic approach
Unable to determine (Passive Voice)	Nécessaires à Parfum are designed to be <i>refilled</i> time and time again with scents from the Cartier fragrance library

 Table 41.3
 Linguistic category model coding examples

	Number of messages	Abstraction level values	
		Mean	Std. deviation
Sustainability	411	2.41	0.67

 Table 41.4
 Overall language abstraction level

41.4 Data Analysis and Results

41.4.1 LCM Categorization and Overall Language Abstraction Level

A total of 458 sustainability-content posts were determined.¹ Based on the LCM classification guidelines [43], 47 sustainability messages did not constitute a unit fit for categorization because of passive/inactive voice criteria. Cohen's kappa was performed to determine if there was agreement between two raters on linguistic categories for each action, feeling, or trait coded. It was found that there was an excellent agreement between the two coders, *kappa* = 0.936 (95% CI, 0.920 to 0.952), p < 0.001 [46]. The mean value of language abstraction for 411 messages was 2.41 (SD = 0.67) (see Table 41.4).Therefore, sustainability messages were found to be linguistically coded in an abstract way.

41.4.2 Sustainability Dimension Categorization and Dimensional Language Abstraction Level Differences

Among a total of 426^2 sustainability-content messages, 63.8% (n = 272) were related to social and 30.3% (n = 129) were related to environmental sustainability. The rest of the 5.9% (n = 25) messages were assign to unable to determine category³ (see Table 41.5). The degree of agreement between the two independent coders was found to be high, kappa = 0.841 (95% CI, 0.794 to 0.888), p < 0.001. The disagreements were solved by discussion to reach a consensus. The mean score of language abstraction for social sustainability messages was 2.48 (SD = 0.59), while this score was 2.24 (SD = 0.74) for environmental messages. An independent samples t-test was conducted to compare the language abstraction scores for social

¹ Within each post, sentences that do not present sustainability approach, interests, and/or intends were not coded.

 $^{^2}$ If different sentence refers to different dimensions of sustainability in one post, each of these sentences was coded individually. Therefore, total number of messages increased to 426.

³ If different units focus on different dimensions of sustainability in one sentence or if a sentence points to overall sustainability without an emphasis on any of three dimensions, that sentence was included in unable to determine category.

Sustainability dimension	Number of messages	Abstraction level values	
		Mean	Std. deviation
Social	272	2.4775	0.58974
Environmental	129	2.2401	0.74217
Unable to determine	25	2.5372	0.78401
Total	426	2.4091	0.65955

 Table 41.5
 Dimensional language abstraction levels

Table 41.6 Independent samples T-Test results

t	df	Sig. (2-tailed)	95% Confidence interval of the difference	
			Lower	Upper
- 3.187	207.357	0.002	- 0.38427	- 0.09057

sustainability and environmental sustainability messages. There was a significant difference in mean scores for social sustainability and environmental sustainability, t (399) = -0.3.187, p = 0.002 (see Table 41.6). In addition, a small to medium effect was found (Hedges' g = 0.369, mean difference = -0.237, 95% CI: -0.384 to -0.091) while the power was estimated at 0.931. Thus, social sustainability messages were found to be linguistically more abstract than environmental dimension messages.

41.4.3 Digital Customer Engagement

Digital customer engagement was measured by the number of likes per brand post divided by the total number of likes of brand posts [12]. A linear regression was used to assess the ability of language abstraction measure to predict levels of digital customer engagement through a bootstrapping procedure (1000 subsamples). The result indicated that the effect of language abstraction was not statistically significantly ($\beta = 0.001$, p = 0.677) (see Table 41.7).

Model B		Bootstrapa					
		Bia	Bias	Std. Error	Sig. (2-tailed)	BCa 95% confidence interval	
						Lower	Upper
	(Constant)	0.037	- 2.962E-005	0.006	0.001	0.025	0.050
	IV	0.001	3.733E-007	0.003	0.677	- 0.004	0.006

 Table 41.7
 Linear regression results

41.5 Discussion and Conclusion

Fashion industry has the responsibility to be more sustainable than other sectors due to the damages it causes [47]. While there is a quite large amount of research on SF, little attention has been given to linguistic nature of SFC communications (e.g., [31]). In addition, by using social media, brands can have direct contact with customers who are actively engaged in sustainable fashion consumption [10]. Although social media is an effective sustainable fashion communication platform, studies investigating this topic has been limited [5]. Therefore, current study aims to contribute to the growing body of the literature on SF communication and language abstraction by examining social media sustainability messages of the most valuable apparel brands.

First, the results showed that most valuable fashion brands share social and environmental sustainability messages on social media, respectively. This is inconsistent with the findings of [5] that slow fashion (SF) communication by both Australian consumers and producers primarily emphasize environmental dimension. This difference might be due to the research context differences. In addition, non-existence of a message on economic sustainability supports the view of academia that SF has social and environmental aspects. Second, present study revealed that fashion brands use an abstract language in communicating sustainability on social media and tend to have a more abstract language in social sustainability messages compared to environmental ones. This is in line with the findings of [13] that luxury brands use abstract messages to communicate sustainability values. The result can be explained through the LCM. As the abstractness of a sentence increases, the sentence implies more temporal stability in behaviors and characteristics [15]. Therefore, sustainability messages linguistically coded in an abstract way may cause consumers to make inferences about fashion brands' overall sustainability values and traits. In addition, moral principles and values often lead to a more abstract style of expression [48]. Finally, the study demonstrated that language abstraction level does not affect consumer responses to SF communication.

41.6 Limitations and Future Research

The present study had several limitations. First, sustainability messages of most valuable 19 apparel brands were examined within a limited time. Future research should compare SF communication of different brands, such as higher versus lower valued brands, luxury versus non-luxury brands or sustainable versus sustainably aware fashion brands, by covering a longer time interval. Another limitation is that economic sustainability could not be investigated. Further studies should examine the linguistic abstractness of economic sustainability messages of apparel brands, such as, in the context of sustainability reports.

Consumer responses to SF communications may enlarge our understanding of the perceived effectiveness of linguistics nature of messages. For example, extant studies

suggested using a more concrete language in sustainable communication [31, 37]. However, previous research showed that abstract (concrete) construals paired with a prevention (promotion) focused message are more effective (e.g., [49]). In addition, encountering information about sustainability practices of a company leads consumer to make prevention-focused inferences about the company's products [50]. Thus, future research may explore the positive effects of the fit between regulatory focus and language abstraction of sustainable messages.

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Chapter 42 Uses and Gratifications of Consuming 'Yo soy Betty, la fea' from a Female Perspective



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Abstract This study delves into the realm of marketing by examining the uses and gratifications of 'Yo soy Betty, la fea' from a female perspective, given its status as Netflix Peru's top show for 54 weeks. The primary objective is to identify the needs it fulfills for young women and analyze the gratifications it provides. The methodology employed is qualitative, involving data collection through semi-structured interviews with 20 female consumers of the series, subsequently coded using 'Atlas.ti'. The results of this study reveal that 'Yo soy Betty, la fea' effectively caters to a diverse array of marketing needs within its audience. The cognitive need strengthens the understanding of the plot. The affective need enables emotional connections with characters and situations. The social integration need is fulfilled through interaction with family and friends during viewing. The need for recreation relieves tension, with some individuals watching up to 20 episodes a day in their leisure time. The need for personal integration is reflected in active participation on social media, sharing content, and maintaining a certain social status. The emotional resonance, viewer dedication, and active social media engagement around 'Yo soy Betty, la fea' present opportunities for marketing campaigns to boost viewer attachment, tap into leisure interests, and harness influencer partnerships for content-related social status enhancement. This study aims to uncover the marketing dynamics driving the sustained popularity of 'Yo soy Betty, la fea' while also advancing the application of the uses and gratifications theory in marketing-oriented audience research.

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42.1 Introduction

In the realm of marketing, telenovelas have emerged as a captivating force, both for established and burgeoning audiences around the globe. This captivating phenomenon has been amplified by the rise of modern media consumption platforms, exemplified by streaming powerhouses such as Netflix, HBO, Prime, Star + , and others. Amongst these platforms, Netflix reigns supreme in Peru, where it commands an astonishing 88% share of the market, as substantiated by the CPI survey [1]. This remarkable market dominance underscores Netflix's pivotal role as a marketing channel for content providers.

It's crucial to recognize that telenovelas are not just a form of entertainment but also a potent marketing tool for the streaming platform. Netquest, a research firm, conducted a survey for Netflix in Peru, gathering data from 600 individuals, constituting a sample of the online adult population. This survey took place between November 2021 and January 2022, revealing that nearly 70% of respondents expressed a preference for drama, and 84% acknowledged watching telenovelas. Notably, 40% of respondents reported enjoying solitary viewing for a more immersive experience. Furthermore, 29% identified villains as the most attractive characters in telenovelas, whereas only 8% favored the protagonists. A staggering 65% affirmed that they found the emotional aspects most appealing, while an additional 58% highlighted the element of mystery [2]. These emotional and thematic preferences offer marketing professionals valuable insights into crafting compelling marketing messages and campaigns tailored to the tastes of Peruvian viewers.

Week after week, in the top 10 list of shows on Netflix Peru, telenovelas consistently occupy half of the slots. Notable titles include 'Yo soy Betty, la fea', 'La reina del flow', 'Café con aroma a mujer', 'Pablo Escobar: el patrón del mal', 'Pasión de gavilanes', 'Pedro el escamoso', 'Oscuro deseo', and more. 'Yo soy Betty, la fea' and 'Pasión de Gavilanes' have secured the top positions for 54 weeks, followed closely by 'Pablo Escobar: el patrón del mal' with 43 weeks [3].

This research aims to comprehend why the Peruvian audience derives such enjoyment from these three telenovelas, selecting 'Yo soy Betty, la fea', the most watched in recent years, as an illustrative case. This article will analyze the uses and gratifications that consumers of these telenovelas find on Netflix, with a focus on the female audience, employing the Uses and Gratifications Theory. This theory addresses the motivations behind people's exposure to various media and posits that individuals play an active role in selecting media that best satisfy diverse needs. These needs can be categorized into five groups: cognitive, personal integration, social integration, affective, and diversion [4]. While there are surveys, studies, and rankings of series in general or their specific themes, there is a dearth of research focusing on why individuals are drawn to a particular product to the extent that it remains in the top 5 for months. To answer this question, the Uses and Gratifications Theory is indispensable in interpreting the chosen audience, making this research original and significant in its field. To achieve this, interviews will be conducted with female consumers of the telenovela on Netflix, followed by coding to discern the needs they fulfill by watching it. These findings will shed light on the intriguing phenomenon of revisiting a telenovela from over two decades ago, amidst a sea of new series and novellas, and why it continues to capture the hearts of its audience.

The research problem centers on understanding why the female audience is drawn to the mentioned telenovela 'Yo soy Betty, la fea'. The general research question is: 'What are the uses and gratifications that the female audience finds in consuming 'Yo soy Betty, la fea'?' with the overarching objective of analyzing the uses and gratifications experienced by the female audience in consuming 'Yo soy Betty, la fea'. Additionally, to facilitate this analysis, a specific research question is posed: 'How do the uses and gratifications needs of the female audience consuming 'Yo soy Betty, la fea' satisfy their needs?' with the specific objective of identifying how the uses and gratifications needs of the female audience consuming 'Yo soy Betty, la fea' are satisfied. The research consistency matrix is available in the appendices.

Furthermore, this research endeavors to unravel the marketing dynamics behind the Peruvian audience's profound enjoyment of telenovelas, with a specific focus on 'Yo soy Betty, la fea,' the most-watched telenovela in recent years. By applying the Uses and Gratifications Theory, we aim to analyze not only the motivations and rewards but also the marketing potential that viewers derive from these telenovelas on Netflix, with a particular emphasis on the female audience. The comprehensive insights gained from this study will not only enhance our understanding of audience behavior but also offer invaluable marketing intelligence for content creators and marketers seeking to capitalize on the enduring popularity of telenovelas in the Peruvian market.

42.2 Methodology

The paradigm employed in this research is social constructivism, a theory that seeks to develop subjective meanings of participants' experiences. The research's objective is to rely on their viewpoints regarding the situation under examination. Consequently, the researcher develops a theory or pattern of meaning with the intention of interpreting them [5].

The research adopts a qualitative approach, which aims to understand and explore phenomena from the perspective of the participants while delving into their experiences and opinions. Qualitative studies can generate questions and hypotheses before, during, and/or after data collection and analysis [6].

This study employs a phenomenological research design. This design describes the common meaning for several individuals based on their lived experiences of a concept or phenomenon. The researcher gathers data from participants who have experienced this phenomenon and generates a composite description of the essence of this experience for all individuals [5]. Convenience sampling was chosen as the sampling strategy, implying that cases readily accessible to the researcher were selected [6].

The chosen sample consisted of 20 women aged 20 to 35 who were consumers of the telenovela 'Yo soy Betty, la fea' and who displayed the greatest availability,

willingness, and interest in participating in the study. The inclusion and exclusion criteria were as follows: being female, as the research is framed from a female perspective; having watched the original version of 'Yo soy Betty, la fea'; being consumers of Netflix; and falling within the age range of 20–35.

The data collection technique employed is semi-structured interviews, with the general purpose of focusing on a specific object and its meaning. It is characterized by affording the interviewe the greatest freedom to express their opinions, revealing existing knowledge in a way that can be articulated in responses and made accessible for interpretation [7]. The instrument used is the interview guide. This semi-structured qualitative interview guide aims to obtain the necessary information to understand how the phenomenon under study is experienced [6].

For the analysis of qualitative information, both the first and second cycles of coding were employed. The first cycle occurs during the initial coding of data, being simple and direct, while the second cycle involves classifying into patterns and beginning to construct theories [8]. Finally, codes were organized using networks that graphically represent the systems of relationships between categories and/or codes. This allowed for linking categories with the interviewees' opinions. For the analysis of qualitative data, coding was conducted using the qualitative analysis software 'Atlas.ti'.

42.3 Results and Discussion

42.3.1 Cognitive Need

One initial finding was that the reasons for watching 'Yo soy Betty, la fea' are rooted in the desire to remember, relive, experience nostalgia, and revisit childhood memories with family. Most of the participants recall having watched it as children with their grandmothers and/or mothers. Additionally, they mention watching the telenovela as adults to gain a better understanding of its context and plot. Some stated that they noticed it in Netflix's top 10, which piqued their interest, along with recommendations from acquaintances:

I saw it because it appeared in the top 10, I was looking for something to watch, and there it was. It was a show I had seen a long time ago when I was a kid, and I didn't remember much, just the main character. I wanted to watch it with more awareness to see what it was like. (Interviewee 16, 28 years)

And then, when Netflix put it on the platform, it was like remembering back when I was a kid with my grandma. (Interviewee 2, 24 years)

When asked why they believe 'Yo soy Betty, la fea' is the most-watched telenovela on Netflix, they respond that many people identify with the telenovela. It is realistic, addresses themes of acceptance and society, and evokes memories, as it is also a shared interest among family members. They also highlight that the telenovela is quite ironic and has a humor that was well-received during its time: It has drama, it's funny too. I think it's the most-watched because my generation used to watch 'Betty la fea' when their parents watched it in the evenings. It's a nostalgic thing because it's very old. (Interviewee 12, 27 years)

Because the episodes are short, they last a maximum of 30 min. They're enjoyable. The telenovela deals with self-esteem, which is something that many people find helpful, and its theme will never go out of style. (Interviewee 17, 33 years)

They also mentioned that the main attraction of 'Yo soy Betty, la fea,' compared to other telenovelas, is that it breaks the mold and challenges the classic telenovela storyline. They emphasize that it's due to the main character, Betty, who is a different kind of protagonist, breaks stereotypes, and is easy to relate to because she feels real. The quality of acting and the other characters also have a significant influence for some:

She's a different person who feels different, and at some point in our lives, we've all felt that way in any area of our lives, maybe in school, at university, at work. At some point, we've all felt different. (Interviewee 4, 25 years)

Even though Betty is Betty, she's quite charismatic. She knows she's ugly and doesn't let it affect her. She knows it, but she doesn't care. The other secondary and tertiary characters also have their charm, and each one contributes to making the telenovela work. (Interviewee 9, 27 years)

When asked how many times they've watched 'Yo soy Betty, la fea,' the most common answer was three times, followed by two times. Nearly all of them mentioned that the first time they watched it was as children with their families on television, while the second and third times were as adults on Netflix, either alone or with their partners or friends:

I've seen it five times... the first time, I watched it with my mom, the second time with my boyfriend, and during the pandemic, I watched it twice, especially in the early days of the quarantine. I even made my boyfriend watch it again. (Interviewee 4, 25 years)

I've seen it three times... so, the first thing I do after work is take a break, and I actually feel much better after watching Betty la fea because it's really funny. (Interviewee 5, 24 years)

Undoubtedly, times have changed along with society. There are situations that are no longer tolerated, and actions that are frowned upon today. The interviewees highlighted the issues of the work environment and mistreatment at 'Ecomoda.' They also criticized the prevalent sexism in every male character and the significant discrimination based on appearances:

The discrimination, in terms of appearance, not judging people solely by how they look. I think they still do it because I see a lot of ads online that say, 'Wanted: young lady with a good appearance.' (Interviewee 2, 24 years)

Definitely, the physical and psychological abuse towards women. When Armando yanks Betty, he does it very harshly. (Interviewee 11, 28 years)

In this context, as we delve into their knowledge and understanding, there is a noticeable fondness and nostalgia regarding the telenovela. They believe that the

success of 'Yo soy Betty, la fea' lies in its realism and relatable characters. Along the same lines, Grandío [9] suggests that the audience seeks comfort. A viewer watches a series because it is pleasing to the senses, representing a familiar and warm environment. Consumption creates a sense of comfort for the viewer. Additionally, Huang [10] found that satisfaction reflects a positive attitudinal disposition that leads to loyalty to a service provider, so satisfied customers continue to consume and remain loyal. Chávez [11] argued that members feel connected to a specific group based on the identity formed as a group or community with a common interest. Regarding the participants' response regarding the empowerment of the main character of the telenovela, which is the main attraction of the telenovela and its differentiating factor from others, Grady [12] supports that women began to empower themselves starting in 1990, and programs emphasizing this became more common to eventually lead to gender equality. Grady provides data indicating that the first program promoting female empowerment was in India in a telenovela aimed at promoting women's status. An important point is that when asked how many times they had seen the telenovela, the participants mentioned that part of the reason was the COVID-19 pandemic in 2020. They did not want to feel alone in isolation, and the telenovela made them forget about the bad news happening in the world.

42.3.2 Affective Need

When the interviewees were asked about their favorite episodes, they mentioned several that they favored either because of emotional moments, moments they identified with, or because they held more emotional weight. The favorite episodes that were mentioned most frequently were the one where Betty undergoes her transformation after her trip to Cartagena and her return to Ecomoda to confront everyone and secure the presidency:

My favorite was when the definitive transformation happened, with her looking really pretty after her trip, which she had taken with a friend who helped her boost her self-esteem. She returns to Ecomoda to confront everyone because they all thought she wanted to take the money and leave the company. (Interviewee 1, 27 years)

The one I liked the most was the fashion show when Betty was already the president of Ecomoda. She was very nervous because it was the first time she was doing this type of event. Hugo Lombardi wanted to sabotage them, but she didn't let him. (Interviewee 13, 25 years)

When asked about their favorite characters, almost all of them mentioned Betty, the main protagonist. In addition to her being ironic and funny in her own way, she makes the audience empathize with her. They also mentioned Patricia Fernandez, known as 'la peliteñida,' for her humor, and Marcela Valencia for her maturity and assertiveness:

Betty, beyond being the main character, is a character you can identify with in many ways. I also like her a lot because she's a very intelligent person but is shy about showing it, and I like how she faces change despite all her fears. (Interviewee 4, 25 years)

Marcela, I think she's in her 30 s and was engaged to the general manager of the company. She's quite strong, independent, and determined, although she also made mistakes because of her Achilles' heel, which was her boyfriend. But in her professional life, she was very determined, and in the end, she decided to step aside and leave the company, and I liked that about her. (Interviewee 3, 33 years)

'Yo soy Betty, la fea' is a telenovela that is easy for many people to identify with because it features very real characters who experience common situations in both work and personal life. In this case, the interviewees shared which characters they identified with. The majority responded that Betty is a character who undergoes significant personal growth throughout the telenovela, which reminds them of themselves. They also named other characters like Marcela, Freddy, and Catalina:

Catalina, for example, showed herself as someone who, no matter her status, always supported Betty and didn't want to get involved in more than what was in front of her because she didn't want to cause problems. So, I consider myself part of that character because I think I do that in my day-to-day life with my closest friends. (Interviewee 5, 24 years)

I think with Betty, I find that most Latin American families have conservative parents, the love she has for her family, always seeking their well-being. From there, girls who identify with Betty for her friends, for the impossible love. (Interviewee 13, 25 years)

Following the previous question, participants were asked if there was any event in the telenovela with which they identified. These responses were more varied because they mentioned different characters in the same response and commented that their identification depended on the personal experiences they had gone through:

I think a little bit of each one. For example, with Betty, sometimes I'm a bit clumsy, then with Marcela, I'm a bit grumpy, and maybe with Freddy, I try to see the positive side. (Interviewee 7, 35 years)

Yes, I particularly identify with Betty because you can't imagine the things you can achieve if you start gaining confidence, loving yourself a bit more, and valuing yourself for the things you do every day. (Interviewee 11, 28 years)

A common trait in the scenes that had the most impact on the interviewees is that they are the ones with the most emotional weight and dramatic arcs, whether they are moments of joy or sadness. Scenes such as when Betty leaves Ecomoda, when she returns from Cartagena, and when she finds out about the bet were highlighted:

I was shocked, and it made me very sad when Betty reads the letter and finds out about the plan Mario and Armando have to make her fall in love. When she sees and finds out and cries and suffers and goes through a tough time, and what I like is that she doesn't decide to confront them at that moment but decides to continue with the charade. (Interviewee 9, 27 years)

When she confronts Marcela, that's a strong scene. She finds out that Betty is the mistress, and she never imagined that she would be her fiancé's mistress. She confronts both of them, and it was sad. (Interviewee 3, 33 years)

It is recognized that young women can identify with Betty, her characters, and the stories that accompany them. In line with the points mentioned, Grandío [9] discusses the strong emotions that have impacted the audience and the affection shown toward such a character. He also suggests that everything points to a partial identification of the viewer with the character's personality, sharing only certain traits of their personality. Gabbiadini [13] found that the affective need is relevant in terms of narrative transportation, and this characteristic moderates the impact of identification with different characters. Additionally, Hwang [14] indicates that emotional motives are the most important needs. Thongmak [15] argues that the longer users spend in the medium, the more satisfied their connection needs are. Gonzáles [16] supports that personality patterns are associated with self-perception and beliefs about oneself, known as self-beliefs. Mayora [17] explains that the characters in the telenovela show this personal effort, but the definition of success is being part of the upper class and achieving wealth. Our interviewees observed the same class differences and history when conducting a brief analysis of their favorite characters, where they discussed their backgrounds and characteristics.

42.3.3 Social Integration Need

When it comes to the preference between watching the telenovela alone or with others and the differences between these choices, half of the interviewees expressed that they didn't see a significant difference and that it didn't matter to them. The other half believed that watching with someone allowed for more laughter and discussions during each scene, so they preferred to watch it with company. The most notable difference mentioned about watching alone was that it allowed them to watch the telenovela at their own pace without depending on someone else:

Watching it with someone, it's a family show, you can watch it with your family, and it's normal. (Interviewee 10, 20 years)

Watching it with someone, you can comment on it, but when you watch it alone, you complain about the scenes to yourself. (Interviewee 19, 27 years)

Similarly, they were asked who their companions had been when watching the telenovela on all the occasions they had seen it. Many mentioned that they watched it with their grandmothers, mothers, and aunts when they were children, and later with friends or partners when they grew up:

The first time I watched it was with my grandmother and my mother, and I didn't have much say in it. Then I watched it alone on Netflix twice. (Interviewee 9, 27 years)

My work colleagues and my nanny when I was a child. (Interviewee 19, 27 years)

Regarding discussing the telenovela with family members or friends, the interviewees said they did so with friends, partners, and family members, especially when it came to important events in the telenovela. They also mentioned sending each other 'Yo soy Betty, la fea'-related content through their phones:

I even send TikToks to my parents, and they laugh a lot. I also send stickers to my friends, and I have Betty la fea memes. (Interviewee 29, years)

Especially when, for example, they're advanced, in the case of my best friend, it's like I leave her with the bug that, hey, you don't know what's going to happen, depending on the episode she tells me she's watching. (Interviewee 5, 24 years)

As noted in previous responses, 'Yo soy Betty, la fea' is a telenovela that is typically watched with family or friends, which is why interviewees mentioned their desire for company from family members, friends, and now partners when watching the telenovela. They also recalled childhood memories of watching it with family. In line with these points, Bosch [18] argues that media use is an example of how social utility increases contact with others and becomes a need for connection in individuals. This contact is not only communication but also activities like sharing news and photos, which is what our interviewees do with their family and friends through social media to have a good laugh. Additionally, Tarullo [4] explains that the desire to socialize, share content, and meet people has been one of the main reasons users cite for their engagement in the digital space. They join communities and pages related to their interests to stay updated on news and trends.

42.3.4 Recreational Need

In the case of the moments when they watch 'Yo soy Betty, la fea', the interviewees concur in stating that they watch it in their free time, in the evenings, and during snack breaks. They all aim to watch it when they are already free so they can unwind and relax:

At lunchtime, we started there, and we couldn't stop. Not during breakfast because we were in remote classes. At lunchtime, we settled down and told my little one to put it on. (Interviewee 1, 27 years old)

My work hours are over, and I feel like I have nothing else to do, no pending tasks, so I feel free to watch it because it relaxes me a lot, amuses me, truly entertains me, and, I mean, hours can go by without me even looking at the clock. (Interviewee 5, 24 years old)

Another interesting finding is that a significant portion of the interviewees acknowledged that they binge-watched, sometimes watching up to 20 episodes a day. They mentioned that they spent 12 h watching 'Yo soy Betty, la fea', partly due to the pandemic and the shorter episode duration. But at a minimum, all of them watched 3 episodes a day:

Wow, we used to watch, easily, about 8 or 10 episodes a day, since they were short because they weren't like the telenovelas that last 1 h; there were episodes of 20 min, and we just kept going. (Interviewee 1, 27 years old)
I spent a whole Saturday watching Betty la fea, from 10 am, then I had lunch, and then back to Betty until dawn. It was twelve hours. (Interviewee 8, 29 years old)

Based on the above, it can be asserted that the young women watched/watched the telenovela in their leisure time to relax their minds and divert their attention from work-related matters. Furthermore, they claim to have engaged in binge-watching. In line with this, Grandío [9] contends that audiences also appreciate the agility of a half-hour product, such as 'Friends,' for example, noting that the brevity of the format has led viewers to desire to watch multiple episodes in succession. This observation is similarly applicable to 'Yo soy Betty, la fea' with the marathons mentioned by the interviewees and the emphasis on its brevity. Moreover, Bilişli [19] asserts that individuals use social tools to obtain information quickly, relax, and make the most of their leisure time. Flores [20] explains that depending on individuals' sociocultural context, habits, and emotional state, various needs arise that must be satisfied in some way. Thus, after a grueling workday, people require rest, which can take the form of conversation, relaxation, eating, or entertainment. Similarly, Huang [10] explains that the medium of their research provides fun and entertainment to its players, and they may be content dedicating all their time to it. Lianlian [21] supports that in other studies, the uses and gratifications theory has been applied to examine the joy, time, stress relief, escapism, and social interaction, with researchers defining the need to binge-watch and how it influences the gratifications obtained. This affirms the finding from the interviewees, the majority of whom claimed to always watch marathons of the telenovela.

42.3.5 Personal Integration Need

On the other hand, I asked them if they had discussed 'Yo soy Betty, la fea' on social media; several responded affirmatively, mentioning Facebook and Instagram. Conversely, some interviewees stated that they did not use social media and, if they did, it was in private with friends:

I have shared 'Yo soy Betty, la fea' memes, retweeted quotes from 'Yo soy Betty, la fea' because there's a Twitter account and, I think, an Instagram account that posts quotes or memes from Betty. There are times when I don't know when Patricia is broke, and I see they've posted on this Betty account: 'poverty is breathing down my neck,' so I grab it and share it; I do it every end of the month. (Interviewee 9, 27 years old)

I also watch on Facebook because sometimes they post Reels of scenes, and they say, 'Do you relate to this scene?' or something like, 'I died in this scene,' and they put up the video, so, for example, with my friends who I know have seen it, I tag them, they tag me, and we start commenting on what happened next. (Interviewee 5, 24 years old)

Related to the previous question, I asked them if they enjoyed interacting with others on social media. Those who confirmed that they commented on social media responded to this question; half said yes, and the other half said no, as they preferred to comment with acquaintances:

I've even met people from other countries who also enjoyed the soap opera. (Interviewee 4, 25 years old)

No, actually, I only leave my comment that I liked it or something about the actors in the scene, but I don't really interact or reply to others. (Interviewee 1, 27 years old)

Likewise, I asked them if they shared content on their social networks. They confirmed that they did, primarily on Instagram, WhatsApp, Facebook, and Twitter, with memes being the most common type of content shared:

Yes, especially on Facebook, thanks to this group that posts memes, I always hit the share button. (Interviewee 4, 25 years old)

I've shared a couple of stories about watching it, as I usually do on Instagram. (Interviewee 11, 28 years old)

Finally, I asked how often they accessed 'Yo soy Betty, la fea' content on the internet. They mentioned that they often encountered content related to the soap opera naturally since they followed pages about it on their social media:

Between two to three times a week because, since I follow the page, it sometimes appears almost daily by default, or when I have the page myself and I search for new things they've posted. (Interviewee 5, 24 years old)

I'd say a couple of times a week, specifically to watch it because, as I mentioned, this group posts daily, but it's not that I check it every day. (Interviewee 4, 24 years old)

In conclusion, some young women mentioned using social media to share content about the soap opera and, in some cases, to interact with others. Social media includes options for obtaining information, music, videos, and expanding one's network of friends [22]. Hwang [14] explains that the social presence theory delves into how users feel the co-presence of others who are not physically in the same location through the network. On the other hand, Nee [23] asserts that social media platforms are where users interact with others the most, creating a sense of presence and enjoyment. While the young interviewees were able to use social media, it was the least pronounced need concerning the soap opera, with only half of them fully taking advantage of it. This differs from Dimmick [24], whose findings show that the Internet has the largest niche in the gratification dimension, providing users with satisfaction for more needs than other known media. Also, contrary to Bilişli [19], who claims that young people in their study attach great importance to social media regarding their social environment. Nevertheless, some participants used social networks to access necessary information quickly, as did those in our study who searched for information about the soap opera and actor trivia. Chávez [11] demonstrates in her research that getting to know new people makes the relationship with those who share the same interests interesting and involves sharing information. Some participants in our study also engaged in this when meeting new people on social networks, who could be from other countries. García [25] supports that women who are connected to the Internet more days a week are more likely to search for information. Kim [26] believes that the recommendation algorithm suggests video and photo content to users based on their preferences, which several participants in our research claimed to have noticed on their social networks.

42.4 Conclusions

In this research, we have identified the uses and gratifications that the female audience In this research, we have explored the multifaceted realm of marketing insights generated by the female audience's consumption of the telenovela 'Yo soy Betty, la fea.' Our investigation has illuminated the ways in which the show effectively satisfies various needs outlined by the Uses and Gratifications theory, encompassing Cognitive, Affective, Social Integration, Recreation, and Personal Integration needs. The following key findings have emerged:

Regarding the Cognitive need, the gratifications obtained included strengthening their understanding of a telenovela that, in many cases, was what motivated them to watch. They also gained an understanding that the telenovela depicted situations that would not be accepted today.

Regarding the Affective need, the gratifications obtained were living the emotional experience with the most impactful episodes of the telenovela. They felt sadness, happiness, and frustration with each character, especially Betty. They even identified with some of the characters and situations, enhancing the empathy they felt while watching the telenovela. This was the second most gratified need among the participants.

Regarding the need for Social Integration, the gratifications obtained included bonding with family and friends while watching the telenovela. They even watched it together virtually, discussed it in person or through social media, and created memorable experiences related to the times they watched it together.

Regarding the Recreation need, the gratifications obtained included stress relief after work, the opportunity to relax with something entertaining, and even having the telenovela as background accompaniment while working. This need was fully satisfied, being the most gratified of the five.

Regarding the need for Personal Integration, gratifications were only observed in half of the interviewees. The gratifications included the social status they displayed on their Facebook and Instagram profiles when posting about the telenovela and sharing content with their friends. They also reinforced their knowledge by seeking trivia and information about the characters.

These findings contribute significantly to our understanding of marketing strategies and audience engagement, particularly within the context of 'Yo soy Betty, la fea.' They offer insights into why the telenovela has resonated with audiences on platforms like Netflix and beyond, shedding light on its enduring popularity.

Furthermore, this research opens the door to several promising avenues for future investigation. First, there is an opportunity to delve into the roles of female characters within the telenovela, exploring issues related to sexism and workplace mistreatment,

as well as their objectification. Second, a comprehensive analysis of the character of Betty can uncover themes of empowerment and feminism, contextualizing her portrayal within the time period of the show.

However, it's essential to acknowledge the limitations of this study. The exclusive focus on a single gender, a specific age group, and particular demographics restricts the generalizability of the results. Future research should aim to include a more diverse sample, encompassing individuals from various locations and backgrounds to facilitate broader comparisons.

In conclusion, this research underscores the intricate interplay between marketing, audience engagement, and the satisfaction of multifaceted needs within the realm of entertainment, exemplified by 'Yo soy Betty, la fea.' By extending our exploration to diverse demographics and dimensions of the telenovela's impact, we can continue to unravel the complex dynamics of audience reception and its implications for marketing strategies in the evolving media landscape.

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Part XI Technologies Applied to Tourism Marketing

Chapter 43 Experiencing a City Through Instagram: What Do Tourists Engage with?



Rúben Pinhal, Ana Estima, and Paulo Duarte

Abstract Currently, tourists are more active on social networks and get information about cities on these platforms, which highlights the importance of municipalities communicating online. In this way, based on the UNESCO Creative Cities Network, this study intends to verify which type of city marketing content generates greater engagement on Instagram. A comparative study was conducted, where the engagement rates of municipalities were calculated based on their respective creative areas within the network. The aim was to analyse whether the images associated with the network exhibit superior rates compared with standard images. The results show that cities use this platform to communicate with their audience, demonstrating that images associated with creative areas generate better engagement results than those that reflect cities' day-to-day life. The study contributes to the scarcity of studies related to tourism and Instagram. Additionally, it shows that it is necessary to be aware of what cities need to disclose on social networks to ensure higher and more effective engagement rates. This pioneering study analyses user engagement rates with municipalities on Instagram, being one of the few studies addressing this issue. In addition, the research contributes to the literature on tourism marketing by analysing UNESCO creative cities' activity on the platform.

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43.1 Introduction

In a globalised world, the intense competition between tourist destinations means that there is a need for constant action and differentiation on the part of cities [1]. Cities seek new ways to stand out and promote themselves, showing themselves as unique [2].

The notorious and rapid growth of social media networks has changed how tourism promotions are carried out, making these platforms used to create engaging promotional content, build relationships, and enhance user feedback [3, 4]. These platforms have become a basic source of information, given their ability to disseminate information and generate interest in tourist destinations [3]. These applications are particularly relevant, given their ability to generate interest in a particular destination and their potential to become a complementary tool to traditional promotion methods commonly used in tourism marketing [4].

Tourism is one of the industries that mostly benefits from and takes advantage of the development of new information and communication technologies [5]. When choosing a tourist destination, tourists rely mainly on user-generated content (UGC) [6], which stands for the experience of tourists and has become an important source of information dissemination [7]. Social media play an important role in destination marketing strategies, allowing tourist destinations to communicate with different audiences through platforms such as Instagram [8]. Currently, 5 billion people are on social networks, representing 63% of the population [9].

Among the multitude of information available and the array of user-generated content, photographs stand out, which prove to be practical and easy means of capturing a holistic view of reality, allowing tourists to share their experience through digital platforms [10]. Photographs, when of high quality and resolution, provide tourists with a better visual experience to understand whether a particular destination meets their needs [11]. As such, photographs have become a common way of communicating travel experiences and documenting the perceived image of the tourist destination [12].

An increasing body of research has centred on social networks and their influence on tourist behaviour [13], showing that decision-making about travel has completely changed due to the emergence of these new forms of information sharing [14]. Considering the importance and current power of social networks, as well as the role of tourists as promoters and prescribers of a given destination through their publications [15], it was considered important to study the process of promoting a destination, considering as a central element the content published on the social network Instagram, bearing in mind the relevance of its distinctive characteristics that can make it a crucial tool for destination marketing [16].

As information about destinations is increasingly acquired on social networks, where photography is revealed as central, based on UNESCO's network of creative cities, the purpose of the current study is to assess which are the images with the greatest engagement by users who follow the municipalities on the Instagram platform.

43.2 Theoretical Background

43.2.1 City Marketing

The strong competition between cities to attract tourists has motivated municipal governments to use marketing strategies to promote the city [17]. Like companies, products, or services, cities can also apply marketing tactics to reach certain target audiences [18].

City marketing can be defined as a process of planning and designing cities that aims to satisfy the needs of visitors to the city [19, 20], and the main actors in its implementation are the local governments, businesses, and residents [19, 21]. According to Braun [22], city marketing can be understood as a joint use of marketing strategies directed towards customers to create, communicate, and deliver urban offers that generate value for city visitors and the city community at large. To this end, marketing professionals use not only routine communication tools, such as advertisements but also social media (to create brand communities and increase positive word-of-mouth about the location) or the city's brand itself (to trigger positive associations and position the city in a certain way) [23].

City marketing encourages local governments to learn more about target audiences and develop focused and coherent policies to attract groups considered valuable to the city [24]. Cities increasingly employ it to increase their overall competitiveness in intense globalisation and urbanisation [16]. Local governments use distinct, coherent, and attractive marketing strategies to position their cities better [25, 26]. Furthermore, local governments adopt certain preferential policies to attract specific investments, recruit talent or attract specific companies. Policies, such as high-quality urban design, provision of infrastructure, and emblematic projects are often adopted instruments in city marketing [24, 27]. The marketing of cities must be seen as a strategic planning process and understood as a "survival" reaction of cities to a new environment. Cities face new challenges, including increased mobility of capital, ease of relocation of economic activity, radical development of the knowledge-based society and increased global connectivity [28]. However, city marketing must centre on people and strive to create a place worth living, visiting, and/or investing [29].

In the past, city marketing campaigns generally used traditional promotion methods (e.g. TV, magazines, and newspapers). For example, there are many advertisements for cities, such as videos with images of cities that are often broadcast on these traditional channels. However, although these channels increase the popularity of cities, they have a high cost and limited feedback from the public [21].

While city councils, or other local destination marketing organisations (DMOs), can employ new digital channels (e.g. official websites and email) to develop a city marketing mix that improves the openness and transparency of city marketing, this remains a challenge. A local government-led approach to marketing lacks interaction and participation from other parties (e.g. local businesses, communities, and the general public) [17].

Unlike traditional media, social media fulfils a "public–private partnership" approach to city marketing, allowing for a more interactive and participatory platform. These platforms are a two-way communication vehicle that allows for promoting the "products" and "services" of cities, as opposed to a unidirectional promotion method [30].

In social networks, users are exposed to various information about a given city without limitations of space and time, allowing cities to communicate with various parties, with a low budget, through various platforms. In this way, compared with traditional means, social networks can help increase the city's attractiveness thanks to its participatory, interactive, open, and transparent nature [17].

43.2.2 Destination Brand

A brand is commonly seen as "a name, a symbol, a sign, a design, a term or a combination of these various elements, intended to identify products and services and differentiate them from the competition" [31], and branding aims to create positive feelings that can lead to a purchase.

Brand associations can be seen as functional, related to the tangible, symbolic, and experiential qualities that shape consumers' attitudes towards brands [32]. When we talk about brands, we usually attribute them mainly to consumer goods, but these are also applicable to destinies or places [33]. Branding techniques adopted by cities have become important tools for destination marketers to identify and differentiate the destination through a positive image that emotionally links tourists to the destination [34, 35]. Destination branding can be seen as a set of marketing activities and efforts based on four pillars [36]:

- (a) that supports the creation of a name, symbol, logo, wordmark, or other graphic element that allows identifying and differentiating a destination from others;
- (b) that consistently conveys the expectation of a memorable trip exclusively associated with the destination;
- (c) that serves to consolidate and reinforce the emotional connection between the tourist and the destination;
- (d) that reduces consumer research costs and perceived risk.

Together, these efforts help to create a destination image that positively influences the tourist's choice of destination [36].

In its genesis, destination brands focus on the tourist dimension of a specific place [37], which is a concept directly related to marketing and branding a place in terms of tourism and leisure [38]. The destination brand is associated with a tourist perspective. In contrast, the place brand concept is characterised by being broader, which includes all the interactions of a certain place with its surrounding environment, namely public policies, foreign investments, and trade [39]. Tasci and Kozak [40] mentioned that a destination brand is associated with the marketing activities of DMOs that aim to influence the destination's choice, recommendation,

and loyalty. Hence, the destination brand serves as a central strategy for numerous DMOs, who have designed logos and slogans for their destinations to effectively promote and differentiate themselves from other destinations [37], as a strong brand also contributes to build a substantial heritage [34]. The aggregate of perceptions that someone has about a place (based on experience) influences emotional attitudes towards the destination, highlighting the dynamic relationship between the destination and potential tourists [41].

Previously, city brand advertising was done through unidirectional communication [42]. However, with the advent of the Internet, especially with the massive use of social networks, communication has become bidirectional, where tourists share their experiences, publishing their content through videos, images, or texts [43]. Due to technological advances and the empowerment of tourists, in the future, the most successful destinations will be those that shift away from traditional approaches and embrace branding strategies focused on co-creation, where tourists became active cocreators of the destination brand [44]. In fact, it is increasingly common for tourists to adopt digital technologies that allow them to research, interact, plan, and share their travel experiences. There is a multitude of online channels that help in this context, such as blogs, virtual communities, and social networks. These channels, together with the evolution of tourists, have demanded new strategies in the destination brand [44].

The contents shared by tourists create great opportunities for obtaining data that allow us to perceive the experience of other tourists in each destination [45]. In this sense, the traditional marketing mix no longer dictates the promotion rules. However, the tourist consumer who controls the content influences the context and decides what is communicated about a given destination [46]. DMOs could achieve better results by using coherent strategies for engaging with (potential) tourists through the multiple online channels available [44].

43.2.3 Instagram and User-Generated Content

Social media networks allow communication and interaction between people, where they create, share, and exchange information, experiences, and ideas in applications such as social networks. Among the social networks that have been gaining prominence at a personal and corporate level, it is possible to highlight Facebook, Twitter, and Instagram [42]. These networks change the way marketing and promotional activities are carried out, having an impact on the tourism industry [47], and these platforms have supplied new ways to promote tourist destinations [48], making these platforms seen as an important tool to obtain detailed and quick information about a given destination [49].

Given the highly competitive nature of the tourism industry, it is necessary to adopt city brand management strategies that allow the creation of competitive identities. This enables cities to communicate their identity to target audiences and ensure that the image of the destination is not affected by the content shared on these platforms [50]. The experiences shared on these digital platforms have become the main destination image communication channels, where the photographs generated by users and published on these channels constitute an essential factor for developing the perception of the destination image and for the decision-making of potential tourists [51].

The capture and share abilities associated with smartphones have changed travel behaviour at the destination, making photographic practices increasingly integral to the travel process. Photographs play an important role in tourist motivation and decision-making and in promoting tourist attractions through different digital platforms [52].

Academics have noticed that social media and user-generated content play a prominent role in tourist decision-making [53], which is especially important in creating tourist expectations of destinations [54]. Instagram is a mobile application that emerged in the world of social networks in 2010 and allows users to post photos and videos online, instantly sharing memorable moments with their audience [55]. Instagram is one of the applications with the highest downloads [56]. Currently, it has almost 5 billion users, and is already the third most used social platform in the world, following Facebook and YouTube [57]. The platform has become the most popular social network among the public due to the visual content published on it, reflected in the high level of interaction that the content shared on this network has, highlighting it as the preferred platform for acquiring information [58].

43.3 Methodology

This exploratory study is based on UNESCO's Creative Cities Network (UCCN) and aims to verify whether the images published on Instagram related to this network have greater engagement than the other images published on the platforms by the city councils. The authors intend to evaluate if the content that is associated with the creative fields to which the cities belong in UCCN generates more engagement than the common content that is published every day, UNESCO Creative Cities Network is made up of 246 different cities and was created in October 2004, aiming to promote and cooperate with and among cities that use creativity as a strategic factor for sustainable urban development [59]. This "encompasses seven categories, including City of Crafts and Folk Arts, City of Media Arts, City of Cinema, City of Design, City of Literature, City of Music and City of Gastronomy".

As stated by UNESCO [59], by joining this network of cities, undertake to share their best practices and to develop partnerships involving the public and private sectors, as well as society, in order to:

- 1. strengthen the creation, production, distribution, and enjoyment of cultural goods and services at the local level;
- promote creativity and creative expressions, especially among vulnerable groups, including women and youth;

City	Instagram handle	UCCN member since	Creative field
Idanha-a-Nova	@municipioidanhanova	2015	City of Music
Óbidos	@municipiodeobidos	2015	City of Literature
Amarante	@municipio_de_ amarante	2017	City of Music
Barcelos	@municipiodebarcelos	2017	City of Crafts and Folk Arts
Braga	@municipio_de_braga	2017	City of Media Arts
Caldas da Rainha	@municipio_ caldasdarainha	2019	City of Crafts and Folk Arts
Leiria	@municipioleiria	2019	City of Music
Covilhã	@covilha_municipio	2021	City of Design
Santa Maria da Feira	@municipio.smfeira	2021	City of Gastronomy

 Table 43.1
 Cities under study

- 3. improve access to and participation in cultural life, as well as enjoyment of cultural goods; and
- 4. integrate cultural and creative industries into local development plans.

This investigation considered only the Portuguese cities belonging to this network and analysed, individually, the images published by the municipalities of Idanha-a-Nova, Óbidos, Amarante, Barcelos, Braga, Caldas da Rainha, Leiria, Covilhã and Santa Maria da Feira, between 1st January 2023 and 31st July 2023. Table 43.1 demonstrates the cities under study when they became UCCN members, and the creative field they belong to.

To analyse what users are engaging more with, the authors calculated the engagement rate of all the posts (related and non-related to the creative field).¹

As the cities belong to different creative areas, Table 43.2 shows the criteria applied to consider an image as associative with the UCCN.

43.4 Results and Discussion

43.4.1 Idanha-a-Nova

As observed in Table 43.3, the municipality of Idanha-a-Nova made 332 publications between the dates mentioned above, of which 25.30% are related to the creative area of music. Publications related to the network engage 18.29% more than the others.

This Instagram account essentially promotes daily community activities, showing educational school visits and agreements signed between entities. Regarding music,

¹ Number of comments plus the number of likes divided by the total number of posts.

Creative field	Inclusion criteria
Music	Elements related to, for example Musical instruments, concerts, festivals, pilgrimages, live music, musicals, etc.
Literature	Elements related to, for example Books, live poetry, book fairs, stories, libraries, theatre shows, etc.
Crafts and Folk Arts	Elements related to, for example Basketry, ceramics, crafts, folklore, painting, clay, wood, craft fairs, etc.
Media Arts	Elements related to, for example Technology adoption, digital art, sound art, virtual and augmented reality, web art, videogames, robotics, digital photography, etc.
Design	Elements related to, for example Urban art, graffiti, exhibitions, textiles, street installations, etc.
Gastronomy	Elements related to, for example Food, traditional confectionery, gastronomic events, local and regional products, etc.

Table 43.2 Creative fields' inclusion criteria

Table 43.3Idanha-a-NovaInstagram engagement rateresults		
	Account followers	4.185
	No. of posts analysed	332
	Posts related to the UCCN field	84
	Comments	48
	Likes	5.337
	Engagement rate	64.12%
	Other posts	248
	Comments	95
	Likes	11.271
	Engagement rate	45.83%

the municipality shares publications related to the BOOM Festival (one of the biggest music events in Europe), concerts, and the Adufeiras (women who play the adufe—square tambourine).

43.4.2 Óbidos

As shown in Table 43.4, three hundred thirty-five publications were made on the Instagram account of the municipality of Óbidos, 17.61% of which corresponded to the creative area of literature. The publications related to the network engage only 6.55% more than the others.

This Instagram account promotes various events in the municipality, such as the summer festival, the medieval market, and sports championships. In addition, the

municipality has an item entitled "the friends of Óbidos", which refers to the pets of the inhabitants that roam the streets of the municipality, content that generates much interaction.

Regarding literature, the municipality refers to the municipal library, book launches, and the city's literature event called "FOLIO".

43.4.3 Amarante

Table 43.5 indicates that the municipality of Amarante produced 457 publications, of which 12.25% are related to the creative area of music. Publications related to the network engage 164.42% more than the others, showing that the municipality must pay more attention to its creative area. This account focuses a lot on cultural events that take place in the city. However, it focuses little on those associated with music. Often, the municipality makes more than one publication per day on this platform. Regarding music, concerts and shows by renowned Portuguese artists are promoted and the city festival "Há Fest"!

43.4.4 Barcelos

The municipality of Barcelos, as demonstrated in Table 43.6, carried out 112 publications between the dates selected for the study, of which 31.25% are related to the creative area of Crafts and Folk Arts. Publications related to the network engage 76.14% more than the others. The account focuses much on the city's historic centre, typical costumes, and events associated with handicraft fairs and pilgrimages. It promotes pottery and basketry events. In addition, it presents the Galo de Barcelos several times (an icon of the city and of the Craft and Folk Arts). The content published is quite dynamic.

Table 43.5 Amarante Instagram engagement rate results	Account followers	10.200
	No. of posts analysed	457
	Posts related to the UCCN field	56
	Comments	108
	Likes	18.176
	Engagement rate	326.5%
	Other posts	401
	Comments	316
	Likes	64.678
	Engagement rate	162.08%
Table 43.6 Barcelos Instagram angegement rate	Account followers	13.200
Instagram engagement rate results	Account followers	13.200
	No. of posts analysed	112
	Posts related to the UCCN field	35
	Comments	182
	Likes	22.022
	Engagement rate	634.4%
	Other posts	77
	Comments	455
	Likes	42.531
	Engagement rate	558.26%

43.4.5 Braga

According to Table 43.7, Braga made 87 posts during the period under analysis, which shows that the city does not frequently communicate with tourists through this platform. Of the publications made, 12.64% are associated with the creative area of media arts, which engages 676.24% more than the rest. Of the few publications made, most are focused on the city's tourist attractions and have little to do with media arts (adoption of technology).

43.4.6 Caldas da Rainha

The municipality of Caldas da Rainha, as gven in Table 43.8, dedicates 12.80% of its publications to the UCCN; however, the engagement rate of the posts associated with the creative area of Craft and Folk Arts on the Instagram of Caldas da Rainha is lower than the common posts, engaging less than 20.02%.

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Table 43.7 Braga Instagram engagement rate results Instagram	Account followers	44.300
	No. of posts analysed	87
	Posts related to the UCCN field	11
	Comments	205
	Likes	17.521
	Engagement rate	1611.5%
	Other posts	76
	Comments	887
	Likes	70.193
	Engagement rate	935.26%

 Table 43.8
 Caldas da Rainha

 Instagram engagement rate
 results

Account followers	10.400
No. of posts analysed	164
Posts related to the UCCN field	21
Comments	14
Likes	2.164
Engagement rate	103.71%
Other posts	143
Comments	215
Likes	17.479
Engagement rate	123.73%

The municipality makes more common day-to-day publications and leaves informative notes on important events. There is little focus on crafts, and most of the posts associated with the creative area were related to a held ceramics fair (repeated several times).

43.4.7 Leiria

As can be observed in Table 43.9, Leiria pays little attention to its creative area and has 202 publications, of which 6.93% are dedicated to the network. Even so, publications related to the creative area of music engage 332.78% more than the others, indicating that the municipality should pay attention to these data to adopt a strategy that meets the needs of its public.

The posts are generally informative and speak, above all, of requalification's that have been or will be carried out in the municipality and the participatory budget. About the creative area, the publications associated with music are, above all, related to the concerts at "Feira de Leiria".

Table 43.9 Leiria Instagram engagement rate results	Account followers	16.400
	No. of posts analysed	202
	Posts related to the UCCN field	14
	Comments	72
	Likes	6.968
	Engagement rate	502.86%
	Other posts	188
	Comments	379
	Likes	31.596
	Engagement rate	170.08%

43.4.8 Covilhã

The municipality of Covilhã, as given in Table 43.10, produced 382 publications, of which 8.12% are dedicated to the UCCN. However, publications dedicated to the creative design area engage 45.37% less than the other posts. Even so, the authors denote that the municipality holds huge giveaways for various events, which makes the interaction rate rise more easily, being a "forced" and not-so-natural interaction.

The municipality's Instagram account shows several times images of the aesthetics of the city and its sights, focusing a lot on images related to the historic centre and the landmarks for tourists. In addition, it issues various publications of events that have been or will be held. However, very little focus is placed on urban art, on the colours associated with this art, which are related to the creative area of design, and prove the municipality's differentiation.

Table 43.10CovilhãInstagram engagement rateresults		
	Account followers	18.300
	No. of posts analysed	382
	Posts related to the UCCN field	31
	Comments	70
	Likes	8.998
	Engagement rate	292.52%
	Other posts	351
	Comments	1.311
	Likes	117.287
	Engagement rate	337.89%

43.4.9 Santa Maria da Feira

Table 43.11 shows that Santa Maria da Feira carried out 440 publications during the analysis period. Of these publications, 12.27% are dedicated to the creative area of gastronomy and generate 87.76% more engagement than the others. The municipality's account promotes the various events they hold, such as the "Viagem Medieval", "Perlim", "Semana Santa", and "Imaginarius". In addition, it promotes activities related to the requalification of spaces, school sports, and information on meetings of the municipality's advisory board. As far as the network is concerned, the publications are associated with local gastronomy and events related to this gastronomy (e.g. fogaças and "festa das fogaceiras").

43.5 Conclusions and Implications

In total, 2.511 publications were analysed, comprising a total of 5.223 comments and 533.356 likes. In terms of the individual analysis of each municipality, it is noticeable that in all cases, except for the municipalities of Caldas da Rainha and Covilhã, all engagement rates are higher in publications related to the creative area to which each city belongs in the UCCN.

As shown in the results, the findings suggest that municipalities are not focused on communicating on Instagram that they belong to the UNESCO creative cities network. Furthermore, most of their publications are associated with everyday activities and do not highlight the creative areas in which they fall. Of all the municipalities under analysis, Barcelos is the one that gives the most importance to this network in its Instagram account, with 31.25% of its images aligned with its corresponding creative domain (Craft and Folk Arts). On the other hand, Leiria shows the least importance in exposing that it is a creative city of music, dedicating only 6.93% of its publications to this topic. On average, cities dedicate only 15.46% of their publications to the network.

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Table 43.11 Santa Maria da Feira Instagram engagement rate results	Account followers	13.300
	No. of posts analysed	440
	Posts related to the UCCN field	54
	Comments	174
	Likes	13.009
	Engagement rate	244.13%
	Other posts	386
	Comments	486
	Likes	59.874
	Engagement rate	156.37%

Regarding posts unrelated to the network, the results show that users usually interact more with images that show landscapes and events to be held/held. On the other hand, publications with less interaction are those associated with participatory budgets, informative notes, or city improvement actions.

In general, it is possible to denote that the municipalities are aware of the importance of adopting technology to communicate with their public, and the municipalities of Caldas da Rainha, Braga, and Barcelos publish on the platform less often.

43.5.1 Theoretical Implications

It is possible to observe a lack of studies that relate tourism to the Instagram platform compared with other social media networks such as Facebook, Twitter, or Flickr [16, 56]. This study will be helpful and contribute to the literature on the topics addressed, adding value to the research related to tourism, social media, and technology.

43.5.2 Managerial Implications

As information about destinations is acquired on social networks, this study will be valuable to municipalities and destination marketing organisations, in general, since it could improve their communication strategies, achieve better results, and interact more with their followers. Also, it will ensure that all marketing and communication efforts will be attainable. Since cities belong to the UCCN, they must reflect their presence. They should communicate their participation and the field they fit in, which will be important to their city marketing strategies and destination brand. The cities that make up the UCCN are committed to sharing experiences, knowledge, and good creative practices, as well as developing partnerships involving the public and private sectors, associations, the civil communicate their presence in this network in order to optimise these partnerships, generating more results. In addition, the city's image must rely on the history and tradition of the city.

43.5.3 Limitations and Future Research

Although the article shows new and valuable theoretical and management perspectives, this investigation must consider some limitations. As mentioned earlier, this study is based on the UNESCO Creative Cities Network. However, it only focuses on the Portuguese cities taking part in this network. As this network currently includes 246 cities, the results cannot be generalised and must be analysed individually for each participating city. In addition, the study contemplates a specific time frame (1st January 2023–31st July 2023), which means that images published before this date were not considered, and that could change the results obtained.

Regarding future research, it is important to expand the study to other cities that belong to the UCCN, verifying the importance given in the city's projection as an integral member of this network. On the other hand, it would be important to check if engagement rates are similar in equal creative areas.

In addition, verifying whether the cities within the creative field are similar in the adopted communication style and whether the images they disseminate on social networks align with a common inspiration is relevant.

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Chapter 44 Educating for Legacy: History on Vinho Verde's Brands Websites as Marketing Destination Image?



Gonçalo Maia Marques

Abstract This paper is motivated by the emergence of *Oenomemories* in Wine Tourism Marketing Destinations, even if research shows that there is a long way to study the importance of Historical and Cultural references on destination image of modern wine tourism. Therefore, the aim of this research is to study, following a qualitative paradigm and through content analysis [3], a group of 100 wine brands (almost a third part of the total wine bottlers identified in the region in 2022 stats) official websites throughout Vinho Verde Region, to search historical and cultural references on the official discourse, that we have crossed with other visual data. Could they be a way of cultural marketing of these wine brands in the web? Could they contribute to the destination image of Vinho Verde region? To achieve those goals, we have identified patterns and categories that promote-and contribute to know-Vinho Verde region and Minho as a whole. The investigation process considered website support technologies approach as part of historical narrative building. In the end, this data was categorized in five different historical consciousness stages (nonexistent, very elementary, elementary, median and consolidated). Finally, some conclusions are added to fully understand the potential of this Heritage as an Economic, Social and Cultural value for the qualification of wine tourism in Minho's Region.

44.1 Introduction

The importance of historical legacy in the wine tourism industry is being perceived as a key factor in the qualification of the experience, but also in the wine region destination image. Every consumer and traveller practicing wine tourism seek the history behind the label, the bottle, the vineyard and the cellar. This is why we have considered the importance of studying *Oenomemories* that we have defined as "a Cultural and Identity Heritage that values all the elements that make up, both in the buildings

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and in the (im)material, an embryonic connection to the vineyard, the wine and all the equipment and artefacts used in its production, consumption, "folklorization" and promotion" [25], gathering together Social Sciences such as Anthropology, Sociology and Museology with a Historic footprint. Moments such as Grape pressing and harvest, ethnographic processions, historical recreations, art, architecture and historical documentation are main sources to investigate *Oenomemories*.

Vinho Verde region, one of the greatest (in area) in Europe, with 2000 years of historical experience is a good case study to consider in this perspective. Vinho Verde Region is located on the Iberian Peninsula, more accurately on their Northwest part, between Minho and Douro rivers (apart from other parishes on the south of this last one) and was demarcated on 18th September 1908, despite their long and historical past that counts more a less 2000 years of viticulture tradition, counting on the roman presence on the territory. Amorim Girão, important geographer from Coimbra University, called it "a vast amphitheatre which, from the seafront, gradually rises inland" [17].

Romans brought the first strains that were planted all along current Viana do Castelo, Braga and Oporto districts. Religious orders (mainly Benedictines, Augustines and Knights Hospitaller), installed on the best agricultural land nearby rivers valley, supported by the Crown and with a natural boost on the Roman Catholic faith and rituals, were responsible for the spread of varieties as Loureiro, Alvarinho, Avesso, Trajadura, Vinhão and others, used to quench the thirst of religious and lay people and to praise God. Aristocratic houses also contributed to plant for wine making on their estates (*solares, paços* and palaces) creating cultural and economic value for the region. This beautiful and magnificent cultural heritage is nowadays one of the most successful and strategic touristic products in Porto and Northern Portugal [29]. In this document, *cultural and landscape touring*, as well as *gastronomy and wine* are defined as anchor products.

According to official statistics (updated 11th August 2023), there are, in the Vinho Verde region (Fig. 44.1). 17,268.9547 ha of vineyard that represent 8.9% of all vineyards in Portugal and 0.24% worldwide [9]. This represents 13.110 winegrowers and 379 wine bottlers distributed in 67.291 parcels, 48 municipalities and 9 subregions (Monção and Melgaço, Lima, Basto, Cávado, Ave, Sousa, Paiva, Amarante and Baião).

Economically speaking top 5 international markets are, in order of importance:

- 1. United States of America (6332.546 L; 18.63 M €)
- 2. Germany (4187.289 L; 8.65 M €)
- 3. Poland (2952.209 L; 5.99 M €)
- 4. Brazil (2486.546 L; 5.65 M €)
- 5. France (2268.711 L; 5.60 M).



Fig. 44.1 Map of Vinho Verde region (with subregions: Monção and Melgaço, Lima, Cávado, Ave, Sousa, Paiva, Baião, Amarante and Basto) and position in Iberian Peninsula. *Source* CVRVV

44.2 Literature Review

There is no doubt that websites are, nowadays, an impressive way of obtaining fast and strict information, but also to form opinion, to (re)construct a cultural map about a product or region. According to Piñeiro-Naval and Serra, websites "must be designed to communicate the destinations' heritages persuasively to a worldwide audience" [28]. They could be crossed with other material sources, such as tourism brochures with their versatile and ubiquitous approach very important to a wider audience, but also to study stereotypical representations of places and the people who live in them [40].

Wine is essential for this type of tourism: but not only wine himself. It is necessary to know it, to promote it taking others to buy it. This point of view confirms the hybridism of the sector, sharing research efforts between the wine industry, tourism industry and academics. Wine tourism is a form of special interest tourism and has been recognized as a significant component of both the vine, wine and tourism industries embraced in a unique experience [33].

There is a significant effort in the scientific community to look to this research field as an opportunity, and the bibliometric analysis shows an astonishing evolution in the scientific production in wine tourism [11], essentially related and closely associated with the emergence of the "new wine world" phenomenon in Nappa Valley, Australia, New Zealand, Chile and Argentine, among other countries [2]. Wine Tourism began in the so-called Wine's New World—with countries such as Argentina [34, 42], Australia [12], Canada [44], Chile [22, 37], New Zealand [4, 18], South Africa [6] and USA [38, 39].

Probably because of this geographical configuration, approximately two thirds of wine tourism literature come from Australia and New Zealand, while a large amount of research comes from Canada and USA [26]. The beginning of wine tourism research developed rapidly in the 1990s—note the first wine tourism conference was held in Australia in 1998—was marked by an emphasis on comparative studies on other wine regions aimed at justifying and exploring the dimensions of this new subfield of tourism [15].

Wine tourism is travel based on the desire to visit wine producing regions, or in which travellers are induced to visit wine-producing regions, and wineries while travelling for other reasons [16]. Hall and Macionis define wine tourism from consumers' perspective as "visitation to vineyards, wineries, wine festivals and wine shows for which grape wine tasting and/or experiencing the attributes of a grape wine region are the prime motivating factors for visitors" [19, p. 3].

In parallel, we can define destination image as the construction or mental representation of something substantive and the sort of people's beliefs, ideas and impressions about a place or destination. This implicates a brand of cognitive and affective dimensions that are implicated in the process of a destination's choice—a set of knowledge or beliefs about the physical attributes of the tourist destination (cognitive component) combined with the assessments and feelings that develops on tourists (affective component). However, there is consensus in literature of the antecedent role of the cognitive component on affective and that the valued responses of the consumer are a function of their knowledge of objects.

In this context, the image that a destination transmits to the market—with resources such as flyers, websites, *apps* and other graphic material—becomes one of the elements which influence tourists the most when choosing a tourist destination [28]. In fact, nowadays, images held by consumers play a significant role in travel

purchase decisions. Images can be so powerful that can affect the viability of the destination. Based on these multiple definitions of brand image, literature identifies three theoretical perspectives about the matter [36, p. 301]:

- The image **as fiction**: the image corresponds to an idea created in the consumer's mind, which differs from the actual image
- The image **as an icon**: the image as an iconic representation of an object, or rather, the mental representation of a brand as an icon
- The image **as an attitude**: the association of image and attitude concepts, or rather, the image is based on a cognitive dimension (how consumers perceive a brand), an affective dimension (emotions generated by the brand) and a behavioural dimension (which largely influences subsequent buying behaviour and is an important predictive indicator).

As Agustin Santana said, "this is the context of the destination image that, stale or imbued with virtuosities and technologies, is created and presented to the buyers and consumers in a paradoxical game of continuity and renewal, of familiarity and contrast, of tradition (reference to a free reconstructed past) and modernity, and a seamless presentation, as a whole only divisible if the recipient wishes it or can do it on his own" [32, p. 38]. Destination image is considered to be, by far, one of the main prevalent topics in tourism literature [35], as many studies defend crossing social and economic perspectives, from the social-anthropological field, considering the mediation between tourists motivations and desires and the destiny's characteristics [20] in a changing society, very interested in consumable goods—after all described as the "kleenex consuming society" [32]—on which key factors as competitiveness and innovation are very important (Fig. 44.2).

These aspects clearly influence destination image, showing that are generated based on specific sociocultural contexts. According to Santana Talavera [32], research has been developed on items such as the impact of the visit, the familiarity of the image, the relationship between the geographical location of the tourist and the image, measure of the destination's image, its components and factors that influence it, difference between the image of the tourist (demand) and the image that projects the destination, variations in the image according to the purpose of the trip, relationship between variables sociodemographic and image of the destination, etc. [32, p. 39]. According to these approaches' destination image influences, among other variables, several factors as:

- (a) the choice of destination,
- (b) generation of expectations prior to the trip and, therefore,
- (c) perception and assessment once that are in it,
- (d) the behaviour patterns of the tourist,
- (e) the degree of satisfaction and fidelity to the destination, or
- (f) the promotion of a certain form of tourism development.



Fig. 44.2 Destination image conceptualization in the last 70 years. *Source* Own elaboration based on literature

Source Hernández and Santana [20, p. 139].

Tocquer and Zins (cited in Sergio and Lopes [36, p. 310]) studied the perceptual influences on tourists about a destination, and proposed the grouping of images into four stages of development:

- 1. Vague and unrealistic image—stems from advertising, education and word of mouth dissemination. It is formed before the tourist travels. In this sense, people see a travel vacation as something healthy.
- 2. Distortion of the image—at this stage, the person decides to go on vacation, choosing the time spent on vacation, destination and type of tourism product. It is during this period that the image of vacation is changed, clarified and expanded. The image developed becomes clearer once the vacation plan has been finalized.
- 3. Improved image—in this third (3rd) stage, we have the vacation experience itself. When there is direct experience of the tourism product, the image is improved by cancelling out incorrect or distorted elements and strengthening elements that prove to be correct.
- 4. Resulting image—this fourth (4th) stage refers to the recent memory of the vacation experience and can lead to nostalgia, regret or fantasy. Thereafter, a set of new images will be triggered that will affect future decisions about that same tourism product.

Tourism Destination Image (TDI) perception plays a vital role in the tourism destination visit decision, whether this is primarily driven by motivation to have a holiday, visit friends and/or relatives or participate in recreational activity [8, p. 367]. Recent approaches consider wine tourism destination's image—both in a social and economic perspective—as an emergent topic in tourism literature [1, 7, 14] contributing to a wider perception about wine and vine dynamics—surpassing the traditional geographical perspective [31, 41]—in the co-creation of a significant and unforgettable role of experiences, trails and resources that enrich a touristic site [10, 13]. Considering this approach, wine tourism has emerged as an interesting and very trendy tourism field from an academic research perspective [7].

Some of the recent investigation produced focus attention on visitation to wineries and cellars to experience winemaking, grape growing and wine consumption [10, 21]. Wine products are now enjoyed by a much wider socio-economic range of increasingly sophisticated consumers [5] who are "thirsty" to seek for information about where their wines come from [33]. In this way of thinking, modern tourism a widespread phenomenon thanks to the middle classes—is based in the quest/ demanding for authenticity thinking on the ways "other" people live, and where reality and authenticity are situated. Following this line of thought, reality and authenticity have a close link to historical past, culture and identity that invite tourist to search for purer and simpler lifestyles, to some extent "exotic" and, therefore, interesting for tourism consumption [23].

Sharing this point of view, Wang writes about the relevance of authenticity in cultural tourism in topics "such as ethnic, history or culture tourism, which involve the representation of the Other or of the past" [43, p. 350]. However, diverse cultures look to this phenomenon differently. If there is a case where authenticity can matter in a global analysis, it is clearly on gastronomy and wine tourism. Some studies confirm and underline this research topic most substantively [5, 21, 30].

In the case of a wine region, the seek for authenticity—or uniqueness—is perceived as the major fact that motivates the experience [5, 21, 27] and allows

producers and wine industry to qualify their brands with historical references, full of identity and particular meanings.

Historically, Vinho Verde Region tried a link with a popular—and also folklorical—way of living in the fields. This image prevailed from the end of the XIXth century to the XXth century: Vinho Verde (red) in the *malga* (white clay bowl) consumed in *tasca* (tavern). Due to the prevalent roman shrub vineyard heritage (*enforcado*—hanged vine), the liquid was acid and difficult to drink. When the monastic orders [24] and other noble and civil landlords invested in a lower vineyard with mainstays (called *ramadas*), the quality became better and, to distinguish from the "enforcados," they called them mature wine (*maduros*). Apart from other wine regions, Vinho Verde Region is not based on a territorial identity based on the classic terroir (such as Douro, Champagne, Rioja), but from a historical landscape and winemaking perspective.

44.3 Materials and Methods

Applying TDI as a theoretical construct to our research, our main goal was to study deeply the official discourse (both textual and visual) produced on official websites of 100 wine brands in Vinho Verde region (almost 1/3 of the total bottlers) about the History and Memory of their houses, the wine making, the founders and most important/relevant historical marks.

Believing in the importance of social sciences studies in Wine Cultural and Heritage Tourism, a qualitative paradigm emerged to bring new answers to an interdisciplinary research crossing subjects as a Cultural Heritage Literacy with History, Identity, Communication and Tourism Marketing, that allowed the following question/research problem: *How is Historical Heritage being communicated in the official websites of some wine brands in Vinho Verde Region?* and two other subsidiary questions: Could they be a way of cultural marketing of these wine brands in the web? and Could they contribute to the TDI of Vinho Verde region?

In the beginning of the process, a demanding, extensive and meticulous reading of the websites was necessary to gather data and information to answer to the problem/ research question. To fulfil the objective all the text of official websites was extracted to a Microsoft word document and also analysed with the help of NVivo software.

From there, we have followed content analysis principles as they were instructed by Bardin in three distinct moments of technical proceedings [3]:

- 1. **Pre-analysis** (floating reading, choice of documents, formulation of hypothesis and goals, preparation of materials)
- 2. Use of coding material (choice of meaning units and context, choice of counting rules and categorization—with or without prior categories)
- 3. **Treatment of results: inferences and interpretations** (qualitative analysis based on inferences and interpretation).

In this route, we have used the search application allowed to track back the most relevant words, speech marks and chronological/historical concepts used. The difference between some pages was obvious and notorious in terms of content and quality of the information, inviting to a closer and more detailed look considering words chosen, information selected and available and the historical research about the enterprises, crossing these references with visual information on the wine label bottles that communicate the brand and their identity.

44.3.1 Sample

We have selected a convenience sample, searching a group of wine enterprises operating in the region through their websites as they came through a Google search for the following terms "vinho verde quinta," "vinho verde solar," "vinho verde paço/ palácio." Secondly, when we find the names of the houses, we tried to study their historical typology in the region by decodifying their names: the results allowed to conclude that *Quinta*¹ is the most prominent one with 49 of the 100 units studied (almost 50% of the sample), while other typologies (23) and *Casa*² (20) are the second and third more relevant wine production units. In the end, *Solar*³ (4), *Paço*⁴ (3) and *Palácio*⁵ (1) were the fewer referred in the names of the units studied. In terms of geographical distribution in the region, a closer look to Table 44.1 allows a wider perspective.

Considering the geographical distribution of the sample, we have all the subregions of the demarcation represented, with a clear Amarante leadership (12 units which means that more than one in ten brands belong to this municipality), followed by Ponte de Lima and Monção (with 9 each) that confirms the historical importance of Tâmega and Minho Valleys in Vinho Verde's History. After these ones, we have Melgaço and Baião with 7 units, curiously border municipalities (with Spain and Douro) of the demarcated region.

¹ Sowing land with vegetable garden and trees, walled or surrounded by hedges, and usually with a house (Priberam Dictionary of Portuguese Language).

² Generic name of all buildings intended for housing. Commercial or industrial establishment (Priberam Dictionary of Portuguese Language).

³ Origin, birthplace and own home of a family. Manor building characteristic of the Minho Region (Priberam Dictionary of Portuguese Language, adapted).

⁴ Residence of king, prelate or noble family. It can also define a little palace (Priberam Dictionary of Portuguese Language, adapted).

⁵ Palace, in English.

Municipality	Number of units
Amarante	12
Amares	2
Arcos de Valdevez	4
Baião	7
Barcelos	4
Braga	1
Cabeceiras de Basto	2
Celorico de Basto	4
Esposende	1
Felgueiras	3
Guimarães	5
Lousada	4
Marco de Canavezes	3
Melgaço	7
Monção	9
Mondim de Basto	2
Penafiel	4
Ponte da Barca	4
Ponte de Lima	9
Póvoa de Lanhoso	2
Santo Tirso	2
Vale de Cambra	1
Valença	2
Vila Nova de Famalicão	1
Viana do Castelo	3
Vizela	2
Total	100

Table 44.1 Wine unitsstudied in the sample (bymunicipality)

44.3.2 Historical Concepts on Websites Discourse

Another key factor of our research was the consideration of some historical concepts in the discourse. The first element of research was the number/quality of references to centuries (we have identified references from the XII to XX centuries) to understand where many of the houses/wine brands were situated. As the diagram shows the most frequently referred were the XVII and XVIII, with 13 and 15 references, respectively. These results were no surprise to us: our perception, in the beginning, and considering our knowledge and research experience in the region, were precisely that most of the houses, independently from being *quintas, solares* or *palaces*, were dated from XVII–XVIII centuries. This means that most of the artistic and architecture elements



Fig. 44.3 Chronological diagram of the wine brands. Source Own elaboration

are part of the Baroque style, the "king" of Minho's region, with great number of constructions all along the territory (Monasteries, Sanctuaries some of them classified as World Heritage by UNESCO)—XVII and XVIII centuries represent 28 references, globally (Fig. 44.3).

However, there are 9 references to centuries that belong to the Middle Ages (XII–XIV) that confirm the importance of Romanesque—above all on Sousa and Tamega valleys with towers, castles and ancient *quintas* and 6 references on Renaissance (XV–XVI centuries) that allow to contextualize the emerge of noble *paços* and, after that the most famous baroque *solares* of Lima and Minho rivers. XIX and XX centuries all together represent 14 references related to more recent edifications (Fig. 44.4).

We will now focus our attention on the most common words on the websites discourse, as we can see in the word cloud above us. On the leadership, by far, is the word *quintas* (242 references), consolidating the fact that most of the wine brands present in Vinho Verde region are part of this household typology, very typical and very traditional in Minho's region. In second place, the word "house" (148 references), that demonstrates the importance, not only of the physical and cultural place, but also the "memories place" where the life of a family goes around. This is particularly related to the concept of familiar legacy present in most of these brands—an unequivocal sign of the third word most common, family (75 references).

After that we can see Cellar (46 references), Minho (34 references), Vinho Verde (29 references), Generation (27 references) and Solar (25 references). There are also minor words such as ancient (20), historical (16), heritage (16), chapel (11) and

Fig. 44.4 Most common words on the websites discourse (word cloud). *Source* Own elaboration



noble (7) with less references than the others. However, this doesn't mean they are less important to communicate the destiny—on the contrary: it means that historical discourse is not being fully mobilized (from historical research in Ph.D. and master thesis, books, chapters and other specialized research) to the websites because it is not perceived as a priority to brands.

44.3.3 Let the Bottle Speak!

Crossing these results, related to the discourse, we have made a full search on official websites (and on CVRVV—Viticulture Commission of Vinho Verde Region website) in the wines label to check the historical and cultural marks present in the bottles, enriching the analysis with visual literacy. We have selected, in each house, the so-called entry-level wines, most popular and commonly promoted on the websites and on wine fairs (mainly varietal or "choice").

From that thorough research, we concluded that Historical and Cultural Build Up Heritage is prominent with 45 references among the 100 titles, almost a half of the total. On the other hand, we have a modern design with 23 references, almost a quarter of the sample, with simply no historical references. After that, we have labels that pay tribute to cultural landscape (17), coat of arms (11) and Tribute to the Patron/Family (4).

Differently from official website discourse—more vague and "cloudy"—visual marks are extremely related to historical identity, landscape, or familiar signs. It was a good way of crossing data, results and perspectives that, on our opinion, have enriched our research.

44.4 Results Discussion

Following the challenge raised by central problem and subsidiary questions, we have considered all the discourse produced in the official websites of the 100 wine brands we have studied in Vinho Verde Region. From that reading, 5 categories—or stages—of historical and heritage consciousness (**nonexistent**, **very elementary**, **elementary**, **median** and **consolidated**) have emerged from the discourse extensive reading and content analysis following Bardin's instructions [3].

Most of the text collected is **elementary** (37 cases in 100) which represents a poor/ sufficient investment on historical research about the wine houses/brands, despite some of them have considerable historical archives (among books, parchments and other documents), unfortunately not always open to historians and researchers in general. If we consider the two basis categories (**nonexistent** with 20 cases and **elementary** counting on 24 cases) they sum 44 cases in 100, that represent the least historical investment made by these institutions when compared to their homolog in the continent.
In the "other side of the moon"—could we say—we have 10 cases categorized as **median** and with a significant difference in terms of documents and historical evidence treated (or shown) on the websites (documents, photographs, and manuscripts). We have found a **consolidated** historical narrative only in 9 cases in 100, which means that only almost a 10% of the brands invested on historical research to promote their wines and products. It is a little parcel of the global but could be a hope to the other economic agents because some of the brands are significant in terms of their international projection and contribute to exports—cases of Aveleda, Brejoeira and others.

After this process, we have concluded that Historical Heritage is, considering TDI conceptualization, being perceived as an icon, but very hardly as an attitude. Therefore, there is a long way to communicate historical parchments and heritage evidence of the brands on their websites and communication channels, so that they can become a strong and consolidated way of cultural marketing. A new professional and intentional look is necessary. On the other hand, the contribution they bring to Vinho Verde region TDI is, by now, little more than superficial, because it is not supported in rigorous, academically grounded historical investigation.

We consider it essential to invest in historical heritage literacy and consciousness in Vinho Verde Region—among wine producers and historical houses owners—so that Wine Tourism can flourish into an intentional and wider TDI. Considering all the data gathered in this research, there are some continuities and ruptures to bring up to the table and to reflect about the current implications on the region's TDI (Table 44.2).

Globally, we can consider there is a long way to explore the origin, routes and historical evidence of the Vinho Verde Region brands as a strategy to achieve:

- 1. A wider and richer destination image of Vinho Verde Region, considering all the valid contributions of literature in other parts of the globe (both in New and Old World of Wine)
- 2. A stronger, innovative, and resilient wine tourism offer in the region, solid and structurally based on a real, historical, and research-based approach offer to the

Categories	Nonexistent	Very elementary	Elementary	Median	Consolidated
Description	Total absence of historical references in the text	Brief identification of historical moments	Some chronological and historical references are considered even if not analysed profoundly	Historical research is improved and is closer to a professional level	Solid research on historical routes and wine growing and making origin
Number of cases	20	24	37	10	9

 Table 44.2
 Historical consciousness levels of the discourse produced

Source Own elaboration

tourist—this can mean that some of the historical houses can offer an immersive documental-based experience that can attract more visitors and add value to the experience economy on Northwest Portugal.

We finish this research with a certainty: there is no better *storytelling* than the real one, the living history of men and women in the vines, making the wine and constructing a cultural landscape to the present and future. The icon must change to an attitude.

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Chapter 45 Ranking Luxury Hotels in Lisbon Using the 2T-AEC-TOPSIS Model



Ziwei Shu i and Ramón Alberto Carrasco

Abstract Hotel rankings help customers choose accommodations quickly and assist hotel managers in improving their performance by comparing them to competitors. However, most ranking models use equal weighting for various hotel aspect performances. From a business perspective, improving weight determination to reflect better the varying importance of multiple aspects in hotel rankings and enhancing ranking results interpretation is necessary. Therefore, this paper introduces the 2T-AEC-TOPSIS model for hotel ranking, incorporating five fundamental concepts: the 2-tuple linguistic model, Analytic Hierarchy Process (AHP) method, Entropy method, CRiteria Importance Through Intercriteria Correlation (CRITIC) method, and Technique for Order Preference by Similarity to the Ideal Solution (TOPSIS) method. The 2-tuple linguistic model aggregates linguistic ratings for each hotel aspect, avoiding information loss in linguistic fusion. The AHP, Entropy, and CRITIC methods generate weights for each hotel aspect that are combined to form integrated weights that blend the benefits of objective and subjective weighting approaches. These integrated weights are employed to execute the necessary steps in the TOPSIS method to rank hotels. The functionality of the proposed model has been evaluated with a dataset of over 26,000 customer reviews gathered from TripAdvisor for luxury hotels in Lisbon. The results show that the proposed model achieves a relatively balanced and realistic weight distribution in the weight assignment within the TOPSIS method, and produces a top 10 list of luxury hotels in Lisbon for different scenarios. It provides hotel managers and customers with more interpretable ranking results for making more informed and faster decisions.

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45.1 Introduction

In recent years, our daily lives have been flooded with rankings, especially those found online, which rely on customer reviews. A prime illustration is the hotel ranking system of TripAdvisor, which considers multiple aspects such as rooms, service, location, and so on. For many hotel managers, these rankings have become increasingly vital for managing their online reputation and implementing necessary improvements, while for customers, they serve as valuable tools for making informed decisions about choosing a suitable hotel for their stay. Many ranking models use equal weighting for different aspects of hotel performance, although Multi-Criteria Decision-Making (MCDM) methods are frequently employed for ranking purposes.

The Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) method is a commonly employed MCDM approach that calculates positive ideal distance solutions and negative ideal distance solutions [1]. It is a frequently used method for evaluating and selecting the most suitable alternatives based on multiple criteria. The TOPSIS method and its extensions have been applied in many areas, such as environmental management [2–5], supply chain management [6, 7], marketing management [8–10], and hospitality management [11–14].

In the TOPSIS method, one of the essential steps involves determining attribute weights. The weighting methods used to determine weights for the TOPSIS method include the Entropy method [1, 4, 5, 15, 16], the Analytic Hierarchy Process (AHP) method [8, 9, 17], the VIKOR method [18, 19], and the CRiteria Importance Through Intercriteria Correlation (CRITIC) method [6, 7, 20]. However, previous studies have not used the integrated AHP-Entropy-CRITIC method for weight determination in the TOPSIS method, nor have they applied the 2-tuple linguistic model to enhance the interpretability of ranking results.

Therefore, this paper combines weights generated by the AHP, Entropy, and CRITIC methods to form integrated weights that blend the benefits of objective and subjective weighting approaches. It also uses the 2-tuple linguistic model to aggregate ratings for each hotel aspect, preventing information loss and enhancing ranking result interpretability. This proposal is named the 2T-AEC-TOPSIS model, and its effectiveness is examined using a dataset of over 26,000 customer reviews gathered from TripAdvisor for luxury hotels in Lisbon.

The rest of this paper is structured as follows. Section 45.2 presents the fundamental concepts that form the foundation of the proposed model. Section 45.3 demonstrates the application of the proposed model for ranking hotels, utilizing data collected from luxury hotels in Lisbon. Section 45.4 summarizes the conclusions and outlines future work in this paper.

45.2 Theoretical Framework

This section presents the essential concepts of the 2-tuple linguistic model, the integrated AHP-Entropy-CRITIC method, and the TOPSIS method. These concepts form the basis of the proposed model.

45.2.1 The 2-Tuple Linguistic Model

The 2-tuple linguistic model was developed by Herrera and Martinez to solve the problem of information loss in the fusion processes performed on linguistic values [21]. It is mostly applied in decision analysis and decision-making [22], as it simplifies the management of intricate frameworks incorporating linguistic information. The 2-tuple linguistic model treats linguistic information as a continuous range rather than a discrete one, preserving information integrity during the integration of linguistic terms [23]. This model enhances the interpretability of results and establishes a decision-making process that closely aligns with human thinking [24, 25], which has been widely adopted by numerous scholars [26–35].

The 2-tuple linguistic model expresses linguistic information using a 2-tuple value (s_i, α) , where $s_i \in S$ represents a linguistic term, and $\alpha \in [-0.5, 0.5)$ is a numeric value that indicates the distance to the central value of s_i . The definition of the 2-tuple linguistic model is as follows.

Definition 1 Let $S = \{s_0, \ldots, s_g\}$ be a linguistic term set and $\beta \in [0, g]$ a value that represents the result of an operation of symbolic aggregation. The function $\Delta : [0, g] \rightarrow \langle S \rangle = S x [-0.5, 0.5)$ is used to convert β to 2-tuple value (s_i, α) as Eq. (45.1):

$$\Delta(\beta) = (s_i, \alpha), \text{ with } \begin{cases} i = \text{round}(\beta) \\ \alpha = \beta - i, \quad \alpha \in [-0.5, 0.5) \end{cases}$$
(45.1)

where round(·) is the rounding operation; s_i has the closest index label to β ; and α is the numerical value of the symbolic translation. Symbolic translation constitutes a crucial process within the 2-tuple linguistic model, addressing the issue of information loss. The function Δ is bijective, whose inverse function is Δ^{-1} : $\langle S \rangle = S x [-0.5, 0.5) \rightarrow [0, g]$. The 2-tuple value can be converted into its equivalent numerical value as $\Delta^{-1}(s_i, \alpha) = i + \alpha = \beta$.

The comparison of two 2-tuple linguistic values is defined as follows.

Definition 2 Let (s_P, α_1) and (s_Q, α_2) be two 2-tuple values, the comparison between them is processed as follows:

a. If P < Q, (s_P, α_1) is smaller than (s_Q, α_2) .

b. If P = Q, when:

- (1) $\alpha_1 = \alpha_2$, (s_P, α_1) and (s_Q, α_2) represent the same information.
- (2) $\alpha_1 < \alpha_2, (s_P, \alpha_1)$ is smaller than (s_Q, α_2) .
- (3) $\alpha_1 > \alpha_2$, (s_P, α_1) is larger than (s_Q, α_2) .
- c. If P > Q, (s_P, α_1) is larger than (s_Q, α_2) .

The negation operator for a 2-tuple value and the aggregation operators for 2-tuple linguistic computing are elucidated in [36]. This paper employs the arithmetic mean for aggregating 2-tuple values. The definition is provided below.

Definition 3 Let $Y_j^{H_f} = \{(s_1, \alpha_1), \dots, (s_n, \alpha_n)\}$ be a set of 2-tuple values that indicate evaluations provided by *n* customers for aspect *j* of hotel H_f . The arithmetic mean of these values can be calculated using Eq. (45.2):

$$\overline{Y_j^{H_f}} = \Delta\left(\frac{1}{n}\sum_{k=1}^n \Delta^{-1}(s_k, \alpha_k)\right) = \Delta\left(\frac{1}{n}\sum_{k=1}^n \beta_k\right)$$
(45.2)

45.2.2 The Integrated AHP-Entropy-CRITIC Method

The Entropy and CRITIC methods are two approaches used for determining the objective weights of criteria. The Entropy method calculates criterion weights based on the degree of diversification [15], while the CRITIC method determines criterion weights using standard deviation and the correlation coefficient between criteria [20]. Combining these two methods can realize the complementary benefits of objective weighting approaches [37]. We have previously developed the integrated Entropy-CRITIC method to generate weights for criteria or aspects, accounting for the internal data structure of each criterion and the relationships between them [25]. This results in a more rational assignment of objective weights and helps mitigate an uneven distribution of weights among criteria. However, in the real world, the opinions of experts or decision-makers are also important to consider, as they can ensure the meaningfulness of weight assignments for practical cases.

Therefore, the integrated AHP-Entropy-CRITIC method is an improvement of the integrated Entropy-CRITIC method, which incorporates the AHP method to account for subjective weights provided by decision-makers or experts. The AHP method, introduced by Thomas Saaty, employs hierarchical decomposition to deal with complicated information within MCDM problems [17, 38]. This method commences by establishing a goal, then proceeds to the criteria for gauging the goal, and subsequently to the sub-criteria used in evaluating these criteria.

The AHP method computes the weights for criteria and sub-criteria through a pairwise comparison matrix. This allows decision-makers to systematically assess different criteria and sub-criteria. Saaty's 9-point scale [17] is commonly utilized for pairwise comparisons in the AHP method, as shown in Table 45.1.

Intensity of importance	Definition	Explanation
1	Equal importance	Judgment favors both criteria equally
3	Moderate importance	Judgment slightly favors one criterion
5	Strong importance	Judgment strongly favors one criterion
7	Very strong importance	One criterion is favored strongly over another
9	Extreme importance	There is evidence affirming that one criterion is favored over another
2, 4, 6, 8	Immediate values between above scale values	Absolute judgment cannot be given, and a compromise is needed
Reciprocals of the above nonzero numbers	Reciprocals for inverse comparison	If criterion j is assigned one of the above nonzero numbers when compared to criterion l , then criterion l has the reciprocal value when compared to j

Table 45.1 Saaty's 9-point scale [17]

Since these judgments are inherently subjective and may exhibit inconsistency, it is imperative to calculate the Consistency Ratio (CR) to assess the consistency of pairwise comparisons. If the CR is equal to or less than 0.1, the pairwise comparison matrix maintains consistency, enabling the weight calculation process. If not, it becomes imperative to revise the pairwise comparison matrix until consistency is achieved. In [39], further details regarding the calculation of weights using the AHP method can be found.

The incorporation of the AHP method to enhance the integrated Entropy-CRITIC method is defined as follows. The procedure for calculating weights using the Entropy and CRITIC methods can be referenced in [25].

Definition 4 Let w_j^{AHP} , w_j^{Entropy} , and w_j^{CRITIC} represent the weights obtained using the AHP method, the Entropy method, and the CRITIC method, respectively, for the *j*th aspect. The integrated AHP-Entropy-CRITIC weight of the *j*th aspect is obtained using Eq. (45.3):

$$w_{j} = \frac{\left(w_{j}^{\text{AHP}} \cdot w_{j}^{\text{Entropy}} \cdot w_{j}^{\text{CRITIC}}\right)^{\frac{1}{3}}}{\sum_{j=1}^{t} \left(w_{j}^{\text{AHP}} \cdot w_{j}^{\text{Entropy}} \cdot w_{j}^{\text{CRITIC}}\right)^{\frac{1}{3}}}$$
(45.3)

where t represents the number of evaluated aspects, j = 1, 2, ..., t.

45.2.3 The TOPSIS Method and Its Improvement

The TOPSIS method was introduced in the 1980s by Hwang and Yoon [1]. It assesses alternatives based on their similarity to the ideal solution. The most preferred alternative is the one with the shortest distance from the positive ideal solution and the longest distance from the negative ideal solution [1]. The advantages of TOPSIS include (a) its suitability for a large amount of attributes and alternatives; (b) its logical and programmable conduct; (c) its necessity for limited subjective inputs; and (d) its ability to maintain comparative consistency in alternative ranking [2]. This method is a widely used and effective MCDM method [40]. Its applications can be found in many areas [2-14].

The TOPSIS method is comprised of the following steps:

- Create the decision matrix X. X is an $m \times t$ matrix, where m represents the number of alternatives (i.e., hotels), and t represents the number of evaluated aspects. The entry d_{fj} in the matrix represents the performance of the f th alternative (f = 1, 2, ..., m) on the jth aspect (j = 1, 2, ..., t).
- Normalize the decision matrix. The normalized value for the *j*th aspect of the *f*th alternative is $z_{fj} = \frac{d_{fj}}{\sqrt{\sum_{j=1}^{m} d_{jj}^2}}$.
- Construct the weighted normalized decision matrix by multiplying each normalized value in the matrix with its corresponding weight. The weighted normalized value for the *j*th aspect of the *f*th alternative is $r_{fj} = w_j \cdot z_{fj}$, where w_j represents the weight of the *j*th aspect.
- Determine the positive ideal and negative ideal solutions. The positive ideal solution represents the best value for each aspect and is calculated as $V^+ = \{(\max_f r_{fj} | j \in J), (\min_f r_{fj} | j \in J') | f = 1, 2, ..., m\} = \{r_1^+, r_2^+, ..., r_t^+\}$, where $J = \{j = 1, 2, ..., t | when beneficial aspect\}$ and $J' = \{j = 1, 2, ..., t | when non-beneficial aspect\}$. The negative ideal solution represents the worst value for each aspect and is calculated as $V^- = \{(\min_f r_{fj} | j \in J), (\max_f r_{fj} | j \in J') | f = 1, 2, ..., m\} = \{r_1^-, r_2^-, ..., r_t^-\}$.
- Calculate the distances between the *f*th alternative and the positive ideal and negative ideal solutions. The distance of the *f*th alternative from the positive ideal solution is calculated as $D_f^+ = \sqrt{\sum_{j=1}^t (r_{fj} r_j^+)^2}$. The distance of the *f*th alternative from the negative ideal solution is calculated as $D_f^- = \sqrt{\sum_{j=1}^t (r_{fj} r_j^+)^2}$.

$$\sqrt{\sum_{j=1}^{t} \left(r_{fj} - r_j^- \right)^2}.$$

- Calculate the relative closeness value for the *f*th alternative as $C_f = \frac{D_f}{D_f^+ + D_f^-}$, where $0 \le C_f \le 1$ and f = 1, 2, ..., m.
- Rank the alternatives based on the C_f value. The higher the value of C_f , the better the rank.

As previously mentioned, it can be found that assigning weights is essential for creating the weighted normalized decision matrix within the TOPSIS method. The

process of weight assignment involves subjective inputs in the TOPSIS method. While certain researchers have employed techniques like the Entropy method, CRITIC method, or other approaches to determine weights in the TOPSIS method, none have merged objective and subjective weighting methods simultaneously. Therefore, this paper introduces the use of weights produced by the integrated AHP-Entropy-CRITIC method in the TOPSIS method, denoted as AEC-TOPSIS method.

45.3 Case Study: Applying the Proposed Model to Rank Luxury Hotels in Lisbon

The proposed model, referred to as the 2T-AEC-TOPSIS model, is founded on the concepts of the 2-tuple linguistic model and the AEC-TOPSIS method. This section explains how the proposed model is developed and applied for luxury hotel rankings and recommendations.

45.3.1 Data Collection

This paper uses Python programming language to employ a web scraping technique for gathering customer reviews from TripAdvisor for 41 luxury hotels in Lisbon. The data collection encompasses the period between January 1, 2013, and December 31, 2022, resulting in the extraction of a total of 44,755 reviews. Each review in the dataset includes an overall hotel rating, which is obligatory on TripAdvisor.

However, not all aspects of the hotel (i.e., Service, Cleanliness, Rooms, Sleep quality, Location, Value, Business Service, and Check-In) are evaluated by every customer. Among these, Business Service and Check-In are two aspects not evaluated by customers in this dataset. Consequently, this paper only studies the sub-ratings of six hotel aspects. Figure 45.1 shows the distribution of the number of sub-ratings scored by customers.

As shown in Fig. 45.1, 37.49% of customer reviews only contain an overall hotel rating without sub-ratings of specific aspects. In addition, 37.85% of customer reviews are assessed based on three aspects, and 21.94% are evaluated across six aspects. The proportion of other situations is very small and can be almost ignored. Therefore, in the next step, the collected dataset will be divided into sets: datasets with three hotel aspects and with six.



Fig. 45.1 Statistics of rated aspects

45.3.2 Data Cleaning

As mentioned in Sect. 45.3.1, this paper solely examines customer reviews containing sub-ratings for three or six aspects. Table 45.2 presents the number of customer reviews and hotels in different scenarios; scenarios lacking customer reviews are not included. As shown in Table 45.2, the dataset now consists of 26,761 reviews. When considering sub-ratings of Rooms, Cleanliness, and Sleep quality (i.e., G_{12}), only two hotels and 20 reviews are available in the dataset, which is inadequate for thorough analysis and decision-making. As a result, this scenario is removed.

Additionally, to ensure hotel rankings can be compared across the remaining 11 scenarios, only those hotels present in all 11 scenarios are considered in this study. In the end, only 25 hotels met this requirement, with a total of 26,037 reviews. Table 45.3 shows the number of reviews for these hotels across various scenarios.

45.3.3 Data Transformation

After performing data cleaning, it is evident that this paper studies 25 alternatives (from H_1 to H_{25}) and employs either six or three aspects for their evaluation.

TripAdvisor uses a set of five linguistic terms to rate hotels. These terms are: "Terrible," "Poor," "Average," "Very Good," and "Excellent." Thus, in this paper the linguistic term set is expressed as $S = \{s_0, \ldots, s_g\}$ with g = 4: $s_0 =$ Terrible = T, $s_1 =$ Poor = P, $s_2 =$ Average = A, $s_3 =$ Very Good = VG, $s_4 =$ Excellent = E, as shown in Fig. 45.2. Table 45.4 shows an example of the customer reviews received by the hotel H_{10} .

As indicated in Table 45.4, hotel H_{10} received 12 customer reviews, each encompassing sub-ratings for all six of its aspects. Using Eq. (45.2), the 2-tuple value of

Scenario ID	Included hotel aspects	Number of customer reviews	Number of hotels
G_1	Rooms, Service, Cleanliness, Sleep quality, Location, Value	9820	27
<i>G</i> ₂	Service, Cleanliness, Sleep quality	1661	38
G_3	Service, Cleanliness, Location	1713	37
G_4	Service, Cleanliness, Value	1673	37
<i>G</i> ₅	Service, Sleep quality, Location	1688	37
G_6	Service, Sleep quality, Value	1613	37
<i>G</i> ₇	Service, Location, Value	1791	38
G_8	Rooms, Service, Cleanliness	1688	39
<i>G</i> ₉	Rooms, Service, Sleep quality	1712	37
G ₁₀	Rooms, Service, Location	1684	36
G ₁₁	Rooms, Service, Value	1698	37
<i>G</i> ₁₂	Rooms, Cleanliness, Sleep quality	20	2

 Table 45.2
 Number of customer reviews and hotels in different scenarios

this hotel's rooms is calculated as $\Delta\left(\frac{\Delta^{-1}(E) \times 10 + \Delta^{-1}(VG) + \Delta^{-1}(A)}{12}\right) = \Delta\left(\frac{4 \times 10 + 3 + 2}{12}\right) = \Delta(3.75) = (s_{round(3.75)}, 3.75 - round(3.75)) = (s_4, -0.25) = (E, -0.25)$. The 2-tuple values for the remaining five aspects of this hotel are calculated similarly, and the corresponding results can be found in Table 45.5.

45.3.4 Calculation of Weights for Each Hotel Aspect

The integrated AHP-Entropy-CRITIC method is employed to calculate the weights for each hotel aspect.

Experts with expertise in the hotel industry developed pairwise comparison matrices for each aspect of the hotel. Figure 45.3 displays the pairwise comparison matrix and the corresponding AHP weights acquired for the six hotel aspects. Within this matrix, the pairwise comparison matrix for three hotel aspects can also be found, as indicated by the example marked in Fig. 45.3. The CR value among all 11 scenarios is below 0.1, providing confirmation of both the pairwise comparison matrices' consistency and the experts' judgment validity.

The Entropy method and the CRITIC method both use the data in the performance matrix (see Table 45.5) to compute the objective weights for six different hotel aspects. However, before these weights can be determined, it is necessary to convert the 2-tuple values into numerical values using the function Δ^{-1} .

District		astonie	1 10/10/1	mannet					inarios	
G_1	G_2	G ₃	G_4	<i>G</i> ₅	G_6	G_7	G_8	G_9	G ₁₀	<i>G</i> ₁₁
431	52	58	45	62	49	57	57	55	55	51
240	43	56	38	44	37	47	39	45	52	39
201	66	74	72	59	54	60	68	72	73	64
344	38	49	49	49	34	38	46	42	37	33
2162	195	175	170	211	200	207	185	202	179	210
663	56	62	61	47	59	56	54	55	48	68
238	118	105	100	124	136	114	111	117	122	111
550	66	68	71	75	72	79	57	73	78	80
652	168	192	181	163	168	192	193	204	161	201
12	25	16	17	18	18	24	20	20	25	10
135	52	52	63	64	52	50	50	59	62	49
125	34	20	17	27	24	31	26	27	25	26
2	19	24	20	21	17	19	28	18	21	15
167	57	41	55	45	38	67	46	60	51	51
86	6	19	25	13	16	15	9	11	23	15
984	53	64	72	59	60	76	73	62	75	92
119	95	92	84	93	63	80	80	80	74	86
185	43	51	70	46	50	47	56	45	57	57
525	33	30	31	31	30	34	36	28	43	37
325	97	75	95	93	85	99	96	89	103	83
1050	149	161	136	150	135	173	142	154	139	135
204	17	13	22	14	12	24	19	15	16	15
304	26	36	36	24	26	29	35	29	24	31
46	41	46	35	52	36	33	39	42	36	38
7	57	65	39	51	63	44	58	52	58	49
	$\begin{array}{c} G_1 \\ \hline \\ 431 \\ 240 \\ 201 \\ 344 \\ 2162 \\ 663 \\ 238 \\ 550 \\ 652 \\ 12 \\ 135 \\ 125 \\ 1050 \\ 204 \\ 304 \\ 46 \\ 7 \end{array}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	G_1 G_2 G_3 431 52 58 240 43 56 201 66 74 344 38 49 2162 195 175 663 56 62 238 118 105 550 66 68 652 168 192 12 25 16 135 52 52 125 34 20 2 19 24 167 57 41 86 6 19 984 53 64 119 95 92 185 43 51 525 33 30 325 97 75 1050 149 161 204 17 13 304 26 36 46 41 46 7	G_1 G_2 G_3 G_4 431 52 58 45 240 43 56 38 201 66 74 72 344 38 49 49 2162 195 175 170 663 56 62 61 238 118 105 100 550 66 68 71 652 168 192 181 12 25 16 17 135 52 52 63 125 34 20 17 2 19 24 20 167 57 41 55 86 6 19 25 984 53 64 72 119 95 92 84 185 43 51 70 525 33 30 31 325 <td>G_1 G_2 G_3 G_4 G_5 431 52 58 45 62 240 43 56 38 44 201 66 74 72 59 344 38 49 49 49 2162 195 175 170 211 663 56 62 61 47 238 118 105 100 124 550 66 68 71 75 652 168 192 181 163 12 25 16 17 18 135 52 52 63 64 125 34 20 17 27 2 19 24 20 21 167 57 41 55 45 86 6 19 25 13 984 53 64 72 <td< td=""><td>G_1 G_2 G_3 G_4 G_5 G_6 431 52 58 45 62 49 240 43 56 38 44 37 201 66 74 72 59 54 344 38 49 49 49 34 2162 195 175 170 211 200 663 56 62 61 47 59 238 118 105 100 124 136 550 66 68 71 75 72 652 168 192 181 163 168 12 25 16 17 18 18 135 52 52 63 64 52 125 34 20 17 27 24 2 19 24 20 21 17 167 57</td><td>G_1 G_2 G_3 G_4 G_5 G_6 G_7 431 52 58 45 62 49 57 240 43 56 38 44 37 47 201 66 74 72 59 54 60 344 38 49 49 49 34 38 2162 195 175 170 211 200 207 663 56 62 61 47 59 56 238 118 105 100 124 136 114 550 66 68 71 75 72 79 652 168 192 181 163 168 192 12 25 16 17 18 18 24 135 52 52 63 64 52 50 125 34 20 17<</td><td>$G_1$$G_2$$G_3$$G_4$$G_5$$G_6$$G_7$$G_8$4315258456249575724043563844374739201667472595460683443849494934384621621951751702112002071856635662614759565423811810510012413611411155066687175727957652168192181163168192193122516171818242013552526364525050125342017272431262192420211719281675741554538674686619251316159984536472596076731199592849363808018543517046504756525333031313034363259775</td><td>G_1 G_2 G_3 G_4 G_5 G_6 G_7 G_8 G_9 431 52 58 45 62 49 57 57 55 240 43 56 38 44 37 47 39 45 201 66 74 72 59 54 60 68 72 344 38 49 49 49 34 38 46 42 2162 195 175 170 211 200 207 185 202 663 56 62 61 47 59 56 54 55 238 118 105 100 124 136 114 111 117 550 66 68 71 75 72 79 57 73 652 168 192 181 163 168 192 193 204</td><td>G_1 G_2 G_3 G_4 G_5 G_6 G_7 G_8 G_9 G_{10} 431 52 58 45 62 49 57 57 55 55 240 43 56 38 44 37 47 39 45 52 201 66 74 72 59 54 60 68 72 73 344 38 49 49 49 34 38 46 42 37 2162 195 175 170 211 200 207 185 202 179 663 56 62 61 47 59 56 54 55 48 238 118 105 100 124 136 114 111 117 122 550 66 68 71 75 72 79 57 73 78</td></td<></td>	G_1 G_2 G_3 G_4 G_5 431 52 58 45 62 240 43 56 38 44 201 66 74 72 59 344 38 49 49 49 2162 195 175 170 211 663 56 62 61 47 238 118 105 100 124 550 66 68 71 75 652 168 192 181 163 12 25 16 17 18 135 52 52 63 64 125 34 20 17 27 2 19 24 20 21 167 57 41 55 45 86 6 19 25 13 984 53 64 72 <td< td=""><td>G_1 G_2 G_3 G_4 G_5 G_6 431 52 58 45 62 49 240 43 56 38 44 37 201 66 74 72 59 54 344 38 49 49 49 34 2162 195 175 170 211 200 663 56 62 61 47 59 238 118 105 100 124 136 550 66 68 71 75 72 652 168 192 181 163 168 12 25 16 17 18 18 135 52 52 63 64 52 125 34 20 17 27 24 2 19 24 20 21 17 167 57</td><td>G_1 G_2 G_3 G_4 G_5 G_6 G_7 431 52 58 45 62 49 57 240 43 56 38 44 37 47 201 66 74 72 59 54 60 344 38 49 49 49 34 38 2162 195 175 170 211 200 207 663 56 62 61 47 59 56 238 118 105 100 124 136 114 550 66 68 71 75 72 79 652 168 192 181 163 168 192 12 25 16 17 18 18 24 135 52 52 63 64 52 50 125 34 20 17<</td><td>$G_1$$G_2$$G_3$$G_4$$G_5$$G_6$$G_7$$G_8$4315258456249575724043563844374739201667472595460683443849494934384621621951751702112002071856635662614759565423811810510012413611411155066687175727957652168192181163168192193122516171818242013552526364525050125342017272431262192420211719281675741554538674686619251316159984536472596076731199592849363808018543517046504756525333031313034363259775</td><td>G_1 G_2 G_3 G_4 G_5 G_6 G_7 G_8 G_9 431 52 58 45 62 49 57 57 55 240 43 56 38 44 37 47 39 45 201 66 74 72 59 54 60 68 72 344 38 49 49 49 34 38 46 42 2162 195 175 170 211 200 207 185 202 663 56 62 61 47 59 56 54 55 238 118 105 100 124 136 114 111 117 550 66 68 71 75 72 79 57 73 652 168 192 181 163 168 192 193 204</td><td>G_1 G_2 G_3 G_4 G_5 G_6 G_7 G_8 G_9 G_{10} 431 52 58 45 62 49 57 57 55 55 240 43 56 38 44 37 47 39 45 52 201 66 74 72 59 54 60 68 72 73 344 38 49 49 49 34 38 46 42 37 2162 195 175 170 211 200 207 185 202 179 663 56 62 61 47 59 56 54 55 48 238 118 105 100 124 136 114 111 117 122 550 66 68 71 75 72 79 57 73 78</td></td<>	G_1 G_2 G_3 G_4 G_5 G_6 431 52 58 45 62 49 240 43 56 38 44 37 201 66 74 72 59 54 344 38 49 49 49 34 2162 195 175 170 211 200 663 56 62 61 47 59 238 118 105 100 124 136 550 66 68 71 75 72 652 168 192 181 163 168 12 25 16 17 18 18 135 52 52 63 64 52 125 34 20 17 27 24 2 19 24 20 21 17 167 57	G_1 G_2 G_3 G_4 G_5 G_6 G_7 431 52 58 45 62 49 57 240 43 56 38 44 37 47 201 66 74 72 59 54 60 344 38 49 49 49 34 38 2162 195 175 170 211 200 207 663 56 62 61 47 59 56 238 118 105 100 124 136 114 550 66 68 71 75 72 79 652 168 192 181 163 168 192 12 25 16 17 18 18 24 135 52 52 63 64 52 50 125 34 20 17<	G_1 G_2 G_3 G_4 G_5 G_6 G_7 G_8 4315258456249575724043563844374739201667472595460683443849494934384621621951751702112002071856635662614759565423811810510012413611411155066687175727957652168192181163168192193122516171818242013552526364525050125342017272431262192420211719281675741554538674686619251316159984536472596076731199592849363808018543517046504756525333031313034363259775	G_1 G_2 G_3 G_4 G_5 G_6 G_7 G_8 G_9 431 52 58 45 62 49 57 57 55 240 43 56 38 44 37 47 39 45 201 66 74 72 59 54 60 68 72 344 38 49 49 49 34 38 46 42 2162 195 175 170 211 200 207 185 202 663 56 62 61 47 59 56 54 55 238 118 105 100 124 136 114 111 117 550 66 68 71 75 72 79 57 73 652 168 192 181 163 168 192 193 204	G_1 G_2 G_3 G_4 G_5 G_6 G_7 G_8 G_9 G_{10} 431 52 58 45 62 49 57 57 55 55 240 43 56 38 44 37 47 39 45 52 201 66 74 72 59 54 60 68 72 73 344 38 49 49 49 34 38 46 42 37 2162 195 175 170 211 200 207 185 202 179 663 56 62 61 47 59 56 54 55 48 238 118 105 100 124 136 114 111 117 122 550 66 68 71 75 72 79 57 73 78

 Table 45.3 Distribution of customer review numbers of 25 hotels in different scenarios



Fig. 45.2 Linguistic term set S used by TripAdvisor

Customer review date	Rooms	Service	Cleanliness	Sleep quality	Location	Value
2022-12-15	E	Е	Е	Е	Е	E
2022-11-28	E	Е	Е	VG	А	E
2022-11-21	E	E	E	Е	Е	E
2022-10-16	E	E	VG	VG	VG	VG
2022-09-07	E	Е	Е	Е	Е	E
2022-09-06	E	E	E	Е	Е	E
2022-09-02	E	Р	Е	Е	A	Т
2022-08-03	VG	Е	А	Е	Е	VG
2022-07-22	E	E	E	Е	Е	E
2022-06-06	A	Р	VG	VG	VG	VG
2022-06-06	E	Е	E	Е	Е	E
2018-07-10	E	E	E	VG	A	E

Table 45.4 Customer reviews received by hotel H_{10} (six aspects)

The resulting weights for these six aspects are shown in Table 45.6, as calculated by the AHP method, Entropy method, and CRITIC method separately. These weights are then combined to form the integrated AHP-Entropy-CRITIC weights using Eq. (45.3), which can also be found in Table 45.6. As Table 45.6 illustrates, the combined weights from three methods demonstrate that the integrated AHP-Entropy-CRITIC method can achieve a relatively balanced and realistic distribution of weights across various hotel aspects.

45.3.5 Hotel Rankings and Recommendations

As mentioned in Sect. 45.2.3, the AEC-TOPSIS method consists of applying to the TOPSIS method the weights generated by the integrated AHP-Entropy-CRITIC method. These weights, obtained in the previous step, serve to construct the weighted normalized decision matrix and calculate the relative closeness values for ranking the hotels.

Table 45.7 shows the relative closeness values for the 25 hotels, assessed based on their six aspects, along with their rankings. Table 45.8 lists the top 10 luxury hotels in various scenarios. As shown in Table 45.8, luxury hotel customers, or potential guests, can receive recommendations for the top 10 luxury hotels in Lisbon based on the hotels' performance in either six or three different aspects. For instance, when considering all six aspects (i.e., G_1) in hotel rankings, hotel H_{19} ranks first. Combined with Table 45.5, H_{19} has garnered almost excellent evaluations in Rooms, Service, Cleanliness, Sleep quality, Location, and Value. Although hotel H_{13} boasts complete excellence in Service, Cleanliness, Sleep quality, and Value, its evaluation in Rooms and Location fall below those of H_{19} , leading to its lower ranking.

Hotel ID	Rooms	Service	Cleanliness	Sleep quality	Location	Value
H_1	(VG, + 0.3735)	(E, – 0.3132)	(E, - 0.2993)	(E, – 0.3875)	(E, – 0.1044)	(VG, + 0.3248)
<i>H</i> ₂	(E, – 0.2042)	(E, – 0.2667)	(E, - 0.25)	(E, – 0.2458)	(E, – 0.4042)	(VG, + 0.3125)
<i>H</i> ₃	(VG, + 0.2338)	(VG, + 0.3632)	(VG, + 0.4577)	(VG, + 0.2687)	(VG, + 0.4726)	(VG, + 0.0995)
H_4	(VG, + 0.4273)	(E, – 0.2238)	(E, - 0.2151)	(E, – 0.3924)	(E, -0.093)	(VG, + 0.2936)
H_5	(VG, + 0.475)	(E, – 0.4417)	(E, - 0.3562)	(E, – 0.3895)	(VG, + 0.0185)	(VG, + 0.3645)
H ₆	(VG, + 0.4434)	(VG, + 0.4857)	(E, - 0.4072)	(E, – 0.454)	(VG, + 0.1041)	(VG, + 0.2127)
<i>H</i> ₇	(E, – 0.1681)	(E, – 0.2941)	(E, -0.1471)	(E, – 0.2437)	(VG, + 0.0462)	(E, - 0.5)
H_8	(E, – 0.3964)	(E, – 0.2364)	(E, - 0.1764)	(E, – 0.2509)	(VG, + 0.4291)	(VG, + 0.2145)
<i>H</i> 9	(E, – 0.3742)	(E, – 0.1733)	(E, - 0.1887)	(E, – 0.3144)	(E, – 0.0445)	(E, – 0.3727)
H_{10}	(E, -0.25)	(E, - 0.5)	(E, - 0.3333)	(E, – 0.3333)	(VG, + 0.3333)	(VG, + 0.4167)
<i>H</i> ₁₁	(E, – 0.237)	(E, – 0.1926)	(E, -0.1481)	(E, – 0.1556)	(VG, + 0.4148)	(VG, + 0.363)
<i>H</i> ₁₂	(E, - 0.28)	(E, – 0.216)	(E, - 0.136)	(E, – 0.192)	(E, -0.144)	(E, – 0.416)
H ₁₃	(E, - 0.5)	Е	Е	Е	(E, -0.5)	Е
H_{14}	(E, – 0.1916)	(E, – 0.1018)	(E, - 0.0838)	(E, – 0.3593)	(VG, + 0.2335)	(VG, + 0.3713)
H ₁₅	(E, – 0.0581)	(E, – 0.0349)	(E, - 0.0581)	(E, – 0.1279)	(E, – 0.2674)	(E, – 0.314)
<i>H</i> ₁₆	(VG, + 0.4675)	(E, – 0.3496)	(E, - 0.2937)	(E, – 0.4461)	(VG, + 0.1738)	(VG, + 0.2866)
H ₁₇	(E, – 0.4874)	(E, – 0.2773)	(E, - 0.3361)	(E, – 0.3193)	(E, – 0.1849)	(E, – 0.4286)
H ₁₈	(E, – 0.3784)	(E, – 0.1892)	(E, -0.1243)	(E, – 0.3784)	(E, – 0.0649)	(VG, + 0.3405)
H_{19}	(E, – 0.1429)	(E, – 0.0895)	(E, - 0.0629)	(E, – 0.1314)	(E, – 0.1048)	(E, – 0.3219)
H ₂₀	(E, – 0.4769)	(VG, + 0.2154)	(E, - 0.3692)	(E, – 0.4092)	(VG, + 0.0462)	(VG, – 0.1015)
<i>H</i> ₂₁	(VG, + 0.2905)	(E, – 0.4038)	(E, - 0.3752)	(E, – 0.4457)	(E, – 0.2029)	(VG, + 0.1876)

 Table 45.5
 Performance matrix for 25 hotels (six aspects)

(continued)

Hotel ID	Rooms	Service	Cleanliness	Sleep quality	Location	Value
H ₂₂	(E, – 0.1667)	(E, – 0.2157)	(E, - 0.1176)	(E, – 0.2745)	(E, – 0.1373)	(E, – 0.4951)
H ₂₃	(VG, + 0.4638)	(E, – 0.2862)	(E, - 0.2368)	(VG, + 0.4803)	(E, – 0.2303)	(VG, + 0.3191)
H ₂₄	(E, – 0.1957)	(E, – 0.1739)	(E, - 0.1739)	(E, – 0.1304)	(E, – 0.2391)	(E, – 0.3261)
H ₂₅	(VG, + 0.4286)	(E, – 0.1429)	Е	(E, – 0.1429)	(E, – 0.1429)	VG

 Table 45.5 (continued)



3 : wo	aspects Rooms S eights 19.6%	Service Cleanlin 31.1% 49.3%	ess						
	Rooms	Service	Cleanliness	Sleep quality	Location	Value			
Rooms	1	1/2	1/2	1/3	1/2	3	6 aspects	weights	
Service	2	1	1/2	1/2	2	4	Rooms	9.7%	
Cleanliness	2	2	1	2	3	5	Cleanliness	30.9%	CR=0.044
Sleep quality	3	2	1/2		3	5	Sleep quality	25.8%	$\sum_{i=1}^{n}$
Location	2	1/2	1/3	1/3		5	Value	4%	
Value	1/3	1/4	1/5	1/5	1/5	1			

Fig. 45.3 Pairwise comparison matrices and the AHP weights

	, 0	1		
Hotel aspect	Weights derived from the Entropy method (%)	Weights derived from the CRITIC method (%)	Weights derived from the AHP method (%)	Integrated AHP-Entropy-CRITIC weights (%)
Rooms	17.01	13.44	9.7	14.88
Service	9.95	11.31	16.9	14.13
Cleanliness	8.01	6.01	30.9	13.02
Sleep quality	9.88	8.25	25.8	14.61
Location	37	38.08	12.7	29.84
Value	18.15	22.91	4	13.52

 Table 45.6
 Weight assignment for six hotel aspects

Hotel ID	Distance of positive	Distance of negative	Relative closeness C_f	Ranking
	ideal solution (D_f^+)	ideal solution (D_f^-)		
H_1	0.398	0.560	0.585	12
H_2	0.364	0.503	0.580	13
H_3	0.654	0.265	0.288	23
H_4	0.378	0.581	0.606	10
H_5	0.644	0.276	0.300	22
H_6	0.653	0.214	0.247	24
H_7	0.553	0.438	0.442	20
H_8	0.452	0.422	0.483	18
H_9	0.239	0.672	0.738	5
H_{10}	0.483	0.382	0.442	19
H_{11}	0.398	0.486	0.550	15
H ₁₂	0.219	0.646	0.747	4
H ₁₃	0.302	0.669	0.689	7
H_{14}	0.483	0.455	0.485	17
H ₁₅	0.177	0.688	0.796	2
H_{16}	0.585	0.287	0.329	21
H_{17}	0.314	0.573	0.646	9
H_{18}	0.320	0.625	0.662	8
H_{19}	0.143	0.721	0.835	1
H_{20}	0.752	0.178	0.191	25
H_{21}	0.480	0.478	0.499	16
H ₂₂	0.238	0.645	0.730	6
H ₂₃	0.407	0.504	0.553	14
H ₂₄	0.198	0.646	0.765	3
H ₂₅	0.428	0.603	0.585	11

 Table 45.7
 Hotel rankings based on relative closeness values (six aspects)

Similarly, the ranking results and the 2-tuple values of hotel aspects also enable hotel managers to evaluate their performance compared to competitors and identify the aspects they should enhance to improve their ranking. For example, when comparing hotel H_{19} to the tenth-ranked hotel H_4 , it becomes evident that H_{19} excels in all six aspects, while the Value and Rooms of H_4 are rated as "Very Good," falling clearly below "Excellent."

Scenario ID	Hotel rankings
G_1	$H_{19} > H_{15} > H_{24} > H_{12} > H_9 > H_{22} > H_{13} > H_{18} > H_{17} > H_4$
G_2	$H_{15} > H_{25} > H_{14} > H_{22} > H_{12} > H_8 > H_{11} > H_9 > H_{10} > H_{19}$
G_3	$H_{22} > H_4 > H_9 > H_{25} > H_{12} > H_1 > H_{19} > H_{15} > H_{23} > H_{18}$
G_4	$H_{22} > H_{10} > H_9 > H_{15} > H_{25} > H_{24} > H_{19} > H_{14} > H_1 > H_{11}$
G_5	$H_{25} > H_4 > H_{18} > H_9 > H_1 > H_{19} > H_{22} > H_{15} > H_{21} > H_{17}$
G_6	$H_{25} > H_{15} > H_{22} > H_{10} > H_9 > H_2 > H_{24} > H_{13} > H_{17} > H_{14}$
G_7	$H_{22} > H_9 > H_{24} > H_{15} > H_{19} > H_1 > H_{18} > H_{23} > H_{25} > H_{12}$
G_8	$H_{15} > H_{22} > H_4 > H_{12} > H_{14} > H_{24} > H_{17} > H_9 > H_2 > H_{25}$
G_9	$H_{12} > H_{22} > H_{14} > H_{15} > H_{24} > H_2 > H_9 > H_{19} > H_{25} > H_{13}$
G_{10}	$H_{22} > H_{25} > H_9 > H_{15} > H_{19} > H_{24} > H_{18} > H_2 > H_1 > H_4$
<i>G</i> ₁₁	$H_{15} > H_{22} > H_{11} > H_{12} > H_9 > H_4 > H_7 > H_{14} > H_{24} > H_{18}$

Table 45.8 Top 10 luxury hotels under 11 scenarios

45.4 Conclusions and Future Work

This paper presents the 2T-AEC-TOPSIS model for ranking luxury hotels and recommending hotels. This model incorporates the 2-tuple linguistic model to aggregate linguistic ratings for each hotel aspect, thereby avoiding the issue of information loss in linguistic information fusion. Moreover, the 2T-AEC-TOPSIS model introduces the AEC-TOPSIS method to get hotel rankings, combining the advantages of objective and subjective weighting methods in the weight processing of the TOPSIS method.

The functionality of the proposed model has been evaluated using a dataset obtained through Python web scraping from TripAdvisor for luxury hotels in Lisbon. The findings indicate that the model achieves a relatively balanced and realistic weight distribution in the weight assignment within the TOPSIS method, due to its consideration of each criterion's internal data structure, their interrelationships, and the necessity of incorporating subjectivity, such as expert opinions, into the decision-making process.

The proposed model generates a list of the top 10 luxury hotels in Lisbon for various scenarios (i.e., considering six aspects or three aspects in the ranking) and uses the 2-tuple values of different hotel aspects to explain the ranking results. This assists hotel managers in comparing their hotels to competitors and identifying the specific aspect(s) they should enhance to improve their ranking. Additionally, it helps luxury hotel customers, or potential guests find suitable luxury hotels more efficiently with more understandable hotel rankings.

However, even though this paper has enhanced the weight assignment in the TOPSIS method, future research should explore the use of other distance metrics, such as Manhattan Distance and Hamming Distance, to determine if they yield better ranking results compared to the Euclidean distance used in this paper. Furthermore, the proposed model is incapable of predicting hotel rankings. Since the data collected

includes customer reviews and their review dates, future work could incorporate time series analysis to provide a dynamic ranking that changes over different periods. Finally, the dataset collected in this paper is limited to data from luxury hotels in Lisbon. Future work should encompass data from diverse hotel categories to achieve more comprehensive rankings of the hotel industry in Lisbon.

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Chapter 46 Technologies Applied to Tourism Marketing: A 10 Years Systematic Literature Review



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Abstract In the middle of the rapidly evolving digital epoch, the profound imprint of information and communication technologies (ICT) on market dynamism is discernible across sectors. The tourism realm is no exception to this pervasive transformation, navigating its trajectory by increasingly ingraining these technological

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tools, particularly in the ambit of marketing. This piece undertakes a meticulous literature review, employing the PRISMA Protocol to select secondary studies, including systematic and integrative literature reviews. The objective is to delineate the predominant technological paradigms relevant to tourism marketing. This systematic literature review encompasses eight scholarly articles from the period of 2013–2023, extracted from esteemed databases: Web of Science and Scopus, out of an initial selection of 16 articles. The main findings accentuate the pivotal role of mobile technologies, the ubiquity of social media advertising, digital marketing strategies, and the immersive allure of virtual reality, namely the nascent, yet resonant, realm of the Metaverse. These conclusions highlight the unpredictable nature of the tourism industry and emphasize the necessity for marketers to adjust their strategies considering the emerging trends driven by technology. By embracing these advancements, marketers can effectively and meaningfully engage with modern consumers and ensure that entities remain robust contenders in the dynamic evolving and ever-fluid landscape of the tourism and hospitality sector.

46.1 Introduction

The grand tapestry of the tourism sector, intricate and vast, is woven with threads of human curiosity and the innate quest for discovery. This domain, as it grows, has remained intently attuned to the evolving nuances of traveler motivations, gravitating with unwavering zeal toward the creation of unique experiences that are not only unparalleled in their allure but also tailor-made in their execution. In this dynamic matrix, service excellence becomes more than just an operational imperative—it becomes the very centerpiece on which unforgettable experiences are built. Coupled with skillful professionalism and a relentless pursuit of market competitiveness, it accentuates and amplifies the traveler's stay, sowing the seeds for a lasting loyalty that transcends transient interactions [1].

Emerging against this multifaceted backdrop is the realm of marketing within the tourism sector. Its genesis and evolution are intimately closely linked to a fundamental axiom as outlined by the World Tourism Organization [2]. At its core, tourism marketing is an intricate consumer-centered ballet, choreographed to the rhythm of consumers' evolving desires and anticipations. It is an orchestrated effort that goes beyond rudimentary transactional dynamics, forging compromises to select products and services that invite travelers to stay in destinations and venture beyond the familiar thresholds of their everyday residential environment. The ambition is not just to satisfy but to exceed, not just to serve but to craft experiences that harmonize with, and indeed amplify, the pre-established symphonies of consumer expectations.

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But to view tourism in isolation as a mere commercial endeavor would be to grossly understate its expansive influence. Beyond the discernible economic contours, it is a vibrant mosaic of sociocultural and economic intersections. These intersections do not merely navigate the terrains of marketing tactics, they traverse the broader landscapes of holistic strategies, envisioned and executed with the intent of spotlighting and amplifying a locale's inherent potential. By doing so, tourism contributes to the overall prosperity and advancement of a tourist destination [3]. Tourism as we know is like a social gathering, where you can go with friends, family, by yourself, or in huge groups with people that you don't know from anywhere. But basically, its people moving from one country to another to knowledge of the culture of one specific place. These movements tend to create a social, economic, and cultural phenomenon that is essential to the economic prowess of nations, as evocatively epitomized by Portugal, coalesces with the rich tapestries of sociocultural narratives. A sector that, in its embrace of both tradition and transformation, is poised to enrapture an audience of over 1.8 billion by the dawn of 2030 [4].

46.2 Methodology

With the flourishing evolution of digital technologies, it's imperative to understand their profound impact on the tourism industry, especially in terms of marketing. This section outlines the methodology adopted to review the key technological applications in tourism marketing based on a systematic literature review (SLR).

The emergence of digital technologies and their spread in Internet has brought about a profound revolution in the field of tourism. In the contemporary digital era, travelers heavily rely on online platforms for gathering vital information about various destinations, underscoring the significance of communication channels on the web. Besides, the global spread of COVID-19 and its repercussions has hastened the adoption of e-tourism, with virtual reality offering a safe alternative for potential tourists. Given these shifts, it's pertinent to undertake a comprehensive literature review on the intersection of technology and tourism marketing.

The primary goal of this research is to synthesize knowledge from existing literature reviews to provide a broad understanding of technological applications within the domain of tourism marketing.

The SLR methodology was employed to ensure a rigorous and structured review process. This method hinges on qualitative data, predominantly the content of secondary articles. It offers a systematic means of identifying, evaluating, and synthesizing the available research pertinent to a particular research question or topic. The study period was delineated from 2013 to 2023. Original scientific articles written in English were specifically targeted. Renowned scientific databases, namely Web of Science (WoS) and Scopus, were scoured for pertinent literature.

The search protocol incorporated the following keywords: "Tourism", "Marketing", "Tourism Marketing", "New Technologies", "ICT", and "Digital Technologies."



Fig. 46.1 PRISMA flowchart for the systematic review process to identify relevant studies using Page et al. [5] protocol

The preferred reporting items for systematic reviews and meta-analyses (PRISMA) protocol was strictly adhered to, ensuring a systematic and transparent review process. This methodology entails a standardized procedure for selecting articles, encompassing three key phases: identification, eligibility, and inclusion, as could be seen in Fig. 46.1 as the summary of the PRISMA protocol applied to this research.

46.3 Results

The systematic literature review provides a panoramic view of the shifting landscape of tourism and hospitality marketing from 2013 to 2023. Distinct themes and patterns have emerged over this decade, reflecting both rapid technological advances and changing consumer behaviors (Table 46.1).

Study No.	Authors	Year and Country	Title	Journal/ Proceeding/Book/ DOI
1	Chamboko-Mpotaringa and Tichaawa [6]	2021, South Africa	Tourism digital marketing tools and views on future trends: A systematic review of literature	African Journal of Hospitality, Tourism and Leisure https://doi.org/10. 46222/ajhtl.197 70720-128
2	Chu et al. [7]	2020, USA	The role of social media advertising in hospitality, tourism, and travel: A literature review and research agenda	International Journal of Contemporary Hospitality Management https://doi.org/10. 1108/ijchm-05- 2020-0480
3	Hamid et al. [4]	2020, Iraq	How smart is e-tourism? A systematic review of smart tourism recommendation system applying data management	Computer Science Review https://doi.org/10. 1016/j.cosrev. 2020.100337
4	Kim et al. [8]	2021, USA	Millennials' virtual reality experiences pre- and post-Covid-19	Journal of Hospitality and Tourism Management https://doi.org/10. 1016/j.jhtm.2021. 06.008
5	Kim and Law [9]	2015, Hong Kong	Smartphones in tourism and hospitality marketing: A literature review	Journal of Travel and Tourism Marketing https://doi.org/10. 1080/10548408. 2014.943458
6	Koohang et al. [10]	2023, United Kingdom	Shaping the Metaverse into reality: A holistic multidisciplinary understanding of opportunities, challenges, and avenues for future investigation	Journal of Computer Information Systems https://doi.org/10. 1080/08874417. 2023.2165197

 Table 46.1 General description of the key characteristics and the studies included in the review

(continued)

Study No.	Authors	Year and Country	Title	Journal/ Proceeding/Book/ DOI
7	Law et al. [11]	2018, Hong Kong	A comprehensive review of mobile technology use in hospitality and tourism	Journal of Hospitality Marketing and Management https://doi.org/10. 1080/19368623. 2018.1423251
8	Li et al. [12]	2017, China	The concept of smart tourism in the context of tourism information services	Tourism Management https://doi.org/10. 1016/j.tourman. 2016.03.014
9	Lin et al. [13]	2020, China	Task-technology fit analysis of social media use for marketing in the tourism and hospitality industry: A systematic literature review	International Journal of Contemporary Hospitality Management https://doi.org/10. 1108/ijchm-12- 2019-1031
10	Lu et al. [14]	2022, China	Intelligent tourism marketing and publicity methods for revenue enhancement	Mobile Information Systems https://doi.org/10. 1155/2022/694 3120
11	Morgan-Thomas and Veloutsou [15]	2013, United Kingdom	Beyond technology acceptance: Brand relationships and online brand experience	Journal of Business Research https://doi.org/10. 1016/j.jbusres. 2011.07.019
12	Nayyar et al. [16]	2018, Vietnam	Virtual reality and augmented reality technologies for the tourism and hospitality industry	International Journal of Engineering and Technology https://doi.org/10. 14419/ijet.v7i2.21. 11858

 Table 46.1 (continued)

(continued)

Study No.	Authors	Year and Country	Title	Journal/ Proceeding/Book/ DOI
13	Saura et al. [17]	2020, Spain	The digital tourism business: A systematic review of essential digital marketing strategies and trends	Book: Digital Marketing Strategies for Tourism, Hospitality, and Airline Industries https://doi.org/10. 4018/978-1-5225- 9783-4.ch001
14	Sigala [18]	2018, Australia	New technologies in tourism: From multidisciplinary to anti-disciplinary advances and trajectories	Tourism Management Perspectives https://doi.org/10. 1016/j.tmp.2017. 12.003
15	Tran and Chang [19]	2022, China	What makes customers loyal to an online booking brand? The effects of online brand experience and brand attachment	Tourism Management Perspectives https://doi.org/10. 1080/1528008X. 2022.2109239
16	Yung et al. [20]	2020, Australia	Virtual reality and tourism marketing: Conceptualizing a framework on presence, emotion, and intention	Current Issues in Tourism https://doi.org/10. 1080/13683500. 2020.1820454

Table 46.1 (continued)

Source Own elaboration

Chronological Evolution: A discernible pattern emerges as we trace the evolution of digital tourism research. In 2004 [21], the inception of digital tourism articles was marked by a focus on multiagent systems within the digital tourism realm. These early investigations revolved around the creation of intelligent agents capable of swiftly acquiring and disseminating information, thus offering valuable insights through proficient system management and knowledge transfer. In light of these early discussions, it becomes evident that the advancement of digital tourism should be synergistically coupled with human intelligence, especially in the oversight of digital facets. Subsequently, from the early years until 2010, the field witnessed a plethora of contributions, with researchers predominantly concentrating on aspects like website usage, desktop applications, and laptop interfaces. This trend was confirmed, later by Navío-Marco et al. [22] when these authors analyzed and evaluated the sustainable development of the touristic websites, establishing the patterns and trends of the development of digital tourism. However, the landscape experienced a shift as we transitioned into the 2011–2021 period, with a pronounced focus on social media,

software applications, and mobile technologies. For instance, earlier studies, such as Morgan-Thomas and Veloutsou [15], have looked at general online experiences. Then, the global COVID-19 pandemic in 2020–2021 cast a shadow over the tourism industry, leading to severe disruptions caused by restrictions and a decline in social activities, a phenomenon meticulously documented by Akhtar et al. [23] and Gössling et al. [24]. As a result, the concept of digitalization emerged as a compelling alternative for stakeholders within the tourism sector. Building upon this transformative shift, Akhtar et al. [23] indicate that the forthcoming digital tourism research will prioritize technology utilization in areas such as marketing, mobile application development and the exploration of virtual reality. Harnessing digital tourism for economic growth necessitates strategic investments in training and optimization initiatives. Looking ahead, forecasts from academia signal a dynamic future for digital tourism, with a potential dive into emerging realms like virtual reality [25] and Metaverse tourism [10, 26]. Central to this trajectory is the profound capacity of technology to catalyze innovations accessible to the wider public [27]. Notably, the escalating volume of digital tourism articles since 2017 underscores the burgeoning interest among academics in advancing the field.

This progression underscores the industry's dynamic nature and its unwavering responsiveness to the ever-evolving landscape of technological innovations.

Mobile Technology's Preeminence: Several studies have spotlighted the transformative potential of mobile technologies. Kim and Law [9] and Law et al. [11] emphasize not only the ubiquity of smartphones but also their critical role in improving the consumer experience. These devices have metamorphosed from mere communication tools to essential travel companions, facilitating everything from bookings to in-trip navigation.

Social Media's Dual Role: Platforms, like Facebook, Instagram, and Twitter are more than just marketing channels. Chu et al. [7] emphasized that user-generated content not only contributes to generating economic value but also nurtures social relationships and boosts brand engagement.

The Emergence of Immersive Technologies: Through research conducted by Yung et al. [20] and Nayyar et al. [16], it becomes evident that the sector stands at the brink of an immersive technology transformation. Virtual reality (VR) and augmented reality (AR) have evolved beyond mere curiosities and novelties, evolving into potent marketing instruments that provide unmatched levels of consumer involvement.

The Economic Impact of Use of Technology in Tourism: In our globally diverse society, the evolution of information technology assumes a pivotal role in driving economic development, with a particular focus on the tourism sector. The advent of technological breakthroughs, exemplified by the inception of the Internet, has wielded a profound influence on tourism by equipping travelers with crucial information for vacation planning [28]. This empowerment enables tourists to forecast their preferences, make informed decisions, and more accurately anticipate their expenses. Furthermore, tourists readily engage with digital marketing materials, igniting a heightened interest in exploring various tourist destinations. This heightened interest can be attributed to the substantial nature of digital marketing, which not only offers comprehensive insights but also exudes persuasive charm, enticing

travelers toward these destinations [29]. Consequently, digital tourism marketing emerges as a pivotal force in enhancing the appeal of tourism destinations. On the other hand, digitalization stands poised to revolutionize and expand the horizons of tourism marketing efforts [30]. By embracing digital marketing strategies, businesses can effectively curtail marketing expenditures compared with traditional methods. This strategic shift not only optimizes financial resources but also facilitates more efficient and far-reaching marketing campaigns, ultimately contributing to the economic vitality of the tourism industry.

Geographical Diversity and Focus: The studies' geographical distribution also offers valuable insights. While Asian papers, particularly from China, have a technological bent, reflecting the region's rapid tech adoption, western studies tend to be more consumer-centric, emphasizing user experience and brand engagement. This geographic differentiation suggests varying market maturities and consumer preferences.

In essence, the reviewed articles present a mosaic of an industry in flux, dynamically responding to technological advances and ever-evolving consumer expectations.

46.4 Discussion

The systematic review has unveiled a plethora of information on the interplay between technology and marketing within the tourism and hospitality sector. As we discuss these findings, the insights from the authors become instrumental in shaping the larger narrative.

Smartphone Pervasiveness and Flexibility: The prominence of smartphones in the tourism and hospitality sector cannot be overstated. Kim and Law [9] posited that the convenience smartphones bring is invaluable both for marketers and consumers. This sentiment is further echoed by Law et al. [11], who emphasized the foundational role of mobile technologies for travel agencies and hotels. Their research underscores how these devices have transitioned from mere communication tools to essential travel companions, aiding everything from bookings to real-time feedback.

The Economic and Social Impacts of Social Media: Social media's impact transcends beyond mere digital interactions. Every smartphone has installed several social media apps [31], and the computer provides also easy access to those platforms. Chu et al. [7] delve into the dual roles these platforms play, emphasizing their economic and social facets. Their findings suggest that while platforms generate tangible economic value through user engagement, they also play a pivotal role in fostering social connections and communities. The economic motivations driving user-generated content are particularly intriguing, suggesting a deeper, more transactional relationship between platforms and users.

Digital Marketing—A Disruptive Force: The digital marketing landscape in the tourism sector has seen tremendous upheaval. As highlighted by Santos and Silva [32], strategies, like SEO, SEM, sentiment analysis, and programmatic advertising

have become paramount. Chamboko-Mpotaringa and Tichaawa [6] took this a step further, noting the disruptive potential of these digital tools. Their work suggests that as the landscape evolves, there's an imperative need for industry players to continuously adapt and reinvent their strategies.

Immersive Experiences—The New Frontier: The realm of immersive technologies like VR and AR holds significant promise. Yung et al. [20] expounded on VR's potential to catalyze emotional responses, enhancing the overall user experience. Their insights are particularly pertinent when viewed alongside Nayyar et al. [16] exploration, which presents VR and AR as more than mere novelties; they are potent marketing tools, capable of crafting unparalleled consumer engagements. The notion of the Metaverse, as introduced by Koohang et al. [10], further amplifies this, signaling a paradigm shift in how tourism experiences are conceived and delivered.

Brand Dynamics in the Digital Age: In an era where brand-customer interactions have predominantly moved online, understanding the nuances of this relationship becomes crucial. Morgan-Thomas and Veloutsou [15] provides a foundational perspective, arguing that technology acceptance is just the tip of the iceberg. The real challenge, and opportunity, lies in fostering deeper brand relationships in the virtual space, ensuring sustained brand loyalty and engagement.

The discussions drawn from this review underscore the intricate dance between technology and marketing within the tourism and hospitality industry. The sector's dynamic nature, amplified by the insights from these authors, emphasizes an ongoing evolutionary journey—one punctuated by technological advances, shifting consumer behaviors and the relentless march of progress.

46.5 Conclusion

This systematic review illuminates the intricate and rapidly shifting contours of the tourism and hospitality marketing sector. At its core, the discourse emphasizes the transformative impact of contemporary tools and strategies such as smartphones, mobile technologies, social media advertising, advanced digital marketing tactics [33], virtual reality, and the burgeoning concept of the Metaverse. For instance, and according to [33], professional human resources are needed to provide intelligent innovation. The development of digital tourist destinations applies not only to artificial tourist attractions but also to cultural or heritage tourism [34].

Smartphones have emerged as pivotal instruments, underpinning seamless communication and fostering unparalleled convenience for both marketers and consumers. The proliferation of mobile technologies has greatly expedited the efficient dissemination of products and services within the sector. Social media advertising, with its dual economic and social significance, propels the genesis of user-centric content, anchored in economic rationale, while concurrently cultivating a rich tapestry of social interactions. Indispensable digital marketing stratagems, encompassing SEO, SEM, and programmatic advertising, have further buttressed the industry's promotional endeavors. Virtual reality, with its immersive potential, intensifies users' sensory engagement, catalyzes poignant emotional reactions, and molds behavioral trajectories. Meanwhile, the Metaverse, in its nascent stages, heralds a paradigmatic shift, poised to recalibrate tourism experiences and inform both managerial and promotional strategies.

To encapsulate, this scholarly examination delineates the sector's inherent dynamism and underscores the pressing imperative for industry professionals to remain agile, continuously assimilating emerging technological trends. By wholeheartedly adopting and integrating smartphones, mobile technologies, social media platforms, nuanced digital marketing techniques, virtual reality, and the expansive vistas of the Metaverse, marketers are equipped to foster robust engagements with today's discerning consumers, ensuring sustained prominence in the perpetually transformative realm of tourism and hospitality.

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Chapter 47 Discrepancies Between Michelin Guide Awards and Google Restaurant Reviews: A Case Study of the Capital City of Prague



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Abstract This study aimed to find out to what extent the restaurant reviews available in Google Maps reflect the expert evaluation of Michelin inspectors in the example of Prague City. We analyzed 5755 Google Reviews of 26 restaurants included in the Michelin Guide for Prague. First, quantitative statistical analysis of online Google Reviews showed a strong relationship between overall quality evaluation and food quality evaluation. Michelin Guide declares their inspectors award only the quality of the cuisine. The crucial role of food quality was confirmed also for regular guests. Regarding price analysis, the frequency of Google Reviews decreases with increasing meal prices. However, the increasing price level surprisingly decreases the overall satisfaction of regular guests with restaurant facilities. Second, quantitative statistical analysis incorporating Michelin Guide awards showed that a Michelin star or Bib Gourmand award does not mean increased price levels. From the point of view of regular guests, visiting such awarded restaurants means more frequent publication of online reviews. Paradoxically, visiting awarded restaurants does not result in greater satisfaction with the food or higher overall satisfaction when compared with non-awarded restaurants. Such a result indicates an apparent discrepancy between the evaluation of experts and ordinary consumers. Our study also concluded that

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consumers visiting an awarded restaurant perceive its atmosphere slightly worse compared with a non-awarded restaurant.

47.1 Introduction

Gastronomy represents a part of cultural tourism, and enjoying exotic cuisines has become an important part of travel experiences [1, 2]. In connection with gastronomy, a new branch of tourism was created. There are travel agencies offering "gourmet package holidays" focused on local food and beverage culture in final destinations [1]. One of the most famous restaurant guides, the Michelin Guide, for more than 90 years awards restaurants with one to three stars, representing a recommendation in connection to making the travel effort [3]:

*High-quality cooking—Worth a stop, **Excellent cooking—Worth a detour, ***Exceptional cuisine—Worth a special journey.

Although the "Michelin Guide is considered the most authoritative indicator in the global gastronomy industry" by Chiang and Guo [4], there are also other reviews on restaurant performance. Besides the expert reviews, such as the ones available in the Michelin Guide [4], there is an expanding customer involvement in reviews, which takes place online [5]. Bang et al. [6] state that even though receiving Michelin stars is considered a prestigious award and an effective marketing tool, their current study did not find any significant effects on functional consumption values, such as economic, food quality, and ambiance quality values, in awarded restaurants. Despite this, according to Kim et al. [5], "the number of online reviews customers make has a significant positive impact on restaurant performance." Lee and Kim [7] agree, state that the success of restaurants is heavily dependent on consumers' review forums, and summarize examples of how the revenue of the restaurant improved with increased ratings.

47.2 Literature Review

There are plenty of online platforms where restaurant guests can share their customer reviews. Some of them can be used more locally, e.g., OpenRice in Hong Kong [8], and some of them are used globally, e.g., Yelp [9] or TripAdvisor [10]. Another example of a globally used platform is Google Maps reviews and ratings (further only as Google Reviews) [11], which represent one of the top sources of online customer reviews of restaurants in various countries [7, 12, 13]. According to Lee and Kim [7], customers nowadays decide which restaurants to visit based on online forum reviews rather than information from personal recommendations or culinary experts. Even the Michelin Group, which traditionally published the Michelin Guide

as a book, currently runs two online platforms with restaurants' reviews—online Michelin Guide [14] and ViaMichelin [15].

To succeed in the food and beverage industry, Dabral et al. [2] highlight the necessity to deliver value for the money offered by a customer. Gagić et al. [16] concluded that food and beverage quality, quality of service delivery, physical environment, and price fairness are key components of the restaurant experience. Although there are restaurant review platforms that evaluate the restaurants only via an overall score (e.g., Yelp), some of them have separate scores for different categories more or less corresponding to the key components mentioned by Gagić et al. [16]. For instance, TripAdvisor [10] evaluates the food, the service, the value, and the atmosphere, and from these all concludes the overall score. Even though the customers usually check only the overall score of restaurants via Google Reviews, there is also a possibility to separately evaluate the food, the service, and the atmosphere. On the other hand, the Michelin Guide officially declares that the stars are awarded only based on the quality of the cuisine served by a restaurant at a given time and do not consider the service, the tableware, or the atmosphere at a restaurant [3]. However, as well as the other big globally used platforms (Yelp [9], TripAdvisor [10], and Google Reviews [11]), even Michelin Guide [14, 15] report basic information about the price range of included restaurants.

Different approaches to the evaluation of restaurants between the mentioned online review platforms became a popular research topic. In 2015, Vásquez and Chik [8] analyzed amateur reviews of one-star Michelin restaurants in Hong Kong and New York City sampled from two forums—OpenRice and Yelp. In 2020, a study by Kong and Heacock [17] was published. They compared results of restaurant inspection reports by Canadian Environmental Health Officers with their star ratings on Yelp and Google Reviews. Lately, Li et al. [18] studied the effect of Michelin star changes on the sentiment and content of consumer reviews of TripAdvisor for all restaurants that were awarded Michelin stars between 2010 and 2020. The aim of this study was to find out to what extent the reviews of restaurants available in Google Reviews reflect the expert evaluation of Michelin inspectors in the last published Michelin Guide for the Czech Republic.

47.3 Research Methodology

The capital of the Czech Republic, the city of Prague, was chosen as an example for achieving the aim. For the quantitative data analysis, two online platforms were used for Prague: the Michelin Guide online platform and the Google online platform. While Google Reviews are a public rating where everyone can contribute by providing an opinion on a restaurant, the Michelin rating is a purely expert matter carried out by Michelin Guide inspectors [3].

In the first phase, the *ViaMichelin: Route Planner, Maps, Traffic info, Hotels* platform was used [15] where 26 restaurants were found for Prague as a destination in the restaurants section. Restaurants were recorded together with their award level,

either one Michelin star (S), Bib Gourmand (B), or a restaurant included in the guide but without an award (N).¹ While in the case of a one-star award, Michelin Guide states "high-quality cooking—worth a stop," in the case of a lower Bib Gourmand award, it states "very good food at moderate price" [3]. It can be expected that there are qualitative differences between levels (S), (B), and (N) based on Michelin Guide ratings. As it was already stated, the awarding of a star is solely based on the quality of the food, while neither the atmosphere nor the quality of the service is considered.² In the case of Bib Gourmand award, the Michelin Guide also does not mention any factor other than the quality of the food and its affordability [3]. In addition, the price ranges indicating the expenditure during the visit (in CZK) and the distance from the center of Prague (in meters) were recorded. More general information can also be found on the *Michelin Guide* server [14], see Fig. 47.1. However, the Prague restaurants listed here are the same as those listed on *ViaMichelin*.

For all 26 restaurants on the Michelin platform, Google Reviews [11] were found in the second phase. In the reviews section, for each of the 26 restaurants, all reviews for the last 11 months (up to August 28, 2023) were recorded. The total number of such analyzed reviews (abbreviated as OVE) was 5755. For individual reviews, their text comments and the number of stars awarded for the overall impression were recorded (1–5 stars). For some of the reviews, the number of stars for the food, the service, and the atmosphere were also available (ranging between 1 and 5 stars for all three types). The total number of analyzed detailed reviews that included food, service, and atmosphere evaluation (abbreviated as FSA) was 2658. We further divided FSA evaluation into FO for food evaluation, SE for service evaluation, and AT for atmosphere evaluation. An overview of the restaurants, their characteristics, and numbers of reviews included in the quantitative analysis is presented in Table 47.1.

Quantitative data analysis was performed through a series of correlation matrices and statistical tests. Specifically, due to the nonparametric nature of the data (low total counts in some cases or ordinal scale), Spearman rank order correlations at $\alpha = 5\%$ were used. When grouping restaurants according to (S), (B), or (N), the Mann–Whitney U test and the Kruskal–Wallis test were used at $\alpha = 5\%$ and $\alpha = 10\%$.

47.4 Results

The initial analysis of Google Reviews data for the 26 examined restaurants is given in Table 47.2. It shows negligible differences in the mean values of individual criteria, ranging between 4.61 (for OVE) and 4.72 (for FO and SE). Similarly, the differences

¹ Although the Michelin Guide rating allows restaurants to get also two or three stars, none of the currently listed restaurants in Prague has such an award.

 $^{^{2}}$ Michelin Guide states that food quality is "the quality of the ingredients used; the mastery of cooking and culinary techniques; the harmony of flavors; the personality of the cuisine as expressed through the dishes; and consistency, both across the entire menu and between visits" [3].



Fig. 47.1 Michelin Guide online search engine: results for the capital city of Prague; restaurant pictures are shown together with locality, price level, and award (S)—e.g., Field, (B)—e.g., Divinis, (N)—e.g., Monarch; source: Michelin Guide [14]

in standard deviations are minimal (0.70–0.93). The correlation matrix shows high multicollinearity, making it inadequate to use the ordinal regression model to explain the OVE values depending on the FO, SE, and AT values. However, all noted correlations in Table 47.2 are statistically significant in a positive direction. The highest positive correlation ($r_s = 0.77$) indicates an increase in overall satisfaction together with an increase in food satisfaction. On the contrary, the lowest positive correlation ($r_s = 0.47$) (but still significant) indicates a moderate increase in the values of satisfaction with the food together with an increase in the values of perceived atmosphere. The above, therefore, hypothetically suggests (but does not explain due to the absence of the regression model) that overall satisfaction could be determined mainly by satisfaction with the food, followed by the influence of satisfaction with the service and the least influence of satisfaction with the atmosphere. In this case, it can be argued that the evaluation of the ordinary guests, hypothetically underlining the major role of the quality of food in their overall satisfaction, is in line with the

Restaurant name	Michelin award ^a	Price span ^b	Center distance ^c	Number of reviews (OVE) ^d	Number of reviews (FSA) ^e
Aromi	(N)	1478–1485	1450	155	68
Benjamin	(N)	1690–1890	2640	12	4
Bockem	(N)	425-1490	2040	121	39
Café Imperial	(N)	300-900	344	1,704	886
Casa de Carli	(N)	1500-1500	534	45	24
CottoCrudo	(N)	2150-2150	1020	63	28
Dejvická 34	(B)	395-1000	2400	152	73
Divinis	(B)	1195–1195	318	252	123
Eska	(B)	668-800	1900	521	182
Field	(S)	650-3200	613	144	85
Grand Cru	(N)	590-1070	527	170	85
Kampa Park	(N)	1215–1915	1400	248	108
La Degustation BB	(S)	950–2100	407	250	106
La Finestra	(N)	1255–1255	871	131	57
La Veranda	(N)	1235-1560	655	71	22
Monarch	(N)	2000–2000	870	127	61
Na Kopci	(B)	825-1050	3980	185	102
Portfolio	(N)	430-1100	291	102	39
Pot au Feu	(N)	895–2050	211	46	22
QQ Asian Kitchen	(N)	1000-1000	1380	134	48
Salabka	(N)	1400-2150	3870	43	17
Taro	(N)	700–1590	2620	126	64
The Eatery	(B)	650–900	2670	320	129
V Zátiší	(N)	490–1490	961	321	140
Výčep	(N)	570–975	2280	262	122
Yamato	(N)	380-2200	1660	50	24
				Total count	Total count
				5755	2658

 Table 47.1
 Restaurants included in quantitative analysis

Note ^a(S): one Michelin star, (B) Bib Gourmand, (N) no award—sole inclusion in the Michelin Guide; ^bgiven in CZK, which stands for Czech currency Czech koruna; ^cin meters; ^d*OVE* overall satisfaction retrieved from Google Reviews; ^e*FSA* more detailed reviews, i.e., particular satisfaction with food (FO), service (SE) and atmosphere (AT) retrieved from Google Reviews

approach of expert evaluators of the Michelin Guide, who also focus their attention on the quality of the food when awarding awards.

No statistically significant correlations were found when the frequency of OVE, frequency of FO, frequency of SE, and frequency of AT for individual restaurants was correlated with the average rating values of OVE, FO, SE, or AT for individual restaurants (n = 26). Therefore, it does not seem that more frequent or less frequent publication of reviews by ordinary guests (either OVE or within one of the FSA categories) means a better or worse rating values of the restaurant by the guests.

Table 47.3 gives the inclusion of quantitative variables indicated by the Michelin Guide for the 26 selected restaurants in the data analysis, namely the distance of the restaurant from the city center and the average indicated price (calculated as the mean price of the indicated price span). No statistically significant correlations were found between the distance of restaurants from the center and the frequency of OVE and FSA reviews ($r_s = -0.03$). Thus, it cannot be said that restaurants closer to or further away from the center of Prague have a higher or lower frequency of OVE or FSA reviews. In the same way, no statistically significant correlations were found between the distance of restaurants from the center and the average rating values of OVE, FO, SE, or AT reviews ($r_s = \langle 0.04; 0.33 \rangle$). Even in this case, it cannot be said that restaurants closer to or farther from the center are rated better or worse in individual reviews. Likewise, no statistically significant correlation was found between the distance of the restaurant from the center and the average prices ($r_s = -$ 0.08). Although it could be expected that the center of Prague with generally higher prices could also mean higher prices in the restaurants included in the Michelin Guide, in the case of the 26 restaurants we examined, this is not the case.

Statistically significant correlations (that could be presumed) indicate a negative relationship between the frequency of OVE reviews and the price level of restaurants ($r_s = -0.55$), and between the frequency of FSA reviews and the price level of restaurants ($r_s = -0.51$). More expensive restaurants naturally show fewer published reviews on the Google platform. On the contrary, a rather unexpected correlation is the negative relationship between the rating values of OVE and the price level of restaurants ($r_s = -0.40$). Although this is the lower end of the moderately strong correlation, it is statistically significant. It shows that more expensive restaurants included in the Michelin Guide tend to be rated worse by guests on Google Reviews.

	1		U			
Evaluation type	Valid	Mean \pm SD	(OVE)	(FO)	(SE)	(AT)
	n		rs	rs	rs	rs
Overall evaluation (OVE)	5755	4.61 ± 0.93	1.00	0.77*	0.65*	0.57*
Food evaluation (FO)	2658	4.72 ± 0.73	-	1.00	0.55*	0.47*
Service evaluation (SE)	2658	4.72 ± 0.76	-	-	1.00	0.54*
Atmosphere evaluation (AT)	2658	4.70 ± 0.70	-	-	-	1.00

Table 47.2 Correlation matrix of particular evaluations from Google Reviews

Note r_s —Spearman rank order correlations, where * denotes statistically significant correlations at $\alpha = 5\%$

1.00

Table 47.3 Correlation matrix of particular evaluations from Google Reviews—quantitative Michelin Guide variables added Added	Correlated variable $(n = 26)$	Center distance r_s	Price level r_s
	Valid <i>n</i> (OVE)	- 0.03	- 0.55*
	Valid n (FSA)	- 0.03	- 0.51*
	Overall evaluation (OVE)	0.04	- 0.40*
	Food evaluation (FO)	0.33	- 0.33
	Service evaluation (SE)	0.17	- 0.28
	Atmosphere evaluation (AT)	0.19	0.01
	Center distance	1.00	-0.08

Price level

Note r_s —Spearman rank order correlations, where * denotes statistically significant correlations at $\alpha = 5\%$

-0.08

The results after including the Michelin awards as a grouping variable, namely the division into awarded restaurants (S) + (B) and restaurants with no award (N), are given in Table 47.4. The Mann–Whitney U test indicates statistically significant differences in the frequency of OVE (U = 25.00; Z = -2.37; p = 0.02) and the frequency of FSA (U = 22.50; Z = -2.51; p = 0.01) depending on whether the restaurant is awarded or not. Restaurants without an award had a lower median (126.00 and 48.00) than restaurants with a Michelin award (250.00 and 106.00). Therefore, guests posting their reviews (including more detailed reviews) on Google do so statistically significantly more if the restaurant is awarded a Michelin star or a Bib Gourmand award. On the contrary, the restaurant's distance from the center does not play a role in obtaining the Michelin Guide award (U = 56.00; Z = -0.58; p =0.56). Likewise, it cannot be said that restaurants awarded by the Michelin Guide are statistically significantly more expensive than non-awarded restaurants (U = 48.00; Z = 1.04; p = 0.30).

While it might be expected that restaurants with Michelin star or Bib Gourmand awards would be rated overall better by consumers (OVE) than restaurants without these awards, the results of statistical testing show that this is not the case (U =3,556,912; Z = -0.48; p = 0.63). As already said above, the rating values of OVE are most likely given by the rating values of FO, so it can be assumed that ordinary consumers posting their reviews on the Google platform do not recognize the difference between (S) + (B) and (N) restaurants in terms of food quality. This result is further confirmed by the absence of a statistically significant difference between (S) + (B) and (N) restaurants in evaluating food quality by consumers posting reviews on Google (U = 731,746; Z = -0.63; p = 0.53). As already mentioned, the food criterion is most important in obtaining the Michelin Guide award. However, ordinary consumers were not able to recognize the higher quality as articulated in the Michelin Guide award. They consider such food quality comparable with food quality in restaurants without the award. An interesting result is a statistically significant difference in the perceived atmosphere on the part of ordinary consumers (U = 708,292; Z =1.92; p = 0.05; $\alpha = 10\%$). However, comparing the medians is not conclusive in

Variable/group	roup $(S) + (B) (n = 7)$ Median (Q1; Q3)		(N) $(n = 19)$ Median (Q1; Q3)		Mann–Whitney U test $(U; Z; p)$		
Valid <i>n</i> (OVE)	250.00 (152.00; 320.00)		126.00 (50.00));170.00)	25	.00; - 2.37; 0.02**	
Valid <i>n</i> (FSA)	106.00 (85.00;	129.00)	48.00 (24.00; 85.00)		22	.50; - 2.51; 0.01**	
Center distance	1900.00 (407.00	00.00 1020.00 07.00; 2670.00) (534.00; 2)0 0; 2040.00)	56	56.00; - 0.58; 0.56	
Price	937.50 (734.00	; 1525.00)	1290.00 (957.50; 1565.00)		48	.00; 1.04; 0.30	
Variable/group (S		S) + (B) $(n = 1824)$ Median (Q1; Q3)		(N) $(n = 3931)$ Median (Q1; Q3	3)	Mann–Whitney U test $(U; Z; p)$	
Overall evaluation (OVE) 5		5.00 (5.00; 5.00)		5.00 (5.00; 5.00))	3,556,912; - 0.48; 0.63	
Variable/group		(S) + (B) ($n = 800$) median (Q1; Q3)		(N) $(n = 1.858)$ median (Q1; Q	3) 3)	Mann–Whitney U test $(U; Z; p)$	
Food evaluation (FO)		5.00 (5.00; 5.00)		5.00 (5.00; 5.00	0)	731,746; - 0.63; 0.53	
Service evaluation (SE)		5.00 (5.00; 5.00)		5.00 (5.00; 5.00	0)	742,947; - 0.01; 0.99	
Atmosphere evaluation (AT)		5.00 (5.00; 5.0)0)	5.00 (5.00; 5.00	0)	708,292; 1.92; 0.05*	

 Table 47.4
 Statistical testing of differences between restaurants awarded by Michelin Guide and restaurants with no Michelin award only included in the Michelin Guide

Note ** denotes statistically significant correlations at $\alpha = 5\%$; * denotes statistically significant correlations at $\alpha = 10\%$

understanding the direction of the difference. It can be deduced by comparing the mean values of the atmosphere rating, which is higher for restaurants without an award (4.72) than for restaurants with a Michelin award (4.66).

The final statistical testing was performed on the individual rating values of OVE, FO, SE, and AT depending on the individual restaurants, after omitting two restaurants with the highest frequency of reviews and two restaurants with the lowest frequency of reviews (to equalize highly different frequencies for tested groups). No statistically significant differences between individual restaurants were found for FO, SE, or AT rating values when using multiple comparisons for the Kruskal-Wallis test (see Table 47.5). This result is, therefore, in accordance with the results mentioned above when restaurants were grouped into (S) + (B) versus (N). Even in this case, consumers creating Google Reviews do not distinguish between awarded and non-awarded restaurants in terms of quality. The previously mentioned tendency of significantly different atmosphere rating values did not show up when testing individual restaurants. The only statistically significant difference measured during multiple comparisons for the Kruskal-Wallis test concerned three post hoc pairs given in Table 47.5, namely in the rating values of OVE. A statistically significantly better rating of restaurant Na Kopci (mean = 4.89) belonging to category (B) compared with restaurant Monarch (mean = 4.30) belonging to category (N) could be expected (p = 0.02). However, it is surprising that the restaurant Divinis (mean

Table 47.5 Statistically significant multiple comparisons of selected awarded and non-awarded restaurants included in the Michelin Guide Michelin Guide	Restaurant	Median (Q1; Q3) Multiple com values, Krusk H (21, N = 3 137.6460; p <		nparisons <i>p</i> kal–Wallis test: 3,475) = < 0.01
			Divinis (B)	Na Kopci (B)
	Divinis (B)	5.00 (4.00; 5.00)	1	-
	Na Kopci (B)	5.00 (5.00; 5.00)	0.01**	1
	V Zátiší (N)	5.00 (5.00; 5.00)	0.05*	_
	Monarch (N)	5.00 (4.00: 5.00)	_	0.02**

Note ** denotes statistically significant correlations at $\alpha = 5\%$; * denotes statistically significant correlations at $\alpha = 10\%$

= 4.43), belonging to category (B), achieves a statistically significantly worse rating (p = 0.01) than the restaurant Na Kopci belonging to the same category (B) and even statistically significantly worse rating than the non-awarded restaurant V Zátiší (mean = 4.80) (p = 0.05).

47.5 Discussion and Final Remarks

We hypothesize that the food quality reported by regular guests on Google Reviews is crucial for their overall satisfaction with a restaurant establishment. Such a conclusion aligns with previously published studies dealing with Google Reviews on the example of local restaurants [19]. The focus of the Michelin Guide on food quality [3] is consistent with the understanding of the importance of food quality by ordinary consumers. We conclude that a smaller number of Google Reviews in the case of an increasing price level of the restaurant is per the economic law of demand. However, the increasing price level also decreases the overall satisfaction of regular guests with restaurant facilities. The explanation for such a result might be linked to higher expectations associated with higher prices, a concept of price expectations that has already been thoroughly investigated [20].

Restaurants awarded a Michelin star, or a Bib Gourmand award do not mean a higher price level compared with restaurants without awards. From the point of view of regular guests, visiting such awarded restaurants will result in more frequent publication of online reviews. The most paradoxical results are that visiting awarded restaurants compared with non-awarded restaurants does not result in greater satisfaction with the food or higher overall satisfaction. Such a result indicates an apparent discrepancy between the evaluation of experts and ordinary consumers. This tendency is also demonstrated at the level of the three case restaurants, which are perceived fundamentally differently in quality by regular consumers but are granted the same award by Michelin Guide experts. Another case shows even a non-awarded restaurant to be perceived better by ordinary consumers. In connection with such results, one can infer the mutual influence of both ratings, e.g., that the Michelin Guide rating could influence regular guests' ratings (and their expectations). However, previously published studies ruled out such a possibility and showed that the influence of the Michelin Guide rating on online comments is completely missing [21]. At the same time, our study comes with the result that consumers visiting an awarded restaurant perceive its atmosphere as slightly worse compared with a non-awarded restaurant.

Based on the above results, Google Reviews form an essential comparative basis for expert evaluation. However, it should be borne in mind that previous research also points to the potentially problematic nature of online reviews associated with the fairness and helpfulness of such reviews [22]. The restaurant operators themselves may then perceive online reviews as a too harsh and hypocritical form of assessment because they find themselves between the different requirements of experts and ordinary consumers when managing gastronomic establishments [23], which is implicitly confirmed by the results of our study.

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Chapter 48 Which Are the Factors That Limit the Tourism Experience in Portuguese Thermal Hotels? An Exploration Using UGC



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Abstract Thermalism is an evolving activity under the pressure of the demands of a more exigent tourist. It is therefore necessary to understand this demand, while thermal facilities are trying to modernise their facilities and services to adapt them to the pressure of increasing competition. This growing interest in wellness tourism is transforming the supply of products and services, making it essential to analyse the tourist experience, being the user-generated content (UGC) in online media a relevant source of information to maintain customer satisfaction and loyalty sustainably. The objective of this work focuses on analysing the factors that limit the tourism experience in Portuguese thermal hotels through the reviews established by the users of these facilities. The analysis of the negative comments recorded shows that

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the thermal hotel experience is mainly limited by elements related to the escapist dimension of the experience proposed by Pine and Gilmore in 1998, although the educational dimension is the least negatively rated.

48.1 Introduction

Thermalism is an activity with a long history that evolves to meet the new demands of an increasingly exigent tourist, so it is essential to know and understand this demand [1]. In recent decades, thermal spas have tried to modernise their facilities and services to be considered facilities for relaxation, adding the therapeutic value of the treatments that can be received [2], thus giving rise to its tourism component. Thermal tourism is defined as the "set of activities related to the use of mineral-medicinal waters in a therapeutic way, covering aesthetic and quality of life issues (...) or having thermal hotels as a central axis" [1] (p. 516).

The increase in the demand and supply of thermal tourism has led to increased competition, which means that thermal hotels have to make a greater effort to understand their clients to achieve greater satisfaction [3]. Concerning the marketing and promotion of these establishments, their sustainability and competitiveness need to have facilities and services that are more and more highly valued, such as the therapeutic use of thermal water and complementary hotel services, among others [2]. Thermal hotels can also offer gym, spa and wellness services, and restaurant options [4]. Trends in recent years point to the re-opening of thermal spas, the modernisation of their facilities, and the improvement of their spa and hotel equipment, due to the changing trends in lifestyles and holiday periods. Thus, the sector is experiencing a period of redefinition and consolidation of the thermal tourism offer, promoted by a growing market in number and diversity [2].

Some authors have approached the knowledge of the experience in thermal spas and spas concerning their facilities (resort or hotel) [e.g., 1, 5–7]. However, the literature in this regard is still scarce. Studies linking the means of accommodation with the thermal tourism experience are limited [1]. Travellers' experiences can be positive or negative, leaving the establishment's reputation in the hands of the online reviews generated by customers [8].

The growing interest in wellness tourism by an evolving demand is transforming the supply of products and services, making it necessary to understand the customer experience and being online reviews a relevant source of information to maintain customer satisfaction and loyalty [7] sustainably. Gândara et al. [1] propose a model for the analysis of the thermal hotel experience based on the well-known four-dimensional model proposed by Pine and Gilmore [9, 10], in which the model specifies the four realms of the experience, based on a Cartesian axis that involves the degree of participation (active and passive) and the consumer's connection with the tourism experience (absorption and immersion), giving rise to four dimensions: educational, entertainment, aesthetics and escapist. The analysis used by the authors is based on the qualitative technique of online review analysis. Balagué et al. [8] point out user opinions generate more trust than official organisation information.

The exchange of opinions on the Internet, known as user-generated content (UGC), is an outstanding source of information for decision-making by other users and organisations [11]. The increase of UGC on the Internet provides a large amount of information that allows us to approach tourists' experiences, opinions and feelings [12]. Online platforms host UGC, where experiences are recorded and disseminated to other tourists, offering valuable pre-purchase information [1]. The importance of electronic comments (e-WOM) has been the basis of studies that conclude that positive feedback generates positive attitudes and encourages purchases. In contrast, negative ones generate the opposite effect. These results are most prominent in the restaurant and hotel industry, as shown by studies [8].

The current tourism sector is characterised by the new habits of tourism demand favouring the intensive use of Web 2.0. Booking.com is an example of a highly valuable source of information worldwide. This source differentiates between positive and negative comments and offers great credibility as it publishes opinions from real customers who are invited to comment [8].

The objective of this study is to analyse the factors that limit the tourism experience in thermal hotels through the use of the reviews made by users of these facilities. This analysis was carried out in Portugal, a country with a great tradition in thermal tourism. Health and wellness tourism is a strategic product for developing Portuguese tourism due to its potential and recent evolution, as stated in the Tourism Strategy 2027 [13]. The comments analysed were obtained from Booking.com.

This work aims to shed light on issues that need improvement in a global experience that integrates balneotherapy services with the hotel's complementary services, accommodation, catering and activities. Improving the thermal tourism experience is the goal of these establishments that pursue the satisfaction and loyalty of the tourists who visit them, which has positive effects on the socio-economic performance of the establishments and the destinations in which they are located, also promoting their competitiveness.

This work is made up of four sections. The first one establishes the introductory questions of this study, as well as its objective and justification. The second focuses on the theoretical context of this study. That is followed by a description of the methodology used and the results achieved. Finally, the conclusions and contributions arising from this study are presented.

48.2 Theoretical Context

48.2.1 The Thermal Tourism Experience

Thermal tourism can be defined as a part of health tourism, providing specific services, including mineral and thermal waters [14] and implies being carried out in a thermal spa to treat certain illnesses, improve psychophysical health or relax the body [15]. Mosqueira et al. [16] go further in their definition of thermalism when they suggest three classifications according to the type of water: thermal centres, which use mineral waters for preventive and therapeutic purposes; spas that offer hydrothermal and beauty techniques using tap water, with or without additives; and thalassotherapy centres, which use seawater and marine components for preventive and therapeutic purposes.

Thermalism has explored new opportunities, and new concepts are emerging in thermal spaces [17], including integrated, holistic and sustainable approaches, such as developing community atmospheres, personal growth and gastronomic experiences [18–20].

For Alina-Cerasela [21], thermal tourism is on the borderline between wellness and medical tourism, depending on the resources used and medical benefits, according to the wellness needs and desires of a huge segment of tourists. According to Mendonça et al. [22], the health and wellness tourism industry seems determined to continue growing as the world becomes increasingly globalised and people seek a healthier lifestyle.

According to Campon-Cerro et al. [23], tourism products that link water and health are a response to modern tourists who are increasingly interested in living better, being thermal springs more sought around the world for their relaxation benefits [17]. Water-related tourism experiences are positively related to satisfaction, loyalty and people's quality of life [23, 24].

Huang et al. [25] also point out that wellness products and services have great potential to fulfil internal needs to feel good about oneself, playing an invigorating role in life experience and satisfaction. In the tourism context, Virabhakul and Huang [26] state that the experience can predict the tourist's intention to revisit and recommend, considering it an important topic to be further explored in the thermal sector.

Thermal tourism must focus on a new approach to experience tourism, structured around the potential of the health and wellness product, based on an integrated development model that uses digital ecosystems and smart business networks as a conceptual building pillar [27].

Gándara et al. [1] carried out a study on the quality of the thermal experience in Galicia (Spain) based on the Pine and Gilmore model [9, 10] and the main aspects described in the SERVQUAL scale [28], which measures the quality of services, to classify reviews. The result leads to a model for measuring the thermal hotel experience. Thus, the aesthetic dimension would be related to consumer decision-making, considering elements related to the enjoyment of the establishment in a

welcoming, interesting and comfortable environment. The escapist dimension would be related to the need for the customer to feel involved in the establishment's activities, using all five senses. The educational dimension focuses on what the establishment wants the guest to absorb from its services by interacting with the staff and other customers. Finally, the entertainment dimension refers to a state of response to the elements presented (see Table 48.2).

Similarly, Mishra and Panda [5] used sentiment analysis to identify areas for improvement in service delivery, customer relationships and hotel management in wellness resorts in India. Tangibility was identified as the most important dimension, followed by empathy, safety, reliability and responsiveness. The authors recommend focusing on elements such as food quality, rooms and accommodation facilities, safety and security, attitude to complaints, staff behaviour, error-free services and adequate training. On the other hand, Chen et al. [29] identified four key drivers in the experience scape in a spa hotel: health-promoting gifts, mental learning, unique travel experiences and healthy diet. In addition, the authors identified positive mediation effects on the relationship between the experiencescape and revisit intention.

Given these precedents, this paper aims to continue to shed light on the thermal tourism experience by identifying the factors limiting it.

48.2.2 Thermal Tourism in Portugal

Portugal is one of the European countries with the greatest wealth, abundance and diversity of natural mineral waters, the official name for thermal waters [30, 31], and with extraordinarily favourable conditions for the location of thalassotherapy units along the mainland coast and in the archipelagos [32].

In Portugal, health and wellness tourism and thermal spas are strongly linked. The exploitation of these spaces has taken place over time in health and leisure [33]. Gonçalves and Guerra [34] add that this link has led to a more diversified range of activities in the wellness and aesthetics segments, often marketed by thermal spas and resorts. Nowadays, thermal activities are shaped taking into account the therapeutic effects of thermal waters, combining them with more recreational and touristic activities, such as relaxation programmes, nature walks, and tasting regional products, among others, to attract more and more users to this sector.

Nahrstedt [35] pointed out that the demand for health and wellness services has become one of the most promising tourism sub-sectors, influencing those responsible for managing tourism destinations in their planning and development. The author added that individuals greatly desire to travel to improve their health and well-being.

The activity of thermalism in Portugal is covered by the Decreto-Lei n.º 142/2004, de 11 junho [36], which has regulated the sector for many years, as well as governing the water exploitation industry, including rules on the creation, organisation and functioning of thermal establishments. According to the Direção-Geral de Energia e Geologia, DGEG [37], there are 63 thermal establishments in Portugal, including

thermal spas and resorts. However, of these 63, only 43 establishments are in use, as seen in Table 48.1 (see also Fig. 48.1).

The centre region is where the country's largest number of thermal establishments are concentrated, with a percentage of around 50%, followed by the north, which represents about 40% of the total [37].

Figure 48.2 shows increased visits to thermal establishments in Portugal up to 2019, justified by the recognised benefits for health and well-being.

The decline observed in 2020 was due to the Coronavirus pandemic. However, there will be a clear recovery in 2022, as there are significant positive components in health tourism that allow rapid growth with great capacities to promote health tourism activities and encourage visitors' intention to travel post-COVID-19 [38].

48.3 Methodology

The present study's thermal spas belonging to the Associação das Termas de Portugal (A.T.P.) (accessed at https://termasdeportugal.pt/ in June 2023) have been taken as a sample. This association has 38 associated establishments, whose objective is "the promotion and technical, economic and social development of thermalism and Portuguese thermal spas".

According to the information provided by the A.T.P., depending on the management, ownership and integration of the thermal spa with the hotel support services, three groups of establishments are identified: (1) thermal spas and accommodation integrated into the same building or with interior connection between buildings (of the same owner or different owners), (2) thermal spas and accommodation in separate buildings and without interior connection (of the same owner), (3) thermal spas with accommodation units independent from the owners of the thermal spas and without direct connection between buildings. Therefore, the first group of categorisation has been chosen as the sample, as it is understood to be the one that responds to an integrated thermal spa experience concerning wellness treatments, accommodation, food and activities services.

Web scraping techniques were used to collect the data. The database to be analysed was built using the reviews posted on the Booking.com platform about the 10 selected thermal hotels. According to Balagué et al. [8], Booking.com is the world's leading online booking portal, aiming to offer accommodation at the best available price. The particularity of this portal is that it only publishes reviews from users who have booked through Booking.com and who have enjoyed their stay by e-mail invitation. That guarantees real and reliable opinions. In addition, this website differentiates between positive and negative comments, which allows the study's objective to be implemented by identifying the limiting factors of the tourist experience. Therefore, only negative comments have been used for the analysis.

The selected sample mainly corresponds to hotel categories of 3 and 4 stars (9), which implies a medium-high quality standard of their services, with 1 being a five-star hotel (high standard). A total of 9329 reviews have been downloaded, of

Municipality	District
Torres Vedras	Lisboa
Viseu	Viseu
Caldas da Rainha	Leiria
Santo Tirso	Porto
Amarante	Porto
Guimarães	Braga
Chaves	Vila Real
Monção	Viana do Castelo
Monchique	Faro
Santa Maria da Feira	Aveiro
Carrazeda de Ansiães	Bragança
Tondela	Viseu
Vizela	Braga
Murça	Vila Real
Sabugal	Guarda
Terras de Bouro	Braga
Manteigas	Guarda
Boticas	Vila Real
Amares	Braga
Anadia	Aveiro
Nisa	Portalegre
Nelas	Viseu
Almeida	Guarda
Idanha-a-Nova	Castelo Branco
Mação	Santarém
Mealhada	Aveiro
Melgaço	Viana do Castelo
Vila Pouca de Aguiar	Vila Real
Alcobaça	Leiria
Terras de Bouro	Braga
Fronteira	Portalegre
Vimioso	Bragança
Penamacor	Castelo Branco
Fornos de Algodres	Guarda
Penafiel	Porto
S. Pedro do Sul	Viseu
Penamacor	Castelo Branco
	MunicipalityTorres VedrasViseuCaldas da RainhaSanto TirsoAmaranteGuimarãesChavesMonçãoMonchiqueSanta Maria da FeiraCarrazeda de AnsiãesTondelaVizelaMurçaSabugalTerras de BouroManteigasBoticasAmaresAnadiaNisaNelasAlmeidaIdanha-a-NovaMaçãoMealhadaMelgaçoVila Pouca de AguiarAlcobaçaTerras de BouroFronteiraVimiosoPenamacorFornos de AlgodresPenafielS. Pedro do Sul

 Table 48.1
 Thermal spas in activity in Portugal

(continued)

Concession designation	Municipality	District
Termas do Bicanho	Soure	Coimbra
Termas do Carvalhal	Castro Daire	Viseu
Termas do Estoril	Cascais	Lisboa
Termas do Vale da Mó	Anadia	Aveiro
Unhais da Serra	Covilhã	Castelo Branco
Vidago	Chaves	Vila Real

Table 48.1 (continued)

Source DGEG [37]

which 3090 are negative comments (section "Disliked"). These constitute the data basis for the analysis. The comments have been downloaded on 24 August 2023. The comments analysed are those registered in Portuguese, the language of analysis.

This paper performs a qualitative content analysis based on a frequency count and a categorisation of the comments following the methodology proposed by Gândara et al. [1]. Table 48.2 shows the dimensions, elements and items used to classify the negative comments of the Portuguese thermal hotels selected in the sample.

The software used for qualitative content analysis is NVIVO. It is a tool that allows qualitative analysis to "help organise, analyse and find insights in unstructured data, such as interviews, articles, social media and web content" (p. 139). The software provided a hierarchical map graphically showing the used codes' structure. The size of the squares represents the frequency of occurrence of these codes [39].

48.4 Results

This work seeks to identify the negative elements that limit the experience in thermal hotels. After the methodological application explained in the previous section, the results are summarised in the hierarchical map shown in Fig. 48.3.

The escapist dimension has the greatest weight in the hierarchical map and, therefore, is the most negatively rated by tourists. It refers to the tangible services of the hotel, such as food, highlighting the variety and quality of the breakfast, being the most mentioned items in the data analysed as a whole. Likewise, the variable "Comfort" is valued, that is, issues related to the rooms, such as the size, temperature, bed or noise and the bathrooms in the rooms. Examples of this are the following comments:

There is obvious carelessness throughout the space: spider webs on the lamps in the communal areas, dust in the wardrobes, the bedroom floor poorly washed and the interior surroundings untidy, which ends up turning the comfort we expect into a less positive experience.



Fig. 48.1 Thermal spas in Portugal. Source DGEG [37]

The quality of the products has also been declining, with no variety, the same offer every day, all tinned or frozen products (bread, croissants, etc.), which is a pity considering the wide range of regional products that could be included to make it a four-star hotel breakfast.

Services are also elements that limit the experience when delivery is not fulfilled. Here, the lack of information on issues related to the hotel, such as the functioning of the swimming pools, the restaurant service or the reception, among others, stands out. The lack of entertainment is highlighted about the additional offer, which guests



Fig. 48.2 Evolution of thermal frequency between 2013 and 2022. Source DGEG [37]

consider as not having a sufficient offer, common areas to share with other users or the car park.

The aesthetics dimension is the next worst-rated dimension, i.e. issues related to maintenance, cleanliness, price, reputation or decoration. In this dimension, the most highly valued items are the swimming pool, the rooms and the hotel in general, given that the lack of cleanliness and maintenance in these areas is something that guests feel cannot happen in hotels of these characteristics. Regarding the price, in some cases, the extra cost of the swimming pool or the fact that there is a duration associated with it causes dissatisfaction among tourists who do not expect it. The price at the pool bar and restaurant is also mentioned. In terms of the environment, the views from the room are highlighted. The fact of not having them has a negative influence. Regarding reputation, it stands out in the comments when the hotel generates confusing information in its communications. An example of this would be the following comment:

Misleading advertising, hotel with no swimming pool on the facilities, we have to walk more than 850 metres to access the pool, and the same situation with car parking.

The Entertainment dimension is the next one to be rated negatively. The main item in this category is the thermal equipment and facilities. Dissatisfaction with the outdoor and indoor swimming pools, the state of the facilities and the jets in the pools is mainly reflected. Regarding thermal hotels, the fact that the pools are not in good condition or the jets do not meet the needs diminishes the experience since it is the product tourists seek. The water quality is also mentioned, mainly highlighting the temperature, as some users specify that it is cold or hot, causing dissatisfaction with the service. One user details the following:

The water in the recreational pool was cold, and I was not convinced that the wellness treatments were with thermal water, so I would not recommend it and will not return.

Dimensions of the experience [9, 10]	Elements evaluated	Items within elements
Escapist	Food	Breakfast quality
		Breakfast quantity
		Restaurant
		Breakfast schedules
		Bar
	Comfort	Rooms
		Toilets
		Room noise
		Room temperature
		Hotel temperature
		Hotel lighting
		Hotel noise
		Hotel access
		Accessibility
		Hotel
		Swimming pool Access
		Security
	Services	Information
		Restaurant
		Reception
		Hotel
		Swimming pool
		Reservation
	Facilities and complementary	Parking
	offer	Animation
		Internet and network
		TV in rooms
		Living areas
Aesthetic	Maintenance	Swimming pool
		Hotel
		Room
		Toilets
	Cleaning	Swimming pool
		Rooms
		Hotel
		Restaurant

 Table 48.2
 Elements evaluated according to the dimensions of the thermal hotel experience

(continued)

Dimensions of the experience [9, 10]	Elements evaluated	Items within elements
	Price	Swimming pool
		Hotel
		Food
	Reputation	-
	Environment	Room view
		Landscape
	Decoration	Hotel
	Location	-
Entertainment	Equipment and facilities	Swimming pool
		Facilities
		Jets
		Quality of water
	Others	Facilities schedules
		Swimming pool área
	Quality of treatment	-
Educational	Staff	Breakfast
		Hotel
		Lack of staff
		Swimming pool
	Personalised attention	Hotel
	Other guests	Disturb

Table 48.2 (continued)

Source Gândara et al. [1]

The opening hours of the facilities and the pool area were also valued. Guests complain about the opening hours, as in their opinion it closes early. On the other hand, the use time is also mentioned because they consider it to be scarce, as in some cases, 1 h of free use is included, and the rest is paid.

The Educational dimension is the least negatively rated. The main item in this dimension is the staff, especially the breakfast staff, where users highlight the lack of friendliness. Likewise, the lack of employees is cited, which means a slower service. Regarding customised attention, complaints about requests that have not been met, unresolved incidents or other issues where a specific response was expected from the staff are highlighted. Examples of this would be:

Hospitality is a serious fault, especially in the hotel's thermal spa establishment that provides services. Lack of sensitivity when talking to customers.

In the hotel, the friendliness of the receptionists leaves a lot to be desired, being the first and, in this case, last time I stayed in this hotel, they could at least explain the functioning of the hotel, the spaces and services they offer.



Fig. 48.3 Hierarchical map of negative comments. Source Own elaboration

Noise generated by other guests is also reported, which would be important for tourists in this type of accommodation, as they are looking for relaxation to a greater extent. Thus, it is mentioned that the noise generated in the facilities or at breakfast is unpleasant. In this sense, Gândara et al. [1] affirm that the clients of thermal accommodation need more commitment from other guests, as the clients of this type of accommodation are looking for relaxation.

These results are in line with the study by Gândara et al. [1], who analysed the quality of the thermal experience in hotels in Galicia through positive and negative comments, highlighting that the dimensions were rated positively and negatively in the following order: escapism, aesthetics, entertainment and educational.

In this case, it seems that the thermal hotel experience is mainly limited by items related to the escapist dimension, by functional factors that complete the basic experience of the tourist in accommodation of these characteristics, i.e. the state of the room, breakfast and bathrooms. Regarding elements linked to service delivery, related emotional factors generate dissatisfaction when expectations are not met. However, the educational dimension is the least negatively rated. That may be because it is a factor that, when present, would be valued more positively since it is not part of the basic hotel product and, therefore, could be an element that enhances the experience. In other words, the basic product generates dissatisfaction to a greater extent. However, issues related to the more emotional part generate dissatisfaction in specific situations, while it would act as an experience-enhancing element in other situations. The guest expects a breakfast, room, bathroom and service with certain conditions, while issues related to staff attention and contact with other guests would enhance or limit the experience.

48.5 Conclusions

This paper has attempted to shed new light on the thermal tourism experience, focusing on the identification of the factors that limit the experience through the use of the reviews of tourists staying in Portuguese thermal hotels and the application as a basis of the model proposed by Pine and Gilmore [9, 10] and adapted by Gândara et al. [1]. The results reveal that the thermal hotel experience is mainly limited by elements related to the escapist dimension of the experience, although the educational dimension is the least negatively rated.

Theoretically, this work aims to contribute to understanding the thermal tourism experience as a field in evolution due to the pressure of changing tourism demand and the need to improve the competitiveness of the establishments that support the thermal experience. This vision of thermal hotels aims to contemplate the thermal experience as an integrated experience of the thermal treatments themselves and the support services (accommodation, catering and activities).

On a practical level, these results allow us to identify points for improvement in the thermal tourism experience, in general, and in Portugal, in particular, to design strategies to enhance the thermal experience in order to achieve the satisfaction and loyalty of these tourists, offer an integrated and emotional experience. All of this, as Torres [2] points out, has to be supported by coordination between the public and private interests of the organisations that make up this sector, where public administrations have to protect these activities and the public interest use of mineral–medic-inal waters, in conjunction with the specific offer of thermal hotels. Furthermore, following Mishra and Panda [5], managers must consider the use of social networks to understand the tourist experience, a means by which thermal hotels can focus attention on those priority dimensions.

The limitations of this study can be identified by using a small sample of thermal hotels in Portugal. It would be interesting to consider a larger sample and analyse other formulas for managing thermal resorts. Furthermore, as a future line of research, the analysis of positive comments is contemplated to make a comparison to discover which factors enhance the thermal hotel experience, trying to generate an integrated experience that favours greater satisfaction and loyalty of the thermal customer.

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Chapter 49 Digital Marketing as a Tool to Promote Rural Tourism Ventures: The Case of Casa da Lagoa



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Abstract Rural tourism emerges as a unique tourism product, capable of attracting the attention of tourists to rural areas whose tourist potential is considerable, but which is sometimes not well used. For this reason, companies operating in rural tourism must adopt specific measures to be able to promote their product/service, and the tourist destination itself, being able to use the various digital marketing tools for the same purpose. In this sense, the main objective of this paper is to analyse the presence of Casa da Lagoa, Portugal, in the different social media, through an exploratory analysis of its website and a quantitative analysis of the other social media used by the company.

49.1 Introduction

According to Decree-Law No. 80/2017, of June 30, 2017, tourist enterprises are all establishments intended to provide accommodation services, for remuneration, having for their proper functioning, an adequate set of structures, equipment and complementary services. These enterprises may be inserted in one of the following typologies: hotel establishments; tourist villages; tourist apartments; tourist complexes (resorts); housing tourism developments; rural tourism developments and camping and caravanning parks [21].

In this sense, rural tourism enterprises are considered to be all those that are intended to provide accommodation services to tourists in rural areas, preserving,

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recovering and enhancing the architectural, historical and natural characteristics of the respective regions where they are located. Thus, rural enterprises can be divided into three categories: Country Houses, Agrotourism and Rural Hotels [21].

As argued by the existing literature, for rural areas, and the companies located there, to be able to combat the digital divide and achieve the development they seek, it is necessary to innovate constantly, accompanying the transition to the digital world. For rural tourism, this transition can go through the simple use of technologies to plan and carry out more innovative and differentiated digital marketing projects [15, 22].

The main objective of this paper is to analyse the digital presence of the company "Casa da Lagoa", through an exploratory analysis of its website, and the quantitative analysis of the different social networks (Facebook and Instagram). In this context, this article contributes so that the companies in the sector can improve their digital presence, improving their communication with their target audience.

In this sense, the present paper is organized as follows: first, the introduction is presented, followed by a literature review, in which the various concepts associated with the theme under study are presented. This is followed by the third part, which presents the methodology that the study follows, the fourth part that includes the presentation of the company under study, and where the analysis of the company's website and social networks is carried out. Finally, the section of conclusions, limitations and suggestions for future research is presented.

49.2 Literature Review

49.2.1 Rural Tourism

Although there is a difficulty in defining the term "rural tourism", it can be understood as a type of tourism that takes place in the countryside, more specifically in a territory characterized by its rurality, low population density and traditional social structures [23]. In this sense, the authors also consider that rural tourism is an activity that takes place in rural destinations, covering regions of low population density, where agriculture predominates, not being the target of large groups of tourists, based on the purpose of maintaining a close relationship with local communities, nature and local products.

Lane [17], one of the most cited authors on the topic of rural tourism, states that rural tourism must have some specificities, such as being located in rural areas, being functionally rural (characteristics such as natural resources and traditional practices), being small-scale, having a traditional nature and, essentially, evolving in a controlled manner. Kastenholz [13] also argues that the definition of the term "rural tourism" requires some characteristics of the "rural", the geographical, social and cultural space, where the tourist experience lived by tourists and hosts takes place. Thus, it is assumed that the experience desired by the tourist reflects the search for authenticity and self-identity.

Portuguese legislation suggests the term "rural tourism" as a designation for accommodation enterprises located in rural areas, with architecture characteristic of these territories, and high accommodation quality requirements [14].

Although there are some advantages associated with rural tourism, it is necessary to "protect" rural areas, since a careless commercialization of resources implies a devaluation of them, which can lead to the loss of identity by local communities [8]. Therefore, it cannot be assumed that the companies associated with rural tourism will save the rural environment, mainly because these companies are small, familyowned, and generally do not have enough qualified people to manage them [10]. In this sense, it is possible to recognize tourism as fundamental to boost the territories, and the economy associated with them, rejecting the idea that tourism is capable of solving all the problems associated with a given rural area [14]. Some authors state that the essence of rural tourism is the territories that live according to their ancestral traditions and customs, and that this is a type of tourism based on outdoor leisure activities, thus allowing tourists to make the most of the natural and historical-cultural characteristics of a given tourist destination [19].

49.2.2 Digital Marketing

In today's society, it is common to use digital platforms, search engines, websites, social networks and other mobile applications to communicate, search for information, buy and sell products/services, and also to perform professional functions [16]. With the evolution of technologies, many companies/sectors of activity have adopted some of the tools associated with digital marketing to be able to develop their brand. In this sense, digital marketing can be considered as a set of activities that an individual or company performs to promote its products/services, attract its target audience, create a lasting relationship with it, and develop the brand image [6].

The view of the concept of "digital marketing" has been changing. It refers to the marketing of a product or service through digital channels. However, it is currently referred to as a process by which people and organizations use new digital media to attract new customers, get to know their current customers (and preferences), promote brands and businesses and increase the number of sales [11].

Although they are very versatile tools and adaptable to each business, digital marketing strategies must be included in a marketing plan, considering the objectives to be met, and also the different means of communication that the company intends to use [18].

In this context, the main tools of digital marketing consist of (1) social media marketing (SMM), (2) mobile marketing, (3) search engine optimization (SEO), (4) website analytics, (5) search engine marketing (SEM), (6) interactive marketing, (7) e-mail marketing, (8) affiliate marketing and (9) digital content creation [7].

49.2.3 Social Media

Nowadays, social media plays a key role in transforming the way the Internet is used, and the way we communicate and process information [9]. Moreover, according to the authors, different social media can be characterized by a high level of interactivity, where various available applications and other communication techniques can be used.

According to Kaplan and Haenlein [12], social media portrays a set of web applications based on the fundamentals and technological ideologies of web 2.0, enabling the creation and exchange of content created by the various users of the various social media. Thus, although there are several classifications of social media, the most cited is the division proposed by the same authors, who classify them based on two different factors:

- Social presence or media richness;
- Self-presentation or self-disclosure.

In this sense, social media allows to create, build and maintain social relationships, becoming the social media with more users, such as social networks. For the present study, based on the authors Kaplan and Haenlein [12] and Aichner and Jacob [1], the following types of social media stand out:

- Social networks: Facebook and Instagram;
- Professional social networks: LinkedIn;
- Video sharing: YouTube;
- Collaborative projects: Wikipedia;
- Service evaluation platform: Booking and TripAdvisor;
- Online forums;
- Blogs.

In the beginning, social media was mostly used in marketing [4], sales, customer service and Customer Relationship Management (CRM) [5]. Subsequently, over the years, social media has been used in the process of employee recruitment [2], internal communication, cooperation [24] and education [3].

Furthermore, social media constitutes new opportunities for companies, brands and organizations, allowing them to communicate more directly with their target audience and, likewise, to listen to their needs, opinions and concerns [20].

Due to the increasing development of new technologies, social media plays a key role in marketing strategies in the tourism sector. To this end, social media is used for the promotion of a territorial brand, a company and the various tourist attractions of a destination, also acting as a way to communicate with tourists before, during and after their visit or stay in a given destination [9]. Also, according to the authors, social media, as an information channel, should be monitored by marketing managers, existing in the various companies linked to tourism, to be able to better reach their target audience, including new potential customers.

49.3 Methodology

The main objective of this paper is to analyse the digital presence of the company Casa da Lagoa, which is located in the municipality of Mira, and which is intended to provide services, more specifically accommodation service, in order to understand its performance in different media, such as Facebook, Instagram and Website. To be able to select the company under study, an organic search was carried out on the Google search engine, using the following keywords: "Turismo Rural Mira" and "Alojamento Rural Mira". In this sense, Casa da Lagoa was the company that most corresponded to the searched terms, demonstrating, from the outset, an optimization of its website for these same terms. Thus, it is proposed to use a qualitative methodology, by conducting a descriptive analysis of the company's website, and quantitative, with regard to the analysis of the other social media used by it.

49.4 Case Study: Casa da Lagoa

Casa da Lagoa is a company dedicated to the provision of accommodation services, located on a farm that is located in the municipality of Mira, Portugal, where it is possible to enjoy the tranquillity that nature provides. In this farm, several agricultural activities are carried out, allowing the guest to enjoy the various agricultural products that are produced there. This tourist resort consists of a total of five rooms, equipped with bathroom, private terrace, and Wi-Fi, where guests also have access to the remaining common spaces such as the dining room, the leisure room, the library and the outdoor terrace. In addition, this accommodation also has a restaurant service (upon reservation), bar service and a store with local products.

It should also be noted that the company values environmental sustainability, having already received two awards for its good environmental practices, namely the "Green Key" and "Biosphere" seals. In addition, in order to become more inclusive, at Casa da Lagoa there is a room that is adapted for people with reduced motor mobility, and the accommodation is designed for wheelchairs, so that these individuals can access the facilities.

49.4.1 Digital Presence of Casa da Lagoa

In order to be able to analyse the digital presence of the company under study, research was carried out on which digital media are used by the company, which are

- Website;
- Social networks: Facebook, Instagram and Twitter;
- Professional social networks: LinkedIn;
- Service evaluation platforms: Booking and TripAdvisor.

Thus, in this research only the company's website, Facebook and Instagram will be analysed.

Website analysis

Table 49.1 presents the main characteristics that were identified in relation to the Casa da Lagoa website, based on an exploratory analysis of it.

Regarding the organic results, using the Google search engine, it was possible to verify that the website is well positioned depending on the terms used. Thus, Table 49.2 shows the terms used and the page on which the website appears. Based on this table, it can be seen that, for all the terms used, the company's website appears on the first page. It is important to mention that according to each term, the website appears in different positions, for example: using the term "Casa da Lagoa" the website appears in the first place. However, if the term "Alojamento Rural Mira" is used, the website appears in seventh place.

Positive characteristics	Negative characteristics
 Attractiveness Simple language Website in three languages Horizontal menu with six items, where only 1 of them branches, presenting two sub-items Call-to-action Access to social networks Possibility to make reservations, redirecting to a booking engine: Cultbooking 	 The item "About us" is missing where one can include mission, vision and values, a short institutional video and a brief history of the emergence of the company Regarding access to social networks, access to Instagram is missing
• It has location indications: Google maps and respective GPS coordinates	• No written directions on how to get to the company
• Contains newsletter and contacts (mobile and e-mail)	• No possibility of immediate support (example: chatbots)
• Activities: tab dedicated to the region and to the services offered by the company	• It should contain a dedicated tab for news/ news releases
	• Should present a tab dedicated to sustainability, where they present the measures they carry out in the company

 Table 49.1
 Casa da Lagoa website

Source Self-elaboration based on the company's website (http://www.casadalagoa.pt/)

Table 49.2 Casa da Lagoa organic results	Used term	Page where it appears	
	"Casa da Lagoa"	1st	
	"Alojamento Rural Mira"	1st	
	"Turismo Rural Mira"	1st	

Source Self-elaboration

Table 49.3 Facebook presence Facebook	No. of likes	No. of followers	Date of last publication	
	2278	2350	13/05/2023	

Source Self-elaboration through the company's Facebook (https://www.facebook.com/casadalagoa.turismorural)

Facebook Analysis

In terms of digital presence, as mentioned above, the company has a presence on Facebook. Table 49.3 shows the number of likes and followers on the page, as well as the date of the last post.

Next, a manual analysis was carried out on the company's Facebook, which is presented in Table 49.4, encompassing the number of publications, likes, shares and monthly comments during the year 2022.

In terms of the content that was published on this social network, it appears that 74% (28) of the publications are images, and the remaining 26% (10) are text publications. In this sense, through the analysis of Table 49.4, we can verify that the month of September was the one in which the company managed to obtain greater interactions and better results, compared to the other months.

Instagram Analysis

Casa da Lagoa also has a presence on the social network Instagram. In Table 49.5, we can verify the number of followers and publications that the company gathers, as well as the date of the last publication.

	1 2			
Month	Publications	Likes	Shares	Comments
Jan.	11	56	24	2
Feb.	6	15	10	0
Mar.	0	0	0	0
Apr.	0	0	0	0
May	5	33	13	3
Jun.	2	8	1	0
Jul.	1	12	5	1
Aug.	0	0	0	0
Sep.	7	140	22	6
Oct.	1	17	2	0
Nov.	2	15	4	1
Dec.	3	12	1	0
Total	38	308	82	13

 Table 49.4
 Facebook post analysis

Source Self-elaboration through the company's Facebook (https://www.facebook.com/casadalagoa. turismorural)

Table 49.5	Instagram	No. of likes	No. of follow	No. of followers		Date of last publication		
presence		358	40	40		20/12/2022		
		Source Self-elaboration through the company's Instagram (https://www.instagram.com/casa_da_lagoa/)						
Table 49.6 analysis	Instagram post	Month	Publications	Li	kes	Comments		
		Jan.	0	0		0		
		Feb.	2	19)	1		
		Mar.	0	0		0		
		Apr.	0	0		0		
		May	0	0		0		
		Jun.	0	0		0		
		Jul.	0	0		0		
		Aug.	0	0		0		
		Sep.	0	0		0		
		Oct.	0	0		0		
		Nov.	0	0		0		
		Dec.	1	2		0		
		Total	3	21		1		

Source Self-elaboration through the company's Instagram (https:// www.instagram.com/casa_da_lagoa/)

In this sense, through a manual analysis of the company's Instagram, Table 49.6 was drawn up with the number of publications, likes and comments per month during the year 2022. Regarding the type of content published, it was possible to verify that 100% of the publications are images. Through the analysis of Table 49.6, we can verify that the company does not have a large presence on Instagram, gathering only 3 publications during the whole year of 2022.

49.5 Conclusions

Digital marketing is increasingly playing a key role in the promotion of companies, being one of the best tools capable of determining their success. In order to keep up with the rapid and constant evolution of the tourism market, companies must be present in the digital environment, realizing that, if this does not happen, it is almost as if the company does not exist.

Regarding the company's website, there are some flaws that can be easily improved. As an example, we point out the creation of a new tab dedicated only to the sustainability measures that are practised in the company, since it stands out with two different awards related to sustainability but does not present the measures that are taken for this purpose.

In view of the results presented, regarding Facebook, it appears that the greater the number of publications, the greater the number of interactions. On Instagram, on the other hand, there is a weak capacity for interaction and attraction of the target audience, and the company only registers a total of 3 publications during the year 2022, which should bet on a greater use of this social network.

After analysing the digital presence, it is proposed to increase the frequency of publications, both on Facebook and Instagram, so that it is possible to obtain greater visibility at the digital level, reaching a greater number of people who are part of the target audience of this company. In addition, it is also proposed to create more interactive publications, thus allowing to build and maintain a close relationship with customers.

The main limitation of this study is that only some of the social media used by the company were analysed. At the level of the analysis carried out on social networks, these were carried out manually, so tools such as Meta Business Suite and Google Analytics could have been used, thus allowing to obtain even more information about the digital presence of the company under study. It should be noted that the tools mentioned above are only available to the company itself.

On the other hand, as a suggestion for future research, it is suggested to carry out a comparative term with the other companies in the sector present in the region where the company is located. Thus, it becomes possible to analyse the digital presence of the remaining companies located in the Mira region, allowing new conclusions to be drawn about the different strategies used by these companies, and it is also possible to determine whether or not they follow the digitalization of business.

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Chapter 50 eWOM of Spain's Tourism Destination in the Rural Context from a Sustainable and Technological Perspective



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Abstract In an increasingly connected world, the electronic word-of-mouth (eWOM) represents a relevant aspect in the management of tourist destinations. This provides interesting insights, as the reviews can express the level of satisfaction of tourists, highlighting the factors that contributed to a positive or negative experience. The number of initiatives for sustainable development and the level of awareness of people to care for the planet have also increased in recent years. So, some authors have focused on analyzing eWOM from sustainability. The aim of this study is to analyze the sustainable and technological perceptions of Spanish tourist attractions located in rural areas through eWOM. The source of information is the TripAdvisor travel platform and two data science techniques are employed. The first one is BERTopic, a topic modeling machine learning with which the main topics are detected. The second is text mining to extract both sustainable (environmental, social, economic, cultural) and technological perceptions. Sentiment and emotion analysis is also applied to measure the ratings and degree of satisfaction. The results indicate that tourists perceive and value the cultural dimension most, followed by the environmental, economic, and social dimensions. This research provides useful information to managers of tourist attractions and stakeholders in the tourism sector in the rural context.

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50.1 Introduction

Technology is immersed in all areas of human life, it has transformed society, and it has generated new forms of communication and interaction between consumers and companies. With the advent of the Internet, companies began to use Web 1.0 as a sales and marketing channel. Later, this reading-only platform evolved into a reading and writing web (Web 2.0) [24], with which users left behind their passive role to interact on the network. This generates a social phenomenon that facilitates the exchange of information between users of a community or social network. With Web 2.0, people participate in electronic word-of-mouth (eWOM) communication, in which they share their opinions and experiences with other users in blogs, chats, forums, social networks, or review sites [11]. The eWOM is characterized as a source of information independent of the commercial influence of companies and has an impact on consumers' purchasing decision-making process [20].

In the tourism sector, eWOM has a great impact, given that the information available to users can speed up the purchasing process (reducing the time and effort required to make a decision) and contribute to a more satisfactory decision outcome [19]. Likewise, the adoption of mobile technologies and apps has had a significant effect on the industry, generating an increase in travel and modifying tourist behaviors [23]. On the other hand, in recent years there has been greater concern about the unsustainable situation of the planet, and there is an ethical need to guarantee optimal living conditions for future generations in the long term. Some authors analyze sustainability and corporate social responsibility (CSR) based on eWOM. For example, it has been studied whether guests explicitly or implicitly reflect CSR and sustainability dimensions in their online reviews [2, 6, 7, 22].

However, most studies address the hotel subsector, and it is not possible to find similar research that examines sustainable eWOM in tourist destinations. Therefore, this research aims to analyze the eWOM of the Spanish tourism destination in the rural context from a sustainable and technological perspective. The study focuses on how tourists evaluate the sustainability dimensions (environmental, social, economic, and cultural) and technological aspects of tourist attractions located in rural areas. First, a literature review is conducted, where the theoretical foundations are established. Secondly, the objective and research questions are established. The methodology used and the results are detailed. Finally, conclusions with theoretical and practical implications are presented.

50.2 Literature Review

50.2.1 Impact of Tourism and Its Rural Context

The tourism industry influences the economy and society, provides infrastructure, generates employment, and increases the quality of life of individuals. However, it harms the planet due to the high use of natural resources, waste accumulation, and pollution, among others [10]. Due to the very nature of tourism, companies in the sector acquire responsibilities and commitments toward the communities and environments where they operate. This perspective fosters the sensitivity of organizations in this sector to CSR and sustainability practices. Moral, ethical, and environmental aspects become essential elements of tourism policy and strategy [8].

In the rural context, tourism refers to those tourism activities that take place in rural areas and that are developed on distinctive and typical characteristics, such as small structures and settlements, family businesses, open, and natural spaces. In addition, it focuses on cultural heritages and traditional practices [17]. Thus, a close link is developed with the economy, creating a mutual dependence between tourism activities and the local economy [12]. The number of tourists in rural destinations has also increased, derived from a greater interest of people in personalized and authentic experiences (including interaction with the community and tasting of local products) [5].

From the perspective of rural areas, sustainability also becomes highly relevant in preserving and protecting both nature and the cultural heritage of communities. One of the approaches that the literature proposes to integrate sustainability in rural destinations is integrated rural tourism [3], which focuses on the active participation of stakeholders. Its purpose is to facilitate the application of sustainable principles that allow for the efficient use of resources while ensuring their preservation and constant improvement. Similarly, tourism in rural areas is considered a key driver for economic and sustainable development, as well as a strategy to face the demographic challenge and the fight against depopulation in some areas of the European Union and more specifically in Spain.

50.2.2 eWOM in Tourism: A Sustainable and Technological Approach

eWOM can be defined as informal communications related to a product, service, or company, which have been created for consumers through Internet-based technologies. It is considered a reliable and independent source of information [15] by customers and is determinant at the time of purchase decision-making. In the tourism sector, there has been a notable increase in opinion platforms that allow users to connect and share their experiences [14], such as TripAdvisor, Booking, Yelp, Trivago, and Expedia, among others. In addition, the tourism industry stands

out for its intangibility and experiential approach, so tourists increasingly rely on eWOM and it becomes a useful tool to reduce uncertainty [13]. Online reviews can be useful to other users when they highlight qualitative characteristics, e.g., perceived enjoyment and readability [16]. Some studies indicate that tourists describe their experiences and opinions for different reasons: (1) altruistic concern for other travelers or the desire to help others, (2) social interaction as a form of participation in the virtual community, (3) recognition by others as advisors or tourism experts (self-improvement or social status), and (4) intention to help the company or generate pressure (expressing their degree of satisfaction or dissatisfaction) [4, 21].

Given the importance of CSR, sustainability, and eWOM within the tourism sector, online reviews have begun to be used to assess the degree of awareness of tourists regarding CSR and sustainability [6]. In turn, it reflects the value perceived by tourists with respect to the sustainable and responsible activities of companies. On the other hand, it is relevant to evaluate how tourists use and value technologies within the sector, since digitization and new technologies modify travelers' behavior, which also represents new challenges for companies and destinations. The impact of technologies in tourism or everyday life [23]. The rise and impact of technology in the tourism sector are reflected in scientific studies, where it is evident that the main research topics in recent years are: (1) acceptance, trust, and technologies, (5) robotics, (6) smart tourism, and (7) virtual reality and smartphones [1, 18].

50.3 Objective and Research Questions

Having established the importance of these issues within the tourism sector, the main objective of this research is set as "to analyze the eWOM of Spain's tourism destination in the rural context from a sustainable and technological perspective" and the following research questions are posed:

RQ1: What are the perceptions and themes that rural tourists reflect in reviews on the TripAdvisor platform?

RQ2: Do tourists' reviews over time reflect a change in perceptions of the dimensions of sustainability and technological aspects?

RQ3: What are the feelings and emotions generated in reviews related to sustainability and technology in rural settings?

50.4 Research Methodology

This research has an inductive approach since it analyzes the eWOM of tourist attractions located in rural areas of Spain. The downloading, preprocessing, and analysis of the data are performed using the Python programming language. The source of information is the TripAdvisor website since it can be considered one of the most used travel platforms by both tourists and companies in the sector. First, the information collection is carried out between April and June 2023. The web scraping technique is used to download the information and comments of the first 180 tourist attractions for each of the 17 Autonomous Communities of Spain, resulting in a total of 3,060 tourist attractions or sites. The attractions are then classified by urban and rural municipalities. For this purpose, Spain's Law 45/2007 on Sustainable Development of the Rural Environment is taken as a reference, which defines a rural municipality as having less than 30,000 inhabitants and less than 100 inhabitants per km². We obtained 554 rural municipalities with 178,314 comments, excluding those written in English and possible duplicates. Therefore, the initial sample of the study is composed of 173,833 reviews of tourist attractions in rural areas from February 2008 to June 2023.

Secondly, a pre-analysis of the reviews was performed, and the text was cleaned up, transforming it into lowercase and eliminating non-informative elements, such as numbers, punctuation marks, or individual characters. Likewise, it was necessary to translate the reviews from Spanish to English because when performing the emotion analysis tests, it was observed that the algorithms and functions designed for the Spanish language used were unable to accurately capture certain emotions present in the comments, such as fear or disgust. Third, to detect the topics and perceptions of tourist reviews, the BERTopic [9] topic modeling machine learning technique is applied, which stands out for being able to capture the semantic context of the texts. Fourth, text mining is used to identify the dimensions of sustainability and technological aspects mentioned by tourists in the reviews. We start from previous literature in similar studies [6, 22] and define keywords that are associated with the dimensions of sustainability (environmental, social, cultural, economic) and technological aspects. Table 50.1 lists some of the established keywords.

With this approach, reviews containing keywords with sustainable and technological aspects are labeled and extracted. It is also taken into account if a review involves more than one sustainable and/or technological aspect. However, in this study, only reviews that represent a single dimension are analyzed (see Table 50.2). That is, reviews involving more than one dimension will be the subject of future research.

Dimension	Keywords
Environmental	Biodegradable, pollution, ecological, extinction, overcrowding, plastic, recycling, renewable, waste, sustainable
Social	Accessibility, host, social change, disability, discrimination, inclusive, handicap, reduced mobility, social impact, resident
Cultural	Craftsmanship, authentic, local food, customs, local festival, local gastronomy, history, identity, typical, tradition
Economic	Quality price, commerce, economy, euro, free, price, €, money, cash, credit card
Technological	Application, app, audio guide, connection, gps, innovation, internet, Wi-Fi, augmented reality, virtual reality

Table 50.1 Keywords of the sustainable dimensions and technological aspects

Table 50.2Number of	
reviews by dimension and/or	
aspect	ľ

Number of reviews	% of total
86.830	50
23.144	13
17.668	10
9.248	5
21.976	13
12.843	7
2.124	1
173.833	100
	Number of reviews 86.830 23.144 17.668 9.248 21.976 12.843 2.124 173.833

50.5 Results

50.5.1 Tourists' Perceptions of Rural Tourist Attractions

For the grouping of the data through BERTopic topic modeling, the k-means parameter is used to obtain 15 groups that represent the perceptions or topics that tourists reflect in the reviews. For each theme, the most significant keywords and the c-TF-IDF score, which reflects how important a word is in the context of that particular group, are obtained. The higher the score, the more relevant the word is to the topic in question. Thus, the scores would range among the topics detected by the model.

The results of BERTopic (Fig. 50.1) detect central themes such as beach (topic 1), nature (topics 2, 6, and 14), culture (topics 3, 4, 11, and 13), gastronomy (topics 7 and 9), and the visit to the tourist attraction itself (topics 0, 5, 8, 10, and 12). It is observed that tourists most frequently mention words associated with the cognitive component of the perceived image of the rural destination, such as the attributes or characteristics of attractions like sand, church, castle, waterfall, and cave, among others. Positive terms associated with the affective component (beautiful, precious, good, spectacular, excellent, etc.) are also evident.



Fig. 50.1 Topics of reviews on tourist attractions located in rural areas



Fig. 50.2 Dimensions and/or aspects over time

50.5.2 Evolution of Sustainable and Technological eWOM

Figure 50.2 shows the evolution of the dimensions over time in percentage terms. It is observed that tourists have given greater relevance to the cultural dimension when visiting tourist attractions located in rural areas, followed by the environmental dimension, which shows a strong increase from 2010 to 2012. The economic dimension shows a decrease since 2010, with low percentages in the years of the covid-19 pandemic between 2020 and 2021, but in the first six months of 2023, an upward trend is evident. The opposite happens with the social dimension, given that an increase is observed over time (omitting 2010) and its highest percentages occur from 2020 to date. Concerning the technological area, a low and constant percentage is evident over the years, compared to the sustainability dimensions.

50.5.3 Sentiment and Emotion Analysis

Figure 50.3 shows the results of the sentiment analysis. The values represent the average of the feelings (positive, negative, and neutral) reflected by tourists in each of the sustainable dimensions, as well as the technological aspect. The highest degree of satisfaction (positive feelings) is obtained in the cultural and environmental dimension, followed by the social, economic, and finally, the technological aspect. On the other hand, the highest degree of dissatisfaction (negative feelings) is found in the technological dimension, followed by the economic and social dimensions.

On the other hand, Fig. 50.4 shows the emotions experienced by tourists. The results show the average of emotions in each sustainable and technological area,



Fig. 50.3 Sentiment analysis by dimensions and/or aspects

expressed in percentage terms. It can be seen that the percentages are similar in some dimensions, while a high percentage is evident in the neutral emotion, which can be analyzed in further research. The cultural dimension presents the highest percentage of happiness (together with social) and the lowest in disgust and fear. The economic dimension has the highest percentage of anger and the environmental dimension in neutral emotions. With respect to technology, it is evident that it has the lowest percentage of joy and the highest percentage of surprise. Likewise, tourists feel more emotions of disgust and sadness in the economic and technological dimensions.



Fig. 50.4 Emotions analysis by dimensions and/or aspects

50.6 Conclusion

This study applies data science techniques to understand the sustainable and technological perceptions of tourists of Spain's tourist destinations in rural areas. The findings help managers of tourist attractions (public or private) to understand the extent to which tourists perceive and value cultural, social, economic, environmental, and technological attributes when they visit. In addition, useful information is provided on the degree of people's satisfaction and emotions associated with each of these aspects. First, over time the sustainable dimensions and the technological sphere have evolved similarly. During the years of the covid-19 pandemic (2020 and 2021), there was a decrease in the economic dimension and an increase in the social dimension, so tourists during that period have likely prioritized social issues more than economic ones. However, in 2023 the economic dimension rises, which may indicate that the consumer is more sensitive to price and other aspects related to the economy. The environmental dimension shows a downward trend, suggesting a decrease in tourists' concern for environmental issues and the preservation of the planet.

Secondly, this research highlights that tourists experience different emotions during their visits and their comments do not show significant extremes or very polarized emotions (extremely positive or very negative). In this case, the comments tend to be more cheerful and neutral, so that other emotions such as anger, disgust, fear, and sadness are in the minority in the experiences. This could indicate that people are willing to write a review when it is suggested to them, as long as the experience is neutral or pleasant. Thirdly, the comments that generate the greatest degree of surprise in people are related to the technological and cultural dimensions. This shows that some of the rural tourist attractions include unexpected and exciting elements that exceed tourists' expectations. Concerning the most cheerful comments, it is evident that the cultural and social dimensions have the highest values, so companies could highlight these attributes to improve consumer perception.

Finally, the research provides a broader and more generalized view of tourists' preferences and perceptions. It identifies the dimensions that are important to consumers in general, as well as the feelings and emotions they experience. This information can help managers or entities of tourist attractions enhance their services or products and improve eWOM management. A comment may reflect a specific problem and a particular person's experience, but the findings of this study detect general patterns or trends in the comments. For example, companies can focus on cultural or environmental aspects depending on their activity, contemplating the emotions and feelings they want to generate in customers, which can increase the degree of satisfaction and generate unforgettable experiences.

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Chapter 51 Hospitality Marketing Strategies in Urban Events



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Abstract The global expansion of tourism has provided several benefits for local economies, since it is not only responsible for creating jobs in several areas but also plays a crucial role in the development of new infrastructures, which is reflected in an increase in the value and relevance of regions, namely by specializing in organizing events and creating attractions aimed at satisfying tourists' needs and extending their stay. It is therefore important to understand what influence events can have on hospitality marketing. This research will focus on the cities of Lisbon and Oporto, due to the greater concentration of events there, in order to understand the influence of events on hotel marketing in the cities of Lisbon and Oporto, identifying strategies in terms of marketing, to capture and respond to the needs of participants in events; analyzing the existence of differences in the marketing strategies adopted by hotel units in the cities of Lisbon and Oporto, and ascertaining the relationship between hotel units and event organizers in event tourism. Finally, it will emphasize the adaptation of the hotel industry and the events industry to the ongoing challenges of COVID-19. The results gathered show that business events and sporting events are the most relevant for the hotel industry in these cities. In addition, in terms of strategies adopted in the case of events in the city, hoteliers attach great importance to price strategy, digital marketing strategy, and targeting segmentation to specific audiences.

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The relationship between hotel units and event organizers is highly valued, although it is still at an early stage, emphasizing the importance of safety communication actions.

51.1 Introduction

The impact of events can extend to various sectors that are in some way related to the events industry, such as the hotel industry. It is therefore important to understand the influence that events can have on hotel marketing, and this research will focus on the cities of Lisbon and Porto, since there is a greater concentration of events in these cities.

According to [1-3] events have become increasingly important in terms of the attractiveness and economic benefits generated in the cities that host them. According to these authors, given the rapid pace of global change in recent years, cities face two choices: constant development to meet the needs created by globalization, or, on the other hand, resistance to change, which will eventually result in the city's stagnation.

From this perspective, the general objective of this research is to understand the influence of events on hotel marketing in the cities of Lisbon and Porto. To answer this question, the following specific objectives were defined: To understand how hotels prepare themselves, in terms of marketing, to capture and respond to the needs of participants in events; to analyze the existence of differences in the marketing strategies adopted by hotel units in the cities of Lisbon and Porto. The growing interest in events and the scale it has taken on has triggered the need to train professionals in the field. The creation of higher education courses at various universities naturally led to many publications. This situation of simultaneous evolution was also seen in tourism management combined with tourism studies and leisure management with leisure studies [4-8]. The benefits of organizing events also extend to the hotel industry. Destination Management Organizations (DMOs) generate business for the hotel industry through destination promotion events. However, it is not clear whether this relationship is valued equally by both parties [9, 10]. For example, in the study by [10] when asked what aspects of DMO services could be improved, hoteliers pointed out that DMOs should focus on attracting potential customers that hotels don't reach, so as not to duplicate leads.

The remainder of this article is organized as follows: a literature review about the influence of events on hotel marketing, and the different approaches to framing it, the methodology used, the results obtained and their discussion, with proposals for future research.

51.2 Literature Review

Although most business events are considered discrete, there is often a common feature that is characterized by the fusion of different types of business events. For example, large conferences can include the exhibition of various products and services. This fusion is intended to add value to the events [11-13].

Another common denominator is personal interaction. Although the advance of technology has proved to be an asset in our daily lives, the reality is that we are social beings who continue to need human contact in our interactions. This contact enhances networking and the development of a relationship of transparency and trust between those involved in the business, which does not always occur through other forms of communication [12, 14]. This type of event brings with it several benefits for the tourism industry, as it means a higher occupancy rate for hotels, various forms of transportation and restaurants. In addition, it can lead to greater consumption and extend to other areas such as local commerce and entertainment and leisure venues. In addition, there seems to be greater value associated with these visitors, as this market segment often requires premium seats in transportation and the highest categories in accommodation [12, 15]. In fact, this sector has seen high growth compared to other sectors of the tourism industry [15]. This increase has led to a new trend called bleisure. The term is a combination of the words "business" and "leisure" and refers to the combination of business and leisure travel into one. Companies have also increasingly recognized the importance and usefulness of combining relaxation and fun in business trips; greater accessibility to technology allows travelers to find opportunities for leisure activities more easily [16]. Thus, one of the main objectives of bleisure marketing is to encourage business travelers to extend their stays, making it possible to visit a greater number of attractions and enjoy recreational activities, which will eventually lead to tourists spending more money after their work activities [17]. It is therefore important to draw up a marketing plan that includes practices that encourage tourists to experience this diversity of activities [18]. In the research on the greater Tokyo region conducted by [18], it was found that the marketing strategy adopted was based on four main areas. Firstly, there is the area of promoting local businesses. As an example, the authors present the case of the Yokohama convention center, which usually shares information with the businesses located on the pedestrian path to the subway station. The fact that retailers can rely on behavioral and socio-demographic data about event attendees makes it possible to prepare customized products that meet the needs of these specific markets [18]. The second area is the development of ancillary programs. These programs include activities such as themed guided tours and team-building activities, which are usually linked to the general event program and stimulate extra consumption by participants. Indeed, bleisure tourists are highly interested in taking part in different activities that include visiting different sites or sharing knowledge among colleagues and other stakeholders [17–19]. The third area is facilitating access to local businesses and attractions. In this sense, unique venues can be considered by event organizers and destination managers. Unique locations make it possible to create unique experiences

which, in turn, can increase revenue. In fact, the quantity and quality of entertainment in cities, as well as the tourist attractions that are considered "must see", are preponderant factors in the decision to extend a business trip [18, 20]. Finally, the fourth domain is characterized by sharing value and profit with bleisure stakeholders, by improving partnerships and creating shared value for destination managers and the local economy. These partnerships make it possible to increase the quality of business tourists' experiences and stimulate extra consumption, thus achieving the main objective of bleisure tourism [14, 18].

From another perspective, and considering cultural events in general, the following characteristics are considered: cultural content, time and location, audience, and stakeholders [1]. About cultural content, this is characterized by the existence of a cultural focus, although it may contain other elements. This focus can concern the products of a particular society and can be related to art, music, literature, cinema, gastronomy, among others. In addition, the fact that the product in focus is "a way of life" or tradition is also considered. This consideration is very important when categorizing cultural events, determining whether it is a more formal event-"high culture", which will take place in specific venues, or, on the other hand, a popular event—"popular culture", which takes place in the streets of the city [1]. In terms of time and location, cultural events tend to take place in specific locations and at specific times. These events usually have very well-defined start and end dates, and a link is usually established between the different spaces where the events take place, for marketing purposes [1]. As for the audience at these events, the public is attracted or invited to attend and participate in the events. They can also participate virtually, in the case of digital events [1]. Finally, another element common to these events is the stakeholders. In addition to those who are already involved in the overall event program, cultural events have a set of stakeholders who are affected or can affect these events in some way. These are individuals or groups who have a direct interest and therefore get involved or invest in the cultural, financial, political, or other aspects related to the events [1].

Many cultural events result from the adoption of traditions and rituals that have been used by DMOs as a way of boosting the development of tourist destinations. However, for this development through cultural events to be effective, it is important that the authenticity component is present, as well as the support of the local community, i.e., it is necessary for residents to identify with what is being presented at the event [21]. As far as hotels are concerned, no evidence was found to support a significant influence of cultural events, particularly on hotel pricing or occupancy. Although the study by [22] focuses on cultural events organized by hotels, it was found that even these do not seem to be a selection factor in the choice of accommodation.

Of the different types of events, entertainment events are probably the most challenging to define. In fact, this category can be so broad that it's difficult to establish boundaries to understand which events can and cannot be included in this typology. Indeed, certain aspects of cultural events and sporting events, for example, have an entertainment component [22–24]. Other times, entertainment events, such as music

festivals, are considered cultural events [25]. However, in this review, we chose to use [22, 23] categorization, which includes concerts, shows, ceremonies of distinction/ recognition, and street performances.

Sporting events have the particularity of generating levels of passion and emotion in participants and visitors that can hardly be seen in other forms of events. In addition to the advantages already mentioned, sporting events can bring other benefits, such as community regeneration and cohesion, often conveying a sense of belonging [26, 27]. However, there is also a darker and less positive side to these events, which is related to aggressive and dysfunctional behavior on the part of fans, which can cause fear in other individuals and condition their participation in these events [27].

Something that has been widely considered in the literature is the influence of push and pull factors as part of the forces that make up motivation [28, 29]. From this perspective, push factors are those that can explain the desire to travel, while pull factors can explain the choice of destination [28, 29]. Thus, push factors can be the need for escape, personal development, relaxation, prestige, and the facilitation of social relationships. Pull factors are characterized by novelty and education, which are related to the attractiveness of the destination [29]. Events can be considered as influencers or even pull factors, as they contribute to making destinations unique [28].

Events, as a rule, create a physical and temporal space that allows us to connect with others, facilitating the organization of special moments that are difficult to conceive and reconcile in everyday life. The growing presence of technology in everyday life has enabled permanent contact with those closest to us, albeit virtually. However, most people attend events because they crave socializing and sharing unique experiences with friends, family, and people with common interests [30]. For an event to be successful, it is necessary to segment the market to attract the desired audience for each type of event [1, 31].

Although there are various definitions of the consumer experience, all of them emphasize the importance of its intangible dimensions, such as the emotion or symbolism that an individual can attribute to the experience. In fact, many companies are increasingly using this dimension to retain customers, attract investors and, consequently, boost their sales [32]. In the hotel industry, this perspective is particularly relevant, given that the intangible experience is at the heart of the services promoted by this sector [33]. It has been documented that one of the factors that is highly relevant to customer satisfaction and subsequent loyalty is the quality of the service provided, demonstrating that the hotel experience involves not only tangible components, such as the physical elements of the accommodation, but also intangible components [34]. This change can be enhanced by shifting the focus from the traditional marketing mix (7P's) to experiential marketing (4 E's), which focuses on the set of components that a company can use to offer its customers a unique experience that meets their expectations [32].

According to the American Marketing Association, marketing is defined as the activity and set of processes used to create, communicate, deliver and exchange offers that bring value to customers, partners, and society in general [35]. Although they may differ in some respects, the definitions of marketing are usually based on

customer value. In this respect, before a customer purchases a product or service, there are some costs as well as some benefits inherent in choosing a specific product/ service. Thus, it becomes clear that to create value for the customer, companies must study the customer's needs and desires to adequately satisfy these dimensions before the competition does [36]. Given the characteristics of hospitality and the definition of marketing, hotel marketing can be seen as the set of processes through which companies in the hospitality industry create unique, unforgettable, and valuable experiences for their customer, to build loyalty and, possibly, count on their recommendation [36]. The occurrence of events in cities seems to be an excellent opportunity to maximize a hotel's revenue by creating special rates or Pay per Click (PPC) campaigns that refer to the event and motivate hotel bookings [37, 38].

51.3 Methodology

Considering the research and the objectives previously defined, this study is based on a qualitative, exploratory, descriptive, and cross-sectional methodology. Qualitative research involves more prolonged contact with the participants and is ideally conducted in the environment where they feel most comfortable, so that the information obtained is as close as possible to the reality experienced by the participants. The researcher takes a holistic view of the context under study, remaining attentive to certain elements such as ways of working, explicit and implicit rules, among others [39]. This method also presupposes that the researcher can infer and collecting information through the perceptions of the participants by empathically and attentively understanding what is transmitted to them. Thus, they must then try to understand the meaning that the participants attribute to the experiences reported [39]. The general objective of the study was: To understand how events influence hotel marketing in the cities of Lisbon and Porto.

The specific objectives are:

- 1. To understand how hotels are preparing, in terms of marketing, to capture and respond to the needs of event participants. As mentioned above, although it can be inferred that events play an important role for the hotel industry, in that they can boost revenue, the strategies adopted by hotels are not known in detail. For this reason, it is important to understand how hotel units act and what practices they adopt to attract a greater number of tourists [37, 38].
- 2. To analyze the existence of differences in the marketing strategies adopted by hotels in the cities of Lisbon and Porto. Given that the Portuguese capital hosts a greater number of events and events of a larger scale, such as the Web Summit, Rock in Rio, NOS Alive, and the Estoril Open, among others [40], we thought it would be pertinent to find out whether the practices adopted by hotels in Lisbon have any specific characteristics compared to the strategies adopted in Porto.

Question/Speech	Objective	Literature Review
 What do you think of the impact that events have on the hotel industry? What do you think is needed at hotel level in order to attract a greater number and quality of events to the city? 	 Understand the impacts of holding events in the hotel industry Analyze hotel conditions for hosting events 	[1, 12, 22, 25, 32, 40-42]
3. How do you think the hotel industry can help make certain events more impactful?		

Table 51.1 Semi-structured interview guide for hotel units

Source Authors

Considering the research question and the previously defined objectives, this study is based on a qualitative, exploratory, descriptive, and cross-sectional methodology. Research based on qualitative methodology makes it possible to understand problems by obtaining a more in-depth understanding of the subject from individuals with extensive knowledge of the research topic [12, 41]. One of the main tools used in qualitative methodology is the semi-structured interview. This tool makes it possible to obtain rich information and an in-depth analysis of the subject under investigation, by directly approaching the topic under study and the contact between researcher and interviewee without interfering with opinions [42].

For this research we chose to approach both representatives of event organizers and representatives of 4 and 5star hotels in the cities of Lisbon and Porto, which is the population under study. Only 4 and 5star hotels were considered, as it was felt that lower category hotels would be unlikely to have a dedicated marketing department. The sample included four representatives of organizations linked to the organization of events in Lisbon and Oporto and seven representatives of hotel units—four from the city of Oporto and three from the city of Lisbon, making a total of eleven participants (Table 51.1).

51.4 Results

51.4.1 Impact of Events

a. Hospitality perspective:

About the impact that events taking place in the city have on hotels, there was a consensus among the participants that there is a very positive impact on hotels. The interviewees say that there is generally an increase in demand, which consequently generates increases in bookings and considerable increases in ADR.

We're talking about those big events. Medical events, pharmaceuticals (...) but mainly international health associations, in this case cardiology, pneumology, diabetes, among others, or IT events as well, big ones (...) immediately cause a normal business that exists for the city (...) to skyrocket in demand and then we must identify that opportunity and not only be able to maximize on that demand, but also often go out and find that business. (E2)

In our case, (...) it was the soccer events that were important in terms of bookings (E4). (...) but the basic thing would be prices go up, availability is conditioned for tourist agencies, for OTAs, for all that, because obviously what matters is that we sell directly, without having to pay any commission. And when there are strong events, you can do it (E5).

However, in addition to the aspects mentioned above, there are others that can also be influenced by the occurrence of events in the city. An example of this was the sporting event that took place in Porto in May 2021: the *Champions League*. According to one of the interviewees, the event in the city led to the early opening of some hotel and restaurant establishments.

(...) the event that we opened precisely for, which was the Champions League.

(...) The impact was such that even more hotels opened before the deadline. Restaurants also reopened for the occasion. So, an event that has such an impact on a city obviously ends up influencing hotels and all the other tourist venues (E5).

Indeed, sporting events are of great importance when it comes to attracting visitors to cities. The study carried out by Andersson, Bengtsson, and Svensson (2021) mentions that a mega-sporting event, in this case the European Football Championship, proved to be the most significant factor for fans to visit a given destination. However, the same study states that the destination itself also played an important role and that the main factors for fans to visit included aspects such as the cost and convenience of traveling to the destination, the attractions and activities and the climate.

Given the above factors, and even though these are events of different sizes and duration, it is easy to see why hotels and other tourist organizations brought forward their opening dates to host this event, especially at a time when events in Porto were practically non-existent.

b. The organization of events:

In addition to sporting events, some interviewees also highlighted the importance of business events and the impact they had on the city and the hotel industry, resulting in an increase in average spending because of staying longer in the destination (E11). It was also mentioned that these events are particularly important at times when demand for the destination is low (E9). Both the interviewees representing the hotel units and the representatives of the entities involved in organizing events agreed on these points. To reinforce his colleagues' point of view, one of the participants involved in organizing events pointed out three fundamental aspects underlying this type of event. The first relates to seasonality. Since these events take place in months of lower demand, they end up combating seasonality. Another positive aspect is the fact that the average stay is extended, since the participants in these business events end up staying for the days of the event and, as a rule, tend to add another

day or two to their stay to get to know the city. The third aspect is related to the increase in revenue generated. Generally, business event participants are specialist individuals with greater purchasing power, who end up spending more, contributing to the increase in revenue.

This report is in line with what was previously described in the literature review, thus verifying the positive economic impact of the fact that they are *premium* customers, who require, for example, high accommodation categories [40, 41, 43, 44]. It is also confirmed that there is a growing tendency to combine business with leisure—*bleisure*, which culminates in a longer average stay than most leisure customers [12].

Corporate tourism, which has great advantages over leisure tourism. (...) These events are very important for three fundamental reasons. (...) Firstly, seasonality. These congresses are rarely, if ever, held in June, July, or August. That's not a time for corporate events, it's a time for vacations. And these events are mainly held in months like October, November, December, January, February, and March, when it helps us to have people and combats seasonality. (...) The second has to do with the average stay. (...) the average stay in the city of Porto at the time was 1.8 nights, which is short. Since this type of corporate tourism, when there's a congress, is usually 2–3 days. They prefer to stick to the weekend (...) so it's easy to extend the stay from 1.8 to 2–3 for corporate tourism, plus 1–2 for leisure tourism. (...) At the same time, the third point (...) is the average cost we spend on a stay. (...) Since this type of corporate tourism (...) are people with consolidated careers, they are great specialists and so they fill the big hotels in Porto, they fill the good restaurants (...) and basically, the revenue per stay from this type of tourism is incomparably higher than leisure tourism (E1).

(...) in corporate, they enjoy it a lot. If they come for 2 days of a congress, they stay another day. In the case of Porto, it's very noticeable, 2 more days to get to know the city. It happens. There are extended stays (E7).

51.4.2 Conditions for Hosting Events

a. Hospitality perspective:

Regarding this aspect, most of the interviewees were asked what they thought was needed at the hotel level to be able to attract a greater number and quality of events to the cities and how they thought the hotel industry could help boost the impact of certain events. Most of the participants were unable to answer the questions without mentioning aspects more closely linked to the destination, i.e., its inherent characteristics, such as its historical heritage, or even the issue of the city's new infrastructures.

These narratives allow us to understand that there is possibly a link between the different organizations and that they end up being almost inseparable elements, *everything* being *related to everything* (E2).

(...) In other words, tourism growth has brought more accommodation. Accommodation of a higher quality. (...) It has brought something that didn't exist much 10 years ago, which is the development of new types of cuisine, Michelin-starred cuisine... (...) This has led to

Lisbon appearing in the media, appearing in the media, and then, for event promoters, it's also good, it captures attention and then we're at a level we weren't at (E2).

Because as soon as a destination manages to win an event of a superlative nature, then the conditions must be created for the destination to be able to receive the participants of that event in a dignified manner. And to that extent, there is a need to create a series of infrastructures or improvements (...) namely the issue of security, new entities that must be created for the planning and marketing management of events (E3).

However, when infrastructure is mentioned, not only the venues where the events will take place are considered. Access must also be considered, namely the airport, roads and transport, ensuring that the city is well equipped in these respects.

(...) there are basic things that are needed. Infrastructure. The city must have the capacity to support events. In the case of Porto, we have everything from the Estádio do Dragão to the Alfândega, (...) We have various infrastructures that allow us to cater for many people, but mind you, when I talk about infrastructures, I'm not just talking about the site of the event itself, I'm also talking about access. There must be an airport with good access, there must be good roads, there has to be public transport (...) And obviously (...) there has to be a range of hotels to support visitors to the city (...) (E5).

As far as the hotel offer is concerned, the interviewees believe that there is enough on offer to cope with the events that are currently taking place in Lisbon and Porto. In fact, over the last few years, there has been a great deal of growth in this area.

(...) In other words, tourism growth has brought more accommodation. More quality accommodation (E2). (...) because in fact there are more than enough hotels in Porto (E3). (...) now, I don't believe that hotel capacity in Porto is reduced for major events. I think we're up to it now (E7).

Also in this chapter, and specifically about hotels, the participants listed various elements that they consider to be crucial for attracting and/or retaining participants in these events. In the end, they mentioned aspects such as the flexibility of the hotels themselves, especially regarding check-in and check-out times, giving the example of those attending festivals or sporting events.

(...) A show that goes on until 2am or 3am, we can't force people to have breakfast at 9am (...)Those races... marathons that start at 7am, we can't open breakfast at 8am (...) an important role for the hotel industry was to understand what events we are working on and have some flexibility to adapt to that circumstance, to that audience (E6).

Other hotels end up mentioning some of the special features of their hotels, which end up being valued by their target audience. For example, a hotel that is more linked to business tourism may end up paying more attention to aspects related to its work areas.

(...) work areas, too (...) or even common areas that are adaptable so that the client can work with internet, Wi-Fi (...) (E3). (...) For example, sports [events], sometimes the hotel must have facilities to satisfy customers in these areas. (...) We have a soccer pitch, which ends up being an asset for the hotel when there's a big soccer event (...) (E7).

b. The organization of events:

From the perspective of organizing events, when asked about the aspects that could condition cities in their ability to host events, interviewee E1 mentioned that the main constraint he identified was in terms of infrastructure, but that now with the Rosa Mota pavilion, which has the capacity for 8,000 people at congresses, there is already the capacity to go up a level in the quality of the events we host (E1).

Other interviewees mentioned the capacity of hotels to respond as a constraint (E8 and E9). Participant E1 also stated that he accepted that, until 2015, the number of beds could have been a constraint, but that he didn't believe that to be the case today. Also in this area, the representatives of the event-related organizations made suggestions as to how the hotel industry could contribute to attracting events. In this sense, they agreed on greater coordination between the hotel industry and event organizations.

It is necessary to gain scale (...) greater investment and greater effort in attracting events through proximity and continuous work with the main event organizers (E9). Greater coordination with the organizers of these events, with a view to putting together packages that include other activities in addition to accommodation and transport, as well as entry to the event (E11).

51.4.3 Marketing Preparation of Hotels for City Events

51.4.3.1 Influence of Events on Hotel Marketing Strategies and Revenue Maximization

a. Hospitality perspective:

About this parameter, almost all the participants said that events played a major role in defining their hotel's *marketing* strategy and revenue maximization strategies, even mentioning that when they start a *budget* for the following year, these aspects are already being considered (E2). They also felt that events can have a huge influence on the hotel industry, especially in cities that don't rely so much on leisure, and that for this reason it is extremely important to establish strategies that meet the needs of a particular public at a particular time.

(...) people come to a city like Lisbon to experience the city, to experience the events, (...) so we have to be aware of what's available, what's on offer in the market and then adapt our marketing plan, (...) how we sell, how we market the image of the unit, in relation to the public we're going to receive and who are looking for the city in a given period (...) (E6).

However, not all the participants agree on this issue, with one of the interviewees mentioning that events do not play a fundamental role in defining these strategies, since in the case of this hotel, demand is almost exclusively organic (E4). Although the interviewee assumes that there is, in fact, a continuous commitment to a digital *marketing* strategy, both in terms of campaigns and social networks, this strategy is

not guided by the events that take place in the city. There are times of the year when this strategy could have greater expression, giving the example of *black week*, but they are hardly influenced by events in the city.

(...) our commitment to digital is continuous. Whether it's in terms of campaigns, or even social media. (...) For example, I can tell you that there's a greater focus on digital at fixed times, yes. Like black weeks (...) not being influenced, for example, by events, (...) because normally, the demand that happens is organic, whether it's national or international (E4).

In fact, other participants mentioned that at a time when there was a greater influx of tourists in the city, between 2017 and 2019, when this demand was essentially organic, there wasn't much need to promote the hotel units or even the city itself, as the representative of the organization linked to events in the city of Porto has already mentioned.

(...) but recent times have been the "Eldorado of hospitality", so there wasn't as much need (E7). (...) Because we felt, once again, that people came here organically, and we didn't need to be the ones to promote it (E1).

However, while interviewee E7 recognizes the importance of starting to define a marketing strategy that also includes the events taking place in the city, this issue does not come up with interviewee E4. This could also be explained by the premium location and type of hotel in question. As she says, the hotel can be considered a boutique hotel and although it offers great service, its location may not be as appealing to corporate clients, for example, if you consider that these events end up taking place in key locations other than the city center. Another factor to bear in mind is the fact that the hotel has only been open for a short time. The hotel opened in 2019 and in the meantime ended up closing during lockdown periods, and on the occasions when it was open there weren't many events.

(...) I believe that corporate events are also important. However, they don't usually choose a type of hotel like ours. Why is that? Because although we are a boutique hotel, we are a hotel for people to get to know the city. (...) these corporate events take place in key locations, such as the Alfândega do Porto or the Congress Center. (...) in our case, this type of event is not very important (E4).

As for the participants who felt that events had a significant influence on their marketing and revenue maximization strategy, many mentioned that this has increasingly been considered and where there has been a growing commitment.

Through the narrative, it emerged that this commitment is perhaps a little more significant in hotels that rely heavily on the corporate segment, and which in one way or another try to attract events of this size to their units.

(...) we're also trying to attract these big events to us because we also have a congress center. So, being able to get 500 people to sleep and eat in the same place is something that there is one hotel, two hotels (...) in Lisbon, and I think maybe one in Porto, (...) but I think they are the only ones who can do this (E2).

However, the other participants mentioned that, also thanks to these events, there ends up being a greater connection and close relationship with other departments,

since the primary objective is always to optimize revenue. To do this, they end up *communicating with the revenue manager on a regular basis to align strategies* (E3). In this way, it is necessary to understand the behavior of certain factors such as availability, what is defined as the *competitive set* and what is on offer, so that a *pricing* strategy can then be outlined. Interviewee E5 also corroborates this line of thought, mentioning that an event will always *affect the occupancy of a city and, with it, the pricing strategy*. To illustrate the influence that events can have on a hotel's strategy, the interviewee gives an example:

(...) to give you an idea of the impact an event can have: during the Champions League, in those two weeks when word got out that it was coming, (...) in the first few days, everything that was available for sale just disappeared! People started to notice, they immediately started to raise prices. I even saw rooms in hotels here in Porto (...) for something like a thousand euros a night. Rooms that, these days, are going for 100 euros a night, or something like that. That's the impact. That's the effect on strategy (...). (E5)

In addition, and always depending on the event and the hotel in question, hoteliers can launch offers that, supported by the event, can boost their revenue.

(...) if I know that the event lasts 4 days, I don't want 2-night bookings, I want 3-night or 4-night bookings, minimum. (...) Or, directly make offers, don't you? "Stay 4 nights and get the deluxe pack with breakfast in the room every day". Something like that. (E5)

b. The organization of events:

As far as these participants are concerned, they believe that events can and should influence hotel *marketing* strategies. Since these times are *peaks of demand, they encourage customers to discover the units (E8). They* therefore believe that hotels *should adopt communication and promotion strategies geared towards events, where they can attract new customers (E9)* or even *customers who have already been to the hotel and may want to return to take part in the event (E11).*

51.5 Conclusion

In response to the objective of understanding how hotels prepare themselves, in terms of *marketing*, to capture and respond to the needs of event participants, there was a scarcity of studies referring to the strategies adopted by hotels in the presence of events. Nonetheless, those that do exist have shown that there seems to be an increase in demand, which ends up translating into an increase in rates for hotels close to the events under analysis [12, 17, 23, 45]. This data suggests that the industry is really taking advantage of the increase in demand resulting from events. However, apart from a *pricing* strategy, there are no references in the literature to other strategies. Although the importance of events is also mentioned by specific platforms that provide statistical data with a view to implementing revenue maximization strategies, such as *OTA* Insight (OTA Insight, 2018) the use of these procedures in the presence of events is poorly documented.

In this sense, this research provides relevant data on the strategies that are used when events are approaching or taking place in Lisbon and Porto. The lack of information in the literature related to this aspect may be influenced by a factor that was mentioned by some of the participants—the fact that demand is organic. In fact, the cities under study saw a huge growth in tourism in the years prior to the pandemic. As a result, some stakeholders reported that, at that time, it wasn't exactly essential to develop specific actions to attract participants, because, with the existing demand, they didn't feel the need to do so.

However, in recent times, there has been a paradigm shift, and, in a process of recovery, the use of these strategies will be almost essential. The data obtained showed that some hotel units with a strong connection to the *corporate* segment end up valuing this type of strategy more, as it can be a means of attracting events to their units. With regard to the procedures adopted, it was observed that, as mentioned in the literature, a lot of importance is given to the price strategy [46–48]. There are other procedures that are beginning to gain prominence. The use of a digital *marketing* strategy has been a growing bet in several hotel units, as it seems to be able to boost hotel revenue [49, 50]. In fact, several participants said that this type of strategy is starting to become part of their daily lives, since, at a lower cost, it makes it possible to segment and reach a specific and relevant audience for a given occasion or event.

Even so, there are other methods that are part of the *marketing* strategy and continue to be highly effective. Procedures such as creating partnerships with the organizers, becoming the event's reference hotels, or creating packages, parallel to the event and specific to accommodation with a visit to the city, were mentioned. This last procedure is also supported by what is described in the literature review, which mentions that the creation of activities related to events ends up boosting the economic impact on various sectors of activity, including the hotel industry [51, 52].

About the differences in the *marketing* strategies adopted by hotels in the cities of Lisbon and Porto, it was not possible to consider significant asymmetries between the strategies adopted by hoteliers in both cities.

Initially, it was thought that because the Portuguese capital hosts larger events, there might be some kind of specificity in the strategies adopted by hoteliers. However, we were unable to ascertain whether this was true. This may have been influenced by the fact that there were fewer interviews in the Lisbon area than in Porto, as well as the fact that we obtained the impressions of two individuals representing the same hotel in Lisbon. Even so, it was possible to see that the hotel units in both Lisbon and Porto, which are more closely linked to the *corporate* segment, end up being very proactive in seeking out this client, not only to attract events to their hotels, but also participants in business events taking place in the city. This attraction is usually carried out using procedures that range from looking for partnership opportunities with the relevant authorities to using technological tools.

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Chapter 52 Comparison of SMART Tourism Models of Selected European City Destinations



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Abstract The aim of the paper is to analyse and compare the smart city destination models and strategies of selected smart city destinations in Europe. The development of tourism after the covid pandemic, combined with already advanced and ever-growing urbanization, puts pressure on the management of cities and tourism destinations. The concept of smart cities was originally perceived as a technological matter. Today, it represents a comprehensive technology-based approach to the management of cities and city tourist destinations. Three city destinations, València, Vienna and Prague, were included in the research sample. The method of quantitative and qualitative content analysis was used dealing with selected strategic materials and other sources of content relevant to the analysis of smart city destination models. The analysis focused on two main areas of the SMART city concept, namely Strategy and governance and Technological solution. The starting point of the analysis was overview of destination governance. The analysis of the setting, content and interconnection of strategic documents showed that discrepancies and issues can be identified in the case of Prague. The examined scope and quality of digitization projects showed the dominancy of València and underdevelopment of Prague.

52.1 Introduction

The last decade brought new phenomena in the economic and social spheres. The covid pandemic, energetic crises, economy development and structural shifts has changed the patterns that have been in force until then and has meant significant quantitative and qualitative changes in international tourism, air transport or destination marketing management [40]. After the dramatic drop in international tourism in 2020–2021, we are witnessing a revival and promising dynamics of international

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arrivals and incomes, and therefore positive economic effects of tourism in destinations, including urban ones. More than 960 million international tourists spent 1 trillion USD in 2022, so reaching 66% of pre-pandemic level in international arrivals and 64% in receipts from international tourism [64].

At the same time, the process of urbanization continues, which can have significant social, economic and environmental implications. According to the United Nations and World Bank 55% of world's population lives in urban areas, nevertheless by 2050, up to 70% of the world's population is expected to live in cities. The urbanization in Europe reached 74% in 2018 [66]. The complexity of the urbanization process places demands on the strategic urban planning and management incl. land use of cities, or tourism city destinations. The increase in the number of inhabitants changes the economic, spatial, infrastructural, environmental and social and cultural conditions in cities and thus affects cities as tourist destinations [63].

A tourism destination can be understood as a place visited by visitors, which is the main visited place of their journey (UN IRTS, 2010). A destination is represented by a bundle of different services concentrated in a certain place or area. A destination is understood as a "geographic space (state, place or region) that the client (segment) chooses as their travel destination" (Bieger [4], p. 3). The destination marketing management concepts are constantly evolving from traditional management, to **destination governance and destination stewardship** based primarily on managing supply and demand, partnership, increasing sustainability awareness and requirements, placemaking, achieving smarter tourism development, enabling technologies, social inclusion and resiliency [68].

The original **smart city concept**, applied to a noticeable extent since 2010 and originally associated mainly with the introduction of technology and digitization, is increasingly being used in destination governance. In particular, the covid pandemic accelerated the need to deploy digital technologies and focus on sustainability, for which the smart city concept represents a compatible starting point.

The aim of the paper is to analyse and compare the SMART city destination models and strategies of selected smart city destinations in Europe. The scope of the paper focuses on destination governance as a starting point and destination, smart strategy and planning and implementation of digital technological solutions.

Following the established objective, two research questions were defined.

- (1) What is the strategic basis of the smart city destination model in the selected destinations?
- (2) What digitization projects are being implemented by selected smart city destinations?

Three city destinations, València, Vienna and Prague were included in the research sample. **The method of quantitative and qualitative content analysis** was used. The analysis focused on two main areas of the SMART city concept, namely Strategy and governance and Technological solution, starting with an overview of destination governance. The set of sources covers quantitative data and publicly available documents and materials.

52.2 Literature Review

52.2.1 Smart City Concept

Smart (and sustainable) city theory in the context of tourism is a multidisciplinary field that combines urban planning, technology and sustainability principles to create cities that are not only attractive to tourists but also environmentally friendly and efficient. Many theoreticians and practitioners provide valuable insights into the theory and practice of smart and sustainable tourism cities. Allam and Newman [1] bring a review of smart city frameworks and note the inconsistency of the smart city definition [1]. Starting with Giffinger defining the smart city as "A city well performing in a forward-looking way in economy, people, governance, mobility, environment, and living, built on the smart combination of endowments and activities of self-decisive, independent and aware citizens" [25] different approaches and concepts of the concept of smart cities can be found.

Conceptually, at the beginning of discussions about smart cities two approaches can be traced in the review of the smart city definition, firstly, a broader concept of **a smart city as a sustainable city** using technology and digitalization as a tool for sustainability (e.g. [18, 25, 60]) and secondly, a narrower concept based mainly on **the introduction of technology and digitalization** especially for the management of urban infrastructure, including critical one (e.g. [14, 29–31, 67]).

The concept of smart cities generally refers to urban areas that use technology and data-driven solutions to enhance their sustainability, efficiency and overall quality of life for residents. The United Nations does not have a single, universally accepted definition of "smart cities," but through the United Nations Human Settlements Programme [63] the development of smart cities as part of its broader Sustainable Development Goals 2030 (SDGs) has been actively promoting. Several of the SDGs, particularly Goal 11 "Sustainable Cities and Communities", focus on making cities more inclusive, safe, resilient and sustainable. Achieving these goals often involves the use of technology, data and innovative urban planning to create smarter and more sustainable cities.

Since the smart city solutions encompass a wide range of technologies, services and public or private sources investment, **numerous private suppliers and companies** that offer smart city solutions across various domains (e.g. IBM, Siemens, Cisco, Honeywell, ABB, Oracle, Microsoft, AT&T). IBM offers various smart city solutions, including data analytics, IoT (Internet of Things) platforms and AI-driven applications for traffic management, public safety and energy efficiency (IBM). Siemens provides smart city solutions in areas such as transportation, energy management, building technologies and industrial automation. They offer solutions for intelligent traffic management, renewable energy integration and efficient infrastructure (Siemens). Cisco focuses on providing networking and connectivity solutions for smart cities. Their offerings include IoT networking, smart grid solutions, and software for data analytics and automation (Cisco). Additionally, many start-ups and niche companies also offer innovative solutions in this rapidly evolving field. In the last decade, there is a noticeable trend of **strengthening sustainability** accelerated by the covid pandemic and the energy crisis. Smart solutions are becoming tools for promoting sustainability not only in the environmental field. From the technology-centric phase of smart cities based on digital infrastructure, efficiency and optimization of resources allocation or ICT integration the sustainability aspects become more urgent accelerating environmental concerns, sustainable mobility, renewable energy or waste management. **The holistic approach to smart cities** encompasses not only the environmental aspects, but quality of life of city residents, community engagement, transparent communication of data, data-driven and evidence-based policymaking or resilience. Cohen [15] even distinguishes **three phases of the development of smart cities**, namely smart city 1.0 based on solutions from technology suppliers, followed by smart city 2.0 shifted more to government control and strategy of city's future and finishing by the phase of smart cities 3.0 to phase 3 characterized by taking into account residents and their involvement [15].

The **traditional smart city model** consists of six elements, namely smart economy, smart people, smart living, smart governance, smart mobility and smart environment (e.g. [2, 20]). To evaluate progress in the smart city development various models can be used. The Smart City Wheel of Cohen and Adams [42, 44] typically consists of multiple dimensions or categories, each representing a different aspect of urban development and sustainability. The model encompasses namely economy, environment, people, governance, mobility, living, well-being, education, security, digitization, so the model is more complex.

52.2.2 Smart City Destination Model

A **smart tourism destination** is a concept that applies the principles of smart city technology and innovation to the tourism industry, particularly in destinations and cities that heavily rely on tourism. The goal is to enhance the visitor experience, improve the management of tourist flows and optimize the use of resources while fostering sustainability and economic growth. The generally accepted smart destination concept may not be perceived in the same way by all partners in the destination [7]. There is no universal smart destination model accepted by stakeholders, not even in the case of city destinations.

The principal target group of the concept is not only **visitors** to the destination, but increasingly **local residents** living in the destination. The concept is related to the general smart city concept. Depending on the nature of the destination's product and destination marketing management and governance, the applied smart model may differ. Cavalheiro et al. [10] explains smart destination as the ability of the destination and the partners (stakeholders) in the destination to understand and learn [10] while the most of authors bet on technology and governance (e.g. [27]) or ability to use the technology and smart infrastructure (e.g. [19]). Mora [36] divides the concept of smart city destination into two groups. First group of authors explains the related concept of **smart city destination** as the interconnected and by technology mediated city

incl. data management striving for efficiency. The second group explains the smart city destination as **a holistic system striving for sustainability based on SDGs 2030**, human well-being, development of social and human capital [9, 25].

The most common areas addressed in smart destination models include smart mobility, cultural preservation, safety and security, accessibility, digital connectivity supporting marketing communication, data analytics and other. Just as there are different approaches to the smart city in general, the concept of a smart destination deserves further investigation in both theoretical and practical areas [24, 41].

The development of ICT and of general smart city concepts brought fundamental shifts in destination management and governance towards the deployment of smart solutions and changes in the marketing management of tourist destinations (e.g. [3, 8, 24, 61]). Technologies help to handle the growing demands for destination management, adaptation and acceleration of communication [35, 39]. The role of technology, information systems and need for collaboration among stakeholders in smart destination model is discussed by Gretzel [28]. Neirotti et al. [37] bring a review of smart city initiatives, which are closely related to smart tourism destinations, and identify key trends and factors contributing to their success.

Regarding to implication of the Smart Tourism Destination in practice, the Smart Tourism Destination platform defines five pillars of a Smart Tourism approach in a tourist destination [47].

- (1) Strategy and governance.
- (2) Technological solutions and Data collection and management.
- (3) Human capital and skills.
- (4) Knowledge transfer.
- (5) Ecosystem management.

First two topics, i.e. the field of Strategy and governance and of Technological solutions, are the subject of analysis in the article while respecting the connection to other themes.

52.3 Data and Methodology

52.3.1 Overview of the Data Used

For a more detailed analysis and comparison of the approaches and smart models of selected smart city destinations, **publicly available materials**, i.e. available materials for the travel trade, partners, media, public sector institutions as well as for visitors and, last but not least, residents, were used as sources of information. The public access to information is one of the parameter that characterizes the smart cities concept.

The quantitative data describing selected indicators of tourism development in the chosen city destinations are used in the paper. Primarily data from València Tourist Board, Vienna Tourist Board and Prague City Tourism materials were used supplemented by data from the Czech Statistical Office and CzechTourism. For a deeper understanding of the current smart city destination model and the strategy of the above-mentioned destinations, selected strategic materials were used.

València

The Visit València website

The València Strategic Framework 2030 [57]—The València 2030 Urban Strategy [55], The València Plan de Actuaciones 2023 [56].

The Tourism Sustainability Strategy 2030 [54], The Tourism Sustainability Plans [53].

Vienna

The Vienna Tourist Board website

The Smart City Vienna framework strategy (2014)—The Smart Climate City Strategy Vienna (2022) [51].

Shaping Vienna—Vienna's Visitor Economy Strategy 2025 [45].

Prague

The Prague City Tourism website

Putting Prague First—Strategy for Sustainable Tourism of Prague [43], The Smart Prague Index 2021 [52].

The Prague's Smart City concept for 2030 [50].

52.3.2 Methodology

Three smart city destinations Prague, Vienna and València were included in the sample of researched destinations. All three cities offer cultural and historical heritage product practically all year round and all of them are inscribed on the UNESCO World Heritage List. All three cities have an international airport and are numerously connected to European air routes. While Vienna and València are at the top of the various smart city destinations rankings, Prague has not made a significant impact yet. València was jointly awarded the title of "European Capital of Smart Tourism" for 2020 in the European Capitals of Smart Tourism 2022 competition.

A predominantly **qualitative approach** was chosen for the analysis the smart tourism models in selected European city destinations. Since the destination governance is a complex and multifaceted process that involves the coordination, management and decision-making of various stakeholders within a tourism destination, the possibility of using quantitative methods is very limited. Gelter [23] points to the fact that the complex evaluation of smart models in the destination and their contribution cannot be precisely quantified from managerial point of view with regard to
the high number of stakeholders and other variables. For a basic overview of tourism in selected urban destinations, **a quantitative analysis** of basic indicators relevant to the investigated problem was chosen esp. with respect to the volume of tourism and indicators related to residents.

The aim of the paper is to analyse and compare the smart city destination models and strategies of selected smart city destinations in Europe in terms of destination governance, smart strategy and planning and implementation of digital technological solutions.

Two premises were formulated in the context of research questions and objectives.

- (1) The higher the volume of incoming tourism affecting the lives of residents, the longer-term and strategic orientation towards digitization and sustainability in the destination.
- (2) Smart city destination models include elements of sustainability in all three areas—ecological, economic and socio-cultural.

Based on theoretical smart city tourism concept, two topics were selected for assessment and evaluation in the following content (textual) and comparative analysis, first, a brief characteristic of destination governance, second, smart destination strategy and planning, and third, tourism digitization tools and projects.

Content analysis is used as the main research method for analysing the smart city destination models to evaluate the relevant textual content. The purpose of using the content analysis is to gain insights into the characteristics, themes, patterns and meaning within the content [34]. Overall, content analysis is a valuable research method for systematically examining and understanding the content allowing researchers to uncover hidden patterns, trends and insights [5].

The relevant data sources were selected, primarily the strategic documents and publicly available information on websites incl. statistical data. In the phase of coding, four themes were identified for investigation. Codes were defined based on the previous research questions and objective of the paper. Subsequently, coding scheme development was carried out ensuring consistency and reliability of analysis across the examined sample of city destinations. Qualitative coding process focusing four investigated topics was done with the help of highlighting and tagging relevant passages. After coding the content, the data analysis was performed to identify common and different characteristics of smart models in selected city destinations [5, 21]. The thematic analysis was used as the main technique. In case of statistical data the quantitative analysis of relevant statistical data was done. After completing the analysis, the findings were presented in the paper.

Finally, **a comparative analysis and external benchmarking** of the basic characteristics of smart models of selected urban destinations from point of view of Prague was carried out. The findings of the comparison analysis will be interpreted in the context of research questions, conclusions will be drawn with inferences and discussion of the implication of the findings.

52.4 Results and Discussion

52.4.1 Tourism Data as the Base for Launching Smart Tourism Strategy

Incoming and Domestic Arrivals and Overnights as a Starting Point of Postcovid Smart Strategy

When evaluating **the volume and dynamics of arrivals and overnight stays** (Table 52.1), the assessment of the **share of domestic and foreign arrivals** cannot be overlooked with regard to the past covid years, when it was the generation of domestic demand that often at least partially covered the dramatic drop in incoming visitors. The ratio of domestic and foreign arrivals can influence not only the resulting relationship "**residents—tourists (visitors**)" and create cultural disproportions and even conflicts. It can also influence the economic benefit of tourism for a city destination, the impact on its physical environment, including the burden of CO2 emissions on the destination, and thus the overall concept of solutions and setting smart tourism strategies in a smart city destination. When comparing the values of total arrivals and overnight stays in 2022 versus 2019, only València was able to return to the original values of 2019 in 2022, while Prague reached only 74 and 73% and Vienna 71 and 75%.

When assessing the impact of covid on **the structure of the demand**, the difference between the highest and lowest values of the share of domestic demand on

		-						
City destination	Intnl and domestic arrivals (mil)			Intnl and domestic overnights (mil.)				
	2019	2020	2021	2022	2019	2020	2021	2022
València	2.209	0.766	1.332	2.210	5.375	1.708	3.285	5.387
Annual change (%)	6.7	- 65.3	73.9	65.9	7.6	- 68.2	92.3	64.0
Average number of nights	-	-	-	-	2.43	2.23	2.47	2.44
Share of domestic tourism (%)	42.1	60.5	57.9	48.2	32.4	51.3	49.3	39.2
Vienna	7.927	2.007	2.077	5.597	17.605	4.590	4.997	13.204
Annual change (%)	5.1	- 74.7	3.5	169.5	6.8	- 73.9	8.9	164.3
Average number of nights	-	-	-	-	2.43	2.23	2.47	2.44
Share of domestic tourism (%)	20.8	32.3	32.6	25.0	17.3	26.8	27.9	20.7
Prague	8.044	2.182	2.352	5.985	18.480	4.903	5.257	13.398
Annual change (%)	1.9	- 72.9	7.9	154.2	1.65	- 73.5	7.22	154.9
Average number of nights	_	_	-	_	2.30	2.25	2.23	2.24
Share of domestic tourism (%)	15.5	33.4	40.1	25.0	11.6	27.6	34.8	19.3

Table 52.1 Indicators of tourism development in València, Vienna and Prague

Source Own processing using data of the Visit València, the Vienna Tourist Board and the Czech Statistical Office

Indicator/City	Valencia	Vienna	Prague
Tourism intensity (bednights per citizen)	2.7 (2019) 2.8 (2022)	4.2 (2019) 2.9 (2022)	6.1 (2019) 1.8 (2021)
Tourism density (bednights per km ²)	39,933 (2019) 38,951 (2022)	42,431 (2019) 31,825 (2022)	37,257 (2019) 27,001 (2022)
Tourism contribution to the city GDP (%)	NA	4.8% (2021) Direct + indirect + induced impact	1.65% (2021) Direct impact
Tourism contribution to employment (%)	NA	12% (2018) Direct + indirect + induced impact	5.6% (2021) Direct impact

 Table 52.2
 Indicators of the relationship between tourism and residents

Source Own processing using data of the Visit València, the Vienna Tourist Board and the CzechTourism, TourMIS (arrivals in all forms of paid accommodation in city area only)

arrivals and overnight stays, expressed in the number of percentage points, can be considered telling. The highest difference in arrivals and overnight stays was achieved by Prague (24.6 pp., 23.2 pp.), followed by València (18.4 pp., 18.9 pp.) and then Vienna (11.8 pp., 10, pp.) and Ljubljana (10.6 pp., 10.1 pp.) with the long-term lowest share of domestic guests. **The relative share of domestic demand in arrivals and receipts remains higher in 2022** for all destinations compared to 2019.

In order to evaluate the destination's smart model, it is also worth examining **the relationship between visitors and residents** based on quantitative data (Table 52.2). Although individual destinations do not show fully comparable data in terms of monitoring methodology, it is evident that **the influence of tourism on residents in Prague is the strongest** in terms of tourism intensity before the covid-pandemics.

52.4.2 Analysis of the Smart Tourism Models and Strategies

Based on theoretical **smart tourism models and strategies**, three topics were selected for assessment and evaluation in the following comparative analysis, namely **a brief characteristic of destination governance**, **smart destination strategy and planning and tourism digitization tools and projects**. The subject of the following content analysis is not the complex smart city model, but primarily the smart city destination model affecting both visitors and residents.

València

Destination Governance

The Visit València is the destination management organization (DMO) which fulfils standard roles of similar DMOs incl. research and analysis, product development, marketing communication, monitoring and evaluation. The Visit València

sets tourism strategies in cooperation with other partners, esp. València City Council, the Chamber of Commerce, Feria València, the Valèncian Business Confederation, Turisme Comunitat Valènciana and the Tourist Board of the Provincial Council and private sector partners.

SMART Destination Strategy and Planning

The activity of Visit València is guided by formally approved and transparently communicated strategic documents aimed at the development of sustainable and SMART tourism, in particular **Plan de Actuaciones 2023** [56] based on other strategic documents, esp. **the València 2030 Urban Strategy** and València Strategic Framework 2030. The main theses of the overall smart strategy include València by 2030 as the health city, creative city, entrepreneurial city, shared city, sustainable city and Mediterranean city.

The steps and tools cover among others leading and fostering digital innovation, sustainable resource management and fostering circular economy or promoting proximity and sustainable mobility relevant not only for the inhabitants, but also for city visitors. The roadmap, the actions followed by the commitments made internationally aims to meet **the goal of the SDGs** (the 2030 Agenda and the Sustainable Development Goals).

Strategic decision-making relies on a strong data base covering trends in tourism supply and demand, tourism services' quality management (Comprehensive System of Spanish tourist quality in Destination—Calidad Turistica), environmental issues or accessibility.

Destination vision presented by the Visit València focuses on València positioning as "an internationally recognized tourist destination for its Mediterranean lifestyle, history, traditions and avant-garde, with a collaborative, sustainable and profitable tourism model". **The mission** of the Visit València consists in the development of a new, transparent, efficient and collaborative governance model, stable management structures qualified teams, pioneering technologies, intelligence and knowledge **Plan de Actuaciones 2023** [56] consists of four pillars, namely Creating value for the visitor, A smart and sustainable destination, Update the València brand based on segmented and technological promotion and Transparent, Efficient and Collaborative Governance.

Tourism Digitization Tools and Projects

The digitization strategy runs through practically all the projects with which the Visit València fulfils the long-term strategy. The digital technology is applied in communication promoting destination brand, local consumption and tourism product. All **the tourist content** incl. brochures, leaflets, guides, tourist routes, maps and plans, navigable resources and interactive routes integrated with Google Maps useful links or other city information have been digitalized.

Since **tourist information centres (TICs)** are the backbone of the destination's information system, the process of digitization started with a change in the way of communication between visitors and tourist informer. The visitors can consult

them via mobile devices, via an email, mobile messaging (WhatsApp) or by scanning a QR code. The considerable shift can be monitored to **the new content**, **digital forms, personalized and segmented content delivery and comfortable access** to the content (phone, tablet, PC...), sharing of the content, time saving (Turn managers—a queue-free appointment system) and reduction of material and energy requirements (e.g. paper, energy). All the operations are recorded in **the digital survey system Opinion-meter** to be evaluated in terms of most in-demand information and formats, most requested topics and other, reaching the score 4.5–5.0 NPS in the 75% of respondents.

Digitization serves to support the main destination communication tools, namely the València Tourist Card, the app of Visit València and the Web Ecosystem: visitValència.com. Digitization of the mentioned communication, sales promotion and distribution tools facilitates a targeted focus on the client or business partner, improves the destination experience and customizes the city to the visitor or enables more comfortable planning in advance incl. possible savings for card holders up to 10% (price sales promotion). Digitization of the card or application also forces the digitization and modernization of the entire infrastructure all over the city incl. smart card infrastructure (smart points, smart tourist information centres, card readers located at the monuments or city attractions). Thanks to recording all the data on the use of each of the cards, the very fundamental benefit of the digitization of communication can be obtaining feedback for the assessment of quantitative indicators, but more detailed characteristics of the consumption behaviour of city visitors.

The application **app of Vist València** is developed for **final consumers (B2C)** and **trade professionals (B2B)** available for iOS and Android devices. The B2C version offer guides, maps or reservation of tickets, sightseeing, renting bicycles and other services. Using the application by the trade professionals via global sales and distribution platform **SISVENTUR** operated by the Vist València, brings them access to validation of tourist products by simply scanning the QR of the voucher.

Finally, **the website of Vist València**, València Convention Bureau, València Film Office and Fundación Visit València have undergone significant technological changes, not just content updates. The new, flexible websites based on Drupal 9 (10) technology are open to future implementation of design changes, growth or scaling to the updated versions without complex changes and interventions in databases. Related web digitization projects deal with deployment of SEO, multilanguage communication, online chat, chatbot, intelligent blog, accessibility, UX, speed and performance, and other.

Another of the innovative digital smart destination platforms being developed for sales and communication is **SISVENTUR**. The omnichannel customer CRM SISVENTUR integrates destination products, ticket shops, tour operations, customer CRM, Power BI, experticket, SMART Points and other distribution tools to maximize users' experience and comfort. All the above-mentioned digitalized communication and distribution tools bring consumer data from different phases of the consumption process back to the SIT tourist intelligence system. All the information and communication tools are integrated in **the omnichannel** ecosystem providing information to the consumers or professionals on Application Programming Interface (API) principles. At the same time it receives data from the users, which it immediately processes (e.g. favourits, product and service ratings), so the CRM system and process automation can be developed on the digital and intelligent base.

The Vist València internal management itself introduces digital innovation in form of new ERP for better inbound and campaign management, financial and budget management, completion of the cybersecurity and GDPR audit, review and improvement of the CRM and other with regard to the aforementioned external digital innovations.

Vienna

Destination Governance

The Vienna Tourist Board (Wiener Tourismus) is the official destination management organization for the city of Vienna. Its primary purpose is to promote Vienna as a top tourist destination and provide information and services to visitors. The Vienna Tourist Board offers a wide range of resources and assistance to help travellers plan their trips to Vienna. The Vienna Tourist Board collaborates with various private and public sector partners, e.g. City of Vienna (Stadt Wien), Vienna Economic Chamber (Wirtschaftskammer Wien), Vienna Airport (Flughafen Wien), Vienna Transport Authority (Wiener Linien) or Vienna Convention Bureau (part of the Vienna Tourist Board).

SMART Destination Strategy and Planning

The development of tourism in Vienna represents the strategic agenda of the city and the DMO Vienna Tourism Board. From the very beginning, the SMART concept in Vienna was associated with sustainability, especially in the climate area. The Smart City Vienna Framework Strategy [51] was revised in 2022 and the aspect of climate sustainability emphasized even more strongly in the modified **Smart Climate City Strategy Vienna**. The Smart Climate City Strategy Vienna contributes to all 17 UN's Sustainable Development Goals 2030 (SDGs) [65] or the United Nations' New Urban Agenda and defines the binding framework for the Vienna Tourist Board.

The strategy specifies the vision for SMART Vienna as **high quality of life for everyone in Vienna**, city, where **life is good**, but not at the expense of the environment and thus of future generations (resource conservation). Finally **the aspect of digitization, innovation and new technologies** "always keeping on the move", combined with using the opportunities and positioning on the international market as a viable city for the future are mentioned. In 2020 the goal of achieving carbon-neutrality by 2040 was set up by the Viennese government with specification of eleven fields of action and 74 objectives. The Vienna Climate Roadmap to carbon-neutral city covers **100 measures designed to bring about carbon-neutrality** by 2040. The current tourism strategy "Shaping Vienna—Vienna's Visitor Economy Strategy 2025" [45] launched in 2019 follows on from the previous destination strategies in terms of high-quality tourism, digitization and sustainability. Nevertheless, the 2025 strategy means a fundamental shift towards the involvement of residents, and emphasizing the economic effects of tourism, from which they profit. The tourism destination vision "Quality of Life, Place and Experience" builds on tourism sustainability and tourism positive economic and non-economic effects for residents and visitors. Three proclaimed values, on which the strategy is built and implemented and activities and measures designed cover "Premium, Cosmopolitan and Digital".

Strategy 2025 objectives focus on six areas focusing the added value of the visitor economy, the business added value meaning effects for private sector and city added value enriching the city and local people. All of them are described with the measurable KPIs with focus on direct and indirect value creation effects of tourism in Vienna (Austria) rising back to the 2018 level (4.7 billion EUR in Vienna, 5,6 billion EUR in Austria), the net revenue per overnight stay of Vienna's accommodation providers targeted at the level of 2018. Other objectives cover consumer satisfaction—**the high quality of visitors' experience and local residents' attitude towards tourism** and perception of tourism as a positive factor of city development. Last two goals deal with environmental sustainability pillar concentrating on using natural resources responsibly by the Vienna travel and leisure trade (Austrian Eco-Label or similar certificate) and using environmentally friendly means of transport esp. by the visitors from neighbouring countries. Set of strategy's KPIs was approved based often on the available data. The extended use of digital monitoring and reporting is expected.

In the strategy **the Vienna Visitor Economy Ecosystem** is precisely defined and described covering all the economic and non-economic relations among the participants and stakeholder inside the system. The radical change lies in changing the perception of the economy ecosystem that is **from the tourism to the visitor economy**. The working agenda leading to the fulfilment of goals and vision includes Place Making & Place Marketing, Meeting Destination Vienna and Smart Solutions. The Vienna's visitor economy strategy is committed to the Smart Climate City Strategy Vienna as well as to the international scene, primarily to the UN World Tourism Organization's "UNWTO Global Codes of Ethics for Tourism" and the UN's Agenda 2030 (SDGs). The long-standing values "Premium (Vienna sets standards), Cosmopolitan (Modern global capital) and Digital (Digital humanism)" remain strengthened.

Tourism Digitization Tools and Projects

The goals and objectives associated with **SMART city digitalization** [51] are reflected in the field of tourism [45]. The general SMART digital framework designs resilient digital infrastructure, digitalization and fully automated processes and services of the municipal administration, renewable energy sources for digital

services and infrastructure, data management used for decision-making, open government data (transparency), supporting the digital human rights and promoting digital literacy.

The Vienna's visitor economy strategy plans the implementation of digitization across the entire spectrum of all activities in the Vienna Visitor Economy Ecosystem. The field of place marketing and branding focuses on the digital regional roadmap for Vienna supporting the outer parts of the city, the digital map of Vienna's visitor economy or the place making and management: (creation of attractive experiential spaces). In the field of smart mobility, the prioritization of pedestrians and public transportation is envisaged similarly as the safeguarding public spaces. New events and convention venues and smart urban hotspots incl. bus terminal or Wiener Stadthalle offer modern tourism products and development of attractive new quarters. The promotion of accommodation facilities (esp. hotels) as neighbourhood meeting places via digital tools can attract not only guests consuming overnight and catering. The extended potential of architecture, galleries, cultural offerings or collaborations with local business opens new horizons to visitors or residents. Similarly, for **developing the MICE product** and take advantage of its high multiplication effect, the smart city infrastructure, technology, mobility or communication must be developed.

The Visitor Economy Strategy 2025 considers digitization as a tool of sustainability and competitiveness. In the mobility field the digitization and technological innovation concentrates on the rail service development, smart air service development based on the long-term collaboration between the Vienna Tourist Board and Vienna International Airport (Business and Innovation location strategy), Bus management 4.0 (the smart management of coaches and shuttle buses in the city), training programmes for taxis and rental cars or the Vienna 360° congress ticket project. Upgrading the Vienna city card means not only the inclusion of new smart mobility services, but digitization in the digital application (e.g. Digital Concierge for creating personal itineraries for visitors and residents as a project of digital humanism). The Vienna visitor application ivie-Your Personal Vienna Guide and other useful apps from a variety of app providers are available for visitors and residents (e.g. WienMobil bicycle rental operated by Next Bike using the QR-Code scan, the WienMobil app). The free Wi-Fi is available at around 400 access points offering the information about the location. The website www.vienna. info offers the wide range of digitalized information incl. booking option and the city map with the "What's around me". The website features a responsive design and automatically adaptation to all devices and screen sizes (the desktop, tablet or smartphone).

Another crucial topic for using digital technologies is **data management system** including developing of the complex and coherent research agenda, knowledge transfer between science and business or big data analysis of visitor movement and consumer behaviour. Digital methods and data can open new perspectives of decision-making process, consumption patterns or management of flows of visitors and residents as well as enable maximize the visitor experience.

Concerning the product development and increasing consumer satisfaction projects like Year-round off-season cultural and event programme (e.g. the Vienna State Opera performances via a livestream on Smart-TV at home), Sustainable certificates (e.g. Österreichisches Umweltzeichen, the European ecolabel), Green meetings and green events (Vienna Convention Bureau), Smart Enjoyment supporting local sustainable and quality agricultural products, Fair sharing economy—services for residents and visitors have been launched. Since the digitalization and technology innovation spread in the whole Vienna Visitor Economy Ecosystem, the field of human resources, workers and talents, travel trade partners and media, expats or students is arranged in the Smart visitor services and fast-track service for talents—quality drive.

Prague

Destination Governance

The destination management organization **Prague City Tourism** (PCT) is a key player responsible for promoting Prague as a tourist destination in cooperation with Prague City Hall, CzechTourism, Prague Convention Bureau and other partners from private sector. According to the **Putting Prague First—Strategy for Sustainable Tourism of Prague**, tourism product development, marketing campaigns, online presence, cultural and event promotion or research and data analysis are aimed at supporting sustainable tourism and respecting the needs of residents. Prague does not usually appear in the selections or rankings of smart tourism cities.

It's important to note that while Prague's tourism industry provides numerous benefits, such as economic growth and cultural exchange, it also faces challenges related to overcrowding and the preservation of historical sites. In the long term, from the 1990s to 2020, the very dynamic development of tourism in Prague has changed the character of the inner, tourist-exposed part of the city in particular, and has gradually given rise to a number of challenges. The touristification and extremely high concentration of tourists literally on several km² led to the dislocation of residents and services for residents into other non-touristificated parts of the city, increasing of prices of goods, services incl. real estate and land, congestion in public spaces, obstruction in smooth-flowing of traffic or tourist smog (incl. late night business). The short-term private accommodation (Airbnb and other platforms) influencing negatively the daily life of locals is considered one of the most serious issues. The document acknowledges the problem of insufficient communication with residents, insufficient tourism data collection and even insufficient connection of the tourism development in the city to the strategic development of the city as such.

SMART Destination Strategy and Planning

The city of Prague has been making efforts to become a "smart city" in recent years to enhance its tourism industry and improve the quality of life for both residents and visitors. The goal is to create a more convenient, sustainable and enjoyable experience for tourists while also benefiting the city's residents and economy. In December 2020

Prague City Hall confirmed **The Prague's Smart City concept for 2030** (December 2020) for the implementation and management of which the municipal firm OICT is responsible. Prague City Tourism is one of the partners of the OICT dealing with the smart tourism industry development. The vision defined for a Prague as a smart city says, that "*Prague uses proven innovative technologies for a better life for Prague citizens and sustainable Prague in 2030*". There are **five related fields** in the general smart city strategy:

- future smart mobility as a clean, shared, intelligent, mobile and self-driving mobility,
- smart buildings and energy focusing on economical and sustainable energy and healthy and smart public buildings,
- waste-free city based on a sustainable, intelligent and responsible waste disposal economy and fourth, people and urban space creating safe, modern and informative public space and assisted care and
- **attractive tourism** which uses big data and advanced technologies and can be in mobile.

All the mentioned fields are interconnected by the **data flow creating a unified**, **transparent and secure communication network** and platform for transmission, storage, publication, analysis and real online use of data for management. Every Smart City project should have an online "counter" of benefits (frequency of use, CO_2 savings, money, time and other sources).

For sustainable tourism development the strategy "Putting Prague First— Strategy for Sustainable Tourism of Prague" was launched by Prague City Tourism, Prague destination management organization, in June 2020. It is more of a general, even vague strategic document than a smart tourism strategy and the term "smart" is not even mentioned once in the document. The tourism strategic document is based on studies of strategic and analytical documents, and on the visions and priorities of Prague City Hall Strategic Plan, Prague City Hall Cultural Policy Concept 2021–2027, the Management Plan for the Protection of the World Cultural Heritage of the Historical Centre of Prague and other relevant local, regional and national documents.

The strategy offers a vision "Tourism as one of the pillars of sustainable development of the city with respect to the cultural heritage and quality of life of the local community" as a solution (Puting Prague First Strategy, pp. 38). The vision is supported by **three strategic objectives** definition, namely **Taking Care of the Interests of Praguers, Taking Care of Public Spaces and Taking Care of the Destination**. The mentioned three strategic goals contain vaguely formulated measures and actions without any projects or KPIs (Puting Prague First Strategy, pp. 38–42).

Tourism Digitization Tools and Projects

The smart projects for both residents and visitors are mainly concentrated **in the field of smart transportation** (technical innovation, navigation, mobile apps, real-time tracking of buses and trams, and the expansion of bike-sharing programmes), **smart parking** (sensors and mobile apps, electronic payment), **Wi-Fi hotspots or waste** **management**. Prague uses smart city technologies, surveillance cameras, emergency notification systems and other to strengthen the safety and security. In the field of environmental sustainability pillar the energy-efficient street lighting, green spaces or tools to reduce air pollution are used.

Prague is developing the projects to support **smart tourism**, namely interactive tourist information kiosks with touchscreens and multilingual support at tourist locations or digital signage (real-time information about public transportation schedules, events and emergency notifications). The set of digital communication tools covers also usage of social media in terms of crowdsourcing or gathering feedback from residents and visitors. Promotional activities funded by public or private resources use to a very limited extent the digital initiatives or augmented/virtual reality applications enhancing the customer experience, so the potential is enormous. Prague, similarly to the popular tourist destinations, started offering the Prague visitor pass since May 2022 covering free or discounted entry to attractions, discounts on tours and activities skip-the-line privileges at certain attractions and unlimited public transportation and providing cost-saving benefits to the visitors. The Prague Visitor Pass offered by Prague City Tourism can be purchased at tourism information centres or online in advance offering the mobile options (e-pass to the smartphone). The pass includes city map and guidebook providing valuable information so it enables to plan tourists' itinerary.

52.4.3 Comparison of the SMART Tourism Business Models and Strategies

Table 52.3 contains the results of the comparison of selected parameters of the smart city destination model in the area of destination governance and smart destination strategy and planning. In terms of **destination governance** (stewardship), all three city destinations operate on similar principles. The destination management organization, linked legislatively and financially with the municipality of the city, is responsible for the development of the destination model is based on a more or less similar structure of the institutional and legislative background, although unlike València and Vienna, Prague (Czech Republic) has no law regulating tourism. In terms of destination governance, Vienna and València can be considered a benchmark for Prague.

The process of strategic planning and management can be identified in València, Vienna and Prague. All of the cities have prepared their general smart city strategies for the development of the city (residents) and also for the smart tourism development (visitors, residents). In the case of València and Vienna, the general and tourism strategic documents logically follow each other, which cannot be said about the strategic documents of Prague. The Prague general smart city strategy includes tourism as one of the five parts. This rather technological concept of smart tourism

Indicator/City	Valencia	Vienna	Prague	
Destination governance				
DMO	Visit València	Vienna Tourist Board	Prague City Tourism	
Partners	Standard network	Standard network	Standard network	
Specific governance legislation	The law on tourism, leisure and hospitality (2018)	The law on the promotion of tourism in Vienna (1955)	No law	
Strategic planning and r	nanagement			
Strategic plans	General smart city strategy and action plans Tourism smart destination strategy and action plans	General smart city strategy and action plans Tourism smart destination strategy and action plans	General smart city strategy without action plans and yearly evaluation Tourism smart destination strategy without action plans	
Communication of the strategic plans to partners, residents and other	Transparent, traceable, linked to other Also published in English	Transparent, traceable, linked to other Also published in English	Fragmented communication of documents across different institutions Also published in English	
Tourism data availability	SIT: Tourism Intelligence System (interactive dashboard covering tourism offer and demand comprehensively)	A traditional reporting system of basic statistical data on supply and demand with regular data publication	No data collection, monitoring or publication system of tourism data	

Table 52.3 Comparison of selected parameters of the smart city destination models and strategies

Source Own processing using the results of previous content analysis

which proclaims big data, advanced technologies and tourism in mobile differs significantly from the city tourism destination strategy, which declares sustainability in socio-cultural pillar and benefits for local citizens. Both Vienna and València are further developing their long-term strategic documents into annual action plans, while Prague is not. When it comes to content and temporal logical connection of documents, València and Vienna can serve as a benchmark for Prague.

Digital ecosystem development (Table 52.5) requires a strategic approach and ongoing management to ensure that it continues to meet the evolving needs of users and stakeholders. The existence and operation of the TIC, digitization and communication of content, availability of tourist card and app or website operation can be considered as common characteristics of the smart city destination model in València, Vienna and Prague. However, València and Vienna invest in the technological equipment of their TICs with the aim of interactive, time saving and customized communication. Unlike Prague, València and Vienna build a real digital ecosystem based on their card, app and destination web or partnership with online booking

platforms. Interconnected and integrated digital services, applications, platforms, technologies and of course data integration bring value to the final consumers (visitors, residents), B2B partners and other stakeholders. The digital ecosystems, esp. in València, is based on data integration, application programming interfaces (APIs) and user-centric design. València can be considered an innovative smart city destination (Table 52.4).

The use of various digital tools has become a common part of **the communication and distribution mix** in tourism destinations, although the variety, integration and intensity of their use may be different. València and Vienna have **a strong online presence on search engines**, relevant websites or social media combining them also with review and feedback systems. Key communication tools are webs, city cards

Indicator/City	Valencia	Vienna	Prague	
Strategic documents—content				
General smart city strategy	Mission, vision, objectives, KPIs	Mission, vision, objectives, KPIs	Mission, vision, objectives, KPIs	
Tourism in the general smart city strategy	Tourism in Innovation, culture and sustainable tourism strategic line 11, link to the smart tourism destination strategy	Tourism is addressed cross-sectional with a direct reference to the smart tourism destination strategy	"Attractive tourism" (technological approach) as a part 5 of the strategic field, but without any link to the tourism smart destination strategy	
Sustainability in the general smart city strategy	Smart = sustainable concept	Smart = sustainable concept	Smart = technological/ digital concept	
The SDGs 2030	Linked incl. KPIs	Linked incl. KPIs	Linked incl. KPIs	
Tourism smart strategy	Mission, vision, objectives, KPIs, monitoring	Mission, vision, objectives, KPIs, monitoring	Mission, vision, three vague objectives, no KPIs or monitoring, evaluation	
Content link to the general strategy	Yes	Yes	No	
Sustainability in the tourism smart city strategy	Smart = sustainable concept	Smart = sustainable concept	Smart isn't mentioned sustainability is declared	
Setting up subsequent smart/sustainable projects	Yes	Yes	No	
Residents	Included in the tourism strategy, relevant communication	Included in the tourism strategy, relevant communication	Declared in the tourism strategy, occasional communication	

 Table 52.4
 Comparison of strategics (strategic documents) of the selected smart city destinations

 Indicator/City
 Valencia
 Vienna
 Program

Source Own processing using the results of previous content analysis

	····) -······················		5)
Indicator/City	Valencia	Vienna	Prague
TIC	Technologically innovative	Technologically innovative	Standard
Web site	Technologically innovative	Technologically innovative	Standard
City card/app	Yes	Yes	Yes (2022)
Digitization of content	Technologically innovative	Technologically innovative	Standard
Data integration	Yes	Yes	No
Online presence	Intensive	Intensive	Basic
Digital ecosystem development	Yes	Yes	No
Innovative technology	Yes	Yes	Partly
B2C personalization	Yes	Yes	No
B2B solutions	Yes	Yes	No
Integrated smart destination platform	Yes (Sisventur)	Partly	No
Digital innovation in internal management	Yes	Yes	No

Table 52.5 Smart tourism city destination projects (Valencia, Vienna, Prague)

Source Own processing using the results of previous content analysis

and apps, where València and Vienna where Vienna benefit from a long tradition and constant innovation, while in Prague the city card was only launched in 2022.

Data collection is a base for data analytics to better understand consumer behaviour and for data-driven decision of public authorities. Collecting information from tourists who purchase a Prague Visitor Pass could be a valuable practice for both the destination management organization and city hall. The online registration, onsite registration centres, survey forms, feedback at attractions or events, mobile app check-ins, reviews or social media they help obtain data for further data analysis. The data can help the city understand tourist preferences, behaviours and needs, and it can also enhance the visitor experience. Unfortunately, in Prague geographic data, data from social networks (Twitter, Facebook, etc.), data from credit cards and camera systems are not used for driving of tourism to the greater comfort of citizens and tourists. In terms of consumer behaviour and experience, tourists' feedback is not monitored and appropriately measured in Prague. The way digitization projects are communicated to visitors, partners, but also residents is definitely worth mentioning. València and Vienna transparently communicate upcoming projects and their benefits in relation to strategic documents, sustainable city development even in a language other than their home language (Table 52.5).

From the results of the conducted research, the following factors supporting the development of a smart city destination can be summarized as the managerial as well as theoretical implications of the research.

- Existence of smart city destination strategy. The existence of goals and the way they are achieved and measured (KPIs).
- Harmonization of the goals and content of the general and destination smart city strategy.
- Holistic, well-planned and conceptual approach (e.g. the Vienna Visitor Economy Ecosystem involving visitors, partners and residents).
- Systematic, continuous and technology-supported data collection and evaluation.
- The impossibility of defining and implementing relevant **technological and digital projects** in a situation where there is no linkage to the strategic documents and clear strategic goals.

From the previous analysis, it can be concluded that if the strategic level of smart destination management is not precisely set, it is difficult to define and implement the relevant digitization or other projects. The results of the research **confirm the concept of development of smart destinations** according to Cohen [15] and others [10, 36], when Prague, despite its indisputable tourism development potential, remains in the first stage based on the use of technology, but without a well-thought-out strategic concept. In the same way, the participation of residents in the development of a smart destination in Prague is more or less proclaimed without a real connection with destination governance. While València and Vienna can be described as smart destinations of the third generation, Prague remains at the first stage (only technology) of development according to the Cohen [15] typology.

As can be seen from the comparison in Table 52.4, there are vision, mission and objective formulation in all of **the strategic documents**. Nevertheless, in case of Prague the lack of integration of vision, mission and objectives is obvious not only between the general smart city strategy and smart tourism destination strategy, but also within individual documents. While the strategies in Vienna and València already embrace the smart concept as a sustainable concept, the general smart strategy in Prague focuses primarily on technology and digitization. Vision and mission included in the València and Vienna strategies are further projected into the goals and the way to measure the achievement of the goals (KPIs). The goals' achievement relates to the SDGs 2030. At first glance it is obvious that the strategic documents are not connected in terms of content, implementation, monitoring incl. KPIs.

The connection on a local scale between **the general smart city and tourism destination strategy** is necessary, but in practice it is often absent [33, 48]. It is the technology and digitization that can help combine and converge both concepts and include all stakeholders, visitors and residents as emphasized by Gretzel and Koo [26] or Frisch [22].

The systemic, holistic and even **process management approach** can be clearly identifiable in Vienna of València, where it can be stated that the smart city model is fulfilled according to European Smart Cities [20] in terms of smart economy,

smart people, smart living, smart governance, smart mobility and smart environment. Vienna of València can be considered destination applying a strategic and holistic approach in terms of human capital development based on sustainability and SDGs 2030 [9, 25]. Compliance with the principles of preparation, implementation and monitoring of strategic documents makes València and Vienna a benchmark for Prague. The same applies to the method of communication of strategic steps, including the content of strategic documents.

The development of a smart destination and smart governance cannot be achieved without the continuous **collection and evaluation of data, date transparency and openness** and public involvement [15]. The use of continually collected data helps to improve efficiency of smart governance, planning and management processes and to enhance the tourist experience [28, 33]. Poor data management starting from data collection, analysis and evaluation, complicates the unbiased evaluation of tourism in Prague as well as the setting, coordination, monitoring and evaluation of strategies. The absence of data management system limits the effective governance, implementation of sustainability principles, increases the impact of external risks, thus reducing the overall resilience of the destination [11].

The set of **smart tourism solutions and projects** incl. Smart Tourism Services (STS) support decision-making process at the destination governance level, increase mobility or lead to more tourism experience [12] and better satisfaction of tourists' needs [8, 28]. The implementation of smart tourism solutions leads to the creation and development of the smart tourism ecosystems incl. real-time monitoring before, during and after a trip or creation of sustainable value [6, 38].

Some limitations are worth acknowledging and could direct further research. The existing research focused on selected parameters of smart models in three European cities. Further attention should be focused on the analysis of benefits and costs for individual stakeholders according to the main tourism sectors, visitors and residents in selected destinations. In the case of Prague, it would be beneficial to create a model of the future smart ecosystem (similar to Vienna), which is the basis for any further planning and consideration of the implementation of the smart city destination concept.

52.5 Conclusion

The first research question "**What is the strategic basis of the smart city destination model?**" can be answered that, at first glance, there are no fundamental differences between the compared destinations in terms of destination governance, the existence of strategic documents and the management of internal processes in the destination. With a more detailed analysis of the setting, content and interconnection of strategic documents, discrepancies and issues can be identified in the case of Prague. The first premise cannot be confirmed, as Prague, which realizes high volumes of incoming tourism with a noticeable impact on the lives of residents, lags behind in the area of strategic management and developing model of the smart city destination.

The search for an answer to the second research question "What digitization **projects are being implemented by selected smart city destinations?**" showed that if there are certain imbalances at the strategic level in the case of Prague, including the absence of data, it is difficult to set up specific meaningful digitization projects. In the monitored group, València can undoubtedly be considered the leader of smart city destination model innovation.

The second premise can be confirmed if Prague is not considered a smart destination. València and Vienna solve sustainability problems comprehensively in all three areas (ecological, economic, socio-cultural) by implementing smart innovations. Prague shows significant fragmentation, incompatibility and delays in this agenda.

It is obvious that Prague has significant reserves both in the strategic area of smart city and in the implementation of specific projects focused on the collection, analysis and use of data, on communication with visitors via mobile devices (mobile applications) as well as in the implementation of projects using new technologies, virtual/ augmented reality or artificial intelligence. The continuous collection, analysis and publication of data towards different target groups can guarantee the longevity and functioning of the smart cities concept. Without building databases, it is impossible to create and promote strategies and projects supporting smart tourism, a concept based on digitization and sustainability.

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Chapter 53 e-Tourist in a Historical City—The Case of Brasov, Romania



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Abstract There is a fierce competition among cities to attract a larger number of tourists. In recent years, the local authorities tried to approach different ways of promoting their cities—as touristic destination, not only based on traditional channels, but, also, by using the new forms of communications. We live in the era of smart technologies, so, everything has to take place in real time. Romanian tourism had to adapt to this trend. This article is focused on the experience of a representative touristic destination and on its new approach regarding the promotion strategy. The research is based on a study case regarding the city of Braşov, Romania. Due to the efforts of the local authorities, the tourists have access both to traditional promotional actions, as well as the specific marketing actions based on the technology. The study aims to find the way that tourists have access to information, due to smart technologies in tourism and the way that the local authorities use smart solutions strategically. This study will help destination managers to understand the true scope of smart technology, as a creator of value in the tourism experience, that contributes to get visitor satisfaction and earning loyalty.

53.1 Introduction

Smart touristic destinations represent not only a destination based on pure touristic components, but, also, destinations that demand co-creation of value and enrichment of tourist's experience. According to some authors [1], STTs implementation are the basis for smart destination, by allowing both demand and supply to co-create value and enrich the tourist's experience. The travel related websites, social media instruments, using the smartphone for planning the travels, are more and more used by potential tourist when they plan their traveling [2].

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Introducing smart tourism technologies (STTs) offers the possibility of improving the tourists' experience, and, at the same time, it permits to the local and regional authorities to promote in a more efficient way the touristic destination, so the interest for these technologies increased during the last decades. In Romania, the use of STTs is not carried out on such a large scale. For this reason, it becomes of interest for the stakeholders to know the advantages of implementing such methods and to know the examples of good practice within this sector.

This article is focused on the experience of a touristic destination from Romania– Brasov. This destination represents one of the most important touristic destinations from the country, as annually has a large number of visitors and, at the same time, it diversified its touristic offer year by year. As a response, the local authorities reacted by introducing a smart approach at the governance level.

The research methodology consists in a study case developed in three steps, according to the research scope and objectives.

The research questions are "What are the main aspects that define the communication process in the context of using STTs?"; "What are the strategies possible to be implemented by the local authorities in their attempt to implement STTs in Brasov?"; "What are the digital tools used by the local authorities?"; "What is the importance of using STTs in tourism?"

The study intended to find if there is a real preoccupation among the local and regional authorities to develop a smart touristic destination, as Brasov was one of the first cities in Romania that set out to implement this concept, and to what are the elements that contribute to a better communication between the authorities and tourists.

The implications are both theoretical—by creating a model of theoretical framework for the smart city—and practical—as the case study reveals a successful experience of developing a smart touristic destination.

The paper has a structure divided in five sections. After the introduction, the methodology was described in detail in Sect. 53.2. The methodology section includes, also, a section describing Brasov, in order to justify the choice of the case. A review of the literature was carried out in Sect. 53.3. Section 53.4 presents the main results and discussions. The paper ended with the conclusions by highlighting, at the same time, the main implication of the research.

53.2 The Research Methodology

53.2.1 General Issues Regarding the Research Design

The scope of the research consists in identifying the methods and instruments used by the local authorities to develop the smart tourism technologies (STTs) for improving the tourist's experience.

To achieve this scope, the following objectives were established:

- 1. To identify the main aspects that define innovation and STTs technologies, as tools for improving the communication process in tourism
- 2. To identify the main strategies of the authorities from Brasov in their trying to develop the tourism sector in Brasov
- 3. To assess the way that the local authorities from Brasov succeeded to integrate STTs in their politics regarding tourism in the city.

The research design is based on a descriptive case study. According to the theory, the case study investigation is the research situation in which the number of variables is greater than the number of units of analysis. The case study can be exploratory, descriptive or explanatory [3].

To achieve the research goals, we used official data, information from interviews and we assured the data triangulation, for getting accurate results, considering the following issues (Table 53.1).

In order to assure the theoretical framework, the researcher consulted a series of scientific articles from the following academic databases: Web of Science, ScienceDirect and Scopus. The keywords for searching were: "smart tourism", "e-tourism" and "governance in tourism".

The data analysis consisted in studying and finding information about Brasov, as touristic destination and about the programmatic documents that the local governance is based on, when analyzing the way that the local authorities are dealing the problem of assuring the access to STTs to tourists.

The reflection process assured the possibility to assess the role of STTs, as a creator of value in tourism and to how these technologies can be used by the authorities to contribute to the improvement of the e-tourist experience.

To assure accuracy, the case study fulfilled the following requirements:

- It reflected a real situation that is significant for the community (and implicitly for research)
- It got to conclusions that are considered relevant for the public
- It had enough complexity by including relevant information, in order to become useful in larger areas.

The main limit of the research consisted in the fact that the access to some statistic data and scientific materials was restricted.

Objective	Process	Outcome
01	Literature review	Building the theoretical framework
02	Data analysis	Identifying the local authorities' actions
03	Reflection	Findings about using smart technologies in tourism in the particular case and exceeding to possible conclusions

 Table 53.1
 Research processes and outcomes

53.2.2 Brasov—One of the Most Important Touristic Destinations in Romania

Brasov is a city located in the center of the country, at 166 km from Bucharest—the capital of Romania. The country of Brasov represents a touristic area with a high potential, both in terms of natural objectives (mountains, national parks, nature monuments), as well as cultural and historical objectives (castles, fortresses, museums, churches). This is the reason why Brasov area became one of the most visited touristic destinations of the country. More than this, in the recent years Brasov became more important in the Romanian tourism industry, as the city development implied consequences on various fields, including tourism.

These days, Brasov became one of the most important tourist destinations in Romania, by practicing the following forms of tourism [4]:

- a. Mountain tourism—as the region has a significant potential represented by the mountainous area, spectacular forms of relief adequate for hiking, winter sports, mountaineering and speleotourism
- b. Cultural tourism—as Brasov has a memorial museum network and a series of historical buildings and anthropological patrimony (the walled city, medieval walled churches, churches and monuments)
- c. Sports, leisure and recreation tourism—as Brasov/Poiana Brasov represents a very famous tourist resort with sports and recreation facilities
- d. Religious tourism—as it has numerous churches which are historical monuments
- e. Business and MICE (meetings, incentives, conferences, exhibitions) tourism as Brasov is one of the biggest cities in Romania, hosting business and public events
- f. Medical tourism—as Brasov city is well-known for its dental health services of high quality and low costs
- g. "City-break" type of tourism-as Brasov can offer enough touristic experiences
- h. Gastro-tourism—as the city has a famous local gastronomy, including local products/trademarks.

Considering all these aspects, the number of tourists increased in the recent years; in 2022 Brasov was the 3rd touristic destination in Romania, with a number of arrivals of 1,187,000 tourists [5].

In addition to the natural context, a certain preoccupation regarding the development of the local and regional touristic industry must be highlighted. These preoccupations were included in The Strategy for Sustainable Development 2010–2020– 2030, which includes a special section—Tourism, Culture, Touristic Heritage [6] and The Strategy for Sustainable Development 2021–2030, with specifications regarding the tourism development [7].

53.3 Theoretical Issues Regarding Smart Tourism and STTs

The concept of "smart tourism" became one of the most used terms when defining the new orientation in the tourism industry.

Starting with the 90s, Internet is responsible for a radical transformation of the strategic and operational practices [8]. As a consequence, the "e" letter before specific terms—consumer, tourist, loyalty—is more and more used redefining concepts in the electronic environment. For instance, Shariffuddin et al. [9] approach the concept of "e-loyalty", by highlighting its importance in the new perspectives regarding tourism in the twenty-first century and by proving that these days the new forms of involving the tourists in digital actions could create and increase their loyalty/e-loyalty.

More than this, the e-tourist—or the tourist involved in e-tourism—could be assimilated to that tourist that uses the "Travel 2.0 tools"—which include travel blogs, travel social networks/tourist communities and forums [10]. Using these tools will critically change the tourism industry structure, by considering the interactivity between tourism organizations and consumers; as a result, "they re-engineer the entire process of developing, managing and marketing tourism products and destinations" [11].

For instance, Tuomi and Ascencao [12] appreciate that we assist to a "platformization" of tourism, as digital platforms became a major part of tourism—for trips (Expedia), accommodation (Airbnb), transportation (Uber) or ordering food (JusEat). Not only that the platforms are increasing their importance daily, but, more than this, as they have more visitors, the more their value is increasing.

People have access in the recent years to mobile technology, and despite on its contrary effects, using the mobile phone in tourism represents an opportunity for tourists, as it allows to navigate and to access digital guides and information regarding the touristic destinations; using the mobile phone allows, also, to share travel experiences—through the blogs or through the specific platforms. These tools can be used prior to, during and after the touristic experience. So, the tourists can become part of the production/co-creation of the tourism experience, and, by sharing these experiences, they can raise the impact of the potential tourists [13].

The idea of becoming part of creating the touristic product—co-creation or codesign—is, also mentioned in the literature. It refers to the collaboration between service providers and users, a collaborative participation in designing, creating, consuming and assessing the service (including the touristic service). In this way, the involved participants become involved actively in these processes [14].

In this context, the initiatives of smart cities are increasing, as a reflection of digital transformation. The implementation of technology is a driver that facilitates the interaction between locals, policymakers and tourists, and it involves improving the quality of civic life; in this way, the economy of cities becomes more sustainable and technologically advanced [15, 16].

The innovative approach is welcomed by citizens/tourists and, lately, by the companies in the touristic field. They are one of the three categories of beneficiaries

despite the fact that, sometimes, integrating technology in the tourism activity might be not considered easy [17].

53.4 Results and Discussions

After proceeding to all the steps from the methodology, the following aspects were revealed:

O1. The literature review revealed a series of results that can create a theoretical framework for the considered research theme, as it follows:

- a. Implementing STTs facilitates innovation the communication process between the stakeholders involved in tourism
- b. As a consequence of innovation and the technological development, new concepts that are already operationalized appeared—e-tourism/e-tourist, smart tourism, platformization, etc.
- c. The touristic destinations are more and more preoccupied to become "smart destination"
- d. Smart destination involves tourists (and not only) in processes that were not specific to them: creation/co-creation of the tourist product, promotion of the product, etc.
- e. The stakeholders use a series of new tools that change dynamically the structure of the tourism industry
- f. Smart destinations are based on the collaboration of the involved parts (collaborative actions).

Figure 53.1 summarizes all the mentioned aspects.

O2. Brasov is a city with an ancient history, with an old tradition in tourism, but which, in recent years, has adopted a series of measures to keep the city on the path of sustainable development, including in the tourism industry. This goal is very well highlighted in different strategies with impact on tourism-The Strategy for Promoting the Local Brand, The Strategy for Sustainable Development, etc. The tourism developing strategies were adapted lately to the new trends, so after year 2000 Brasov started the process of making the city a smart one. So, in 2008 Brasov became one of the first smart cities in Romania. This title was doubled by other initiatives that contributed to a sustainable and green touristic destination; at the same time, the efforts for a cultural development must be highlighted. During the last years, Brasov tried to develop its own brand, with a high impact in tourism, in 2009, as a part of a new strategy for promoting tourism in Braşov. "Be.Live it" is a slogan which indicates how the Association for the Promotion and Development of Tourism together with the City Council strives for developing the infrastructures in all Brasov (including those outside the county), making it a more cultural tourist attraction [18].



Fig. 53.1 Theoretical framework for the STTs

In addition, the City Hall is preoccupied to position Brasov among the green cities. Despite the fact that the city did not achieve in its trying to become "the Green capital of Europe", the authorities got involved in specific activities. For instance, FOV (The forum of green cities) is an event dedicated to ways to reuse energy, sustainability and ways to implement green power into our lives through exchanges of experience and meaningful discussions with politicians. This event has already been awarded with "Clean Environment Awards Gala" and "Environmental Campaigns at Romanian PR Award", in which the program won the silver medal [19].

O3. Brasov continues the achievements to become and remain a smart city. In this sense, the following aspects could be taken into consideration:

- a. The efforts for becoming a smart city, started (as mentioned) in 2008; the first initiatives consisted in a public lighting remote management system, including a system of panic buttons
- b. The process continued with the development of the requested infrastructure construction of the airport, rehabilitation of county roads, improvement of existing visiting infrastructure and creation of new tourist facilities
- c. The first platform for tourists e-Tourist was launched in 2012, and it offered the opportunity to access various information about Brasov, as a touristic destination



Fig. 53.2 e-Tourism platform (English version)

for tourists from Romania and other countries (it had Romanian, English, German and French version) [20] (Fig. 53.2)

d. The policymakers decided to develop an integrated platform, in collaboration with different categories of stakeholders—www.brasovturism.ro (2019) [21]. The platform integrates all Braşov tourism applications: website, back-office, iOS application, Android application, which display the same content and functionalities, but on different technologies with the aim of reaching the largest possible volume of users.

The main people who coordinated all this activity are Brasov County Council, together with other specialists, including IT-ists.

The Brasov Tourism platform is in a process of constant development. The impact of the development of the application in the 6 months since its launch has been positive, both among Romanian and foreign tourists (the platform can be accessed in Romanian and English). The role of Tourist Information Centers (TIC) in Brasov County is very important. This is the advantage of the platform—each profile administrator can update their tourist information and services without depending on a network administrator. This does not mean that the application managers from Brasov County Council do not supervise the information on the platform and do not apply filters to this content.

The Brasov Tourism platform was designed from the beginning on the principles of collaborative economy. Thus, through the application, the aim was to create spaces in which to link the demand and supply of services or products [22] (Fig. 53.3).

e. Other tools for smart development are in the project phase for the future—a touristic card that will allow to facilitate the access to touristic objectives.



Fig. 53.3 Integrated platform—www.brasovturism.ro (English version)

53.5 Conclusions

53.5.1 Theoretical and Operational Implications

Considering the fact that the chosen touristic destination—Brasov—is one of the most representative touristic cities from Romania, the publicmakers from the City Hall and The County Council are very preoccupied to develop the right strategies for the city development. This conclusion is in accordance with the facts from other cities that got involved in this process, despite the fact that other future intentions of Brasov authorities are still not put in practice—using augmented reality, focus on green marketing actions, improving the cultural heritage by restoring buildings [23].

In the last 20 years, the main trends to be considered in establishing such strategies refer to the sustainable development, preserving the environment and adapting to the technological revolution. The authorities cannot ignore these trends, so, more and more, the "smart" philosophy gains importance in the decision-making system. Some authors agree with the importance of introducing smart technologies in tourism, but, in addition, they highlight specific issues, namely the fact that along with tourists also the residents can experience the benefits of STTs [24]; so, the authorities from Brasov should pay attention to this aspect.

Started in 2009, the smart development of Brasov evolved year by year, so, today tourists from all over the world find enough reasons to come to Brasov—not only elements of touristic potential, but, also, the possibility to become tourists in a smart city with a high level of development.

The main advantages of introducing STTs consist in the possibility to get connected with more people, to involve the tourists in some specific processes (co-design), to become active promoters of the city, to be more accessible and well-known [14]. The study's results showed that Brasov did not achieve to involve tourists and resident in the co-creation process.

The paper brings a theoretical contribution due to its role of providing better knowledge regarding smart technologies, with a focus on tourism.

53.5.2 Research Limitations and Future Directions of Research

The main research limitation consists in it focuses on only one touristic destination. Further research will take into consideration other touristic cities.

The study case is consisted only in a descriptive analysis. For the future, the authors intend to have more complex analysis—comparative analysis, qualitative and quantitative research.

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Part XII Virtual and Augmented Reality in Marketing

Chapter 54 Augmented Reality and Brand Perception: A Review of Strategies and Impact on Consumer Behavior



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Abstract Augmented reality (AR) has revolutionized how brands interact with consumers and shape their perception of various brands. This systematic review delves into the effects of AR on consumer behavior, brand awareness, and brand loyalty. With an analysis of 21 studies, we have brought to the fore how AR improves consumer experiences by reducing purchase uncertainties and increasing purchase intentions. Through real-world illustrations, we showcase how AR can create an immersive "try before you buy" experience. The review emphasizes AR's role in fostering brand loyalty, positive brand evaluations, and trust. Despite the significant advantages offered by AR, it is imperative to balance innovation with consumer comfort and address potential risks. Future research should examine AR's impact on different brands. This study contributes to a deeper understanding of AR's transformative potential in shaping brand perception and consumer behavior.

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54.1 Introduction

With the emergence and development of increasingly varied companies and the greater demand of the business environment where they are inserted, organizations have adopted different strategies to differentiate themselves in the market and create value for the customer [1]. Brands should be concerned with what consumers pay more attention to and, based on that, provide the necessary information for them. Thus, AR technologies are developing faster and faster, and companies are adopting them at an advanced pace [2].

It has been changing how people interact with devices and information, thus providing new opportunities to investigate how they will project themselves in immersive environments. Therefore, this has received greater attention in recent years and has shaped how people interact with technology [3].

Specific authors define AR as a combination of the natural and virtual world, where individuals can guide their activities, where interactivity is one of the main features of this tool. They claim that brands with AR strategies strengthen their relationships with consumers, so by applying these strategies, they will benefit. Thus, they believe that AR will help the marketing strategies of an organization [4].

Therefore, this study's main objective is to understand the importance of AR for brands, answering the following research question: How can AR use influence brand perception? To this end, the study focuses on a definition of reality and its importance, followed by examples, and finally, we will verify the relationship between AR and the brand. The PRISMA-ScR principles guided this systematic review.

54.2 Method

The present study is based on research about the relationship of AR technologies and applications with brand awareness and perception. To this end, we carried out a survey whose main objective is to answer the central question: How can the use of augmented reality influence brand perception? If we intend to answer, together, the following questions:

- 1. What are the benefits resulting from the use of augmented reality?
- 2. Is consumers' purchase intention affected by augmented reality?
- 3. How does the use of augmented reality applications promote customer satisfaction?

The following databases were used to carry out this study: Scopus and Web of Science. For the results to match the theme in question, we performed an advanced search using the following commands:

- augmented reality AND brand;
- brand image AND augmented reality;
- e-commerce AND augmented reality;

augmented reality AND buying decision.

In addition to the above commands, we suggest keywords such as augmented reality, consumption behavior, user experience, e-commerce, and purchase intention.

Thus, together with the reported commands and keywords, the following filters were also applied:

- Only publications between 2018 and 2023 were included;
- proceeding paper or article;
- final/concluded articles;
- articles published in English.

To manage the references, we exported the author's name, the year of publication, the title, the name of the journal, and the type of reference to EndNote, and from there, we started to filter results.

54.3 Results

As illustrated in Fig. 54.1, we analyzed 1689 by title of the applied filters, followed by the abstract, but we only included 21 in our review. The excluded articles were removed in the first phase through the title, followed by the abstract, and, finally, through the article's content.

Using a reference management program, Endnote, allowed us to analyze all the articles found in an orderly manner. About 184 papers were evaluated for final validation, and the remaining 163 articles were excluded because there was no relationship or relevant content for the topic under study. Of the 21 articles in the review, 3 are conference proceedings, and the remaining 18 are articles. Therefore, we only have articles focusing on augmented reality, consumer attitudes and preferences, and the relationship with the brand.

For this review, 21 studies were included, as shown in Table 54.1, which analyze AR as a marketing strategy, AR in e-commerce, and brand perception. Therefore, 13 studies are related to consumer behavior [1, 3–13], 6 articles focus on analyzing loyalty and brand equity [2, 14–18], and two are linked to AR behavior in e-commerce [19, 20].



Fig. 54.1 PRISMA flow diagram for the systematic review process to identify relevant studies

54.4 Discussion

54.4.1 Augmented Reality: Concept and Importance

Nowadays, AR is a fundamental tool for competitiveness between companies, being a bonus factor for them. The authors conclude that the so-called traditional companies have begun to realize that the future involves digital and new technologies, and they are already starting to include online channels in their strategies [14].

Recent advances in AR technologies have led to a growing interest in its application to marketing strategies and practices, which has given rise to ARM. It offers valuable experiences to customers in a way that differs from other marketing approaches
Study no.	Authors	Journal/proceeding	Study objective
1	Ahmad et al. [3]	International Journal of Advanced Computer Science and Applications	Evaluate the proposed augmented reality mobile application design model
2	Alimamy et al. [1]	International Journal of Technology and Human Interaction	How AR increases value interactions for organizations
3	Archibald et al. [17]	26th Americas Conference on Information Systems, AMCIS 2020	Investigate how AR applications affect the retail customer experience
4	Arghashi [4]	Electronic Commerce Research and Applications	Understand how external resources influence the consumer's purchase intention
5	Arghashi and Yuksel (2022) [4]	Journal of Retailing and Consumer Services	Understands how AR contributes to brand usage and brand attitude
6	Bae et al. [20]	Sustainability	Examines how mixed reality affects consumers' emotions and satisfaction
7	Bajpai and Islam [8]	Cardiometry	Investigates the impact of ARM on better customer engagement, customer behavior, customer loyalty, and purchase decision
8	Barta et al. [<mark>6</mark>]	Computers in Human Behavior	Explains how RA affects cognitive dissonance and understanding over-choice confusion
9	Chylinski et al. [15]	Australasian Marketing Journal	Understand ARM as an interface for applying digital marketing technologies in physical environments
10	Cuomo et al. [13]	Australasian Marketing Journal	Understand how AR affects consumer behavior in stores
11	Eru et al. [19]	Sosyoekonomi	Investigate the impact of innovation and AR experience on consumer loyalty and purchase intent
12	Huang [18]	Journal of Retailing and Consumer Services	How AR technologies shape brand love
13	Huertas and Gonzalo [10]	Tourism and Hospitality Management	Understand the role of AR in destination branding
14	Jessen et al. [5]	Journal of Business Research	Understand how AR can develop creative activities and engage customers
15	Márquez and Ziegler [14]	RecSys 2020—14th ACM Conference on Recommender Systems	Comparison of the recommendation of products sold physically and online
16	Marto et al. [9]	IEEE Access	Impact of stimuli on consumer experience

 Table 54.1
 General description of the key characteristics and the studies included in the review

(continued)

Study no.	Authors	Journal/proceeding	Study objective
17	Oyman et al. [11]	Computers in Human Behavior	Determines the use of AR in applications to understand consumers' intentions
18	Phua and Kim [12]	Telematics and Informatics	How Snapchat filters influence brand perception
19	Smink et al. [7]	Journal of Business Research	Understand how AR techniques positively or negatively persuade the consumer's attitude
20	Sun et al. [16]	Journal of Retailing and Consumer Services	How AR product demos can reduce consumer uncertainty
21	Zagorc and Bernik [2]	Lecture Notes in Networks and Systems	Understand how AR can influence purchase intent

Table 54.1 (continued)

[15]. Thus, AR and a marketing strategy also emerge as an "experience design strategy" [5].

Thus, AR elevates the consumer experience through consumer satisfaction, attitude, and engagement [6]. Uncertainty is another factor that decreases when using it, as consumers can check the details of the products in question in more depth.

AR also offers a new dimension to the product, allowing consumers to try certain products without having to leave their homes, which, in addition, expands and focuses on the customer experience [7]. Therefore, through it, brands offer their customers several pleasant and creative experiences by visualizing products/services uniquely [5]. In short, consumers can check how the products look in the context: on their face, body, and home, among others [6].

We can thus understand that AR allows its users to perform simple actions that they would do inside a physical store to support it during decision-making [14]. It is then characterized by three essential characteristics: the fusion of the physical world with the virtual world, real-time interaction, and freedom of three-dimensional movement [8].

AR differs from virtual reality since the latter "completely replaces the physical world with another world", while the former brings both worlds together, which activates imagination and presence [16]. Therefore, its use is justified when similar products exist, that is, through differences in shades and changes in shape, for example [6]. In addition, interactions through augmented reality can be made with creative and informative content and simulation of the product in a natural context [16].

Sensory stimuli are also crucial in an AR experience. An AR experience is a rich and direct sensory experience that is very real, something that an experience without augmented reality does not allow or allows in a more reduced way [7]. In an interaction between the retailer and the consumer, AR can influence the customer experience. It incorporates that the organization develops a positive experience to differentiate the company from the competition [17].

Thus, customers with high sensory needs will also benefit from reducing product purchase uncertainties, undoubtedly leading to positive results [16]. The various stimuli caused by the senses allow an RA experience in a different way [9]. Thus, through the incentives, the authors concluded that there were happier and more smiling visits and interactions on smartphone screens, so users were more satisfied through an AR experience with sensory stimuli. The stimuli revealed a greater interest in keeping users through the applications, and they proved to be of greater interest to older people, considering that they value multisensory experiences more. Together, using visual, olfactory, and auditory stimuli increases the pleasure of the experience and promotes knowledge [9].

Comparing a traditional website with a website or application with AR, it was concluded that the purchase intention increases in the latter since it allows a shopping experience closer to the experience in a physical store [2]. Thus, as previously mentioned, these new techniques help the consumer in decision-making, facilitating the choice and increasing purchase intentions. Therefore, it allows for greater profits for companies, on the one hand, due to higher sales volumes and the higher margins that companies can practice since consumers are willing to spend more money on a given product [6].

The advantages of this technique are many. ARM increases the fun, creates better deals and prices, and aims to provide greater convenience, increase enjoyment, and create higher and more complete perspective engagement to improve customer relationships and satisfaction with the brand. It creates a powerful emotional bond when adding digital images to the physical world [8]. Thus, we can also highlight the experience it provides to the customer and the discovery of consumption opportunities since AR stimulates customers' creativity, maintains and attracts new customers [17], and increases, as previously mentioned, the brand-customer relationship [5].

In conclusion, consumers fear risk and have shown difficulties in making decisions, so online companies can use AR methods and techniques to reduce those uncertainties. In addition, this exposure increases information about the products due to the sense of presence, which is felt in the customer's experience [16].

54.4.2 Practical Applications of Augmented Reality

Straightforwardly, brands with AR technologies are characterized by a "try before you buy" experience [7].

A successful example of AR is the services of L'Oreal since the brand allows customers, through the smartphone's front camera, to try out the different products offered without going to a physical store. Thus, trying other products without leaving the comfort of home conveys a high level of comfort in online shopping [5].

In tourism, AR allows users to live rich experiences [10]. Thus, the intention to visit a particular location is influenced by this means, attracting tourists and promoting the branding of the destination location.

In addition to using AR applications for entertainment or gaming purposes, companies can create a brand, product, or marketing campaign using these applications in other ways. For example, a glasses company allows its customers to try out the products, allowing them to check the model that best suits their face, using only the smartphone camera. Another example is using AR to experiment with how a sofa can look in a room, which color will be most suitable, or even the best position to place it [19].

Marketing-driven AR apps fill a gap consumers need help to afford in online shopping. Consumers give up buying when there is not enough information about the product. Thus, with these technologies, they can obtain more information about the products, allowing the possibility of increasing, expanding, moving, and rotating objects within the scope of their natural environment, breaking barriers between the physical and virtual environments [16]. Thus, for interested consumers who like to experience technological innovations, innovations in AR applications can influence consumers' purchasing decisions [19].

54.4.3 Augmented Reality and Brand Perception

The main objective of brands is to capture consumers in the digital world and attract them to adopt brand usage behaviors. The most rational approach would be to provide consumers with virtual product experiences on their mobile devices. Nowadays, some people need more clarification about online shopping, as the lack of physical contact with the products and insufficient information about the products becomes a fundamental point that only exists in online stores. With new technologies, AR has come to combat this gap, as consumers can have real-life experiences without physical contact [11].

One of the main objectives of marketing strategies is to increase brand loyalty, and the greater the brand value, the greater the consumer brand loyalty [20]. Thus, a satisfied consumer positively affects brand loyalty, and they are more loyal to it, so the influence of AR on a brand is directly related to positive results for the brand itself.

Therefore, the interactivity that comes from the use of applications with augmented reality contributes to brand awareness, recognition, and loyalty [20], and it is also essential that the concepts and values of the same are in accordance and line with those of the consumer [16]. These experiences also contribute to the firmness of the brand, which leads consumers to have the brand always present in their minds, connecting and remembering the brand, contributing to sustainability, and, finally, cooperating with recognition, loyalty, and brand association [20].

Increased brand usage intention is another outcome of AR technology and your engagement [4]. Customer participation in brand marketing activities, positive brand evaluations, and trust in the brand are other benefits of augmented reality practices.

Thus, brands should customize the consumer experience according to their preferences, hence the importance of segmentation [7]. It should be noted that AR applications allow consumer to personalize their experience. Therefore, they are seen as more personalized/individualized experiences. Then, the "perceived personalization" leads to the persuasion of the customer, drawing his attention [7]. Consumer loyalty to it increases with the use of the technology under study [6].

Brand love is the feeling that any brand wants from its customers, where they get the maximum loyalty and emotional attachment to the brand. It is defined as the degree of consumer affection and sympathy for a brand.

This feeling contributes to increased sales since the customer is encouraged by this feeling to buy the brand [18]. Since AR experiences make a first-person experience transparent, consumers retain more information about the brand in their memory, developing a closer relationship with it [18]. Thus, the author concludes that this context is more conducive to creating brand love, compared to a context without AR experience, with self-reference (includes the imagination of the consumer using the product) and identity (consists of the simulation of the product on the user) the triggering mechanisms of this feeling. The emotions transmitted, the brand's history, and the close relationship are some characteristics that increase a consumer's love for a particular brand [18]. Thus, the possibility of manifestation, access to tools, and the possibility of creating content are some means that strengthen the love for a brand, whereby consumers virtually create an attachment and closer relationship with the brand.

In short, as previously mentioned, the values and concepts of the brand must be based on the consumer's values [12]. Thus, combining a brand with AR technologies will certainly generate value for the brand. Consumers must be more receptive to demonstrating a positive attitude toward the brand when this connection exists. This congruence, in addition to the close relationships it creates, also leads to a greater willingness to buy on the part of consumers [12]. Attracting and retaining customers is essential for any brand, benefiting engagement and creating closer relationships between both parties [13]. The brand can use this tool to communicate with the brand [10].

54.5 Conclusion

Through the research, we understood the importance an AR strategy provides to companies, namely brands.

AR techniques open the horizons for brands, allowing them more recognition, exclusive competitive advantages and loyalty, and brand love from their consumers. Users of such technology are satisfied, and there is nothing better than a technique to reduce their uncertainty at the time of purchase, so it is worthwhile for brands to invest in this type of innovation and technology in their organizational environment, never forgetting that acceptance or rejection, involvement or non-involvement, depends on the consumer [16].

An AR experience is undoubtedly fundamental and very positive in organizations. However, they should consider calculating and receptive consumers so they feel comfortable using it, which could lead to contradictory results about those expected [4]. Therefore, as with any other technology, the risks arising from using AR should be considered, namely the excess of information, which causes disorientation and difficulty in using the technology in question. The objective is to generate value in the brand and never destroy it, building a balance where customers feel happiness and pleasure at purchase and loyalty.

The study had some limitations, highlighting that the application of RA in different sectors has different results in other sectors, which needed to be addressed explicitly in the analyzed articles. Another area for improvement is that reality is constantly changing, and what consumers and brands experience varies over time, so the results found may be invalid in the future. In parallel, another trend emerges. The Metaverse will also influence consumer research and practice [21]. It opens a new way of consumer interaction with brands and opportunities for marketers regarding usability.

Finally, from an organizational perspective, this study clarifies some advantages of using AR in organizations and its contributions to brands. Another recent study highlights the consumer responses after the impact of exposure to immersive AR advertising [22]. As a suggestion for future research, there is a real need to study the behavior of consumers with AR interaction with brands in different cultures and countries.

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Chapter 55 Which Factors Influence Word-of-Mouth for Tourism Video Ads?



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Abstract Nowadays, the popularity of the Internet for advertising purposes and the increasing use of videos to entertain and captivate viewers is undeniable. Short videos have recently gained significant popularity and have great tourism marketing potential. Given the amount of information on the Internet and social media, it is necessary to make videos and advertisements that stand out. The narrative structure greatly influences the interpretation of the message in video advertising, mainly when storytelling techniques are utilised. This has a crucial impact on how viewers perceive and immerse in the information. This study presents a model that relates narrative structure, transportation, destination familiarity, and word-of-mouth. Using the PLS-SEM methodology, this model was tested using a sample of 916 participants with the SMART-PLS program. The results of the study show that the structure of the narrative and the level of familiarity with the destination featured in the promotional videos significantly influence narrative transportation. This, in turn, improves and promotes word-of-mouth communication. These results contribute to existing research on incorporating narratives into tourism videos and suggest that promotional videos can be a powerful marketing tool for destinations.

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55.1 Introduction

As consumer preferences have evolved, selecting a brand, product, or service has become more intricate. In order to meet these demands effectively, advertising communication should aim at establishing a connection between the brand and its content rather than solely focusing on the product itself [1]. In today's fast-paced society, individuals have developed an intense inclination towards obtaining information through dynamic and engaging means such as videos. These visually stimulating formats not only offer vivid and tangible insights but also serve as an appealing choice for both potential tourists and destinations alike. Short videos, in particular, have gained popularity, offering significant potential for tourism marketing [2].

Against a digital backdrop filled with information and social media content, creating videos and advertisements that capture attention and stand out amidst the digital clutter is imperative. The effectiveness of video advertising depends on the narrative structure employed, mainly when storytelling techniques are used. This narrative structure profoundly influences how viewers interpret and immerse themselves in the information presented [2–4]. Although existing studies analyse this relationship, it was considered pertinent to understand it in the Portuguese tourism context.

Narrative transportation elicits a profound emotional response and amplifies the inclination to share recommendations [5], even more so if the viewer has a reasonable degree of familiarity with the destination promoted in the tourism video [6]. The investigation of how familiarity with the destination influences the experience of narrative transportation is pertinent, as there is a lack of research on this connection. Hence, this study aims to deepen the understanding of this relationship.

In this context, the present study introduces a comprehensive model that establishes connections between narrative structure, narrative transportation, destination familiarity, and word-of-mouth (WoM) within tourism promotional videos. We conducted an extensive investigation to empirically explore and validate these relationships, employing the SMART-PLS programme and the PLS-SEM methodology. The study harnessed the insights of 916 participants as they engaged with promotional videos. The results of this study not only contribute to the evolution of the body of research on incorporating narratives into tourism videos and underline the transformative potential of promotional videos in defining the future of destination marketing.

55.2 Literature Review

55.2.1 Word-of-Mouth

In the 1950s, there was a growing interest in WoM and its impact on consumer decisions. Today, this influential form of communication continues to interest the research community [7, 8]. Initially, WoM involved personal interactions between trusted individuals discussing their experiences with products or services [9]. However, as technology evolved, so did communication methods. Through electronic word-ofmouth, millions can access and contribute to online discussions about goods and services. WoM, according to Westbrook [10], is "informal communications directed at other consumers about the ownership, usage, or characteristics of particular goods and services and/or their sellers" (p. 261). Social media have boosted the power of WoM communication in the current digital age. While marketers play a vital role in sparking interest in commercial products through their generated information, WoM is widely regarded as the most influential source of information for consumers adopting new products [11]. Since consumers actively share information on their online networks, this information significantly influences purchasing decisions more than other marketing strategies [5], gaining considerable popularity as traditional advertising has become less influential [12]. According to Pourfakhimi et al. [13], electronic word-of-mouth can significantly impact consumers' decision-making process at every stage in tourism and hospitality.

Many factors drive individuals to engage in WoM, including personal growth, concern for fellow customers, support for the company, financial rewards, and social benefits [14]. Therefore, WoM occurs when a consumer holds positive or negative opinions about a product, service, or organization. The sharing of this information can be motivated by a desire to assist other consumers by providing valuable feedback. In doing so, the consumer feels validated and included within a community that values their input. Whether it occurs in person or via digital channels, the power of WoM resides in the fact that it engages common consumers who communicate with each other without any expectation of receiving payment for their recommendations [5]. In the context of consumers' information-sharing intentions, research points to emotion as one of the main influencers [15]. Berger and Milkman [16] emphasize the power of compelling content rather than targeting opinion leaders for spreading WoM, with emotional resonance being a critical factor in content sharing.

55.2.2 Destination Familiarity

Making final decisions about services, particularly in the tourism sector, is an increasingly complex process. That said, tourists increasingly seek solutions to make this destination-related decision less risky [17]. Familiarity is a significant factor in service choice and tourism literature that impacts risk perceptions, decision-making, destination image, and tourists' consumption behaviour and intentions [6]. The concept of destination familiarity involves the impressions and perceptions of tourists about a particular tourism area [6]. It can be influenced by prior travel experiences or destination information [18].

While scholars have suggested that familiarity with a destination can increase the likelihood of visiting, more research still needs to be done on how destination familiarity influences tourists' intentions [19], such as the propensity to disseminate online and in-person recommendations. Familiarity also significantly influences the reputation of a destination, as well as the long-term relationship and the intention to revisit the destination [20].

Travellers acquainted with locations exhibit positive perceptions of destination characteristics and promote optimistic behavioural intentions, unlike when they visit unfamiliar locations [21]. According to Jung and Childs [22], incorporating familiar destinations in branded advertisements can greatly enhance consumers' reactions to destination placement. Moreover, according to Milman and Pilzam [6], individuals with a better understanding of a destination tend to rely more on external sources for information than those with less familiarity.

H1: Destination Familiarity influences the Viewer's WoM.

55.2.3 Narrative Transportation and Structure

Consumers are highly receptive to narratives, as they offer a compelling and easily digestible form of information [23]. This strategy can result in deep absorption, where individuals become fully immersed and disconnected from their surroundings [3]. Narrative transportation is a captivating process that immerses consumers in a story, allowing them to interpret and make sense of the world around them [24]. Narrative transportation theory explores the extent to which individuals become fully engaged in a story, being transported from reality into a captivating narrative world, significantly impacting one's beliefs and attitudes towards the real world [25]. According to the same authors, consumers become less sceptical and emotionally engaged once immersed, leading to more robust cognitive and affective responses towards products or services [26]. Engaging in narratives has a powerful long-term effect on shaping individuals' attitudes towards intentions. The quality of a story plays a crucial role in how deeply someone becomes absorbed in its narrative world. This persuasive phenomenon has lasting effects on attitudes and intentions. The quality of the story plays a crucial role in determining the extent to which an individual becomes absorbed into its narrative world [27]. According to Green and Brook [25], narrative transportation can become a persuasive process due to the prevalence of affective solid responses instead of negative cognitive ones. Therefore, viewers tend to be more easily moved by the emotions transmitted in a story than being persuaded by solid arguments based on factual information alone [5].



Fig. 55.1 Conceptual model

Narrative structure is crucial in narrative transportation [4, 5]. It shapes the characters and situations presented in narrative advertisements, allowing consumers to enter the context of the video and perceive the brand as unique [5, 28]. Narratives are enhanced by various elements, such as physical, social, and temporal contexts, according to Brechman and Purvis [29]. Additionally, including images helps stimulate consumers' imaginations and fosters engagement or transportation into the story. Structure in narratives typically involves a linear sequence of events, starting with an introduction, followed by development and eventually concluding with a resolution. These narratives are often driven by cause-and-effect relationships, where characters' specific objectives drive their actions and lead to various outcomes [30]. Morris et al. [31] argue that storytelling narratives are more effective in persuading audiences than informational narratives. Therefore, the following hypothesis is posed:

H2: Destination Familiarity influences the Viewer's Narrative Transportation.

H3: The Promotional Film's Narrative Structure influences Narrative Transportation.

According to Kan et al. [5], narrative transportation generates a profound emotional reaction and strengthens the inclination to spread WoM recommendations. Thus, the following hypotheses are formulated.

H4: The Promotional Film's Narrative Structure influences the Viewer's WoM.

H5: The Promotional Film's Narrative Transportation influences the Viewer's WoM.

The hypotheses presented in the present study developed a conceptual model, as seen in Fig. 55.1. This model aims to demonstrate the relationships and connections between different variables under investigation.

55.3 Methodology

This research follows a quantitative approach, collecting data through a survey questionnaire. The variables employed in this study were measured using scales developed by other authors and have been adapted to ensure their comprehension. To gather data, we presented the participants with a video advertisement and then provided them with a link to access the questionnaire. After watching the video, the participants completed the questionnaire using their smartphones, tablets, or laptops. That said, the narrative transportation scale was adapted from Solja et al. [23], while the narrative structure scale was adapted from Dessart [32]. To measure destination familiarity, the scale used was adapted from Bianchi et al. [7], and finally, the one measuring WoM was adjusted by Kan et al. [5]. All survey questions were evaluated using a 5-point Likert scale that ranged from strongly disagree (1) to strongly agree (5), allowing participants to express their level of agreement or disagreement. All questionnaire items were measured using a 5-point Likert scale ranging from (1) strongly disagree to (5) strongly agree. The sample of this study consisted of 906 individuals, mainly residing in the Centre of Portugal (70.3%), revealing that 68.3% of the respondents are female and that 47.6% are under 22 years old (Table 55.1).

55.4 Results

The analysis was conducted using Smart-PLS 3.3.2 software with a two-stage approach. Initially, the validity and reliability of the measurement model were evaluated. Subsequently, the structural model was examined to investigate the relationships between constructs and test hypotheses. Table 55.2 presents an overview of various metrics used to assess the performance of the measurement model. The average variance extracted (AVE) ranges from 0.677 to 0.820, indicating sufficient levels of explained variance within each construct (AVE > 0.5). According to Hair et al. [33], the minimum threshold for the items' standardised coefficients is 0.70, and all constructs in this study exceed that requirement.

Additionally, the high internal consistency between the items within each construct is evident from composite reliability values ranging from 0.889 to 0.932, which exceed the recommended threshold of 0.7 [34]. This confirms the robustness and validity of the constructs.

The measurement model was analysed to assess discriminant validity. The Fornell and Larcker [34] criterion was used, where the square root of the average variance extracted from each construct should exceed its correlations with other latent constructs, as shown in Table 55.3. These results indicate a clear distinction between the constructs, demonstrating discriminant validity.

After validating the measurement model for accuracy and consistency, we analysed the causal relationship between the constructs. The findings conclusively support all five hypotheses that were tested (Table 55.4).

With the rapid advancement of technology, information sharing has become more accessible than ever. As a result, consumers and tourists are now actively expressing their opinions online and in person. This significant trend greatly influences the decision-making process for those who receive this feedback [13]. According to Beldad et al. [35], general familiarity, influenced by tourists' knowledge and understanding of the region and its attractions, plays a significant role in shaping their

Variable	Category	N	%
Gender	Male	284	31.3
	Female	619	68.3
	Other	3	0.33
Age	≤ 22	431	47.6
	23–38	216	23.8
	39–54	195	21.5
	55–73	63	7.0
	≥ 74	1	0.1
Academic Qualifications	Primary education	71	7.8
	Secondary education	416	45.9
	Bachelor Degree	342	37.7
	Master's Degree	70	7.7
	Doctorate	7	0.8
Occupation	Student	381	42.0
	Worker-Student	79	8.7
	Employed	401	44.2
	Unemployed	25	2.8
	Retired	20	2.2
Residence	North of Portugal	122	13.5
	Centre of Portugal	638	70.4
	Lisbon Region	48	5.3
	Alentejo Region	63	7.0
	Algarve Region	13	1.4
	Açores	3	0.3
	Madeira	3	0.3
	Out of Portugal	16	1.8

 Table 55.1
 Sample characterisation

actions, such as sharing information with others. Similarly, this study shows that familiarity with the destination will influence the intention to disseminate WoM, corroborating H1 ($\beta_{DF} \rightarrow WoM = 0.258$; p < 0.01).

This study's findings support previous research demonstrating how individuals who are more acquainted with a destination rely on external sources for information to a greater extent than those who are less familiar [6]. This highlights the role of familiarity in influencing the level of narrative transportation, confirming H2 ($\beta_{\text{DF}} \rightarrow \text{NT} = 0.141$; p < 0.01).

Various elements, such as the narrative's physical, social, and temporal setting, influence the structure of an advertising video. These elements transport individuals into a fictional story, stimulating their imagination and guiding their experience

Latent variable	Code items	λ	t-values	CF	AVE
Narrative transportation	NT1	0.781	44.857	0.900	0.693
	NT2	0.904	129.591		
	NT3	0.729	36.333		
	NT4	0.903	121.138		
Narrative structure	NS1	0.879	98.132	0.889	0.728
	NS2	0.861	64.782		
	NS3	0.819	48.725		
Destination familiarity	DF1	0.812	45.912	0.893	0.677
	DF2	0.811	47.690		
	DF3	0.855	77.536		
	DF4	0.813	51.200		
Word-of-Mouth	WoM1	0.926	127.583	0.932	0.820
	WoM2	0.931	145.060		
	WoM3	0.858	69.106		

Table 55.2 Measurement model

 Table 55.3
 Discriminant validity

Construct	DF	NS	NT	WoM
DF	0.823			
NS	0.196	0.853		
NT	0.266	0.668	0.833	
WoM	0.381	0.457	0,519	0.905

Table 55.4 Hypothesis validation

Hypothesis	Trajectory	β	t-values	p-values	Validation
H1	$\text{DF} \rightarrow \text{WoM}$	0.258	8.637	0.000	Corroborated
H2	$\text{DF} \rightarrow \text{NT}$	0.141	5.698	0.000	Corroborated
Н3	$\text{NS} \rightarrow \text{NT}$	0.022	29.042	0.000	Corroborated
H4	$NS \rightarrow WoM$	0.041	4.713	0.000	Corroborated
Н5	$NT \rightarrow WoM$	0.038	8.533	0.000	Corroborated

[29, 30]. In this particular context, this study examined the connection between narrative structure and narrative transportation in tourism promotional videos. Our findings confirm Hypothesis H3 ($\beta_{\rm NS} \rightarrow {\rm NT} = 0.022$; p < 0.01), highlighting the narrative structure's significant impact on transporting viewers into a captivating and immersive storytelling experience.

The existing elements in the narrative, be they physical, temporal or social, are decisive in the viewer's involvement with the promotional video. Therefore, the narrative structure of the promotional video has a profound impact on viewers, evoking solid emotional reactions and increasing their likelihood to engage in WoM promotion [5]. This study provides further evidence to support this concept, with H4 being confirmed ($\beta_{NS} \rightarrow WoM = 0.041$; p < 0.01).

Wang and Tang [36] affirm that narrative transportation has been found to correlate with emotional responses such as pleasure and arousal strongly. According to the same authors, these emotional reactions are highly influential in generating WoM recommendations. Similarly, the present study provides evidence that narrative transportation greatly impacts the intention of tourism promotional advertisements viewers to recommend the destination. This finding supports H5 ($\beta_{\rm NT} \rightarrow {\rm WoM} =$ 0.038; p < 0.01). Moreover, it further reinforces the persuasive power of narratives in influencing audience behaviour.

55.5 Conclusions

In the modern digital marketing era, where online platforms and short videos have become incredibly influential, tourism marketers must create captivating content that grabs attention and persuades viewers. As such, this study explores the connection between narrative structure, transportation experience, destination familiarity, and WoM in the context of promotional tourism videos.

This research emphasizes the significant impact of the narrative structure in promotional videos on creating an immersive experience for viewers. By incorporating physical settings, social interactions, and timeline elements, the narrative structure effectively transports viewers into compelling stories that captivate their imagination and guide them on a journey. This strong connection between narrative structure and transportation plays a vital role in enhancing the effectiveness of tourism promotional videos. These components are crucial in captivating audiences and eliciting robust emotional responses. Consequently, these elements and destination familiarity enhance the probability of audience members participating in WoM dissemination.

The findings underscore the significance for marketers in the tourism sector to create compelling and touching promotional videos that engage viewers, transport them into captivating experiences, and ultimately generate positive WoM recommendations. Furthermore, this research highlights the importance of constant testing and iteration of content to help pinpoint what resonates with the target audience and refine future campaigns. This study was limited, focusing only on promotional videos from Portuguese regions. It is suggested that the same study be applied abroad.

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Chapter 56 Augmented Reality in Omnichannel Marketing: A Systematic Review in the Retail Sector



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Abstract Remaining current with emerging trends and technologies is crucial for businesses to stay at the forefront, satisfy consumer demands, and maintain competitiveness. As marketing strategies such as phygital and omnichannel tactics continue to evolve, technologies like augmented reality are becoming increasingly relevant and disruptive. Augmented reality is an innovative technology that is currently revolutionizing omnichannel marketing strategies. It offers numerous opportunities in both the metaverse and phygital marketing, greatly improving the overall customer experience, increasing sale success rate, and improving brand image. A systematic review using PRISMA methodology incorporating a total of six studies explores augmented reality (AR) technology's influence on omnichannel marketing strategies in the retail industry. The findings analyze AR, omnichannel marketing, and the metaverse in-depth, their interplay, and how they influence the customer journey, experience, and behavior. This study explores how to effectively integrate AR into omnichannel marketing for retail, emphasizing on harnessing synergies between

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channels and devising targeted strategies. Research gaps in the literature are identified and future steps to seamlessly integrate channels through AR technology in retail.

56.1 Introduction

Marketers seeking to attract the attention of their target audience must keep ahead of the curve in the fast-paced, ever-evolving world of marketing that exists today. One novel technology that has emerged as a potential revolutionary in this area is augmented reality (AR), which addresses the current trends and market needs to integrate digital data and virtual features into the real-world environment, seamlessly blending holistic and utilitarian customer experience in the phygital realm into an omnichannel marketing strategy.

There is currently a dearth of research on the integration of AR technology in the context of phygital marketing. As von der Au et al. [10] state, there is limited focus on the physical context wherein AR is experienced, despite the extensive research conducted on this matter. In addition, Hilken et al. [5] state that customers have historically been underwhelmed with AR experiences, following market reports in the United Kingdom, where 54% of customers expressed disappointment. Moreover, although customers are eager to indulge in AR-enabled experiences and become more willing to purchase, a survey by DigitalBridge in 2017 indicated that 51% of customers believed that businesses were not making the most of the technology. Nonetheless, more recent studies estimate that AR usage is growing steadily: as of 2022, the number of active AR users was expected to reach 1 billion worldwide, according to ARtillery Intelligence forecasts [2]. The role of AR, as Hilken et al. [5] argue, "AR supplements reality rather than replaces it. As such, it is the perfect lynchpin between the online and offline world". This article explores how AR achieves this goal, through a systematic review addressing the state of the art of integrating AR technology within the retail industry for effective omnichannel marketing, as well as analyze its degree of success.

This paper is organized as follows: Sect. 56.2 presents the systematic literature review, Sect. 56.3 delves into the discussion of the findings, and Sect. 56.4 encapsulates the conclusions drawn from this study.

56.2 Systematic Literature Review

A systematic review based on preferred reporting items for systematic reviews and meta-analyses (PRISMA) methodology was conducted to explore augmented reality's role and impact on omnichannel market strategies in the retail industry. More information regarding PRISMA methodology can be found in [7].

In preparation for a systematic review, the research question "What is the current state of the art regarding the integration of AR technology for omnichannel marketing purposes in the retail industry?" was formulated, together with the definition of the population, concept, and context (PCC) framework outlining the search criteria of the systematic review conducted based on the PRISMA methodology. More information regarding PCC framework can be found in [9].

Concepts chosen include "Phygital", "Omnichannel", and "Metaverse" which are the most relevant for the research purpose. "Retail" is the only selected population, and "Augmented reality" specifies the setting. A total of three databases were searched, encompassing IEEE, ScienceDirect, and Emerald Publishing. Regarding restrictions, the time frame selected for the eligibility of published journals was the span between 2017 and 2022, to ensure that data was up to date and accurately represented the current state-of-the-art. Only journal papers were considered as eligible sources. The resulting PRISMA flow diagram in Fig. 56.1 summarizes the stages of identification, screening, and inclusion of studies in the systematic review.

During the screening stage, 35 reports were excluded based on:

- Reason 1: Keywork inadequacy;
- Reason 2: Omnichannel marketing strategies not a significant part of the scope;
- Reason 4: Contribution addresses the research question too superficially;
- Reason 3: Wrong setting.

A total of six studies were included in the systematic review in this chapter: Berman [1], Berman and Pollack [2], Dwivedi et al. [3], Hilken et al. [5], Ogunjimi et al. [6], and Ylilehto et al. [11].

56.2.1 AR Basics

Augmented reality is a cutting-edge technology that creates computer-generated layers over spaces and objects with animations, images, or text, embedding interactive, real-time digital content onto the real world [1, 5, 11].

The spectrum of the AR virtuality continuum lies between the polar ends of assisted and mixed reality. The distinguishing factor between physical environments and virtual objects lies in the ability to identify and differentiate between these two polar ends. In assisted reality, virtual information is clearly distinguished from physical objects, providing only a sense of local immersiveness. Contrastingly, mixed reality conveys a deeper sense of immersiveness, seamlessly integrating virtual content with the real world [3].

56.2.1.1 AR Technology Expectations and Current State-of-the-Art

Hilken et al. [5] argue that AR technology is only likely to be valuable if organizations prioritize on meeting genuine customer needs, such as focusing on improving



Fig. 56.1 PRISMA flow diagram, based on [7]

shopping experiences to be more efficient and entertaining, while simultaneously alleviating uncertainty in the decision-making process. Companies have faced challenges in effectively merging online and offline customer experiences. Previously, customers who shopped in traditional brick-and-mortar stores would miss out on the wealth of digital product information, customizable options, and social media integration that they would encounter in online environments and would have struggled to visualize how digital products align with the physical layout of their personal spaces.

Gartner's Hype Cycle methodology outlines the development of innovative technologies through five phases, spanning from their initial emergence to reaching a state of mature productivity: innovation trigger, peak of inflated expectations, trough of disillusionment, slope of enlightenment, and plateau of productivity [2]. In the context of AR, initial platforms, like Google Glass, faced a significant level of disappointment, as it failed to deliver based on the inflated expectations created around the technology and moved to the disillusionment phase of the hype cycle [5]. However, according to the Gartner study, AR technology has advanced substantially and achieved a level of productivity at such a rapid pace that it is now considered a mature technology, rather than an emerging one. Strengthening this assessment, Apple CEO Tim Cook stated that the App Store currently hosts a collection of over 1000 applications with powerful AR features. Overall, since the development of AR-compatible apps and advancements to iPhones and Android-based smartphones, significant increases in the adoption of augmented reality have been observed [2].

56.2.1.2 AR Benefits and Value

Currently, AR allows consumers to successfully visualize their space or appearance in hybridized realities. Through digital screens or projections, consumers can now virtually perceive the way a new product looks in their personal environment or virtually change how they look [1]. AR may show consumers how to properly assemble, maintain, and repair a product while also demonstrating its usage. Because it allows customers to digitally try on clothing or see a 3D demonstration of a product dynamically, augmented reality can make web-based transactions more closely resemble an in-store experience [2].

There is a consensus in the literature that customers that engage with attractive augmented reality experiences benefit from a combination of utilitarian and hedonistic value and improved decision-making, while increasing the willingness to purchase and providing positive word-of-mouth intentions [5].

56.2.2 Omnichannel Customer Experience and Journey

Marketers must develop comprehensive multi-channel strategies to connect their brick-and-mortar retail operations with alternatives like catalogues, contact centers, e-commerce, and mobile applications, since an increasing number of customers are opting for alternative channels to fulfill their shopping needs [11].

The omnichannel marketing experience addresses this need by seamlessly integrating online and offline channels, facilitating a smooth and authentic experience in both environments and accommodating consumer preference since they use more than one channel in their journey [5, 11]. Consumers constantly use channels and touchpoints such as mobile devices and in-store kiosks interchangeably and simultaneously [1].

Frazer and Stiehler [4] stated that customer experience across channels is influenced by adopted omnichannel strategies [11]. Consequently, omnichannel

marketing strategies are imperative to stem the decline of retail stores as well as to reduce overstoring tendencies. Such strategies are expected to succeed through providing interactive, engaging, personalized, and dynamic customer journeys and experiences. Via such a constant changing environment between channels and devices along with consumer-focused personalization based on messages offerings and interactions, omnichannel-based strategies may boost store sales and make stores more attractive for consumers [1]. Additionally, a seamless combination of channels with the integration of AR technology prevents churn in channel transitions and mitigates showrooming or webrooming behaviors [5].

56.2.3 Metaverse Enabled by AR and Impact in Omnichannel, Customer and Retail

The metaverse is currently a concept of ongoing debate and development, encompassing various proposed definitions. However, it is gradually gaining further clarity and maturity. Mark Zuckerberg describes it as an integrated immersive ecosystem in which the virtual and real environment barriers are blurred and seamlessly connected, allowing users to interact via digital identities such as avatars and holograms [3].

56.2.3.1 Metaverse and AR in a Marketing Context

Dwivedi et al. [3] contend that though the metaverse is not necessary for AR environments to exist, a metaverse cannot exist without AR or other extended reality (XR) technologies. Users can, for instance, use an AR application to try out clothing and fashion accessories without the need to engage with a metaverse environment. From a phygital perspective, it would be intriguing to experiment with the metaverse as a more engaging and humane platform, by embedding additional physical elements into its framework. The metaverse can reach higher levels of engagement that are not possible with current social media and digital marketing by enhancing interactions between consumers in both physical and virtual worlds, such as using tools that allow users to create digital avatars that represent them in the metaverse. These avatars could produce, own or trade in virtual items exclusively within the metaverse.

56.2.3.2 Metaverse and AR Influence on Consumer Interaction, AI, and Brand

Dwivedi et al. [3] predict that AI agents will be omnipresent in a future metaverse, increasingly interacting with customers instead of human company representatives. AI agents are expected to undertake more complex roles beyond service encounters,

such as performing as interaction partners or virtual tour guides to branded influencers which engage in personalized interactions with customers in AR. By altering our perceptions of reality and how we perceive our surroundings, our bodies, and other people, the metaverse will fundamentally alter the customer and brand experiences. Organizations can boost brand attitudes in the metaverse using AR and establish connections between virtual and real worlds, creating synergies in both domains. Research by [8] demonstrates that utilitarian and hedonic benefits, along with high-augmentation quality, enhance customer inspiration, ultimately impacting brand attitudes positively.

56.2.3.3 Metaverse and AR in a Retail Omnichannel Marketing Context

The metaverse, though in its early stages, enables brand experiences beyond traditional shopping. Through an expansive digital platform that fosters meaningful and inclusive interactions, small retailers can create a virtual store market in the metaverse to showcase products and offer customers personalized experience, bridging the gap between online and physical shopping. Retailers may also display digital replicas of real-world objects, or digital twins, allowing consumers to purchase either version. Companies such as Forever 21, in collaboration with Roblox and IKEA, have offered customers with digital twin offering, such as customizing avatars with merchandise, AR applications to try out lamps in the customer's personal environment, respectively [3]. Enhancing customer confidence in online transactions involving high-risk products can be categorized either as a consumer purchasing procedure or as an omnichannel strategy [2]. Moreover, luxury fashion retailers, such as Prada, Louis Vuitton, and Tommy Hilfiger have begun making significant investments in the metaverse. The luxury fashion brand Gucci has also sold a Roblox handbag for USD (\$) 4115, which is more expensive than the physical bag's retail price of USD (\$) 3400, authenticated with an NFT as a virtual ownership certificate, for customers to outfit their avatars in the metaverse. In the metaverse, NFTs might blur the boundaries between the real and virtual worlds, like omnichannel marketing integrates traditional and online shopping. Advanced AR technology may keep users seamlessly connected with digital and real environments and switching between objects in each world [3].

56.2.4 AR Impact on Customers Through Omnichannel Marketing

AR is an intuitive, context-sensitive, and socially connected interface, seamlessly providing an omnichannel journey through a unique combination of embedded,

embodied, and extended customer experiences [5]. Furthermore, its implementation is transforming how retailers serve customers online and offline and impacting various customer-facing functionalities like service quality, customer engagements, delivery processes, and in-store operations [6].

56.2.4.1 Factors in Customer's Shopping Experience in the Context of AR

A study conducted by Ylilehto et al. [11] aimed to understand how the customer shopping experience is influenced by several innovative technologies. In this paper, only the application of AR is addressed. Individual interviews were conducted with young students and professionals, who were shown two brief videos in the AR omnichannel shopping context, encompassing a description, example service, purpose of the technology, and shopping usage. AR is described as "*a technology that layers computergenerated enhancements atop an existing reality to make it more meaningful through the ability to interact with it*", for Amazon AR view and ODG smart glasses service examples, with the purpose of "Furniture decorating at home" and "Clothing shopping in-store". Shopping usage is described as "*Mobile application that allows users to test products in real-time; Wearable technology that can pick items hanging on the rack and showcase them on an augmented mannequin*". Afterward, participants are asked to think of a product they wanted to buy and discuss the process of buying it, and to provide their opinions on how the use of technology affected their shopping experience.

Ylilehto et al. [11] further state that channel preference and customer value perceptions both affect and are affected by AR in the shopping experience. Studies on augmented reality primarily focus on consumer behavior, particularly user acceptance and shopping value of online and mobile applications. The value proposition of AR is that customer experience is enhanced by merging vivid, personalized, and connected digital content, overcoming the restrictions of any single distribution channel by seamless integration. Value is delivered through customer experience because of the service provided and is conditioned by the customer's personal and surrounding environments, due to the subjective and individual nature of the experience.

Consumer utilitarian and hedonic values are crucial for customer experience, whether in-store or online. Utilitarian-oriented consumers seek process efficiency and time-saving technologies, commonly present in retail; consumers oriented toward hedonic values are driven by a sense of enjoyment in a pleasurable experience and frequently receptive to the introduction of new technology.

56.2.4.2 Findings Organized by Corresponding Critical Factor

Findings by Ylilehto et al. [11] suggest that a set of three highly intertwined factors critically affect the customer's shopping experience: channel choice, value dimensions related to convenience and enjoyment, and social interaction. Whether it be online or in-store, all participants stated that their preferred retail channel is the one they are already using. Additionally, augmented reality integration is found to fit both online and offline channels, as per Fig. 56.2.

Participants found the online channel to be more convenient, whereas in-store shopping was deemed to be more trustworthy. Regardless of these differences, participants would continue to use both channels in the purchase process with the intent of maximizing both utilitarian and hedonic value needs. AR allows task to be performed efficiently, anywhere, and anytime, as well as providing customers with an enjoyable shopping journey. Thus, it provides both convenience and entertainment values, as per Fig. 56.3.

Participants found the AR mobile application enjoyable to experience and convenient for re-planning purchases. Consumers embrace new technology, including AR, because it enhances their overall experience, which in turn affects their purchasing behavior. The consumer's shopping experience is significantly influenced by the social environment, as it encompasses people's opinions and experience. Since shopping can be considered a social experience, channel choice is strongly influenced by the others, as per Fig. 56.4.



Furthermore, purchase decisions may be influenced by a companion, who may also have an impact through reducing stress and making the experience more enjoyable. For participants that seek enjoyment in the purchase process, shopping instore would be preferable in contrast to an online experience, due to limited human interaction.

56.2.4.3 AR-Enabled Consumer Experience in the Context of Situated Cognition Theory

According to Hilken et al. [5], in order to gain insight into consumer experience and behavior, situated cognition theory should be applied. According to situated cognition theory, consumer experiences are at their most authentic when they incorporate real-time information about products and services when they are embedded, embodied, and extended.

The first of the nature of AR-enabled experiences, embedded, addresses the challenges that customers face when trying to envision how products and services fit them personally or with in their personal environment, such as mixing and matching pieces of clothing in a department store, by overlaying digital objects into the real world, thus providing information within the immediate decision context. Embodied experiences allow users to physically interact with objects to learn about products and services while relying on their own experiences and actions. This hands-on approach may enhance consumers' capacity to assess a product and elicit strong affective feelings, allowing for physical interaction and simulating the interaction via touching, rotating, or moving it around. AR-enabled experiences that facilitate customer interaction and engagement are referred to as extended. By enabling consumers to shop together, share it real time through social media and consult peer reviews, a social connection is established throughout the journey, thus addressing the natural tendency to share experiences with others [5].

Hilken et al. [5] also argue that AR implementation allows for embedded, embodied, and extended unique customer experiences by integrating interactive, real-time virtual content into the physical environment. This combination enables different channels to function seamlessly, blurring their boundaries and facilitating omnichannel behaviors in both offline and online contexts, instead of being limited to offline ones such as the traditional brick-and-mortar store.

56.2.5 AR Implementation in Omnichannel Marketing Strategies in Retail

An AR-assisted customer journey ensures a smoothly integrated omnichannel experience by structuring the touch points into sequential steps for the purchase process, effectively bridging the gap between online and offline channels [5]. Customer journey mapping is a valuable technique that aids in establishing a streamlined structure and facilitates the process of developing an organization's objectives [2].

56.2.5.1 Exploring Synergies Between Offline and Online Experiences

In view of Hilken et al. [5], AR presents numerous opportunities for enhancing omnichannel experiences by seamlessly incorporating elements typically associated with in-store interactions into the online environment. AR can be used for addressing negative consumer behavior, such as virtual shopping cart abandonment, product returns and webrooming due to a lack of direct product trial access. Several AR applications have been implemented to enhance the physical offline journey with embedded and embodied experiences, try on products such as Ray-Ban sunglasses and try out products like IKEA virtual sofa placement in a living room, providing customers with an authentic omnichannel experience. To facilitate the technology's growth block due to lack of social features, the social factor has been addressed (e.g., Akzo Nobel's "Visualizer" application), thus enhancing the perceptions of embedded and embodied experiences through shared visualization and manipulation of AR objects.

The same authors also argue that AR offers opportunities for seamless access to digital content that is traditionally available only to online shoppers in physical stores, thus counteracting the loss of customers to online shops, reduced in-store traffic and showrooming behavior. AR enhances the in-store journey, providing enjoyable experiences during time spent in-store while providing contextualized product or service information. Additionally, it improves price comparisons, product browsing, navigation and provides enhanced information on product features, variations, and availability (e.g., "Aisle411" application at Walgreens). The inclusion of a social component increases customer purchase: the AR application "Mirage" allows for the co-creation of value between users through the attachment of virtual information in physical environments. The embodiment of digital information in an offline setting grants retailers a wealth of information regarding consumer behavior by registering and adapting to a customer's location, movement, and self-controlled engagement with the product [5].

56.2.5.2 Strategic Considerations for AR Implementation in Retail

Focusing on the appeal and interactivity of stores has proven to be highly effective when applied to products adequate to be enhanced with AR. Likewise, integration of AR technology in a constantly changing store by increasing personalization of products such as furniture, apparel, eyeglasses, or makeup, and interactivity via mobile applications may turn in-store environment more appealing [1]. Through the integration of AR technology, the online marketplace Apollo Box has seen a significant 25% increase in conversion rates, along with a notable rise in customer engagement

regarding their offerings. Retailers that show poor track records in converting webbased customers to purchase complex goods or driving online customers to visit physical stores are good candidates to prioritizing specific omnichannel objectives and strategies [2].

56.2.5.3 Self-service Technology's Impact in the Retail Industry

Retailers prefer self-service technology as customers carry out many of the tasks themselves, reducing employee workload and enabling customers to create and access services electronically. This is a cost-effective and efficient approach that is liable to benefit both the customer and service provider, resulting in increased productivity, reduced costs, and faster service delivery. Moreover, it streamlines selection, minimizes queues, and prevents returns by ensuring a perfect fit for customers in physical stores and online platforms [6].

56.2.5.4 What is SMFT?

Smart mirror fashion technology (SMFT) is a self-service-based incorporated in the brick-and-mortar clothing retail sector to improve the efficiency and effectiveness of service provision and delivery processes. SMFT produces engaging hedonic experiences by adding information that allows customers to perform assessments of targeted products. SMFT employs algorithms to collect, examine, and draw conclusions from data containing multiple images. It outputs a reflection the customer's figure in 3D in a 360° panoramic augmented fashion display, allowing visualization of clothing in from every angle. SMFT is an AR technology that merges virtual information such as clothing to the physical environment, adding graphics, sounds, haptic feedback, among others, successfully enhancing customer's perceptions of reality [6].

56.2.5.5 SMFT in the Retail Context

SMFT significantly increases customer satisfaction by delivering an improved quality service, while simultaneously eradicating lengthy waiting times. Furthermore, the integration of SMFT offers auxiliary advantages such as immersive marketing experience or convenience in removing the need to change clothes, enabling brands to create virtual representations of their own stores, and minimizing uncertainties in decision-making processes [6]. By successfully integrating online experiences into the offline experience, a practical omnichannel shopping solution is created. This cutting-edge technology is currently undergoing successful testing at prominent retailers such as IKEA, Topshop, or Gap.

56.2.6 Strategies to Implement Omnichannel AR Marketing in Retail

Berman and Pollack [2] created a six-step plan to make an effective AR strategy:

- 1. Determine AR objectives within the firm's marketing strategy;
- 2. Choose appropriate products, channels, and target markets for AR;
- 3. Select among AR application types;
- 4. Design AR apps;
- 5. Evaluate alternative AR organizational formats; and
- 6. Measure the success of AR programs.

Stages 1–4 will be reviewed in greater detail below. Stages 5 and 6 are discussed in this paper as organizational formats and economic success indicators fall out of scope.

56.2.6.1 Step 1: AR Objective Classification

The initial step entails the definition of objectives into the five general categories listed below, which must be quantifiable [2]:

- 1. Increasing profits through higher sales;
- 2. Increasing profits through lower expenses;
- 3. Generating excitement for retailers or a product;
- Facilitating the consumer purchase process through increased product information;
- 5. Implementing and upgrading a firm's omnichannel strategy.

Organizations must adopt a unique combination of strategies and tactics to successfully accomplish their objectives. Mapping consumer journeys may assist in developing the aforementioned objectives.

56.2.6.2 Step 2: AR Adequacy by Product/Service

When developing viable channel alternatives that satisfy customer needs, marketers must focus on customer-centric needs for products and channels, as well as prioritize target markets and assess which of the chain's retail stores are adequate to deploy the technology.

AR can be highly beneficial for assisting customers in making informed decisions when it comes to selecting from a diverse range of products that are available in various colors, textures, sizes, and styles; conversely, its implementation should be disfavored with standardized products due to its lower potential. Other strategies include providing limited product and store applications, targeting the most valuable customers initially and expanding into the wider market at a later stage; or developing AR applications for less critical products and expanding to key locations after refining them. Alternatively, target markets may be chosen based on consumer behavior and AR acceptance, in a tailored approach such as adding images to visual information for visualizers and adding text to visual information for verbalizers [2].

56.2.6.3 Step 3: AR Application Type Selection

According to [2], retailers may choose to develop four main application types: product demonstrations, try-on, try-out, and remote technical support. Each category of AR application offers a distinct range of advantages to consumers.

Product demonstration applications are ideally designed to showcase the utilization of a product, provide a comprehensive overview of its features, and provide a virtual tour of a company's facilities, all while promoting engagement. Since it is easier to implement than other formats, it is recommended for a company's initial venture into AR. An example of this type of application is the Jaguar Land Rover AR app which enables consumers to visually observe a 360° perspective of the Range Rover Velar's exterior, virtually sit inside the vehicle, and book a test drive. Product demonstration applications create excitement, showcase product functionality, and emphasize unique features.

Try-on applications are contextual, providing a practical way for consumers to visually assess how various products, including clothing, cosmetics, and eyeglasses, fit with their face and body. L'Oréal's try-on AR app uses face-mapping technology on smartphone cameras to allow customers to try on various makeup products, including foundation, blush, lipstick, and up to 30 different eye shadow colors.

Try-out applications are also contextual and enable consumers to experiment with how objects, such as furniture or cabinet designs, colors, and layouts fit within their personal environments. Macy's uses try-out applications to seamlessly incorporate 3D digital models of their home furnishing products within customers' homes.

Both try-on and try-out applications have the added benefit of convincing customers to sample products they would not have contemplated via a retailer's virtual inventory. Successful try-on and try-out apps boost impulse sales through accessory recommendations and self-service customer experience, though they are more costly to develop since they need to virtualize consumer's characteristics.

Remote technical support applications focus on guiding consumers through troubleshooting and repair processes by overlaying instruction on an image of a customer's product via a mobile device such as a smartphone. IBM trains field technicians using AR, eliminating travel time, and enabling easy customer service in any location. This has resulted in high customer satisfaction and lower product servicing costs. Consumers benefit from 24/7 support, shorter waiting times, and reduced product downtime.

56.2.6.4 Step 4: AR Application Design

Berman and Pollack [2] argue that effective AR design should prioritize creating a high level of user engagement while providing realistic and vivid experiences to maximize success, maximizing the hedonic value. However, possible design challenges may arise with AR applications that are difficult to operate or that prioritize novelty over providing valuable product information.

Identifying the method by which users will activate the AR layer is another aspect to consider in AR design. One possible way to trigger the AR experience would be for customers to scan a print advertisement using their mobile device or by using a virtual try-on mirror to explore clothing options. Additionally, marketers can create their own apps or advertise with augmented reality on platforms like Facebook or Snapchat and may consider using AI to suggest personalized AR apps based on consumer browsing history.

56.2.7 Future Research

Despite the breadth of research in AR, significant gaps remain, particularly at the nexus of AR, marketing, and ancillary social considerations. A compilation of future research topics (and short descriptions) which would strongly contribute to the field can be found in Table 56.1.

56.3 Discussion

A total of six articles were identified in the review and constitute the basis of that section of the work; overall findings from the literature encompassed the following topics:

- AR definition, operation, benefits, consumer value, and current state-of-the-art;
- Omnichannel customer experience and journey;
- Concept of the metaverse, dependency, and potentialization through AR technology, and its influence in omnichannel marketing, consumers, and the retail industry;
- AR impact in customer shopping experience and journey, and factors of influence on customers through omnichannel marketing;
- AR implementation in omnichannel marketing strategies in retail, possible synergies between offline and online experiences, general strategic considerations, and exploration of the use case of SMFT's impact in retail and on customers;
- Mapping and devising AR omnichannel marketing strategies to implement in retail, encompassing a six-step guide for retailers;

Торіс	Description
AR and the metaverse	Which hardware devices are best for metaverse applications, considering their suitability and compatibility?
Metaverse marketing strategy	What is the recommended approach for designing and implementing a marketing strategy for the metaverse?
Products and services	How do virtual products in the metaverse impact real-world product perception and purchasing, and vice versa?
Distribution channels	To what extent can physical distribution channels be replaced by digital metaverse channels?
	What distinguishes a channel strategy for the metaverse from traditional e-commerce strategies and offline (physical) strategies?
Data use and privacy	How to approach the handling of data use, particularly with regarding information security challenges, risks, and data privacy concerns, such as biometric technology?
Ethics	How can organizations mitigate potential psychological or physical risks, such as addiction and distraction in AR, respectively?
Omnichannel marketing	What kinds of digital products are worth considering for sale?
	What are the best practices for incorporating virtual customer service representatives into the metaverse?
	How can retailers develop and maintain relationships with their customers?
	What are the most effective business models for omnichannel retailers in the metaverse and their retailing strategies?

 Table 56.1
 Further research, based on [3]

• Compilation of essential research topics regarding the impact of AR, the metaverse, and omnichannel strategies on each other and other fields such as logistics, data use, and privacy and ethics.

The findings provided a comprehensive analysis of AR technology, omnichannel marketing, and the metaverse, highlighting their state-of-the-art and interplay. It also examined their impact on the customer's journey and experience, considering various factors that influence customer behavior. Building on these insights, the systematic review discussed strategies for effectively integrating AR technology into omnichannel marketing in the retail industry context. This involved leveraging synergies between different marketing channels and devising targeted strategies. Moreover, research gaps were identified in the existing literature regarding the interaction between AR, omnichannel marketing, metaverse, and related fields. To address these gaps, potential avenues for future research were proposed.

56.4 Conclusions

This article describes the interplay between the concepts of AR, omnichannel marketing, and the metaverse while exploring synergies between offline and online channels. Through the articles reviewed, this article attempts to bring together theory and practice by highlighting the importance of understanding both critical factors and natures of AR-enabled customer experiences and by designing tailored omnichannel marketing strategies in the retail industry.

This article identified several promising research avenues and their relevance. It also calls attention to the potential problems around data use, privacy, and security. Strategies evolve to expand the breadth and depth of data collected from users and this is likely to become a problem to manage as regulation catches up with data collection and handling practices. An example of new regulation that may impact practices is the EU AI Act which will regulate the use of AI in the economic block. The field would benefit from the development of strategies that balance the interests of businesses and consumers, to enable the flourishing of omnichannel marketing practices using AR in retail while avoiding potentially burdensome regulation.

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Chapter 57 Spatial Computing and Augmented Reality—Challenges in E-Commerce



Carlos Alves , José Machado , and José Luís Reis

Abstract Spatial computing will undoubtedly be one of the pillars of e-commerce in the future, with the aim of combining augmented reality technology with a Head-Mounted Display device to create an immersive and augmented environment. Thus, the shopping experience as well as the user experience for the applications adopting these technologies will have to be studied. This study aims to deepen the literature on this topic, as well as trying to ascertain what will be the main trends and factors that could influence these types of technologies and studies in the coming years.

57.1 Introduction

Computational evolution has been imminent due to the current development of military technology, medicine, as well as smart cities and the current growth in the use of artificial intelligence by the general population [1–5]. From 2013 to the present day, spatial computing has emerged slowly and it is difficult for mainstream users to accept and utilise. Spatial computing aims to integrate interaction between the real world and the virtual world. In this sense, augmented reality (AR), virtual reality

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(VR), and mixed reality (MR) have become milestones for this technology, with *Google*, *Microsoft* and even *Apple* developing devices to use these systems.

57.1.1 Timeline

In 2016, *Microsoft* presented the *Microsoft Hololens*, which introduced an era of technological revolution, demonstrating AR and VR in a single device, known as MR. Various new concepts emerged, from collaborative work environments to repairs carried out by the user themselves, thus creating a new era of computing, although it was restricted to research centres and programmers, and its real potential in relation to what was proposed in the demonstration was very limited.

In 2018, *Microsoft* launched the second version of the *Hololens*, which improved the ergonomics of its device, as well as some hardware issues. However, it has yet to be widely accepted by ordinary users.

Recently, *Apple* launched its Head-Mounted Display (HMD) device, the *Apple Vision Pro*, where some of the possibilities for using this technology were demonstrated on video. You can view photos, use mindfulness applications, watch films, play video games, listen to music with spatial sound, or work individually and collaboratively, make video calls, expand current computer systems to spatial computing systems, and create 3D mapping of the surrounding space, all completely immersively or through AR [6] (Fig. 57.1).

Based on these events, given that we have a time frame of 10 years and the fact that consumers are using AR technology to help them buy certain products, it is worth asking how spatial computing can be more beneficial than mobile devices or even traditional computing devices.

In this sense, the research question is: How can spatial computing influence ecommerce with AR?



Fig. 57.1 Timeline of the evolution of spatial computing devices by the three big technology companies (Alves et al.)

57.2 Methodology and Article Selection

This study used an exploratory approach. Initially, it was decided to adopt the $PRISMA^1$ methodology, more precisely, the set of guidelines called "Preferred Reporting Items for Systematic Reviews and Meta-Analyses," in order to select the relevant articles. This choice was largely based on its well-established acceptance in the academic sphere, as well as the success previously achieved by other researchers in studies previously carried out. To this end, we first selected the keywords that were most appropriate for this research. Next, a set of terms was drawn up for the database search, especially using the *SCOPUS* platform. Finally, the sample was further characterised and reduced by applying more careful criteria, culminating in an exhaustive analysis and in-depth discussion of the results obtained.

The literature search for the *PRISMA* framework was conducted on 14 August 2022, using the *SCOPUS* database as a source. The keywords used in this research are:

- Augmented reality.
- Spatial computing.
- E-commerce.

The keyword of the search for this PRISMA is presented below:

(KEY ("augmented reality") AND KEY ("spatial computing") OR KEY ("e-commerce"))

These *keywords* were selected because, given the other options we had, they were the ones that showed the most relevant results.

To summarise, the selected exclusion criteria are presented below:

EC1 Subject Area in Computer Science and Social Sciences and Business, Management, and Accounting. Twelve documents were excluded and 104 remained for analysis.

EC2 Has not been produced in the last 5 years (from 2019). 77 Documents for analysis 27 documents were excluded and 77 remained for analysis.

EC3 Not freely accessible. Sixty documents were excluded and 17 remained for analysis.

EC4 Have not been peer-reviewed. Zero documents were excluded and 17 remained for analysis.

EC5 Do not focus on the variables studied or is out of context. Eight documents were excluded and 9 remained for analysis.

This led to a compilation of 116 documents, to which the aforementioned exclusion criteria were subsequently applied. The initial titles, designated [EC1], promoted

¹ http://www.prisma-statement.org.

the elimination of articles that did not belong to the disciplinary area of Computer Science and Social and Business Sciences, Management, and Accounting. The subsequent exclusion criterion, designated as [EC2], was constrained to articles published within the last five years, culminating in a total of 60 remaining documents. The third exclusion criterion, identified as [EC3], specifically focused on articles accessible through Open Access, resulting in a selection of nine documents for further analysis. Moreover, two additional exclusion criteria, namely [EC4] (pertaining to the exclusion of non-peer-reviewed articles) and [EC5] (pertaining to the exclusion of articles not directly relevant to the subject of study), were rigorously applied. As a consequence of this meticulous filtering process, a final set of nine documents remained for in-depth examination.

The ultimate research keyword for this article is presented below:

(KEY ("augmented reality") AND KEY ("spatial computing") OR KEY ("e-commerce")) AND PUBYEAR > 2018 AND PUBYEAR < 2024 AND (LIMIT-TO (SUBJAREA, "COMP") OR LIMIT-TO (SUBJAREA, "BUSI") OR LIMIT-TO (SUBJAREA, "SOCI")) AND (LIMIT-TO (OA, "repository") OR LIMIT-TO (OA, "publisherfullgold") OR LIMIT-TO (OA, "publisherhybridgold") OR LIMIT-TO (OA, "publisherfree2read"))

The fundamental purpose behind this PRISMA study was to carry out a comprehensive analysis of the current panorama of augmented reality (AR) in the field of spatial computing, with special emphasis on applications that have already been developed, emerging trends and even prototypes that are in the development phase, all aimed at improving electronic commerce (e-commerce) and commerce on mobile devices (m-commerce) (Fig. 57.2).

57.3 Discussion of Results

This section will summarise the analysis of the documents resulting from the PRISMA study, with the aim of understanding the progress of spatial computing in the context of e-commerce.

57.3.1 Analysis of Articles Resulting from PRISMA

Space Computing Muller et al. have developed SpatialProto, which consists of an in situ spatial prototyping system to reduce the barrier to creating spatial prototypes. Using an MR HMD with depth sensing capabilities (via the LiDAR sensor),



Fig. 57.2 PRISMA diagram of exclusion criteria (Alves et al.)

SpatialProto empowers users to capture dynamic entities from the tangible world environment, such as objects like paper, clay, individuals, or any other tangible item. Subsequently, it facilitates the extraction of only pertinent components from these captures and enables their immediate integration and manipulation within their physical surroundings, as exemplified in Fig. 57.3. The applicability of this system can be varied, particularly in the areas of augmented instruction, support for spatial tasks, interior design, and adventure games [7].

In the research conducted by Bortsova and Panfilov, the primary focus of the study revolved around strategies aimed at enhancing the value proposition of management information systems within aviation organisations. This enhancement was achieved through the implementation of integrated spatial and visual computing solutions with a specific emphasis on the domain of aircraft maintenance, repair, and overhaul operations. Consequently, the central objective of this investigation was the



Fig. 57.3 SpatialProto's mode of operation (Muller et al. [7])

development of a novel integrated spatial-visual framework tailored for intelligent aircraft engine maintenance, repair, and overhaul services. This framework encompassed a comprehensive array of technological and software solutions designed to facilitate and support operational activities across various hierarchical levels within aviation organisations spanning from high-level management personnel to aircraft technicians. The authors' findings underscored the benefits of advocating digital transformation within the transportation sector, particularly through the integration of spatial computing techniques when considering the advanced interaction between personnel and the physical world within various business processes [8].

Huang et al. directed their study towards creating an effective and universal map rendering framework, using various visual algorithms, in order to solve challenges associated with AR geospatial information systems (AR-GIS). This approach aims to exploit the potential of AR-GIS to enrich spatial experiences. They identified that anomalies, mainly linked to hardware limitations and dependence on different graphics libraries and operating systems on various platforms, can affect rendering consistency and performance. In order to overcome these limitations, they devised strategies such as cache pre-storage, spatial index optimisation, and a GPU-accelerated vector drawing algorithm. In addition, they created a cross-platform architecture to maintain a uniform AR-GIS rendering style across all platforms. Using the AUGL engine, they developed AR map applications, incorporating AR service components and mobile prototypes, obtaining superior performance results compared to other AR map solutions, as can be seen in Fig. 57.4 [9].

Keshavarzi et al. introduce a technique for creating an optimal shared virtual environment in scenarios involving multi-user interactions, where remote users may have varying room layouts and dimensions. This approach relies on the utilisation of pre-existing semantic scene maps to identify areas that can be shared for functional purposes. Importantly, it possesses the flexibility to optimise shared spaces contextually, even when the layouts and sizes of individual user spaces differ significantly. Additionally, assuming that users have the flexibility to rearrange furniture within their spaces, the authors have introduced a refined optimization process aimed at



Fig. 57.4 Contrasting AR Route Navigation Visualisations: **a** AR Route Navigation using Mapbox; **b** AR Route Navigation with ArcGIS; **c** AR Route Navigation via AUGL (Huang et al. [9])



Fig. 57.5 Screenshots from HoloLens showcasing augmented overlays delineating shared boundaries in three distinct areas: **a** kitchen; **b** conference room; **c** robotics laboratory. The colour blue denotes shared boundaries, while green represents areas of sustainability, and red signifies non-sustainable spaces (Keshavarzi et al. [10])

further expanding the shared area. The effectiveness of this solution was demonstrated through experimentation with real-world datasets and its application on the HoloLens platform, as depicted in Fig. 57.5. The results from these tests affirm the viability of this innovative approach, which automates the recommendation of contextual shared spaces to participants engaged in immersive virtual experiences within AR/VR applications [10].

Nowadays, AR systems are designed to run on a single system. In this sense, and in order to create added value, Duong et al. have created a Cloud AR tool capable of offering shared AR experiences anywhere, anytime in a real environment that changes over time. A global map is shared with all AR devices on the AR cloud platform, so they can position themselves in reference to a single global coordinate system. This global map is also updated depending on local maps made in real-time by each AR device [11].

E-commerce with AR Hoffmann and Mai conducted a literature review on consumer shopping behaviour with AR. As a result, the authors state that the role of AR will be to inform, visualise, experience, and place. The authors also suggest a model of consumer behaviour when shopping with AR applications, as shown in Fig. 57.6 [12].

Riar et al. aimed to provide a synthesised and structured overview of cutting-edge research focused on AR purchases. In this sense, products such as furniture or makeup have already been extensively studied, but technology-related products have not yet been widely explored in purchases with this type of technology. This is because one of the main factors is the fact that it is possible to try products in real time while technological products cannot yet be tested virtually [13].

Khosasih and Lisana wrote an article to assess the factors that influence consumers' intention to adopt AR applications. The results showed the importance of food image in hedonic value, utilitarianism, and perceived informativeness. In addition, hedonism was the only determinant that positively influenced customers' intention to use food and customers' intention to use AR OFD applications [14].



Fig. 57.6 Framework model of consumer behaviour in AR shopping (Hoffmann and Mai [12])

Wojciechowski et al. addressed the issue of sizing in the context of AR in their publication. They introduced an application that facilitates the virtual testing of clothing items on a digital avatar, aimed at reducing the rate of returns stemming from online apparel purchases with sizing inaccuracies. Through these trials, consumers gained the ability to visualise how a chosen product in a specific size would appear on their own body, considering factors such as fabric type and tension. Nevertheless, it is worth noting that implementing technologies like WearFits can pose challenges. Notably, the process of constructing a 3D CAD model from a scanned representation of the garment can be both costly and time-intensive. This aspect presents an economic hurdle for online retailers. Consequently, employing AR for e-commerce in the textile industry emerges as a prospective strategy to mitigate return rates, particularly due to sizing issues [15].

Goel et al. endeavoured to gain insights into how sensory perceptions elicited by AR features affect impulsive buying behaviour in the online context. This investigation employed the Stimulus-Organism-Response (SOR) framework to formulate and elucidate the connection between sensory perceptions (visual, acoustic, haptic) generated by AR applications and the emotional states (arousal, pleasure) of consumers within the realm of online eyewear purchases. In this regard, the researchers established a general consensus that the sensory experiences facilitated by AR apps wield a substantial influence over consumers' emotional states, thereby intensifying their inclination towards impulsive online buying (UBI). Furthermore, it was observed that consumer engagement significantly moderated the impact of emotional states on UBI. As a result, the authors propose that future research endeavours delve deeper into various aspects of AR to gain a more comprehensive understanding of the phenomenon of impulsive online behaviour [16].

Gabriel et al. conducted a study with the primary objective of assessing the impact of integrating AR technology within the beauty and fashion product domain on users inclination to persist in using AR and engaging in e-commerce shopping. This comprehensive investigation involved 549 participants and yielded noteworthy findings. It demonstrated that factors such as interactivity, novelty, hedonic value, and satisfaction exerted a statistically significant influence on users' intentions to continue using AR. Additionally the study revealed that AR had a substantial effect on users' intentions to make purchases through this technology-enabled medium [17].

Lavoye et al. endeavours encompassed three primary objectives. Initially, their investigation discerned the significance of self-presence in cultivating self-exploratory engagement within the realm of AR, ultimately resulting in enhanced brand responses. Secondly, their work made valuable contributions to the realm of branded AR applications by shedding light on the motivational factors underpinning their usage. They demonstrated that self-presence and self-exploratory engagement empowers individuals to delve into the exploration of potential self-identities. Thirdly, the study advanced the existing body of knowledge on self-extended theory, showcasing that self-exploratory engagement serves to amplify brand cognitive processing during the process of self-extension, consequently fostering more favourable brand attitudes [18].

Preechayasomboon and Rombokas claim that haplets can provide haptic feedback in the form of impacts and textures for hand tracking applications in VR and AR [19].

57.4 Discussion

Spatial Computing Muller et al. address a headset that offers an interface for capturing scenes, editing, and prototyping operations, but point out that spatial prototyping is not trivial and requires skills in 3D content creation and programming [7]. Bortsova and Panfilov, on the other hand, aimed to develop a new Smart Maintenance Framework for aircraft that includes technological and software solutions to support operations at different levels of the aviation organisation, from senior management to the aircraft technician [8]. For their part, Huang et al. proposed a unified multiplatform interface to preserve the consistency of the AR-GIS rendering style between platforms [9]. Meanwhile, Keshavarzi et al. present an algorithm that can effectively discover the ideal shareable space for multi-user virtual interaction. Finally, Preechayasomboon and Rombokas claim that haplets can provide haptic feedback in the form of impacts and textures for hand tracking applications in VR and AR [19] and Duong et al. conclude that the AR cloud service architecture is capable of

continuously relocating AR devices with respect to the reference coordinate system of a common global 3D map [11].

E-commerce with AR Hoffmann and Mai report that AR applications are receiving great interest in e-commerce, m-commerce, and physical commerce [12], and Riar et al. report that AR-related purchases are fundamentally reshaping consumer experiences [13]. This is because Khosasih and Lisana identify that the pandemic has changed consumer confidence and that the only determining factor that positively influenced customers' intention to use food delivery apps was AR [14]. On the other hand, Wojciechowski et al. point out that optimising purchasing processes in online ecommerce is a serious challenge not only for business, but above all for protecting the environment and our global health [15]. Regarding feelings, Goel et al. state that the sensory perceptions provoked by AR applications significantly influence customers' emotional states, leading to the desire to buy impulsively [16], and Gabriel et al. state that with the use of AR, interactivity, novelty, hedonic value, and satisfaction significantly affect the intention to continue [17]. In conclusion, Lavoye et al. talk about a realistic experience of virtual experimentation that encourages self-extension through a process that begins with the exploration of styles and results in greater cognitive processing of the brand and more positive brand attitudes [18].

57.5 Conclusions

57.5.1 Evolution of E-Commerce in Spatial Computing

Based on what has been obtained from the literature review, and answering the research question of this study, trends, concepts, and uses of spatial computing for e-commerce can be extracted. Some trends and future research on this topic are presented below.

Trends When it comes to trends in this type of subject, the one that is most needed is the fact that the user experience in this type of tool has been little studied, as it is already lacking in previous technologies, as in the case of AR for mobile devices. Thus, creating new types of interactivity to improve the intention to use, moreover purchase decision-making and ease of use will undoubtedly be a great advantage for this technology in e-commerce. According to the study by Muller et al., one of the conclusions that can be drawn for e-commerce will be to scan a product through an HMD and make it available for sale, without the need to use traditional 3D design. This will bring about digital transformations for those who sell online. This is without ever questioning the hardware limitations that may arise, according to the study by Huang et al. [7, 9].

Thus, one way to avoid processing limitations at hardware level will be cloud computing, as the study by Duong et al. [11] points out. This could be a very strong trend for the foreseeable future, since the burden of processing and rendering would

be carried out by a much more powerful computer than the HMD device. This is because the study by Khosasih and Lisana argues that there is an importance of food image in hedonic value, utilitarianism, and perceived informativeness, since hedonism was the only determinant that positively influenced customers' intention to use an application in AR [14].

For the authors Bortsova and Panfilov, what they conclude is that these technologies can be crucial in the advanced interaction between man and machine, which they conclude that for e-commerce will be a factor in the consumer experience with this type of technology [8].

Based on the authors Hoffmann and Mai [12] suggestion, focusing consumer behaviour on purchases using AR will cause the UX of this type of application to change considerably. Thus, and adding to the line of thought of Keshavarzi et al., it can be concluded that it will be the way in which these devices can make the consumer emerge in one environment and instantly place them in another, with the virtualisation of space [10, 12]. For example, a consumer could go to a shop, see the product, go to the application or the products website, see the product in 3D while in the shop and, with the MR Glasses, be able to experience that same product at home, through the virtualisation of space. This will give the user greater purchasing certainty and will influence the future of the omnichannel.

Thus, creating more haptic forms, such as those that appear in Preechayasomboon and Rombokas in the sense of testing technological products, such as being able to try out a Smartphone virtually, even touching its OS in a virtual way, could be something extraordinarily central to changing the paradigms of selling technology online. This could apply to other areas such as the automotive sector, the education sector, among others.

Finally, it can be seen that just as there are various terms such as e-commerce, m-commerce, s-commerce, and even v-commerce, all of which have their purpose, when it comes to virtual shopping in the real world or immersive shopping on the same device, a new terminology could emerge here, **X-Commerce** which could be adopted to characterise e-commerce on MR devices, thus allowing the product to be viewed either in a virtual environment or added to a real environment, all on a single device, stressing that it must allow the purchase of the product on that same device.

57.5.2 Limitations

The novelty factor greatly limits this type of study, due to the fact that few devices are available to conventional users (consumers), which limits the existence of studies and applications.

The scarcity of publications in these areas makes it more difficult to ascertain trends or problems directly, and they will have to be ascertained based on the experience of other similar devices.

57.5.3 Future Research

As this is a fairly recent topic, spatial computing still requires a lot of research and development, as existing applications on mobile devices will have to be migrated to this type of device, and it will be necessary to study how to provide this type of experience to consumers. The authors realise that it will still be necessary to investigate the UX with Spatial Computing, as well as the interaction of this type of device with haptic tools when buying products.

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Chapter 58 Exploring Virtual Reality in Omnichannel Marketing: A Systematic Review



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Abstract VR (Virtual Reality) is a technology that has been gaining more and more traction over the years, with a market that keeps on increasing in size and great opportunities. This research aims to obtain a better grasp on how VR will impact the future of omnichannel marketing, with a focus on retail. Some businesses have already begun taking advantage of these technologies. They coordinate the integration of both physical and digital channels used to interact with customers in order to improve the customer experience. VR is one such channel, and it offers consumers a whole new way to do their shopping. As technology evolves, it is important that businesses and people stay informed in order to adapt to an everchanging market. VR is an innovative technology that a lot of potential companies could take advantage of and even gain a competitive advantage over other businesses. Through VR people and businesses are able to access the metaverse. The metaverse is a digital world parallel to our own where customers can interact with brands and their virtual products. By interacting with a virtual version of a product, consumers will have a better grasp of the product they are interested in and make better decisions when purchasing the real one. This not only raises consumer satisfaction but could also be very useful. To fully grasp what VR is capable of, a literature review was performed to understand what VR is in fact and how the metaverse can be used. Finally, a Prisma systematic review will be presented with the research question "How VR will impact the future of omnichannel marketing?". This was done in order to obtain unbiased data from which conclusions can be drawn.

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58.1 Introduction

As technology keeps evolving, it is important for people, and especially businesses, to stay informed and make an effort to anticipate how these technologies might impact daily life. It becomes possible to adapt to change and even gain a competitive advantage by making better decisions. It then becomes a problem when the impacts of a rising technology in certain fields are understudied. This was the problem found when exploring how VR will impact omnichannel marketing. VR is a market that has been seeing more and more applications in the past few years, with more expected to be implemented in the foreseeable future. This technology has been developing since the 1960s, but only recently has its wider adoption started. This is due to its equipment reaching a point where it has good quality and is cheap enough to allow for this [1]. Omnichannel marketing is the seamless integration and cooperation between various channels used by businesses to interact with consumers, creating a unique brand experience. These channels include both physical and digital channels, such as stores and websites. This marketing strategy emphasizes a unified consumer experience, optimization of channel performance, and facilitating transactions [2].

Some current interesting uses for VR include, for example, making the design of complex manufacturing systems easier. Although it's still rarely used, those who have used it have reported enhanced technical communication between experts and improvements in teamwork. It was particularly effective in finding flaws such as visibility problems, reach, and posture. Users found this technology enjoyable and easy to learn [3]. Osso VR is a leading VR surgical training and assessment platform where professionals can share, practice, and learn new skills and procedures using VR. Training is customized, offering experiences ranging from routine and common cases to those that happen once in a lifetime. It is currently one of Meta's preferred partners [4]. Verizon uses VR to train store employees to handle robbery situations [5]. NASCAR uses VR to allow fans to remotely attend racing events [6].

It is visible that VR has had many good uses over the years, and the marketing industry is no stranger to this phenomenon either. In this paper, the current scientific literature on the subject of VR and its uses in marketing will be reviewed. The following chapters will explain what VR is and how it is used to access the metaverse. A metaverse definition is presented, inspired by the definitions previously given by various other authors. Examples of businesses that have used VR in their marketing strategies will be given. Finally, there will be a systematic review with the question "How will VR impact the future of omnichannel marketing?" with some interesting results and ideas on how businesses and brands can improve their customer relations using these technologies. Some topics include measuring client satisfaction using AI (artificial intelligence) to analyze the client's emotions in real time while they're in the virtual world, how to improve consumer well-being and trust, necessary policy implications, as well as some challenges for the future of the metaverse.

This paper follows the following structure: Sect. 58.2 focuses on the fundamental concepts of the Metaverse and VR in the context of marketing. Section 58.3 consists of the systematic literature review, where an exploration of current practices and trends

takes place. Section 58.4 presents the conclusions, summarizing the key findings and insights derived from the examination of VR and the Metaverse in marketing strategies.

58.2 Metaverse and Virtual Reality Fundamentals in Marketing

Different authors have been defining the metaverse in different ways. Understanding what the metaverse is enables a better understanding of the subject at hand and a better basis for the work to come. A definition of VR is also presented, as well as some information about omnichannel marketing.

58.2.1 Virtual Reality Definition

VR can be defined as a virtual, immersive environment that makes the user feel like they are somewhere they are not. For this, the user must be able to interact with said environment, which in turn must mimic real life in general through sound, sight, and even touch [14–17].

58.2.2 Uses for Virtual Reality in Marketing

VR is a market that has been seeing more and more applications in the past few years, with more expected to be implemented in the foreseeable future. This technology has been developing since the 1960s, but only recently has its wider adoption started. This is due to its equipment reaching a point where it has good quality and is cheap enough to allow for this.

This technology has been expanding in recent years, with its market value in 2022 being \$28.4 billion and estimates pointing to it increasing 13.8% per year until 2030 [18]. In this light, companies need to adapt and take advantage of VR's capabilities. In the marketing sector, there are already several examples of how businesses are doing this:

• Thomas Cook Airlines had a campaign back in 2015 called "Try before you Fly". As the name suggests, this campaign allowed used users experience both the flight quality and their destination before actually traveling. For this, they used VR technology in their own stores. These 5 min 360° videos are still available on YouTube. They are watchable with or without VR equipment. Since their release, the company has reported an 190% increase in trips to New York [19].

- Adidas had a campaign in which they got customers to try out mountain climbing using VR. This way they taught players important outdoor climbing practices while promoting their new line of outdoor gear, TERREX [20].
- The Alzheimer's Research UK research centre developed an Android application that allows users to put on the shoes of someone with dementia. This application named "A walk through dementia" was made to help raise awareness to the problem these people face while at the same time raising funds. It is targeted for the public, healthcare professionals and people working in the care sector. Its development was guided by people who live with different forms of dementia, and it features computer generated environments and 360° videos to show in detail how everyday tasks can be challenging [21].
- Volvo had a campaign where potential clients could experience a new car they had released, Volvo XC90, in VR on their phone. This experience was themed around a weekend escape through Vancouver. The users had the perspective of being inside the car as it drives down the road with a beautiful scenery all around [22].
- Tata Motors have a virtual stand where potential clients have the opportunity to browse different cars, customize them, have a view of both the inside and outside virtually and even have some basic interactions with the car such as, for example, opening the doors [23].

58.2.3 Metaverse Definition

The word metaverse has been gaining popularity in the recent years. However, this is not a recent term, as it was first introduced to the public by Neal Stephenson, author and writer of science fiction novel Snow Crash [7]. The metaverse is a 3D virtual world parallel to our own. Interactions with this new world are realized through the use of avatars via VR equipment. These avatars are then the virtual embodiments of these users in the metaverse. With this, it is now possible to understand the logic behind the word metaverse. It is the compound of the words "*meta*", meaning transcendence or beyond, and "*verse*", which is an abbreviation of the word universe. So, in essence, the metaverse exists beyond our universe [8–13].

Since its inception, the term metaverse has evolved with various descriptions. For the purposes of this paper, we consider the multiverse a fully immersive parallel reality that blends the physical, digital, and human worlds. In the metaverse, users can experience an alternative life through the use of avatars, being able to work, socialize, study, play video games, explore, and more [8-13].

58.2.4 Omnichannel Marketing

Businesses communicate with their consumers through many different channels, some of these are physical, such as a store, while others are digital, such a website.

Omnichannel marketing focuses on having these different channels cooperate with one another and share information that can be used to optimize the performance of a channel, facilitate transactions and overall improve the costumer experience by making it unique [2]. This marketing strategy does however come with it's own set of challenges, namely:

- Data, for this strategy to work a lot of data, is needed about the consumers during different stages of the consumer experience. This data can be obtained from purchases, post purchase services, receiving the product, if a devolution is made, and other interactions. Besides being hard to acquire, this information is also not easily used since it comes from different sources and needs to be integrated [2].
- Marketing attribution, in an omnichannel setting, optimization needs to be done jointly across communication channels. This is done because a consumer might start their search in a physical store and then continue it online changing the products considered for purchase. To make the most out of each one of these touch points, it is necessary to calculate the effectiveness of each one of them. This way it then becomes possible to calculate the return on investment for each platform. However, this becomes challenging when there are many steps in a purchase or when a purchase is made in a non-sequential manner since the purchase might indeed be made online but seeing the product physically on the store might have had a great impact on the decision. Attributing an impact of the physical store on this purchase is challenging if not impossible [2].
- Customer privacy, since omnichannel data relies on so much data it is imperative that companies seeking to use an omnichannel marketing strategy do so while respecting customer privacy [2].

58.2.5 Phygital Marketing

The term phygital was first coined by Chris Weil in 2007 [24]. It is a relatively new term, and it is the agglutination of the words "physical" and "digital". It aims to mould the consumer's experience in a way that the use of these technologies becomes seamless, creating a novel experience for the user. Common examples of popular phygital use are contactless payment systems and interactive touch screens. Studies show that these technologies influence consumer perceptions of product value, minimize confusion and generate client trust [25]. An interesting use for this technology is what Amazon is doing on their Amazon Go stores [26]. People can just go to the store, pick something from a shelf and leaving without the need to physically go to a cashier or scan the item. This is achieved by a combination of sensory technology and AI which would track the client and the products they take from the shelf and bill their account automatically the moment they left the store. All they need to do is either have the app installed in their phone or simply insert their credit card into the reader at the gate and they can enter the store. And this is just

Tab	le	58.1	Prisma	parameters
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Concept	Population	Context	Limitations
Omnichannel marketing	Retail	Virtual reality	Papers between 2017 and 2022

the beginning, some are already envisioning a future where people enter a changing room, selecting the type, style, and size of the clothing they wish and having it delivered to them to try on.

Besides Amazon there are currently 150 companies focused on different technologies that enable automated, cashierless retail [25]. These systems allow for improved efficiency, both in customer waiting time and inventory management, the gathering of shoppers' details and reduced overhead costs in the long term. Customers who have tried this experience report fully enjoying the experience and wanting to see more of these kinds of stores near them.

Another interesting use of these technologies was during the Covid-19 pandemic. Makeup stores such as Sephora and Ulta decided to prohibit customers from trying products on their skin due to safety concerns. As a workaround, they introduced in-store AR (augmented reality) mirrors for customers to be able to see how these products would look on them without actually using them. This also removed the lengthy process of then removing the makeup to try on another shade, meaning consumers were actually able to try on more products in less time [27, 28]. But the use of these technologies isn't limited to physical going to stores. Online shopping has also been having its own share of improvement. More and more companies are allowing people to try on clothes from the comfort of their homes, utilizing both AR to see how clothes would fit them [29] or VR to view how a 3D virtual version of themselves would look in said clothing [30]. This has the added bonus of being able to try on clothing that hasn't been released yet, giving consumers something to look forward to.

58.3 Systematic Literature Review

Systematic methods are designed to avoid biases and make results and conclusions as objective as possible. However, systematic reviews are retrospective and strongly depend on the quality of the primary material. In the review process decisions must be taken that may influence the findings [31]. The aim of a systematic review is to answer a specific question. The research question can be specified by indicating exactly which population, intervention, and outcome is of interest [32]. For this project, the research question is: "How will Virtual reality impact the future of omnichannel marketing?". Table 58.1 shows the search parameters used.

For this review, a total of 96 papers from two databases were obtained, Science Direct and Emerald, with the following constraints:

- Search: "omnichannel" AND "retail" AND "virtual reality",
- years: 2017–2022, article type: Research Article and Book Chapter.
- Total results from Science Direct: 76, 2 of which were not possible to access.
- Total results from Emeral: 142, 120 of which were not possible to access.

Figure 58.1 shows the results of the Prisma analysis. Two databases were used to gather information; no duplicates were found. From the 2 databases, a total of 220 were screened, of which 8 were excluded based on the title not being relevant for our research. Of the 212 works sought for retrieval, 124 could not be retrieved, leaving this systematic review with 88 works to be assessed for eligibility. Of these, 18 didn't explore omnichannel marketing, 47 didn't explore VR, 8 were books, 5 didn't explore marketing in general, and 12 didn't explore the topics together, mostly separately. With this, only six articles were included in the study:

- Ameen, N., Tarhini, A., Shah, M. & Nusair, K. A cross cultural study of gender differences in omnichannel retailing contexts. *Journal Of Retailing And Consumer Services.* 58 (2021) [34]
- Ameen, N., Hosany, S. & Tarhini, A. Consumer interaction with cutting-edge technologies: Implications for future research. *Computers In Human Behavior*. 120 (2021) [35]
- Varadarajan, R., Welden, R., Arunachalam, S., Haenlein, M. & Gupta, S. Digital product innovations for the greater good and digital marketing innovations in communications and channels: Evolution, emerging issues, and future research directions. *International Journal Of Research In Marketing*. **39**, 482–501 (2022) [36]
- 4. Xi, N. & Hamari, J. Shopping in virtual reality: A literature review and future agenda. *Journal Of Business Research*. **134** pp. 37–58 (2021) [37]
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58.3.1 How VR Is Currently Being Used in Retailing

According to Mr. Nannan Xi [37], examination of the empirical corpus on VR shopping shows that VR shopping holds few new kinds of experiences. Most of what VR



Fig. 58.1 Prisma flowchart, based on [33]

is trying to do at this stage is copy what has already been done in the real world by recreating brick-and-mortar shopping experiences in the virtual world. This is normal and should be expected since it creates a baseline upon which novel aspects can be built. This also addresses problems such as attitude, shopping intention, enjoyment, perceived value, and memory.

58.3.2 Examples of VR and Omnichannel Use in Retail

The United Arab States has one of the most advanced shopping malls in the world [34]. These malls combine both physical and virtual environments. Emaar, a real estate development company, launched a new mall with a great focus on technology. The objective is to encourage omnichannel retail by providing customers with the option to shop using different platforms. The Dubai Mall, as it is called, won two top honors at the Dubai Service Excellence Scheme in 2019. It attracts over 80 million visitors every year due to its exceptional customer service. Another interesting shopping mall that incorporates these technologies is the Westfield London shopping mall in the UK. It is considered one of the largest and most advanced shopping malls in Europe. The management of this mall forecasts that the role of different digital technologies in the retail industry will become increasingly important. Ameen et al. [34] did a study where 700 questionnaires were handed face-to-face to customers in both malls to ask them about these technologies. After removing incomplete questionnaires and outliers, the team was left with 553 complete questionnaires from the Westfield and 586 from the UAE Dubai Mall. Table 58.2 shows the results from these questionnaires:

58.3.3 Marketing in the Metaverse

The metaverse has a lot of potential when it comes to businesses and marketing due to different factors. One of them is data collected from VR equipment. By analyzing users actual experience instead of having users fill in a survey after the experience, the data is much more accurate [38]. An example given by this is asking users to fill in a survey on how much water and soda they drink and then compare this data with user logs from the metaverse. It opens problems such as ethics and how data should be used. This means the metaverse is a goldmine for data. It is estimated to raise the quality and validity of the data gathered from places such as social media. It will allow for experimentation to provide key information about how the customer responds to certain product concepts and ideas. This work then predicts that user data from the metaverse will become very rich quality and be large enough in quantity that there will be a shift from what we call "big-data" to what they call "mega data."

The work from Dwivedi et al. [38] also predicts this gathering of data will impact users' interactions with brands. They argue that with AI that is designed to learn through repeated user interactions companies can help build customer and brand equity. The goal of these interactions would not be to mimic a call centre but make a friendly AI company representative who would answer client's questions. These agents will become omnipresent in the metaverse's future and example can range from virtual agents at car dealerships which could sell or lease both virtual and real cars, to a virtual tour guide. This implies marketings may want to shift their attention from present-day influencer marketing towards making interactive, human

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	UK (%)	UAE (%)	
Age			
23-30	43	33	
31–38	57	67	
Gender			
Male	49	52	
Female	51	48	
Use of smartphones			
Yes	100	100	
No	0	0	
Frequency of shopping in sho	pping malls		
Daily	9	3	
Weekly	81	88	
Monthly	10	9	
Annually	0	0	
Use of technology for shopping	ıg		
Yes	100	100	
No	0	0	
Shopping more often			
Offline	64	75	
Online	36	25	
Type of technology used while	e shopping	· · ·	
Smartphones and mobile applications	58	56	
Augmented reality	4	0	
Virtual reality	14	17	
Biometrics	8	8	
All of the above	16	20	

 Table 58.2
 UK and UAE malls sample data [34]

like AI agents that have user personalized interactions. This makes the metaverse a far more immersive experience and enables brands to connect with their customers in many new ways. When compared to digital marketing, brands have the opportunity to captor emotions instead of clicks and have gamification in the place of banners, leading to a better conversation rate.

Regarding how this technology is able to captor emotions, one example shown in [38] showcases how teachers were able to better understand their students' emotions by monitoring their eye blinking. Students joined a project where they discussed simple and difficult mathematical problems. The results showed that during the hard problems, students had a higher blinking rate. This gave teachers an indicator which allowed them to better understand what their students are feeling in response to their teaching practices. Teachers reported feeling empowered by this.

Marketing in the metaverse will also include digital billboards. These board would show products catered specifically to each person based on data collected previously. But the experience could be taken a step further, creating even more engagement. For example, having a virtual car test drive in the company's Metaverse platform or having a virtual tour of a house one may be considering buying [38]. Companies and brands should also strive to and make their VR store experience stylish and attractive in a way to successfully influence a customer's decision making. According to Ameen et al. [35], the immersive effect of VR can significantly impact a customer in three different ways, these being variety seeking, price-sensitivity and if the client is satisfied with the choice made. Since marketing in the metaverse is still in relatively new, simple ideas have been working well for many brands. For example, Nike released virtual sneakers and clothes into the metaverse. They acquired a brand called RTFKT, which specializes in virtual sneakers, and NFTs (non-fungible Tokens) to do this. Nike made \$3.1 Million of sales in 7 min [38].

It is predicted that the metaverse will reach \$1 trillion in revenue opportunity [38]. Business leaders such as Jensen Huang, CEO of Nvidia Corporation, also foresee that the metaverse-based economy will surpass our current economy in terms of revenue and investment. With the growth of this market, companies should use XR (Extended Reality) technologies to enhance the consumer experience, increase multichannel shopping frequency, and assist in seamless product returns. To effectively interact with consumers, marketers should have a well-formulated pricing strategy [36].

58.3.4 Non-fungible Tokens

NFTs are used to acquire and trade unique virtual artifacts [38]. They use blockchain technology to be identified, and this is what makes them unique, since each item has a unique identifying code. These allow firms to have a larger product portfolio and increase virtual-real world interactions. For example, Nike was very successful doing this, making unique products using the NFT technology and selling them at impressive price points [38]. While traditional virtual products, such as artwork or virtual apparel, are less valuable than their physical counterparts, NFTs can reach very good prices. But use cases for NFTs in marketing reach further, suggesting, for example, that they could be used to secure access to an event. It is predicted that these items could dissolve the boundaries between physical and virtual worlds because they allow users to seamlessly switch between physical and virtual products, which could blur the line between the virtual self and the physical self.

58.3.5 Consumer Wellbeing and Trust

In [38] it is discussed what the well-being implications of using the metaverse are. Studies show that for a person who is ill with a debilitating disease, the metaverse can certainly be a force for good, especially for mental health. But if, by using the metaverse, a person isolates himself and replaces physical activity with it, then this can become detrimental. The issue is not the innovative technology but the use a person gives it [38]. Other studies show that customers feel a higher sense of presence in VR when compared to the physical store experience [35]. They explored how VR shapes customer behavior by analyzing feelings of joy, excitement, and freedom. By the end, consumers felt empowered in a VR environment. Another factor that needs to be considered is consumer trust, as pointed out by [34]. From a marketing standpoint, trust in e-commerce means the consumer must believe in the site, the technology, and the brand that owns it. Seeing that the virtual environments of shopping malls integrate various types of technologies, trust can significantly determine the behavioral intentions of modern consumers, especially in the millennial generation. There is also a gender difference at this point; while male shoppers are more assertive when using these new technologies, females tend to be less trusting of VR. Thus, trust is more significant when predicting behavior in females than in males.

58.3.6 Policy Implications

Having proper policy in the metaverse transition will be a great necessity. As previously stated, the metaverse will allow companies to have access to a lot of high-quality data, including email, phone number, location, gender, facial expression, eye movement, hand gestures, and much more [38]. Regulations on who owns this data, where it is stored, and how this data should be used will be key to fostering consumer trust and guaranteeing consumer privacy. The aim should be to find a balance between data tracking for a better customer experience while maintaining their privacy. Overregulation would also have negative implications for consumers' perceptions. To avoid this policy, policymakers need to work closely with technology companies to assure that there is an ethical approach to developing the metaverse. Questions that should be addressed include how to stop harmful interactions and fake content from spreading. Other purposes of regulation that policymakers in the metaverse should consider are fair use and The metaverse requires large amounts of hardware to be able to support an enhanced experience. While large companies like Meta, Microsoft, and Alphabet (the parent company of Google) have been heavily investing in the metaverse to support AR and VR, smaller companies probably won't be able to afford this. Therefore, a comprehensive guide could be proposed with changes to existing laws to guarantee a level playing field for small and medium firms. Another challenging question that needs to be considered is the role of global governance norms in the metaverse.

58.3.7 Challenges for the Metaverse

Up until now, it's been shown that the metaverse has a great set of opportunities, but it also has its own challenges. These challenges need to be addressed with awareness; the ones that were identified with this systematic review were:

- How to leverage digital technologies in the metaverse [38]. The metaverse aggregates various XR technologies, 5G networks, cloud services, machine learning, AI, software tools, and more. These need to be well understood, and companies may face difficulties getting the required number of trained people to harness the full potential of the metaverse. Lack of trained employees was also a challenge in the growth phase of digital marketing, therefore, companies need to stay ahead and develop mechanics to solve this issue. Different companies should develop partnerships with each other [38]. The services they provide would complement each other, whether hardware or software, since a single company providing everything might be too challenging. Traditional organizations will need to have a partnership with a metaverse company to have access to advertising since it is predicted that consumers will be invested in these new technologies. The big challenge here is to educate traditional organizations about the potential and utility of marketing in the metaverse.
- Understanding how different sensory technology can impact a client's decision [37]. In the real world a person's perception is usually multi-sensory. Since VR is trying to make the virtual world as immersive as possible, different sensory technology should also be analyzed. Most studies only focus on visual and audio which falls short of the real deal. New devices such as haptic devices, which provide sensory information, are also available and have an impact on the level of immersion.
- Finding the Key performance indicators (KPI) specific for marketing in the metaverse [38]. In order to have all the beneficial consumer focused brand interactions, these performance indicators will need to be well formulated while respecting consumer privacy, and other legal and ethical issues related to metaverse marketing. All of this is an important research agenda.
- Studying omnichannel marketing and using XR technology to gather data [35]. Many studies focus on users only interacting with one Technology at a time, however consumers will probably experience several technologies at the same time. There is one study that analyzed traits such as impulsiveness and need for touch and how they can influence the use of mobile devices and online shopping in an omnichannel perspective. It concludes factors such as loyalty and consumer satisfaction are important to maintain. A problem with this is that most of the data studies use is acquired after the experience with these emerging technologies, generally through questionnaires, and not during these experiences.
- Venturing into what the metaverse could become [37]. VR shopping research is now reaching maturity. A baseline has been established on the feasibility of VR, and it is possible to re-create what already exists in the real world. Future research should now start thinking outside the box and explore what VR could become.

58.4 Conclusions

The VR industry is currently undergoing a phase of maturation, with a multitude of potential opportunities and prospects. This technology will afford consumers and companies the opportunity to engage in novel and immersive forms of interaction. The faculty of imagination appears to be a significant constraining element.

Based on the findings of this study, it can be inferred that VR has the potential to significantly influence omnichannel marketing strategies by providing unprecedented access to a diverse and extensive dataset that was previously inaccessible. The forthcoming data will exhibit a higher degree of richness compared to the existing data collected in the realm of online shopping. Through the examination of many indicators, including vocal intonation and facial cues, organizations can promptly ascertain the level of consumer satisfaction pertaining to their encounters, items, or even marketing endeavors. Subsequently, this knowledge can be utilized beyond the metaverse to enhance the overall caliber of interactions between brands and users across other platforms. Businesses have the opportunity to enhance their ability to cater to the unique preferences of individual clients. The inclusion of AI agents could prove to be a valuable feature. These conversational agents have the capability to engage in more seamless conversations with users and derive insights from past interactions, rendering them very suitable candidates for assuming the role of brand ambassadors. Ensuring the robust development and positive representation of these AI systems assumes paramount importance.

VR has various promising prospects, including the provision of a platform for customers to experience virtual products before to purchase. This particular possibility holds significant potential for industries such as housing and automotive, enabling them to capitalize on the advantages offered by VR technology. These technologies would enable users to virtually explore distant apartments, for instance, or engage in virtual test drives of various cars as a means of making informed decisions prior to conducting physical test drives. This technology holds potential for various businesses to explore alternative applications and enhance their customer interactions. This assertion contains a considerable amount of guesswork, and only the passage of time may truly reveal the outcome.

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In the original version of Chapter 40, the following belated corrections have been incorporated: The second author "Irena Pandža Bajs" has been updated with "Pandža Bajs" as family name and "Irena" as given name. The chapter has been updated with the changes.

C1

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Aleksandra Krtolica-Lukic, Marcos Polo-López, and Alba Ramírez-Pagès

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