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FINAL REPORT

ECO-FRIENDLY LAPTOP CASE

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ABSTRACT

This project explores the development of an eco-friendly laptop case made from recycled materials. By repurposing these recycle materials, this project aims to create a sustainable alternative to traditional laptop cases, reducing reliance on non-renewable materials and minimizing waste. The initiative involves collecting used clothes and organic fibre processing them into a composite material, and moulding this material into a functional and stylish laptop case.

The production process will focus on determining the optimal techniques for integrating recycle materials into the case, including material selection and moulding methods. The project will assess the durability, functionality, and aesthetic appeal of an eco-friendly laptop case compared to conventional cases. Through rigorous testing and evaluation, the project aims to ensure that the final product meets performance standards while maintaining its eco-friendly attributes.

Expected outcomes include a practical and innovative product that not only addresses the issue of recycle waste but also promotes sustainable consumer choices. This project will provide valuable insights into the use of recycled materials in product design and contribute to broader efforts in environmental conservation. By demonstrating the viability of used clothes and organic fibre as a resource, this initiative highlights the potential for creative solutions to waste management challenges.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter consists of the study's background, problem statement, objectives, scope, significance, operational definitions, and SWOT analysis. The eco-friendly laptop case provides a sustainable and eco-friendly alternative for students and professionals, offering an innovative way to protect laptops. The project seeks to encourage the use of recycled materials, minimize waste, and promote environmental conservation awareness among students and working professionals.

1.2 Background of Study

With growing concerns about the environment, there is now a stronger need for eco-friendly products that help reduce pollution. Traditional laptop cases are often made from materials like plastic, synthetic leather, and other non-renewable resources, which harm the environment and add to waste problems. These materials are not easily broken down, and their production often creates pollution. Creating eco-friendly laptop cases using sustainable materials like recycled plastics, organic fibers, or upcycled items can help reduce waste and pollution.

This project also ties in with global sustainability goals, especially two United Nations Sustainable Development Goals (SDGs). First, it aligns with SDG 12: Responsible Consumption and Production, which encourages using resources in ways that reduce waste and are kinder to the planet. By using alternative materials, we can reduce the environmental impact of products and support a circular economy where items are reused or repurposed. It also supports SDG 13: Climate Action, which involves taking steps to reduce carbon emissions and lessen the impact on the climate.

Finally, more consumers today prefer sustainable choices in their daily lives. Many people are choosing products from companies that focus on eco-friendly practices. An eco-friendly laptop case would cater to these consumers by offering a more sustainable alternative.

This project aims to meet both consumer needs for greener products and long-term environmental goals, contributing to a healthier planet and a future with less waste.

1.3 Problem Statement

The production and disposal of regular laptop cases cause a lot of environmental pollution. Many of these cases are made from materials that use non-renewable resources, like plastic and synthetic leather, and may contain harmful chemicals. These materials can take hundreds of years to break down, so they stay in the environment for a long time after they're thrown away. During production, they often release pollutants into the air and water, contributing to climate change and other environmental problems.

Another problem is that there aren't many eco-friendly choices for laptop cases, even though more consumers are interested in sustainable products. Many people don't know about greener options, and sometimes these eco-friendly products are hard to find or seem expensive. This lack of options creates a gap in the market, making it difficult for environmentally conscious consumers to find laptop protection that aligns with their values.

This project aims to fill that gap by creating an eco-friendly laptop case that reduces harm to the environment while still being durable and useful. The goal is to design a product that can compete with traditional cases in terms of quality but with a much lower impact on the planet. By providing this alternative, the project hopes to promote more sustainable choices for consumers and reduce the overall environmental footprint of tech accessories.

1.4 Research Objectives

1.4.1 To design and develop sustainable materials suitable for producing an eco-friendly laptop case.

1.4.2 To determine the consumer acceptance of eco-friendly laptop case.

1.4.3 To implement and evaluate the durability and cost-effectiveness of eco-friendly materials in comparison to conventional ones.

1.5 Research Questions

1.5.1 What types of sustainable materials are available for use in laptop case production?

1.5.2 How do eco-friendly materials compare to conventional materials in terms of durability and longevity?

1.5.3 What are consumer attitudes and preferences regarding eco-friendly laptop cases?

1.6 Scope of Study

The scope of this study includes the research, design, testing, and market analysis of an eco-friendly laptop case made from sustainable materials. It involves identifying and sourcing environmentally friendly materials, like recycled or organic fibres, suitable for use in laptop cases. The material will be tested for key qualities such as strength, flexibility, and durability to ensure it meets the functional requirements for device protection.

Additionally, the study will focus on creating a functional and visually appealing design that appeals to environmentally conscious consumers. The market analysis aspect will involve gathering feedback through surveys and interviews to understand consumer preferences, interest, and willingness to purchase an eco-friendly laptop case. The target audience for this study includes consumers who prioritize sustainability and seek eco-friendly products in their daily lives.

1.6 Significance of Study

The Eco-Friendly Laptop Case project is significant in advancing environmental sustainability and aligning with the United Nations Sustainable Development Goals (SDGs), particularly SDG 12: Responsible Consumption and Production and SDG 13: Climate Action. By using biodegradable and recycled materials, this project reduces waste and lessens the reliance on non-renewable resources, directly contributing to more responsible production practices. It also promotes consumer awareness around sustainable choices, encouraging a shift toward eco-friendly options in the tech accessories market. Additionally, this innovative approach sets a precedent for the development of environmentally conscious products, fostering a culture of sustainability and inspiring others to adopt climate-positive practices.

Through this project, we aim to minimize the environmental impact of tech accessories, supporting global efforts to reduce pollution and combat climate change.

a) The study explores how recycled materials can replace traditional materials in an eco-friendlier way, adding to the field of sustainable materials.
b) It helps reduce waste by giving a new purpose to used materials, which supports environmental and sustainability goals.
c) It looks at how consumers react to eco-friendly products, which is important for understanding market trends and sustainable shopping habits.
d) This study serves as a case for using alternative materials in product design, which is relevant for industrial design and engineering.
e) Its impact across fields like environmental science, economics, and design makes it valuable for researchers from different disciplines.

1.8 Operational Definition

1.8.1 Recycled Materials

The leftover materials like clothes, organic fibres and coffee grounds reused as a material for making products.

1.8.2 Sustainable Product

A product made with little impact on the environment, usually using recycled or renewable materials.

1.8.3 Durability

The product's capacity to endure wear, pressure, or damage while still maintaining its functionality and appearance over time.

1.8.4 Eco-Friendly Materials

Materials made and used in ways that cause little or no harm to the environment, often using natural, recycled, or renewable resources to support sustainability.

1.8.5 Waste Management

The organized process of collecting and reusing used materials like clothes and recycled plastic to cut down on waste, often by turning them into new, eco-friendly products or finding other useful purposes for them.

1.9 Expected findings / Project outcomes

1.9.1 Material Suitability

Showing that recycled materials can be turned into a strong and flexible material suitable for laptop cases.

1.9.2 Effective Design

Developing a laptop case that is both functional and attractive, meeting the needs of consumers while supporting environmental goals.

1.9.3 Consumer Interest

Finding clear evidence of strong demand for eco-friendly products based on positive feedback from surveys.

1.9.4 Environmental Benefits

Decreasing waste in landfills and lowering the carbon footprint compared to regular synthetic laptop cases.

1.9.5 Sustainability Impact

Creating a model that demonstrates how recycled materials can be used in product design, promoting new ideas in sustainable practices.

1.10 Summary

In summary, this project highlights the critical intersection of sustainability and innovation in addressing environmental challenges. By developing a laptop case from recycled materials, it not only provides a practical solution to the issues of e-waste and organic waste but also offers a sustainable alternative to conventional synthetic materials. The project stands to make a significant contribution to environmental conservation by reducing landfill waste and promoting the use of eco-friendly materials. Additionally, it aligns with growing consumer demand for green products, potentially setting a precedent for future innovations in sustainable design. This approach demonstrates that integrating recycled materials into everyday products can drive positive environmental impact while meeting consumer expectations for functionality and aesthetics.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The literature review provides an overview of existing research related to recycling materials, sustainable product design, and consumer behaviour towards eco-friendly products. This chapter sets the foundation for understanding the potential of recycled materials as a material for product manufacturing.

2.2 Previous Study/Reviews/Investigation

This chapter draws the attention of researchers toward the reuse and recycling of bio-based packaging products. Bioplastics are good for the future and end-of-life options, including reuse, organic recycling, energy recovery, and mechanical recycling. By using compostable plastic and biodegradable products, such as bags for food packaging, can strengthen organic recycling using waste management methods and assist in improving waste management. The reuse of a bio-based product will retain its form as well as its ability to perform the desired task. Mechanical recycling might alter the original form and a certain amount of product value due to melting and extruding or other processes of creating a recycled batch, but usually the chemical composition is left intact. Aging of different plastics is influenced by different factors so they need to be degraded differently, such as by exposure to sunlight, oxygen, air, water, heat, cold, and microorganisms. (S.M. Sapuan, R.A. Ilyas et al., 2021). Plastic is a general term utilized for a wide scope of high subatomic weight natural polymers obtained for the most part from the different hydrocarbon and oil subsidiaries. Plastic is non-biodegradable, as it does not break down to a natural, environmentally safe condition after some time by natural procedure. Plastics that are disposed off in daily routine are becoming noticeable execration for environment; more than half of the world is facing these problems. Underdeveloped countries constitute more than half of the world and have heaps or gyre of plastics and other wastes. The time rate of wastage of plastic is increasing which can be observed by seeing oceans. It is hard now to clean them up at this stage. It is a nature of a plastic that when it reveals to the heat or sunlight, it starts to discharge harmful poisonous chemicals. It takes approximately thousand years to degrade, so dumping them in ocean or in landfill does not mean they will be gone, but they will be here after centuries. This paper focuses on the effects of reduction and recycling of plastics on environment. (Nasreen Bano et al., 2020)

The purpose of this work is to provide seminar needs (seminar kit) as compliments of seminar or symposium held by university including Universitas Sumatera Utara (USU). Method of this activity included launching of our main products, namely eco-print both on paper and on fabric. In this work, eco-print products on recycle papers was used as exclusive block-note covers while eco-print products on fabric were used as tote-bag materials. There were two advantages of using these products, firstly: they were made of natural ingredients without chemical synthetic materials; and secondly the products were designed specifically; one product was not similar with the others. This activity involved two partners, namely a recycle-paper producer and a tailor who make tote-bag. Result on progress of this activity was an order for seminar kit through exhibition. During the evaluation of this project it was found that Nauli Apik USU, as a seminar kit's producer, still depends on workers whom working manually and having individual skill. In the future, management of production should be improved. (Arif Nuryawan et al.,2020). The siliceous Kaolin by-product (GO sand) obtained from the TAMAZERT deposit (northeast of Algeria) was used as adsorbent to remove the organic cationic methylene blue (MB) dye from textile industry wastewater. Physicochemical characterization revealed that the by-product is mainly silica with a specific surface area of approximately18 m2.g−1. The influence of some physicochemical parameters, such as adsorbent dose, initial dye concentration, contact time, solution pH, and temperature, on the adsorption of MB by the siliceous adsorbent waste was highlighted. The kinetic study showed that the pseudo-second order model is better suited to describe the adsorption of MB on the GO sand than the pseudo-first order model. Boyd's model indicated that intraparticle diffusion was the limiting step in the adsorption process. (Daouia Ingrachen-Brahmi et al.,2024). Indonesia is the second largest producer of waste after China with an estimated 0.48-1.29 million metric tons per year. Based on data from the Environment, Hygiene and Landscaping Agency (DLHKP), as of 2022 the Klotok Final Management Site (TPA) receives as much as 140 tons of waste per day, the waste is included in organic waste and inorganic waste. Meanwhile, inefficient waste handling can cause water quality in an area to be very poor and contain toxic waste and garbage that is allowed to accumulate can cause flooding and endanger public health. One of the community organizations that cares about waste processing is the Melati Waste Bank in Kediri City. The Melati Waste Bank is productive in carrying out activities to reduce waste in Kediri City, this is evidenced by the process of sorting waste, processing sorted waste, then distribute the product into the society. (Natassya Adelia Candradhita Leonard et al.,2024).

The number of used tires in the world is projected to increase in the future due to an incrementing number of cars and motorcycles particularly in developing countries such as Indonesia. This situation can endanger the environment and public health since it poses a high risk for fires. Despite the environmental impacts, used tires present economic values. This can be achieved by processing it into several forms such as tire-derived fuel, asphalt rubber, and rubber-plastic products. Furthermore, to collect used tires from tire users and send it into used tires recycler, management scheme is required. This paper aims to review the development of used tires recycle management and processing. It has been found that several management schemes for recycling used tires have been identified from literature including Extended Producer Responsibility (EPR), Free Market, and Government. Moreover, several processes to recycle used tires were identified, such as: retreading, energy recovery, product recycling, material recycling, and pyrolysis. (Muhammad Haikal Sitepu et al.,2020). A technical approach was proposed to recycle waste PET yarn on site with the aim of building green manufacturing plant with no waste accumulation. In the recycling process, the waste PET yarn with almost infinite aspect ratio was first treated with custom-designed grinder prior to recycling, which breaks the yarn into small pieces and produce powder-like final product (waste yarn/fiber powder, WYP/WFP). Then it could be mixed with PTA and EG to form slurry and fed into manufacturing unit using well-established method rather than be fed as melt by screw-extruder that is known for its high energy intensity. Furthermore, the wetting of WYP by EG during slurry formation facilitates the de-oxygenation process and is beneficial to improve the quality of product, which produces higher quality products with lower cost compared to conventional methods. (Shenghua Gan et al.,2024). The world's population is growing rapidly, which means that the environmental impact of food production needs to be reduced and that food should be considered as something precious and not wasted. Moreover, an urgent challenge facing the planet is the competition between the food produced for humans and the feed for animals. There are various solutions such as the use of plant/vegetable by-products (PBPs) and former foodstuffs, which are the co/by-products of processing industries, or the food losses generated by the food production chain for human consumption. This paper reviews the by-co-products derived from the transformation of fresh-cut leafy salad crops. (Luciano Pinotti et al.,2020). The purpose of this study is to apply and extend the predictors within the theory of planned behaviour (TPB) to understand consumers' behaviour toward recycling end-of-life garments among Australian consumers. The predictors explored within this study include attitude, perceived behavioural control, subjective norms, self-identity, general recycling behaviour eco-literacy, self-efficacy, intentions to recycle and behaviour to recycle end-of-life garments.

(Esther Oluwadamilola Olufemi Rotimi et al.,2023). In the present study, we report the development of a cellulose-based affinity adsorbent and its application for the purification of proteases from fish by-products. The affinity adsorbent was synthesized using cellulose microfibers as the matrix, isolated from recycled newspapers using the acid precipitation method. As an affinity ligand, the triazine dye Cibacron Blue 3GA (CB3GA) was used and immobilized directly onto the cellulose microfibers. Absorption equilibrium studies and frontal affinity chromatography were employed to evaluate the chromatographic performance of the adsorbent using as model proteins bovine serum albumin (BSA) and lysozyme (LYS). Absorption equilibrium studies suggest that the adsorption of both proteins obeys the Langmuir isotherm model. The kinetics of adsorption obey the pseudo-second-order model. The affinity adsorbent was applied for the development of a purification procedure for proteases from Sparus aurata by-products (stomach and pancreas). A single-step purification protocol for trypsin and chymotrypsin was developed and optimized. The protocol afforded enzymes with high yields suitable for technical and industrial purposes. (Georgios E. Premetis et al.,2020). Huge quantities of unwanted pharmaceuticals are left in households, notably as a consequence of the rising drug demand caused by improved healthcare and the aging population. Unwanted pharmaceuticals may thus easily end up polluting ecosystems upon disposal. This pharmaceutical waste issue has been aggravated during the coronavirus disease pandemic (COVID-19) by excess prescription and panic buying. Unwanted household pharmaceuticals are normally collected by owners and volunteers, then incinerated in centralized facilities, yet with low efficiency during the COVID-19 lockdowns. Most pharmaceuticals could be recycled because they are rather stable, however there is actually no sustainable strategy to manage unwanted pharmaceuticals in a pandemic. (Jie Han et al.,2022). The disposal of PV panels will become a pertinent environmental issue in the next decades. Eventually, there will be great scopes to carefully investigate on the disposal and recycling of PV panels EOL. The EU has pioneered PV electronic waste regulations including PV-specific collection, recovery and recycling targets. The EU Waste of Electrical and Electronic Equipment (WEEE) Directive entails all producers supplying PV panels to the EU market to finance the costs of collecting and recycling EOL PV panels. (Md. Shahariar Chowdhury et al.,2020).

2.3 SWOT Analysis

a) Strengths

i) Sustainability: By using recycled materials, this product helps reduce waste and supports environmental sustainability, which attracts eco-friendly consumers.
ii) Innovation: This laptop case is an innovative option in the market, setting itself apart from traditional materials like metal.
iii) Market Appeal: There is a growing demand among consumers for eco-friendly products, creating a strong opportunity in the market.
iv) Reduced Carbon Footprints: Using eco-friendly materials for this product lowers carbon emissions during manufacturing. This appeals to consumers who prefer products that have a smaller impact on the environment.

b) Weaknesses

i) Material Durability: Coffee grounds may not be as strong as traditional materials, which could shorten the product's lifespan.
ii) Production Costs: Processing waste materials into a usable material might be more expensive than using conventional materials.
iii) Limited Knowledge: There is a lack of extensive research and technology available for turning waste materials into a durable material for laptop cases.
iv) Scalability: There may be difficulties in increasing production to meet high demand.

c) Opportunity

i) Market Expansion: Growing awareness and demand for sustainable products could lead to new markets and attract more customers.
ii) Brand Positioning: The product can be marketed as a premium, eco-friendly choice, enhancing the brand's reputation and building customer loyalty.
iii) Online Retail Growth: The rise of e-commerce platforms creates more channels to reach sustainability-minded consumers globally, expanding the product's market reach.

iv) Government Incentives: There may be potential benefits from government incentives or subsidies for using recycled materials and supporting sustainability efforts.

d) Threats

i) Competition: The eco-friendly product market is becoming increasingly competitive, with other companies possibly providing similar sustainable solutions.
ii) Consumer Perception: Some consumers may be sceptical about the durability and quality of products made from unconventional materials like used clothes and coffee grounds.
iii) Regulatory Challenges: Meeting environmental regulations and standards may complicate production and increase costs.
iv) Supply Chain Issues: Relying on a steady supply of coffee grounds and used materials could be affected by changes in the coffee industry or supply chain logistics.

2.4 CONCEPTUAL FRAMEWORK: ADDIE MODEL

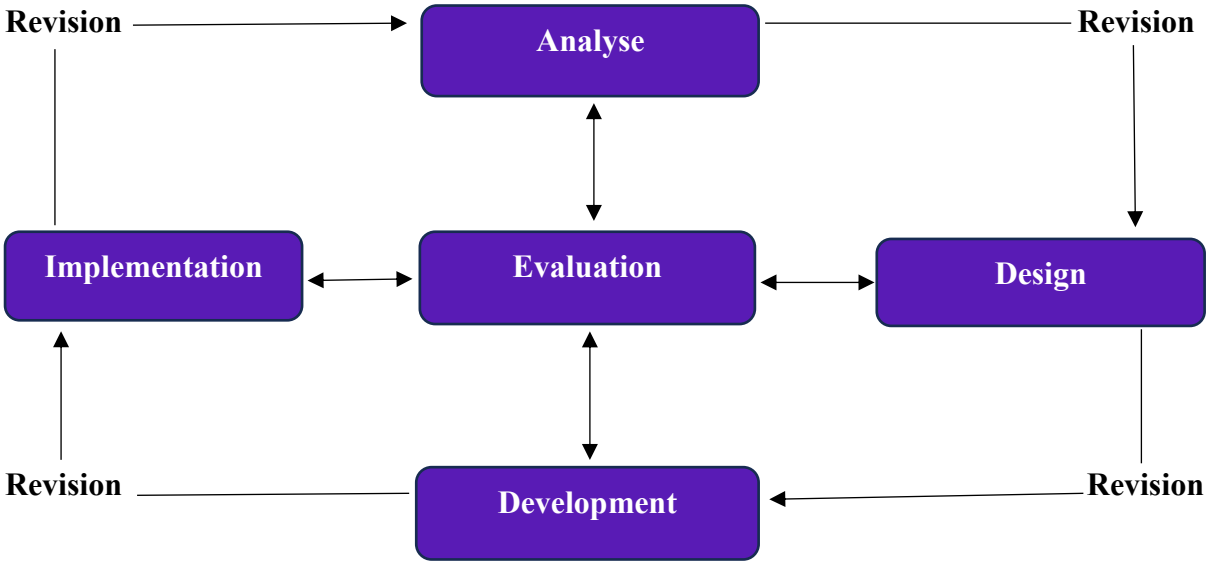

Diagram 1: ADDIE MODEL

a) **Analysis**

This is the starting point, where we identify the learning needs, goals, and challenges. The aim is to understand what the learners need to achieve, set learning objectives, and decide what content and delivery methods will best meet those needs.

b) **Design**

In this stage, a detailed plan is created for the course. It involves structuring the content, defining learning objectives, selecting teaching methods, and planning assessments. The goal is to organize everything in a way that makes learning effective.

c) **Development**

Here, the actual creation of learning materials happens. Based on the design, the lessons, activities, multimedia elements, and assessments are developed and fine-tuned. Initial drafts or prototypes may be tested at this stage.

d) **Implementation**

This phase is about delivering the course or training to learners. It involves setting up the resources, platforms, and tools needed, and ensuring the smooth delivery of the program to participants.

e) **Evaluation**

Lat stage, assesses the effectiveness of the instructional program. It includes Formative Evaluation during development for ongoing improvements and Summative Evaluation at the end to measure if learning objectives were met, ensuring the program's success.

2.5 Summary

The literature review concludes by summarizing the key findings from existing research and highlighting their relevance to the development of the eco-friendly laptop case. It establishes a theoretical framework that supports the feasibility of the project and guides the subsequent research methodology.

Coffee grounds have special qualities like being durable, and easy to shape when combined with certain resins or binders. Studies on sustainable product design stress using recycled materials, such as coffee grounds, to lessen environmental harm. Some research has also shown that coffee grounds can be successfully used in small products like cups and cutlery, proving to be durable and well-received by consumers.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

Research methodology is a critical component of this project, as it outlines the approach used to achieve the research objectives. This chapter provides a detailed explanation of the methods used to develop, test, and evaluate an eco-friendly laptop case, ensuring that the research is conducted systematically and rigorously.

3.2 Project Design: ADDIE MODEL

3.2.1 Analysis Stage

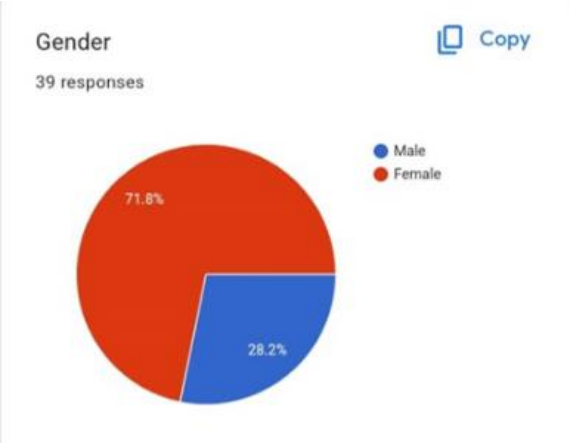

Diagram 2: Gender

a) Based on survey we conducted, we had collected 40 responses from students as above. It shows that female responses are more than male with the percentage of 28.2% and 71.8%.

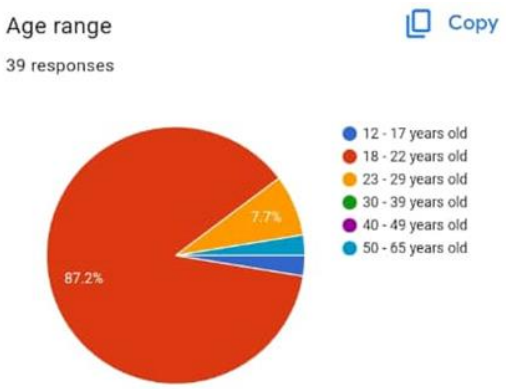

Diagram 3: Age range

b) The question above shows about age range of the respondents. The results showed that most respondents were in the 18-22 age range, making up 87.2% of the total respondents.

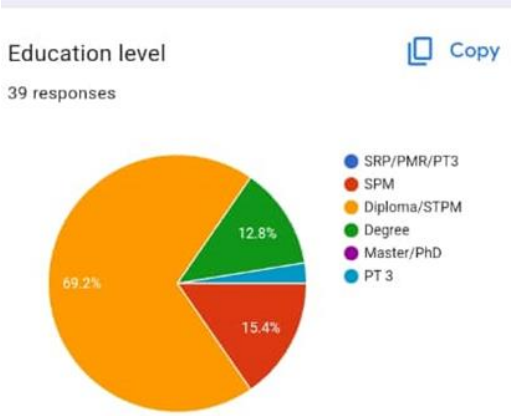

Diagram 4: Education level

c) The next question focused on the education level of the respondents. The data revealed that the most common level of education among the respondents was Diploma/STPM, with 69.2% having completed this level. A smaller percentage, 15.4%, had a degree, while 12.8% had a master's or PhD.

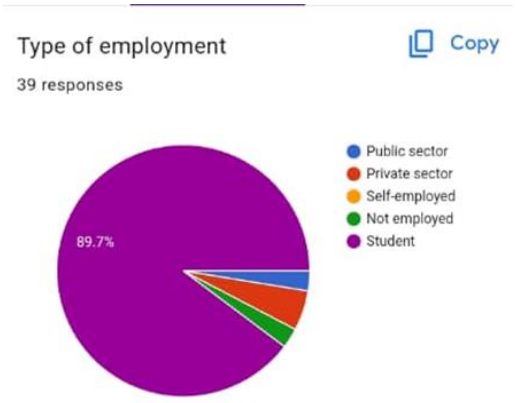

Diagram 5: Types of employment

d) Based on the pie chart, the majority of respondents (89.7%) are students. The remaining respondents are employed in the private sector (5.1%), public sector (2.6%), or are self-employed (2.6%). A small percentage (0.0%) are not employed.

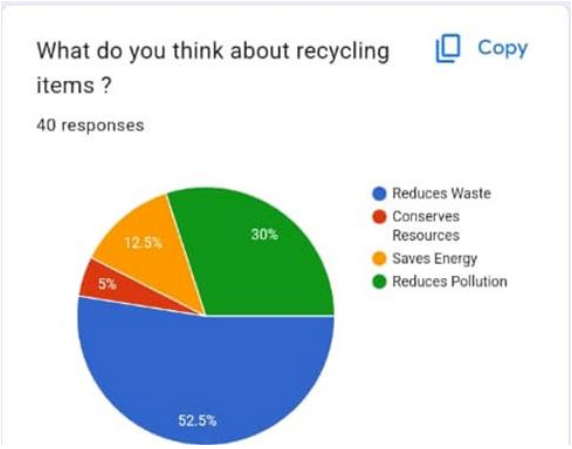

Diagram 6: Opinions on recycling item

e) About our survey, recycling is the process of converting waste materials into new products to reduce the need for raw resources, lower environmental impact, and minimize landfill waste. By recycling items like paper, plastic, glass, and metal, we can conserve energy, decrease pollution, and help sustain the planet for future generations. It's a simple yet powerful way to make a positive difference in the environment. From this survey, 52.5% of people agreed that recycling reduces wastes, 30% says that it reduces pollution, 12.5% is saves energy and 5% says it conserves resources.

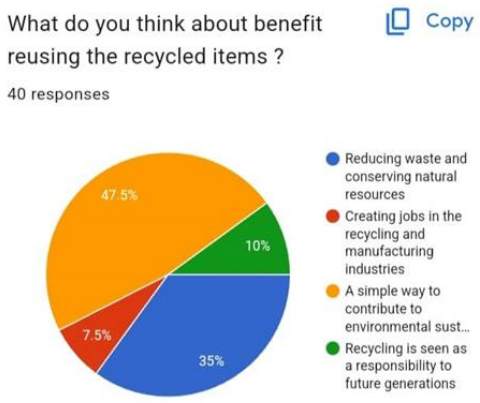

Diagram 7: Benefits of reusing the recycled items

f) Moreover, primary benefit of reusing recycled items as a means of conserving resources and reducing waste, accounting for 47.5% of responses. A significant proportion of respondents also emphasized the importance of recycling for future generations, constituting 35% of the total. Furthermore, the survey revealed the potential economic benefits of recycling through job creation in related industries, with 10% of respondents identifying this as a benefit.

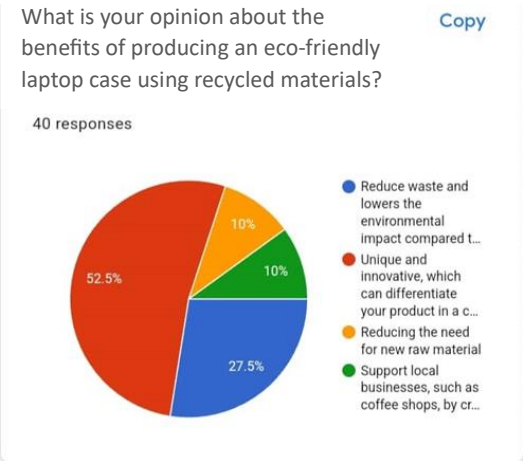

Diagram 8: Opinion about the benefits of producing an eco-friendly laptop case using recycled materials

g) Regarding the production of laptop cases using raw materials like used clothes, organic fibre, coffee grounds and etc, 52.5% of respondents highlighted its potential to reduce waste and environmental impact compared to traditional materials. Additionally, 10% viewed using recycled materials as a way to differentiate their products with unique designs in a competitive market. Furthermore, 27.5% of respondents appreciated the benefit of reducing reliance on new raw materials.

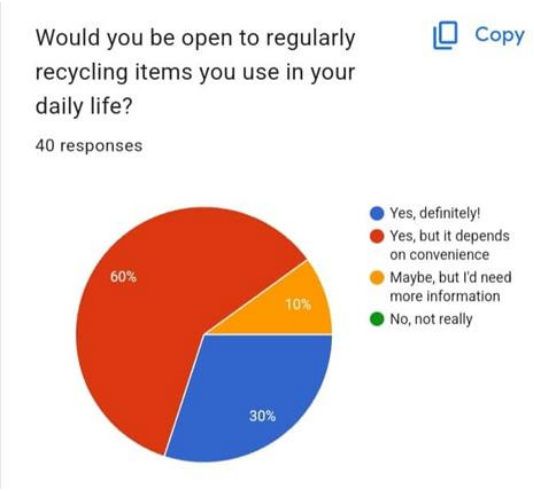

Diagram 9: Willingness to recycle items regularly

h) As for the next survey question about the willingness to recycle items regularly. Based on 40 responses, 60% of respondents indicated a strong willingness to recycle, while 30% expressed openness to recycling but with conditions or a need for more information. Only 10% were not inclined to recycle.

Diagram 10: Recommendation of producing laptop case using recycled materials

i) The last information we asked our audience is about recommendation of producing laptop cases using recycled materials. Based on 40 responses, the most popular recommendation is "Sustainable Material Choice" with 45% of the votes. Other popular recommendations include "Lightweight and Durable" (22.5%) and "Customizable Designs" (12.5%).

3.2.2 Design Stage

Product Sketch

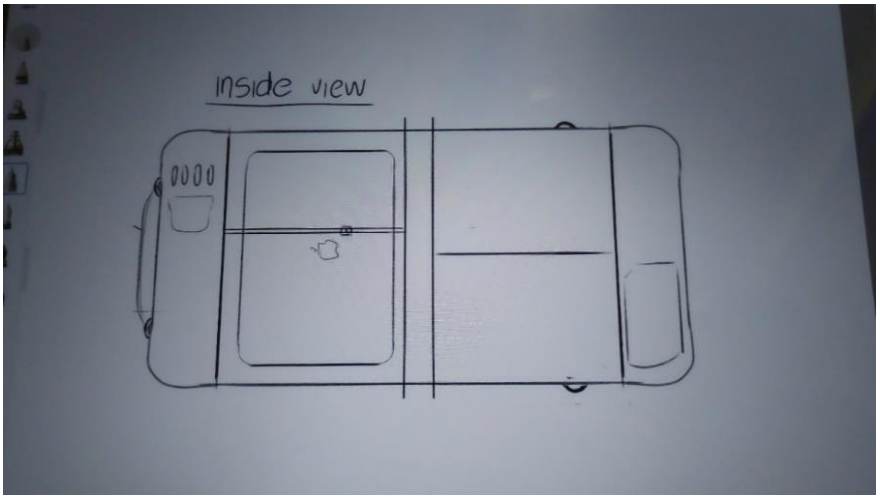

Image 1: Inside view

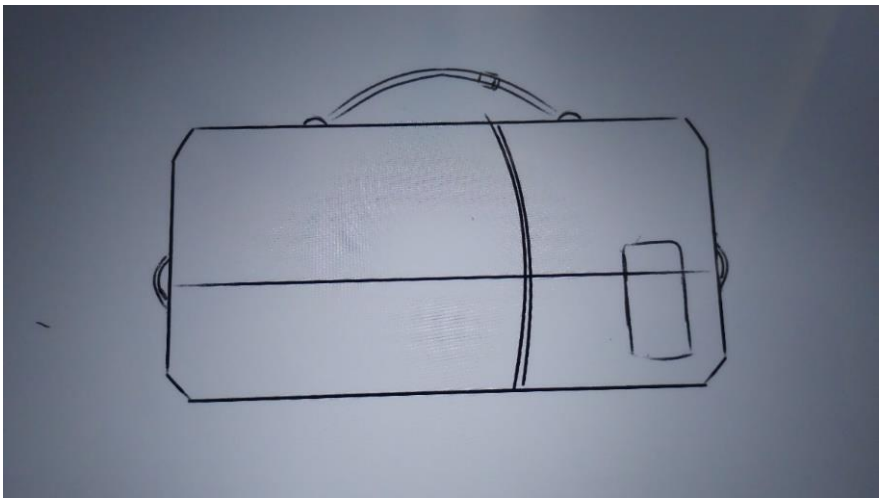

Image 2: Outside view

Material Used

Image 3: Used clothes

Used as an outer layer for its durability and strength. It protects the laptop from physical damage and adds an aesthetic element, providing a sturdy surface that withstands wear and tear.

Image 4: PLA (Polylactic Acid)

Serves as a biodegradable plastic that binds with coffee grounds to form a durable, lightweight composite material. PLA gives the case structural integrity and flexibility while being eco-friendly.

Image 5: Coffee grounds

They can be mixed with other materials to create a composite that has unique properties such as insulation and lightweight durability, coffee grounds can help provide cushioning and impact resistance.

Image 6: Zipper (Resleting)

A high-quality zipper ensures the case remains securely closed, protecting the laptop from dust and impacts, while allowing easy access.

Image 7: Felt Fabric

Provides internal cushioning and padding. Felt absorbs shocks and vibrations, enhancing the laptop's protection and ensuring a soft, secure fit inside the case

Image 8: Velcro

Offers additional fastening options and adjustments. Can be used to create pockets or secure the laptop in place, providing a customizable fit and easy access to compartments.

3.2.3 Development Stage

Manufacturing Process:

a) Material Collection and Preparation

Collect used coffee grounds from cafes, clean them thoroughly, and prepare them as the basement for making the laptop case.

b) Development of Composite Material

Research suitable polymers, then mix the coffee grounds with the chosen polymer to form a strong and durable composite material for the laptop case.

c) Design and Manufacturing

Create a laptop case design that is visually appealing, comfortable to use, and functional. Then, manufacture the case using compression moulding to form the correct shape and thickness.

d) Product Testing and Evaluation

Test the laptop case to check its durability against impacts, moisture, and scratches. Then, evaluate its overall quality and performance gathering feedback from users.

e) Effectiveness and Impact Analysis

Examine how effective recycled waste materials are as the main material regarding cost, quality, and sustainability. Additionally, evaluate the benefits this product brings to environmental conservation and its potential for marketing and commercial success.

Method of Production:

a) Collection and Processing of Coffee Grounds

First, collect used coffee grounds from coffee shops or cafes. Then, dry the coffee grounds completely. Once dry, grind them into a fine powder.

b) Composite Manufacturing

Mix the coffee grounds with polymers in the right amount. If want, can add natural colouring. Stir the mixture well until it becomes smooth and even.

c) Sheath Formation

Pour the composite mixture into a mould shaped to fit the laptop size. Press the mixture firmly to remove any trapped air and create a smooth surface. Let it dry and harden as per the drying instructions of the polymer used.

d) Inner Layer Addition

Cut the fabric lining to fit the inside of the case. Then, either glue or sew it to the hardened inner surface.

e) Addition of Zipper or Velcro

Attach a zipper or Velcro along the edges of the case for convenient opening and closing.

f) Finishing

Clean the case surface, removing any dust or stains for a neat finish.

g) Testing

Test the final product to check its strength, durability, and ability to insulate against heat.

3.2.4 Materials and Equipment

Materials:

a) Organic Fibre
   Outer layer cloth material for the laptop case.
b) Coffee grounds
   Recycled coffee grounds to make the base of front and back of the case.
c) Polymer:
   Such as PLA (Polylactic Acid) to bind the coffee grounds and enhance durability.
d) Natural Dyes:
   For colouring and enhancing the aesthetic appeal.
e) Upholstery Fabric:
   Felt or canvas for the inner lining to protect the laptop.
f) Zipper or Velcro:
   For closure of the laptop case.

Equipment:

a) Mixing Equipment:
   To blend coffee grounds with the polymer.
b) Moulding Tools:
   Compression moulds for shaping the laptop case.
c) Heating Equipment:
   If necessary, for melting or softening the polymer during the mixing process.
d) Cutting Tools:
   Scissors or cutting machines for trimming fabric and shaping materials.
e) Testing Equipment:
   Tools for assessing the strength, moisture resistance, and other quality measures of the final product.

3.3 Summary

The laptop case is made from a mix of recycle materials, making it strong and durable to protect laptops. Eco-conscious shoppers are interested in this unique product because it stands out among other green options, and it should be priced to reflect both affordability and its environmental benefits. The case reduces waste and emissions compared to traditional materials, using less energy during recycling, and its design makes it easy to dispose of through decomposition or recycling.

In my research methodology, we analysed the demand for sustainable materials from eco-friendly consumers. In the design stage, I focused on combining durability with environmental responsibility. During development, we worked on improving the product's performance and sustainability. The materials, were tested for strength and environmental impact, and selected equipment to ensure efficient production. There are opportunities to further reduce energy use by switching to renewable sources. The case is well-designed for laptop protection and appeals to environmentally conscious buyers.

CHAPTER 4

DATA ANALYSIS RESEARCH FINDINGS

4.1 INTRODUCTION

This chapter presents a comprehensive analysis of the research findings related to the viability of our eco-friendly laptop case project. Our project aims to develop a sustainable, durable, and aesthetically appealing laptop case made from environmentally responsible materials. To assess its market potential and consumer demand, we distributed an online questionnaire targeting potential users who prioritize eco-conscious products. In this chapter, we summarize the key data collected from the questionnaire responses and analyse these findings to evaluate the feasibility of this innovation, focusing on factors such as consumer preferences, sustainability awareness, and willingness to pay for eco-friendly products. The insights derived from the analysis provide a foundation for refining our product design and marketing approach to meet the needs and expectations of environmentally conscious consumers.

4.2 STUDY/TESTING FINDINGS

The data collection and analysis for the eco-friendly laptop case project include an evaluation of the product's advantages, limitations, and any challenges encountered during its development. Various tests were conducted to assess the durability, efficiency, and effectiveness of the eco-friendly materials used. The testing methods and the list of equipment, such as durability testers and calibration tools, are outlined to ensure the accuracy and consistency of the data obtained. Safety precautions were also taken during testing to ensure the safety of users and testers. The initial and final test results will be compared to determine the extent to which the product meets the established specifications. If the product does not meet the desired standards, methods for improvement and maintenance will be discussed to enhance the product.

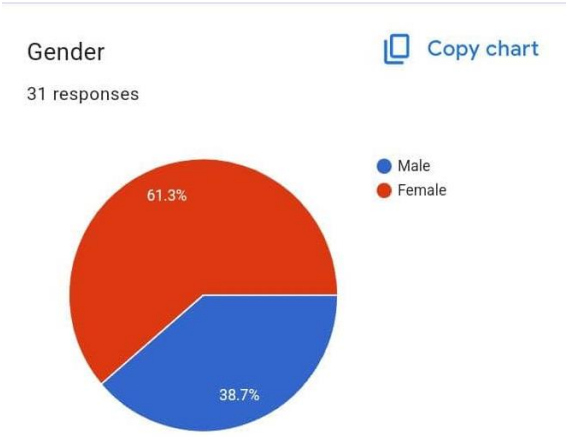

Diagram 10: Gender

Based on survey we conducted, we had collected 40 responses from students as above. It shows that female responses are more than male with the percentage of 28.2% and 71.8%.

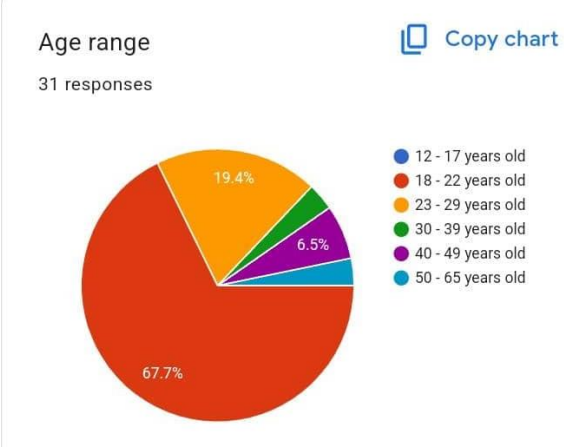

Diagram 11: Age range

The question above shows about age range of the respondents. The results showed that most respondents were in the 18-22 age range, making up 67.7% of the total respondents.

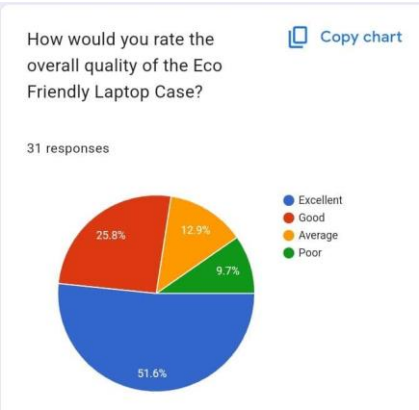

Diagram 12: The overall quality of the Eco-Friendly Laptop Case

According to the responses, more than 77% of respondents are happy with the Eco-Friendly Laptop Case, with 51.6% rating it as excellent and 25.8% rating it as good. Nonetheless, 9.7% gave it a poor rating and 12.9% gave it an average rating, indicating some room for improvement. Even if most consumers are happy, it's crucial to address the worries of the less content ones by getting in-depth feedback to comprehend their problems. Concurrently, marketing and product improvement can highlight the qualities that the majority finds appealing. Ongoing quality evaluations can promote product improvements and assist guarantee ongoing client happiness.

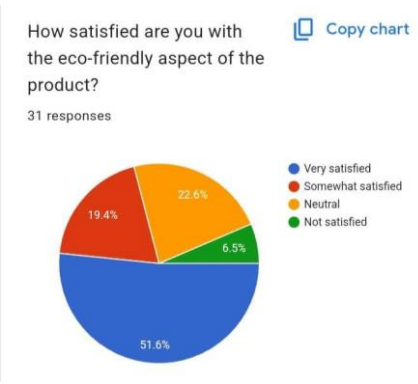

Diagram 13: Satisfaction of the eco-friendly aspect of the product

The chart shows that 51.6% of respondents are very satisfied with the eco-friendly aspect of the product, while 19.4% are somewhat satisfied. About 22.6% feel neutral, and 6.5% are not satisfied. This indicates that most customers appreciate the product's eco-friendly features, but there is room to improve for those who are neutral or dissatisfied. Understanding their concerns could help make the product more appealing.

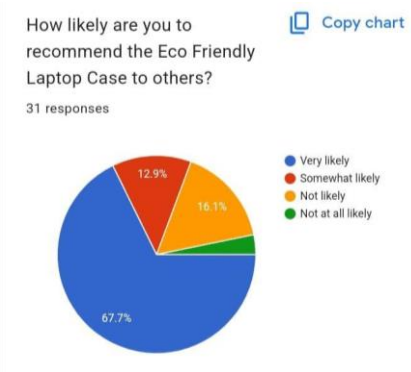

Diagram 14: Recommendation of the Eco-Friendly Laptop Case to others

The chart shows that 67.7% of respondents are very likely to recommend the Eco-Friendly Laptop Case, and 12.9% are somewhat likely. However, 16.1% are not likely, and 3.2% are not at all likely to recommend it. While most customers are happy to promote the product, there is a small group that may have reservations. Understanding their feedback could help improve the product and increase recommendations.

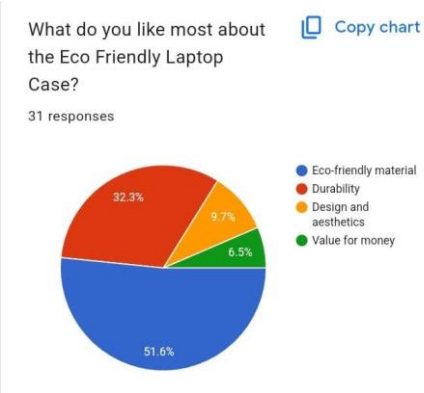

Diagram 15: Most like about the Eco-Friendly Laptop Case

The chart illustrates customer preferences for an eco-friendly laptop case, based on 31 responses. The most favored aspect is the use of eco-friendly materials, which garnered 51.6% of the votes, reflecting a strong appreciation for sustainability. Durability is the second most valued feature, with 32.3% prioritizing it, suggesting the importance of the product's lifespan. Design and aesthetics received 9.7%, indicating some interest in the product's appearance. Lastly, value for money is the least significant factor, with only 6.5% highlighting it, suggesting that customers might be willing to invest more in eco-conscious products.

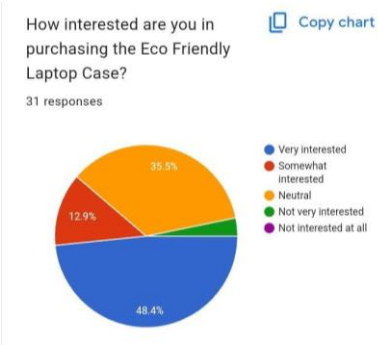

Diagram 16: Interest in purchasing the Eco-Friendly Laptop Case

The survey's findings show that the eco-friendly laptop case is very much in demand. While a sizable number (35.5%) are neutral, nearly half of the respondents (48.4%) said that they were very interested. Just 12.9% of respondents are somewhat interested, while a very small portion are not very interested. These results imply that there is a market for this product, especially among consumers who place a high value on environmental responsibility. But it's important to take into account the large proportion of uninterested respondents and look into ways to reach this market.

Purchase intention

Item	Mean	Std deviation
Q1	3.19	1.014
Q2	3.16	1.003
Q3	3.45	0.888
Q4	3.32	0.909
Q5	4.13	0.922

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
How would you rate the overall quality of the Eco-Friendly Laptop Case?	31	1	4	3.19	1.014
V5	31	1	4	3.16	1.003
V6	31	1	4	3.45	.888
V7	31	1	4	3.32	.909
V8	31	3	5	4.13	.922
Valid N (listwise)	30				

4.3 DISCUSSION

The findings of this study align with previous research and theories that emphasize the growing consumer preference for sustainable and eco-friendly products. Literature on sustainable product design supports the idea that consumers are increasingly aware of the environmental impact of their purchases, which is consistent with our findings showing a high level of interest in the eco-friendly laptop case among respondents. Additionally, theories related to green consumerism indicate that durability and aesthetics are crucial factors for eco-friendly products, which our study confirms through positive feedback on the case's design and material quality. Each research question has been analysed based on these findings and related studies. For instance, the question of whether customers are satisfied with the eco-friendly aspect of the product is addressed by our results, which show that a significant portion of respondents are very satisfied on using our eco-friendly laptop case with leads to a

sustainable lifestyle. Through this analysis, the study demonstrates how the eco-friendly laptop case project contributes to and supports existing models of green consumer behaviour and sustainable product development.

4.4 SUMMARY

This chapter summary highlights the key findings from the eco-friendly laptop case study, emphasizing the most important insights gained from data analysis. The summary reflects on the project's success in meeting the objectives of sustainability, durability, and consumer interest in eco-friendly products. Additionally, it discusses how these findings align with existing research on green consumerism and sustainable product design. This provides a strong foundation for the next chapter, which will explore recommendations for further product improvements.

CHAPTER 5
CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter will cover the overall conclusions of the report, limitations of the study, suggestions for future improvements, and the final conclusion. This section aims to assess the eco-friendly laptop case's potential for regular use and its ability to meet the objectives established during its development. By addressing these points, we aim to provide insights into the product's viability, areas for enhancement, and recommendations for future research and development.

5.2 CONCLUSION

In conclusion, the innovative use of repurposed slack pants fabric in the creation of an eco-friendly laptop bag significantly contributes to the reduction of textile waste, a growing environmental concern. The primary objectives of this project were to minimize waste, explore alternative sustainable materials for product design, and ultimately produce a functional and eco-conscious laptop bag that does not have a negative impact on the environment or human health. By focusing on these goals, the project not only addressed environmental sustainability but also sought to provide consumers with a practical, protective solution for their laptops.

The core idea behind this project was to transform discarded slack pants a material that is often overlooked and disposed into a durable and practical laptop case. Repurposing this fabric not only gives it a second life but also prevents it from ending up in landfills, contributing to the reduction of overall textile waste. The bag design aimed to ensure that it would offer adequate protection for laptops, safeguarding them from scratches, bumps, and minor impacts that can occur during daily use. In addition to the fabric, we incorporated recyclable plastic, which was treated and hardened to create the main protective structure of the case. This approach allowed us to combine flexibility with strength, ensuring the laptop case was both durable and lightweight.

To achieve an ideal balance between sustainability, functionality, and aesthetics, we employed an iterative design process. Through multiple design cycles, we experimented with different moulding techniques and materials, evaluating their effectiveness in providing the necessary protection for laptops while maintaining the environmentally friendly ethos of the project. One of the more unique aspects of the design process involved integrating coffee grounds into the polyster mixture, which not only added an interesting texture and visual appeal but also provided an additional layer of sustainability. The use of used slack pants, zipper from used clothes coffee grounds in the case materials further enhanced the eco-conscious nature of the product while contributing to its overall durability.

By thoroughly testing and refining these components, we were able to develop a laptop case that fulfils its purpose of offering protection and sustainability without compromising on style or function. The result is a product that not only addresses environmental issues but also meets the practical needs of consumers, providing them with a reliable, eco-friendly alternative to conventional laptop case recycled materials.

5.3 RECOMMENDATIONS

A number of significant changes can be made to the environmentally friendly laptop cover to increase its security, mobility, and usefulness while upholding its sustainable philosophy. First, the case may become lighter and easier to carry without compromising its protective properties if the amount of coffee waste in the polyster mixture is reduced. We can reduce the overall weight and increase portability, which is especially crucial for customers who must often carry their laptops. Furthermore, adding a built-in lock mechanism—like a covert combination or key lock on the zipper—would improve security, deter theft, and give people peace of mind in public areas. Students and professionals that use computers in various settings would particularly benefit from this functionality

5.4 PROJECT LIMITATIONS

The project nonetheless ran across certain restrictions and difficulties. One of the primary problems was the variation in the fabric of the slack pants. There were variations in the finished result because every pair of pants had a unique texture, weight, and durability. These variations had an impact on the material's overall quality and consistency, which may have caused variations in the final laptop case longevity. Large-scale production would be difficult due to the labor-intensive and time-consuming nature of the hand silicone molding method, notwithstanding its effectiveness. Automation or the application of more effective molding techniques would be required for mass manufacturing. The case's poor water resistance was another significant flaw found. Although the case did a good job of shielding the laptop from small scratchers it was not sufficiently resistant to water, which could be a significant concern for users who need their laptop cases to offer all-weather protection. This issue needs to be addressed in future iterations by either improving the fabric's water resistance or incorporating a waterproof layer.

5.5 SUMMARY

The purpose of this project was to design and create an eco-friendly laptop case using repurposed slack pants fabric and molded silicone, aiming to address environmental issues like textile waste and over-consumption. The project sought to meet two main objectives: first, to reduce the environmental impact of waste by upcycling old garments into a useful product, and second, to create a functional, durable laptop case that would offer proper protection while remaining sustainable.

The project followed a structured approach, beginning with the selection of materials. Slack pants fabric was chosen because of its softness, availability as waste material, and durability. Silicone was selected for its flexibility, moldability, and long-lasting properties, which allowed us to create a custom-fit case that could accommodate various laptop sizes. After the materials were chosen, several prototypes were created and tested for durability, impact resistance, and protection against scratches. While the case successfully met expectations for impact protection, some areas, such as water resistance and fabric durability, needed further improvement.

One of the key findings from the project was that using waste fabric, like slack pants, is an effective way to reduce textile waste and contribute to a circular economy. The project demonstrated that upcycling everyday materials into consumer products can help lower the need for new materials, reduce energy consumption, and minimize landfill waste. Additionally, the use of silicone as an alternative to petroleum-based plastics proved to be more sustainable and environmentally friendly, offering superior durability and flexibility.

Despite the successes, the project faced some challenges. The inconsistency in fabric strength due to the use of different pairs of slack pants caused some variations in the final product, affecting the overall durability. Additionally, the silicone molding process, although effective, was time-consuming, which would make mass production difficult without improvements in production efficiency. The case also lacked sufficient water resistance, which could limit its functionality for users who need full weather protection for their laptops.

Looking forward, the project offers several opportunities for improvement. Future iterations could explore other sustainable fabrics, such as organic cotton or recycled polyester, to improve consistency and durability. Additionally, automating parts of the molding process or using newer technologies like 3D printing could streamline production, making it more scalable and cost-effective. Improving the water resistance of the case would also be a priority, as it would make the product more versatile for a wider range of users.

Overall, this project successfully explored the potential for upcycling waste materials and using sustainable alternatives in product design. It highlighted both the possibilities and the challenges of creating eco-friendly consumer products. While there are areas that need further refinement, the project has laid a solid foundation for future development and innovation in sustainable product design. The eco-friendly laptop case offers a practical solution for reducing textile waste while providing consumers with a protective and environmentally responsible alternative to traditional laptop cases

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k) https://link.springer.com/article/10.1007/s10311-022-01420-1
l) https://www.sciencedirect.com/science/article/pii/S2211467X19301245

APPENDIX

a) Questionnaire

ECO FRIENDLY LAPTOP CASE PRODUCT FEEDBACK

Dear Respondent,

We are student from Semester 5, Diploma in Business Studies at Politeknik Sultan Salahuddin Abdul Aziz Shah (PSA). As part of our research project, we conducting a survey on feedback of eco friendly laptop cases. Your feedback will provide valuable insights into the potential market and sustainability impact of this innovative product.

This questionnaire is designed to gather your feedback related to the products. The survey will take approximately 1-3 minutes to complete.

Your responses will be used solely for academic purposes.

Thank you for your time and participation.eco

theyseenirameshkumar@gmail.com Switch account

Not shared

* Indicates required question

Gender *

- ◯ Male
- ◯ Female

Age range *

- ◯ 12 - 17 years old
- ◯ 18 - 22 years old
- ◯ 23 - 29 years old
- ◯ 30 - 39 years old
- ◯ 40 - 49 years old
- ◯ 50 - 65 years old

How would you rate the overall quality of the Eco Friendly Laptop Case? *

- ◯ Excellent
- ◯ Good
- ◯ Average
- ◯ Poor

How satisfied are you with the eco-friendly aspect of the product? *

- ◯ Very satisfied
- ◯ Somewhat satisfied
- ◯ Neutral
- ◯ Not satisfied

How likely are you to recommend the Eco Friendly Laptop Case to others? *

- ◯ Very likely
- ◯ Somewhat likely
- ◯ Not likely
- ◯ Not at all likely

What do you like most about the Eco Friendly Laptop Case? *

- ◯ Eco-friendly material
- ◯ Durability
- ◯ Design and aesthetics
- ◯ Value for money
- ◯ Other:

How interested are you in purchasing the Eco Friendly Laptop Case?

- ◯ Very interested
- ◯ Somewhat interested
- ◯ Neutral
- ◯ Not very interested
- ◯ Not interested at all

Submit Clear form

Never submit passwords through Google Forms.

b) Respondents list

Form_Responses1

	Timestamp	Gender	Age range	How would you rate the overall quality of the	How satisfied are you with the eco-friendly as	How likely are you to recommend the Eco
2	11/2/2024 17:24:19	Female	18 - 22 years old	Excellent	Very satisfied	Very likely
3	11/2/2024 17:26:26	Female	18 - 22 years old	Excellent	Neutral	Very likely
4	11/2/2024 17:32:42	Male	18 - 22 years old	Excellent	Very satisfied	Very likely
5	11/2/2024 17:40:01	Female	18 - 22 years old	Excellent	Very satisfied	Very likely
6	11/2/2024 17:45:48	Female	18 - 22 years old	Excellent	Very satisfied	Very likely
7	11/2/2024 17:46:24	Female	18 - 22 years old	Excellent	Very satisfied	Very likely
8	11/2/2024 17:54:31	Female	18 - 22 years old	Excellent	Very satisfied	Very likely
9	11/2/2024 17:56:28	Female	18 - 22 years old	Good	Somewhat satisfied	Somewhat likely
10	11/2/2024 19:24:44	Female	40 - 49 years old	Good	Somewhat satisfied	Very likely
11	11/2/2024 19:25:14	Male	23 - 29 years old	Good	Very satisfied	Very likely
12	11/2/2024 20:58:32	Female	18 - 22 years old	Excellent	Very satisfied	Very likely
13	11/3/2024 0:13:06	Female	18 - 22 years old	Good	Neutral	Very likely
14	11/3/2024 10:02:20	Female	23 - 29 years old	Good	Neutral	Not likely
15	11/3/2024 10:02:38	Male	18 - 22 years old	Good	Somewhat satisfied	Not likely
16	11/3/2024 10:02:42	Female	50 - 65 years old	Excellent	Somewhat satisfied	Very likely
17	11/3/2024 10:02:59	Male	23 - 29 years old	Excellent	Very satisfied	Very likely
18	11/3/2024 10:03:36	Male	18 - 22 years old	Average	Neutral	Not likely
19	11/3/2024 10:03:47	Male	18 - 22 years old	Poor	Neutral	Not likely
20	11/3/2024 10:04:00	Male	23 - 29 years old	Good	Somewhat satisfied	Somewhat likely
21	11/3/2024 10:04:14	Female	30 - 39 years old	Poor	Neutral	Somewhat likely
22	11/3/2024 10:04:30	Female	40 - 49 years old	Poor	Not satisfied	Very likely
23	11/3/2024 10:05:40	Male	18 - 22 years old	Average	Neutral	Somewhat likely
24	11/3/2024 10:07:34	Male	18 - 22 years old	Average	Somewhat satisfied	Not likely
25	11/3/2024 10:59:07	Male	18 - 22 years old	Excellent	Very satisfied	Very likely
26	11/3/2024 11:26:38	Female	18 - 22 years old	Excellent	Very satisfied	Very likely
27	11/3/2024 11:30:44	Female	18 - 22 years old	Good	Very satisfied	Very likely
28	11/3/2024 11:33:30	Female	18 - 22 years old	Excellent	Very satisfied	Very likely
29	11/3/2024 12:17:33	Female	18 - 22 years old	Excellent	Very satisfied	Very likely
30	11/3/2024 12:39:34	Male	18 - 22 years old	Average	Not satisfied	Not at all likely

c) Letter of Project Registration

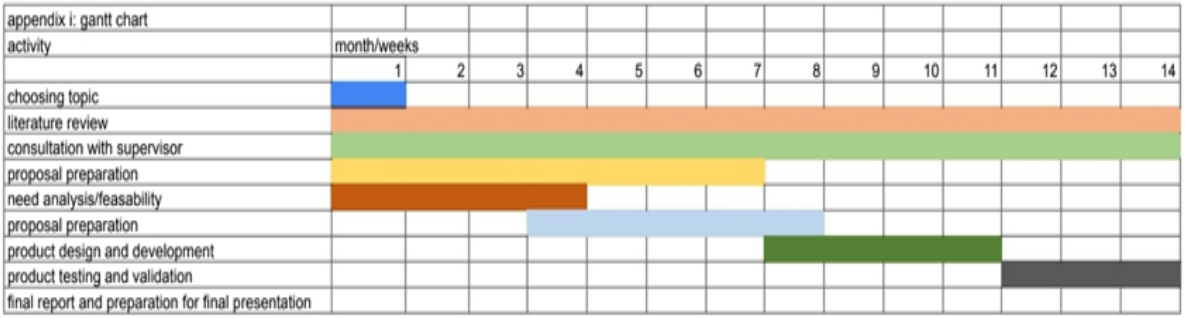
PENDAFTARAN TAJUK PROJEK PELAJAR
SESI PENGAJIAN : 1 : 2024/2025
KURSUS : DPB50163 - BUSINESS PROJECT

Tajuk Projek	**:ECO-FRIENDLY LAPTOP CASE**
Ringkasan Projek/Abstrak	: THIS PROJECT AIMS TO DEVELOP AN ECO-FRIENDLY LAPTOP CASE USING RECYCLE WASTE MATERIALS AS THE PRIMARY MATERIAL. WITH THE INCREASING AWARENESS OF THE IMPORTANCE OF ENVIRONMENTAL SUSTAINABILITY, THIS PROJECT FOCUSES ON REDUCING ORGANIC WASTE AND DECREASING DEPENDENCE ON PETROLEUM-BASED MATERIALS SUCH AS PLASTICS. THE LAPTOP CASE PRODUCED NOT ONLY FEATURES AN ATTRACTIVE AND MODERN DESIGN BUT ALSO PROVIDES GOOD PROTECTION AGAINST PHYSICAL IMPACTS, MOISTURE, AND SCRATCHES. THE MANUFACTURING PROCESS INVOLVES COLLECTING COFFEE GROUNDS, TREATING THE MATERIAL, BLENDING IT WITH POLYMERS, AND FORMING THE FINAL PRODUCT USING COMPRESSION MOLDING TECHNIQUES. THE RESULTS OF THIS PROJECT DEMONSTRATE THAT RECYCLED COFFEE GROUNDS HAVE THE POTENTIAL TO BE USED AS AN ALTERNATIVE MATERIAL IN THE MANUFACTURING OF EVERYDAY PRODUCTS, THEREBY CONTRIBUTING TO GLOBAL EFFORTS IN ENVIRONMENTAL CONSERVATION.
Anggaran Kos Projek	: RM 200

Penyelia Projek	: NORSYILA BINTI RASHID
Ketua Kumpulan	: THEYSEENI A/P RAMESH KUMAR
Ahli Kumpulan	1. 08DPM22F1202 AMILTHINI A/P SARAWANA 2. 08DPM22F1018 FARAH ADIBAH BINTI NORZAKI 3. 08DPM22F1103 RAJA AHMAD NOR ARIFUDDIN BIN RAJA SHAMSUDIN 4. 08DPM22F1072 THEYSEENI A/P RAMESH KUMAR

Pernyataan Masalah	The production and disposal of regular laptop cases cause a lot of environmental pollution. Many of these cases are made from materials that use non-renewable resources, like plastic and synthetic leather, and may contain harmful chemicals. These materials can take hundreds of years to break down, so they stay in the environment for a long time after they?re thrown away. During production, they often release pollutants into the air and water, contributing to climate change and other environmental problems. Another problem is that there aren?t many eco-friendly choices for laptop cases, even though more consumers are interested in sustainable products. Many people don?t know about greener options, and sometimes these eco-friendly products are hard to find or seem expensive. This lack of options creates a gap in the market, making it difficult for environmentally conscious consumers to find laptop protection that aligns with their values. This project aims to fill that gap by creating an eco-friendly laptop case that reduces harm to the environment while still being durable and useful. The goal is to design a product that can compete with traditional cases in terms of quality but with a much lower impact on the planet. By providing this alternative, the project hopes to promote more sustainable choices for consumers and reduce the overall environmental footprint of tech accessories.
Objektif Projek/Kajian	1. To research and identify sustainable materials suitable for producing an eco-friendly laptop 2. To assess the durability and cost-effectiveness of eco-friendly materials in comparison to conventional ones. 3. To assess the market potential and consumer acceptance of eco-friendly laptop accessories.
Skop Projek	The scope of this study includes the research, design, testing, and market analysis of an eco-friendly laptop case made from sustainable materials. It involves identifying and sourcing environmentally friendly materials, like recycled or organic fibres, suitable for use in laptop cases. The material will be tested for key qualities such as strength, flexibility, and durability to ensure it meets the functional requirements for device protection. Additionally, the study will focus on creating a functional and visually appealing design that appeals to environmentally conscious consumers. The market analysis aspect will involve gathering feedback through surveys and interviews to understand consumer preferences, interest, and willingness to purchase an eco-friendly laptop case. The target audience for this study includes consumers who prioritize sustainability and seek eco-friendly products in their daily lives.
Abstrak/*Abstract*	*Bahasa Melayu :* Projek ini meneroka pembangunan sarung komputer riba mesra alam yang diperbuat daripada bahan kitar semula. Dengan menggunakan semula bahan kitar semula ini, projek ini bertujuan untuk mencipta alternatif yang mampan kepada sarung komputer riba tradisional, mengurangkan pergantungan pada bahan tidak boleh diperbaharui dan meminimumkan sisa. Inisiatif ini melibatkan pengumpulan pakaian terpakai dan gentian organik memprosesnya menjadi bahan komposit, dan membentuk bahan ini menjadi sarung komputer riba yang berfungsi dan bergaya. Proses pengeluaran akan menumpukan pada penentuan teknik optimum untuk menyepadukan bahan kitar semula ke dalam kes, termasuk pemilihan bahan dan kaedah pengacuan. Projek ini akan menilai ketahanan, kefungsian dan daya tarikan estetik sarung komputer riba mesra alam berbanding sas konvensional. Melalui ujian dan penilaian yang ketat, projek ini bertujuan untuk memastikan produk akhir memenuhi piawaian prestasi sambil mengekalkan sifat mesra alamnya. Hasil yang dijangkakan termasuk produk praktikal dan inovatif yang bukan sahaja menangani isu kitar semula sisa tetapi juga menggalakkan pilihan pengguna yang mampan. Projek ini akan memberikan pandangan berharga tentang penggunaan bahan kitar semula dalam reka bentuk produk dan menyumbang kepada usaha yang lebih luas dalam pemuliharaan alam sekitar. Dengan menunjukkan daya maju pakaian terpakai dan gentian organik sebagai sumber, inisiatif ini menyerlahkan potensi penyelesaian kreatif untuk cabaran pengurusan sisa. *English Language :* This project explores the development of an eco-friendly laptop case made from recycled materials. By repurposing these recycle materials, this project aims to create a sustainable alternative to traditional laptop cases, reducing reliance on non-renewable materials and minimizing waste. The initiative involves collecting used clothes and organic fiber processing them into a composite material, and molding this material into a functional and stylish laptop case. The production process will focus on determining the optimal techniques for integrating recycle materials into the case, including material selection and molding methods. The project will assess the durability, functionality, and aesthetic appeal of an eco-friendly laptop case compared to conventional cases. Through rigorous testing and evaluation, the project aims to ensure that the final product meets performance standards while maintaining its eco-friendly attributes. Expected outcomes include a practical and innovative product that not only addresses the issue of recycle waste but also promotes sustainable consumer choices. This project will provide valuable insights into the use of recycled materials in product design and contribute to broader efforts in environmental conservation. By demonstrating the viability of used clothes and organic fiber as a resource, this initiative highlights the potential for creative solutions to waste management challenges.

d) Gantt Chart



appendix i: gantt chart														
activity	month/weeks													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
choosing topic														
literature review														
consultation with supervisor														
proposal preparation														
need analysis/feasability														
proposal preparation														
product design and development														
product testing and validation														
final report and preparation for final presentation														

e) Project title change application form

POLITEKNIK MALAYSIA

BORANG PERMOHONAN PERTUKARAN TAJUK PROJEK

AHLI KUMPULAN				
Bil	**Nama Pelajar**	**No. Pendaftaran**	**No. Telefon**	**Kelas**
1	Theyseeni A/P Ramesh Kumar	08DPM22F1072	01117097567	DPM5B
2	Amilthini Sarawana	08DPM22F1202	01133300613	DPM5B
3	Farah Adibah binti Norzaki	08DPM22F1018	0123246820	DPM5B
4	Raja Ahmad Nor Arifuddin bin Raja Shamsudin	08DPM22F1103	0176684345	DPM5B

Tajuk Asal	Recycled Coffee Grounds Laptop Case
Tajuk Baharu	Eco-Friendly Laptop Case
Sebab Pertukaran Tajuk	We have made some mistakes in our project progress that made us to change our project title to avoid any confusion later.

Tarikh: 5/10/2024

.....
(Tandatangan Pelajar)
Nama : THEYSEENI A/P RAMESH KUMAR

Sokongan Penyelia Projek:
Saya (menyokong / tidak menyokong)* permohonan pertukaran tajuk projek pelajar diatas.

Ulasan :
.....
.....

Tarikh:

.....
(Tandatangan Penyelia)
Nama:
Cop:

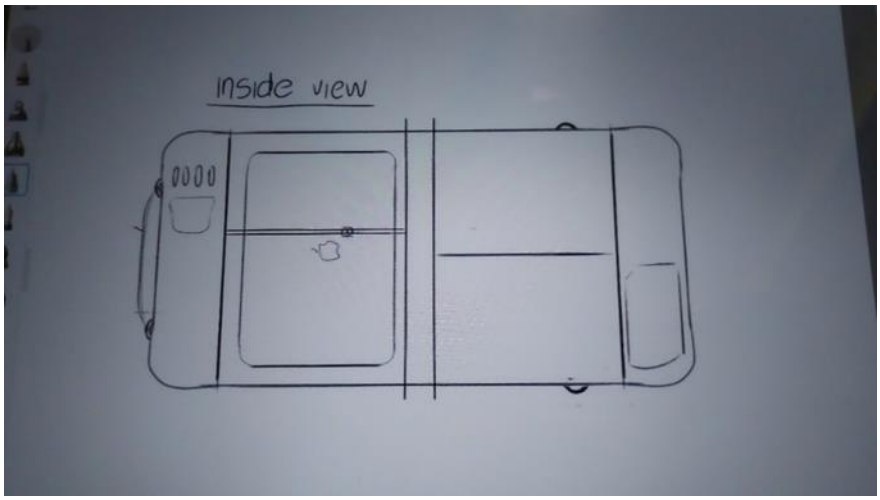
Kelulusan Penyelaras Kursus Projek:

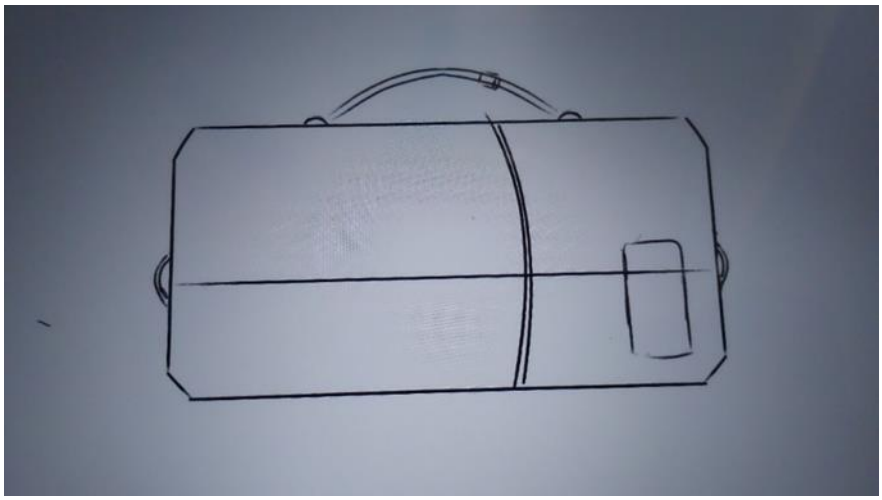
Permohonan pertukaran tajuk projek ini (diluluskan / tidak diluluskan). Ulasan :
.....
.....

Tarikh:

.....
(Tandatangan Penyelaras)
Nama:
Cop:

f) Project Scetch

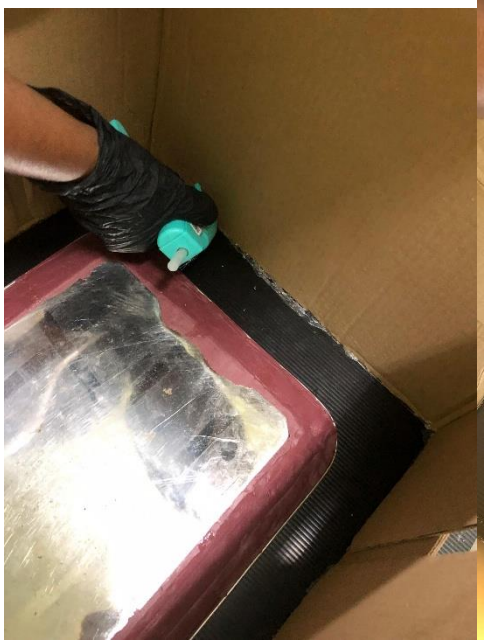


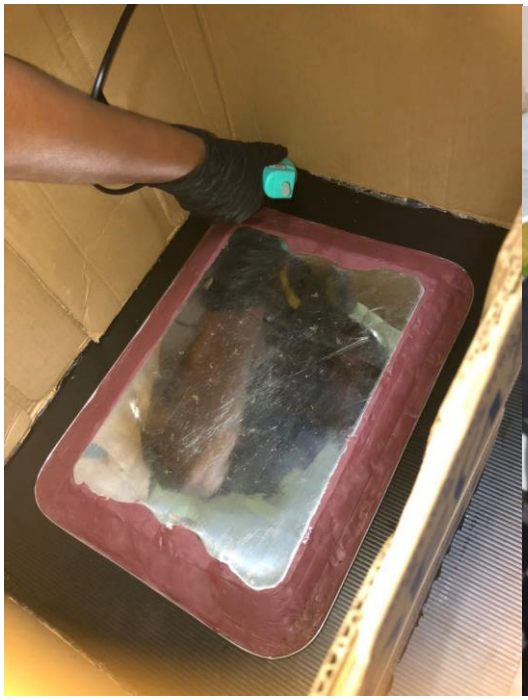


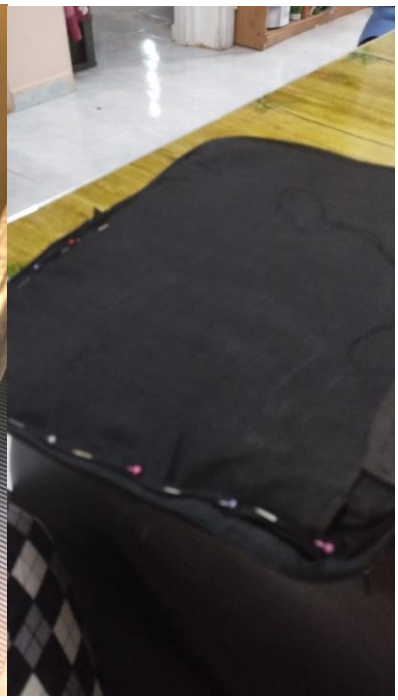
g) Project Cost

No.	Items	Price (RM)	Quantity	Total (RM)
1.	Liquid Silicone	44.24	2 Set	88.48
2.	Polylactic Acid	10.00	1	10.00
3.	Resin	17.90	2 set	35.80
4.	Coffee Grounds	14.89	1 kg	14.89
5.	Cardboard	4.80	2	9.60
6.	Clay	1.90	5	9.50
7.	Gloves	4.90	1 box	4.90
8.	Tissues	2.80	1 box	2.80
9.	Mold Release Agent	7.87	1	7.87
10.	Felt Fabric	0.80	2	1.60
11.	Sand Paper	0.50	1	0.50
12.	SPSS	35.90	1	36.90
13.	Poster 1	25.50	1	25.50
14.	Poster 2	35.50	1	35.50
			TOTAL (RM)	**RM 283.84**

h) Project Progress





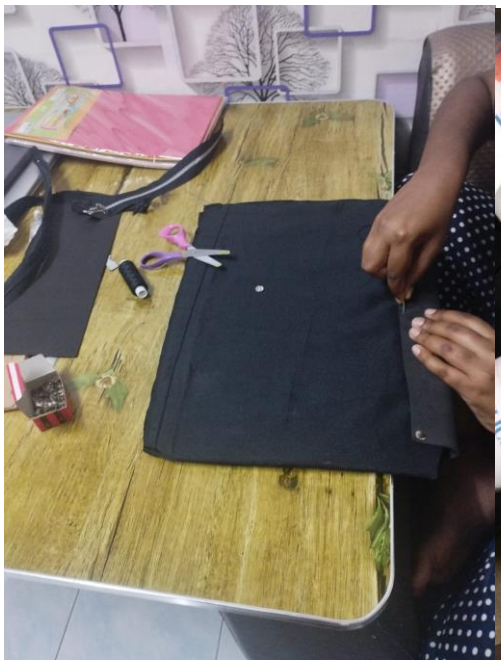


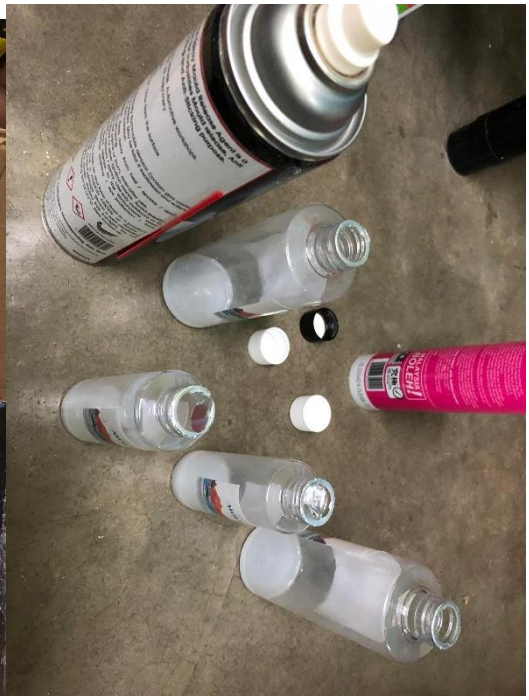

DEVA

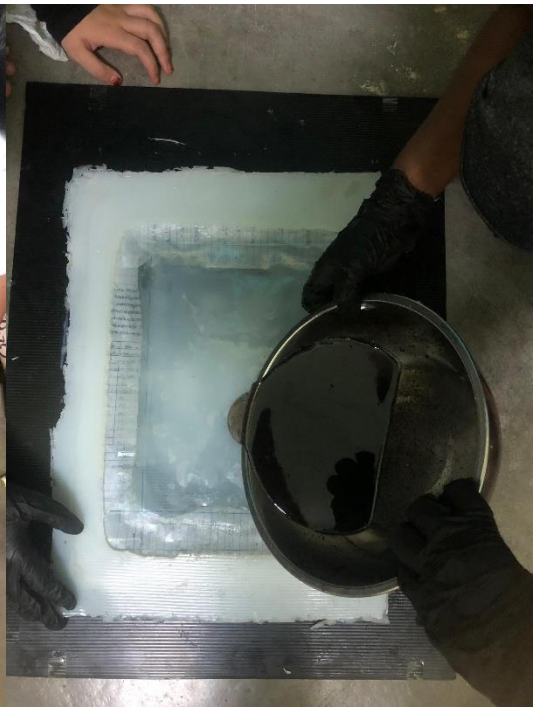

DESA

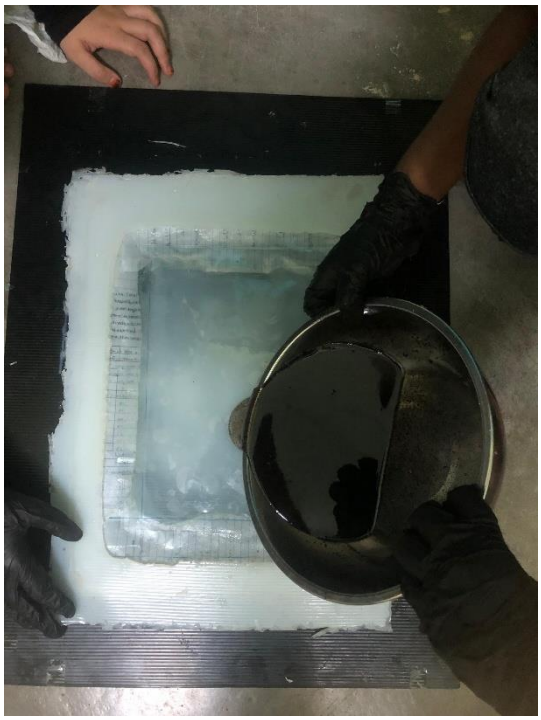

PREMIER

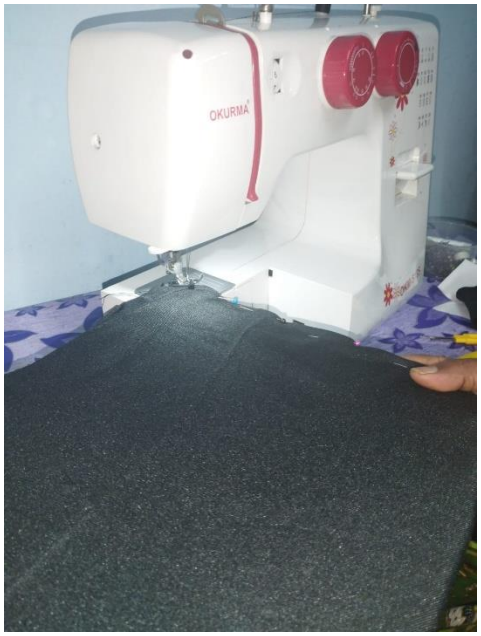

PREMIER

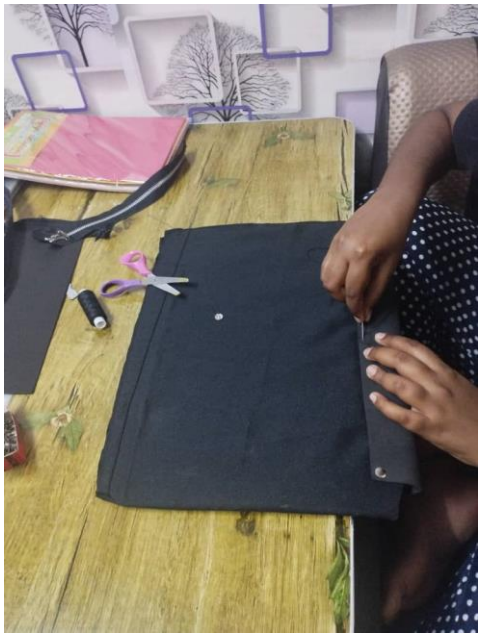









OKURMA




PERTANDINGAN PROJEK
AKHIR PELAJAR
SESI 2024/2025
ECO-FRIENDLY LAPTOP CASE
PROBLEM STATEMENT
PROJECT BACKGROUND
OBJECTIVE
METHODOLOGY
SIGNIFICANCE OF PROJECT

i)

STATEMENT OF AUTHENTICITY AND OWNERSHIP

PROJECT TITLE:
ECO-FRIENDLY LAPTOP CASE

1. I'm THEYSEENI D/O RAMESH KUMAR (IC NUM: 040311141166), a student of the Diploma in Business Studies, Polytechnic Sultan Salahuddin Abdul Aziz Shah, residing at Pangsapuri Sri Nilam, Bandar Baru Ampang, 68000, Selangor (hereinafter referred to as 'the Polytechnic).

2. I acknowledge that the "above- mentioned Project" and the intellectual property contained within it are the result of my original work/design without copying or imititating any intellectual property from other parties.

3. I agree to transfer ownership of the intellectual property of the "Project" to "the Polytechnic" to fulfil the requirements for the award of the Diploma In Business Studies to me.

Signed and truly acknowledged by

THEYSEENI RAMESH KUMAR ……

(ID NUM: 040311-14-1166) THEYSEENI D/O RAMESH KUMAR

In the presence of Madam Norsyila binti Rashid

as project supervisor on the date …… ……...

Norsyila binti Rashid

j) Poster Template Student Innovation Project Competition

ECO-FRIENDLY LAPTOP CASE

PROBLEM STATEMENT

The production and disposal of conventional laptop cases contribute significantly to environmental pollution. Many existing cases are designed with non-renewable resources and toxic chemicals, which can persist in the environment long after disposal. Moreover, there is limited awareness and availability of eco-friendly options for tech accessories, despite a clear consumer shift toward sustainability. This project addresses the lack of environmentally responsible options for laptop protection, aiming to develop an alternative that reduces environmental impact without compromising on durability or functionality.

PROJECT BACKGROUND

With growing environmental concerns, the need for eco-friendly products is more pressing than ever. Traditional laptop cases are often made from materials like plastic, leather and synthetic fabrics, which are not only harmful to the environment but also contribute to the growing problem of waste and pollution. An eco-friendly laptop case would utilize sustainable materials such as recycled plastics, organic fibers or biodegradable alternatives. This project aligns with global sustainability goals and caters to an emerging market of environmentally conscious consumers who value sustainable lifestyle choices. This project aligns with the United Nations Sustainable Development Goals (SDGs)—especially SDG 12: Responsible Consumption and Production and SDG 13: Climate Action—by aiming to design a laptop case with minimal environmental impact.

OBJECTIVE

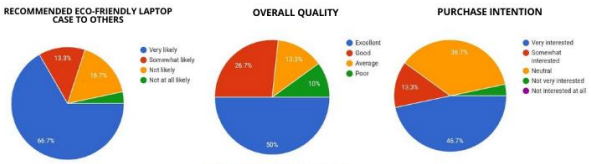
- To research and identify sustainable materials suitable for producing an eco-friendly laptop case.
- To assess the durability and cost-effectiveness of eco-friendly materials in comparison to conventional ones.
- To assess the market potential and consumer acceptance of eco-friendly laptop accessories.

SIGNIFICANCE OF PROJECT

The Eco-Friendly Laptop Case project is significant in advancing environmental sustainability and aligning with the United Nations Sustainable Development Goals (SDGs), particularly SDG 12: Responsible Consumption and Production and SDG 13: Climate Action. By using biodegradable and recycled materials, this project reduces waste and lessens the reliance on non-renewable resources, directly contributing to more responsible production practices. It also promotes consumer awareness around sustainable choices, encouraging a shift toward eco-friendly options in the tech accessories market. Additionally, this innovative approach sets a precedent for the development of environmentally conscious products, fostering a culture of sustainability and inspiring others to adopt climate-positive practices. Through this project, we aim to minimize the environmental impact of tech accessories, supporting global efforts to reduce pollution and combat climate change.

METHODOLOGY

FINDINGS



CONCLUSION

The Eco-Friendly Laptop Case project serves as a step toward integrating sustainability into everyday technology use. By offering an alternative to traditional cases, it promotes an environmentally friendly lifestyle choice for consumers and contributes to waste reduction. Successfully developing and marketing an eco-friendly laptop case could inspire further innovation in sustainable tech accessories and help transition the market toward greener solutions.

MADAM NORSYILA BINTI RASHID
SUPERVISOR

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AMILTHINI A/P SARAWANA
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FARAH ADIBAH BINTI NORZAKI
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RAJA AHMAD NOR ARIFUDDIN BIN RAJA SHAMSUDIN
08DPM22F1103