POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

MULTI NOISE AND DUST GUARDIAN (NAD G)

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Laporan ini dikemukakan kepada Jabatan Kejuruteraan Awam sebagai memenuhi sebahagian syarat penganugerahan Diploma Kejuruteraan Perkhidmatan Bangunan

JABATAN KEJURUTERAAN AWAM

JUN 2019

AKUAN KEASLIAN DAN HAK MILIK

TAJUK : MULTI NOISE AND DUST GUARDIAN (NAD G)

SESI : JUN 2019

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Adalah pelajar tahun akhir **Diploma Kejuruteraan Perkhidmatan Bangunan, Jabatan Kejuruteraan Awam, Politeknik Sultan Salahuddin Abdul Aziz Shah,** yang beralamat di

2. Kami mengaku bahawa MULTI NOISE AND DUST GUARDIAN (NAD G) dan harta intelek yang ada didalamnya adalah hasil karya\reka cipta asli tanpa kami mengambil atau meniru mana-mana harta intelek daripada pihak lain.

3. Kami bersetuju melepaskan pemilikan harta intelek MULTI NOISE AND DUST GUARDIAN (NAD G) kepada Politeknik Sultan Salahuddin Abdul Aziz Shah bagi memenuhi keperluan untuk penganugerahan **Diploma Kejuruteraan Perkhidmatan Bangunan** kepada kami.

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Sebagai penyelia projek pada Tarikh :

PENGHARGAAN

Bersyukur ke hadrat Ilahi serta selawat ke atas junjungan besar kita iaitu Nabi Muhammad SAW dapatlah kami menyiapkan projek akhir dengan cemerlang dalam tempoh yang telah ditetapkan iaitu selama 2 semester tanpa menghadapi sebarang masalah yang sukar diselesai sebagai syarat penganugerahan Diploma Kejuruteraan Perkhidmatan Bangunan sesi Jun 2019. Sekalung penghargaan kami ucapkan kepada semua pihak yang terlibat secara langsung mahupun tidak langsung terutamanya penyelia kami Puan Nur Hazlina Binti Lamli yang telah banyak memberi segala tunjuk ajar, nasihat, dorongan serta kritikan membina kepada kami sehinggakan kami berjaya menyiapkan laporan projek akhir ini. Tidak lupa juga kepada rakan-rakan dan ahli keluarga yang banyak membantu dari segi pandangan dan kewangan serta tidak lupa juga kepada industri – industri yang sudi menerima kami dalam menjalankan kajian dan juga kepada golongan pakar seperti Encik Ahmad dalam membantu menyiapkan produk sehingga dapat kami menyiapkan tugasan projek akhir ini.

Dengan ini kami bersyukur ke hadrat Allah SWT maka siaplah projek akhir ini. Harapan kami semoga laporan ini dapat dijadikan contoh dan panduan kepada pihak-pihak yang berkenaan pada masa hadapan.

ABSTRAK

Pembangunan semakin meningkat di persekitaran sekarang ini. Jenis perkembangan seperti pembinaan projek yang sedia ada, banyak jenis kilang yang sedia ada, bengkel yang tidak mantap dan meningkatkan bilangan kenderaan. Oleh itu, terdapat masalah umum seperti bunyi bising dan pencemaran debu di sekelilingnya. Berasaskan, pemerhatian menunjukkan bahawa di setiap tempat yang mungkin bunyi bising dan debu mempunyai halangan yang ada. Jadi, kami bersetuju untuk membuat pemasangan tambahan yang boleh dipasang untuk sebarang jenis halangan dan dapat mengisi panel dan bersih untuk debu. Juga, untuk membuat panel yang dapat menyerap bunyi bising dan bersih untuk menapis habuk. Panel mengandungi bahan seperti buih PU (buih poliuretana) dan bulu batu dan diliputi oleh keluli tergalvani. Untuk bersih, sebahagiannya diperbuat daripada dawai dan bahagian lain dari span. Melalui ujian, panel dapat mengurangkan sebanyak 20dB dan net dapat menyaring debu dengan jenis PM10 sebanyak 800gram. Semasa ujian, kami melakukannya dengan meter dB untuk mengukur kebisingan dan aplikasi AirQualityMeter untuk mengukur habuk PM2.5 dan PM10. Pada setiap skop, tiga hari data dicatat dan dianalisis. Data tentang bunyi dan habuk diambil sekali setiap jam kerja \ jam operasi. Pertama, data sebelum produk pemasangan diambil maka kami mengambil data setelah selesai pemasangan produk. Ini adalah untuk memerhatikan dan mencari perbezaan juga untuk membuat kesimpulan jika produk tersebut telah memenuhi objektifnya. Selepas ujian dijalankan, soalan kaji selidik mengenai produk dan tujuan kami telah dikongsi dan dijawab oleh 163 responden. Hasil kajian menunjukkan sebanyak 50.3% responden bersetuju bahawa produk itu dapat mengurangkan bunyi dan debu. Selain itu, sebanyak 48.5% bersetuju bahawa halangan dapat memegang panel dan bersih. Oleh itu, menunjukkan apa-apa jenis halangan yang boleh dipasang dengan produk ini. Menyimpulkan, berdasarkan analisis data dan tinjauan, produk kami telah memenuhi objektif dan berpotensi menjadi produk yang mudah untuk semua.

Kata kunci: bunyi bising, habuk, penapis, panel, halangan, boleh dipasang, pencemaran, bunyi pelbagai dan penjaga habuk

ABSTRACT

Development is rising up in nowadays environment. The types of developments such as existing many project construction, existing many types of factory, unstopping workshop and increasing the number of vehicles. Thus there are causes a common problem such as noise and dust pollution around it. Based, on observation showed that at every places that possible noise and dust have existing barriers. So, we agreed to create an additional installation that installable for any types of barriers and able to fill panel and net for dust. Also, to create panel that able to absorb noise and net to filtering dust. The panel contains materials such as PU foam(polyurethane foam) and rock wool and its covered by galvanized steel. For net, its partially made from wire mesh and another part from a sponge. Through the testing, the panel could reduce as much as 20dB and the net able to filter dust with the type of PM10 as much as 800gram. While testing, we did it by dB meter to measure noise and AirQualityMeter apps for measuring dust PM2.5 and PM10. On each scope, three days of data were recorded and analyzed. Data about noise and dust were taken once every hour of work\operation hours. Firstly, data before the installation product were taken then we take the data after done installation product. This is to observe and find the differences also to conclude if the product has met the objectives. After conducted testing, the survey questions about the product and our objectives has been shared and it answered by 163 respondents. The result of survey shows as much as 50.3% of respondents agreed that the product was able to reduce noise and dust. Other than that, as much as 48.5% agreed that the barriers were able to hold the panels and net. So its shows any type of barriers able to be installed with this product To conclude, based on data analysis and survey, our product has met the objectives and potentially to be product that convenient to all.

Keyword : **noise,dust,filter,panel,barrier,installable,pollution,multi noise and dust guardian**

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CHAPTER 1

INTRODUCTION

1.1 RESEARCH BACKGROUND

In recent years various harmful illnesses have existed due to environmental pollution. The effect of the pollution is that humans will suffer from a variety of diseases, especially respiration due to inhaling contaminated air. Humans need clean air to survive. If the inhaled air is contaminated, its respiratory system will absorb various pollutants into the lungs. This will result in conversion process carbon dioxide to oxygen can't be done and blood will be lacking in oxygen. This in turn causes the lung function impaired and the blood circulation system is problematic and causes various diseases. Therefore, the environment should be well maintained for human health.

At the end of research, we decide to having experiments and solution to problem at our choosen scope. The scope is :

i) Site construction
ii) Factory
iii) Workshop
iv) Road

1.2 PROBLEM STATEMENT

1.2.1 Site construction problem

The most of site construction limitation such as drilling, demolition , lorry or heavy cranes coming out , land dumping and outpouring and mixing concrete.

These lacks are totally improve at releasing dust and noise to surrounding.

Based on our research, dust are potential to give bad affect to human . Bad affect such as asbestosis , lung cancer and silicosis .

Silicosis is from silica dust at fine aggregate, coarse aggregate and brick materials.

KUALA LUMPUR, April 13 - The residents of Kampung Muhibbah People's Housing Project (PPR) in Bukit Jalil near here appealed to the Kuala Lumpur City Hall (DBKL) to solve the problem.

They claimed that they faced many problems following the booming construction project activities near the PPR.

The situation is worsening when trucks exceeding three tonnes make the road there as the main route to go out every day.

In addition to dust contamination, soil dust and noise, severe road damage problems and blockage drainage systems also affect residents.

(kota, 2014)

1.2.2 Factory problems

Noise :

Among of the problem solvers is the creation of a loud and noisy sound from the machine or any processing activities cannot be contained and controlled properly. Unplanned urban planning has also caused noise pollution as adjacent factories and adjacent housing areas may cause noise pollution in residential areas.

Dust :

Dust and dust exposures openly affect the workers and the people who live and then around the plant. In addition, the establishment of an area is not embedded in an environmentally friendly plant. A large number of death rates have also been recorded either domestically or globally..

KOTA BHARU June 22 - Nearly 100 residents around Batu 6, Kampung Pendek here claim to be exposed to noise pollution and breathe dusty air from a liquid factory there 20 years ago.

The Utusan Malaysia survey to the village here today found that the problem was due to the fact that it operated 24 hours a day and produced noise while the resulting dust was discharged into the air without treatment.

The problem faced was allegedly lodged in Ketereh District Council office but was not entertained and no action was taken by local authority (PBT).

A resident, Tey Poh Jie, 36, when met said, dust pollution into the air caused many communities in the area, especially children with tiredness and cough.

"There are already some families who have to move because they can not withstand the pollution sounds and the air they perceive every day.

"The whole space of my house and car is filled with dust that is produced by the plant as it operates 24 hours," he said.

Another resident, Tey Som Tin, 55, who lived in the village for the past 20 years, said the helpless air not only affected the lives of the people but it also spread up to 100 meters from the plant.

"We also have difficulty sleeping because the noise is too strong from the factory," he said.

Clearly Som Tin, the noise from the cement plant at night causes many people unable to sleep.

(ABDULLAH, 2011) (abdullah, 2011)

1.2.3 workshop problems

Butterworth, a factory operating in the Mak Mandin Industrial Area, is located about 500 meters from Mak Mandin Tamil National School (SJKT) and several residential parks.

Resident Ahmad Shariff, 50, said the people in the area were accustomed to heavy traffic noise, heavy smoke emission, and factory smoke and black water were polluted by industrial waste.

In Malacca, surveys in the Sungai Rambai Industrial Area which houses various factories including furniture and poultry enterprises, housing parks and schools are only about a kilometer away.

In fact, a survey at 2pm yesterday also found that a wood mill was emitting smoke, but residents found they were accustomed to smelling industrial smells, especially in the morning.

Student, Muhd Danieal Kamarolzaman, 17, said the situation was much better than it was a few years ago when he was in Form Two when his school uniforms turned black as the school was located near industrial areas.

(reporter, july 2019)

1.2.4 road problems

Urban noise pollution is making us deaf and killing us slowly, writes Aznim Ruhana Md Yusup

I LIVE in an apartment next to a major highway, and the sound of traffic is something that I deal with daily. It is bearable when the doors and windows are shut, but the motorcycle races on weekends are something else.

With the exception of rain, roadworks and presumably police roadblocks - though I've not witnessed any - the races happen regularly from midnight to 4am. Trespassing on the early morning calm, the racers ride unafraid and unabashed in a contest that has been going on for decades.

It is, of course, illegal, and yes, I am annoyed by it. I suppose my annoyance is further exacerbated given how powerless I am in this situation. But what's new to me is that this annoyance may also contribute to an early death.

In a study titled A Vision Of the Environmental And Occupational Noise Pollution In Malaysia published in the Noise And Health journal in 2014, Foo Keng Yuen from Universiti Sains Malaysia wrote: "(the) potential implications of noise exposure are numerous, pervasive, persistent, cumulative and augmented synergistically and antagonistically, with corresponding real (economic) and intangible (well-being) losses.

"An explicit link between environmental noise with the activation of sympathetic and endocrine systems has been witnessed, resulting in the changes of blood pressure, hypertension, peripheral vasoconstriction and cardiovascular disease."

A morning snapshot of traffic in the Klang Valley. Notice the wall between the highway and housing area.

(ruhana, 2019)

1.3 RESEARCH OBJECTIVE

a) **To upgrade and change barrier by adding sound absorption panels**
b) **To ensure panels that can absorb noise by using noise barrier and filtering dust by net.**
c) **Sound absorption panel absorbs 35 dB.**
d) **Present two function in one concept such as combination of dust netting and noise panel in one barrier.**

1.4 RESEARCH SCOPE

This research was progressing at site construction. Base on our research, we found our scope that site construction, factories, workshop and road are always releasing dust to atmosphere. Beside that, also make a noise pollution. Actual situation right now at site construction are typically same. Site construction still using standard barrier like zink barrier and divider barrier. As we know, those barrier are literally can't reduce dust and noise from site of scope. So, our product the Multi Noise And Dust Guardian barrier are planned to be install at standard barrier at site construction. This is because our product are easy to install on standard barrier at site construction and at other scope. The site construction is the main scope of the study as most of the site construction in Malaysia blast dust and noise are uncontrolled to cause the surrounding residents to have negative impacts such as silica and deaf.

Limitation of the research

- This study is suitable for use in construction sites, workshops, roads especially in factories only
- There should have supporters such as barriers to put this study into place.
- Only used in large and large open spaces
- The risk of this study is not according to the existing barrier at factory in Malaysia
- Can't resist and absorb 100 percent of the noise and dust.

1.5 IMPORTANT OF RESEARCH

Able to give positive impact on social, institutional, community and country. With dust and sound barrier, dust will be dropped with a shower on the barrier and is expected to reduce the problem by 70%. While the barrier can absorb 29 dBA noise. Indirectly, noise and dust exposure can be reduced from factory outlets, construction sites, road and workshops. Thus, there is no negative stream given from the surrounding population to the factory. Not only that, even silica disease will also decrease as dust depletion is reduced. The development of our country will also develop without harm to the people. In fact,this shows that we are making global equivalent technology.

1.6 SUMMARY

Problems in construction sites and surrounding areas such as housing are mostly influenced by dust pollution and excessive noise pollution.

Most of these problems still lack awareness of all relevant parties.

how to moisten the soil through water flows from the lorry seems ineffective and potentially stagnant water leads to Dengue problem.

Construction progress should be in line with the health status of its population.

it is necessary to enable a healthy construction environment so that workers and residents can live safely and can progress together for a long time

CHAPTER 2

LITERATURE REVIEW

INTRODUCTION

Barrier is a tool that is widely used in most construction sites. this tool is used on the boundary of the construction site to distinguish between the construction site area and the non-construction site area. the atmosphere in the construction site usually does not appear outside because of this barrier.

This barrier consists of several parts depending on the type of barrier. A typical barrier is a 'new jersey' barrier. This barrier is just a fraction of the part. The commonly used zinc barrier consists of wood and zinc. The wood as a frame.

' Construction barriers are fences, signs, and other devices used on constructions sites for: − Limiting the movement of personnel, vehicles, and equipment, to only specific, predetermined areas necessary for ingress/egress and for performing the work. This minimizes disruption of the site, maximizes the preservation of existing vegetation, and reduces the potential for soil erosion or compaction' (michigan, 2014)

2.2 OLDER RESEARCH

literature based on the same category or theme as writing, purpose or objective formulation and chronology need to be collected. This is aimed at reassuring the study of barriers. it can also help identify ideas, designs and tools that need to be used.

Sources used such as :

1. Journal
2. Article
3. Older thesis
4. Report

2.3 HISTORY OF SITE CONSTRUCTION BARRIER

in barrier applications, the barrier is used to describe the road from including the construction site area. In the past, it was named as a barricade. It started in 1968 by Bob Brownee in South Florida.

Bob Brownlee is the original Bob, founder of Bob's Barricades, the company he started in his back yard 25 years ago while working as a Metro-Dade police patrol sergeant. He sold the company and its famous name years ago, started a second barricade company and sold that one, too. Now, tired of playing gin during a two-year retirement, Bob is back in the barricade business. (kernicky, 2014)

Figure 1 shows The Founder with his product.

2.3.1 TYPE OF BARRIER/ EXISTING BARRIER

1. Concrete construction barrier
2. Plastic barrier
3. Fencing barrier
4. Guardrails barrier
5. Safety net barrier

(emily, 2017)

2.4 CONCEPT AND THEORY OF "MULTI NOISE AND GUARDIAN"

This modified barrier becomes "**MULTI NOISE AND DUST GUARDIAN**" where the absorption concept is used to absorb sound and also absorb dust or reduce dust levels. This is because by absorbing sound, the noise generated in construction sites, workshops, quarries, factories and others will be reduced when sound waves are generated in the area exposed to the barrier or wall attached to noise absorption.

The concept of the sound barrier and how it works is remarkably simple. In fact, it is one of the simplest solutions in the entire field of acoustics. It is a barrier or wall: a hard surface made of wood, concrete, brick, or other reflective, strong and durable material. Sound reacts to solid walls in three ways: it is reflected (bounces off the surface); absorbed or transmitted (passes through the barrier to the other side). The taller the wall, the more surface area it will have to effectively do all three of these things.

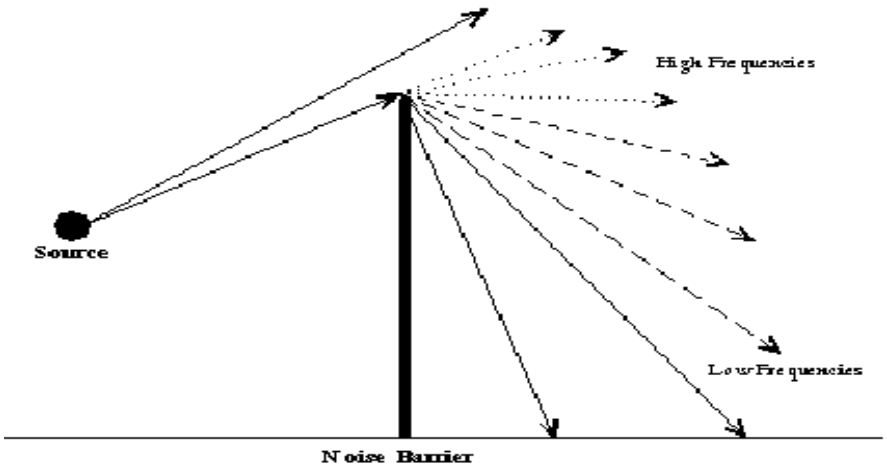


Figure 2 show where the low frequency and high frequency of sound through the noise barrier

2.5 NOISE

Noise is usually associated with construction work although modern preventive measures may substantially reduce the amount of noise (in the neighboring community). Noise may adversely affect your health, including effects such as **stress, sleep disturbance, high blood pressure and even hearing loss**.

2.5.1 TYPE OF NOISE

1. Continuous Noise

Continuous noise is what it says on the tin. It is noise that is produced continuously by machinery that keeps running without interruption. This could come from factory equipment, heating or ventilation systems.

2. Intermittent Noise

Intermittent noise is a noise level that increases and decreases rapidly. This might be a freight train passing by, factory equipment that operates in cycles or aircraft overhead.

3. Impulsive Noise

Impulsive noise is most commonly associated with the construction and demolition industry. This sudden burst of noise can startle you by its fast and surprising nature. Impulsive noises are commonly created by explosions or construction equipment such as pile drivers.

4. Low Frequency Noise

Low frequency noise makes up part of the fabric of our daily soundscape. Whether it's the low background humming from power plants or the roaring of large diesel engines, we are exposed to low frequency noise constantly. This is also the hardest type of noise to reduce at source, so it can easily spread for miles around. (doctor, 2015)

2.5.2 CONTROL METHOD

Eliminating noisy processes or substituting them for a less noisy process are the best ways of dealing with noise on a construction site. If this is not possible removing people from the noisy area and choosing quieter equipment can also be effective. As last resort, hearing protection and hearing protection zones may be appropriate.

Here are some examples of how you can reduce noise:

1. Eliminate noise during design. For example, design ducts into a structure rather than chasing channels in walls.

2. Substitute a less noisy process. For example, use a hydraulic block splitter rather than a cut-off saw to cut blocks.

3. Remove people from the vicinity of noisy work. For example, use a machine mounted breaker on an excavator with a good quality cab and exclude other people from the area while the breaker is in use.

4. Select quiet equipment. For example, compare noise levels from power tools when buying or hiring equipment. Use information from the manufacturer or supplier, and choose the quietest tools that are effective for the job.

5. reduce noise when selecting other types of tool. For example, choose plastic or rubber hammers, rather than metal, to free collars on falsework legs.

(executive)October 18, 2017

2.5.3 SOURCE OF NOISE

The major noise sources on construction work sites. On construction work sites there are many different noise sources and these sources exhibit many differing types of noise such as background noise, idling noise, blast noise, impact noise, rotating noise, intermittent noise, howling, screeches and squeals that need to be controlled.Fortunately, the noise levels of common construction noise sources are well-known. Below are the noise levels of common construction.

Equipment	Sound Level at Operator	
	Average	Range
*Background**	86	
Earth Moving:		
Front End Loader	88	85-91
Back Hoe	86.5	79-89
Bull Dozer	96	89-103
Roller	90	79-93
Scraper	96	84-102
Grader	<85	
Truck	96	89-103
Paver	101	100-102
Material Handling:		
Concrete Mixer	<85	
Concrete Pump	< 85	
Crane	100	97-102
Derrick	<85	
Power Units:		
Generators	<85	
Compressors	<85	
Impact:		
Pile Driver (diesel and pneum.)	98	82-105
Pile Driver (gravity, bored)	82.5	62-91
Pneumatic Breaker	106	94-111
Hydraulic Breaker	95.5	90-100
Pneumatic chipper	109	
Other Equipment:		
Poker Vibrator	94.5	87-98
Compressed Air Blower	104	
Power Saw	88.5	78-95
Electric Drill	102	
Air Track Drill	113	
Noise Standards		**Noise Level**
OSHA (at workers ear)		90 dB (A)
Day Time Community (at property line)		65 dB (A)

Figure 3 source of noise schedule

(Ihsfna, 2014)

2.6 DUST

Construction Dust is a general term used to what may be found on a construction site.

Silica dust – Silica is a natural mineral present in large amounts in things like sand, sandstone and granite. It is also commonly found in many construction materials such as concrete and mortar.

2.6.1 DUST SOURCES

Sources: Where Does It Come From

Airborne Dust Particles can come from pretty much anywhere, any movement or activity can cause a large amount of excess particles in the air.

I. Disturbed vacant or open lands

II. Construction and mining activity

III. Landscaping maintenance activity

IV. Industrial sources

V. Fires: fireplace, camp, forest

- Charcoal or wood-burning barbecues - Off-road vehicle activity
- Unpaved and paved roads, parking lots - Diesel exhaust

(airbone dust particle, 2016)

2.6.2 TYPE OF DUST

1. Concrete dust
2. Wood dust
3. Chalk dust
4. Rubber dust
5. Metal dust

(types of dust, 2014)

2.6.3 TRAP METHOD

1. Water
2. Mulch and vegetation.
3. Tillages
4. Polymers as dust control
5. Chlorides
6. Tackfikiers and soil stabilizers
7. Barrier
8. Sweep equipment
9. Stone

(rodriguez, 21 october 2018)

2.6.4 SIZE OF DUST

Dust have two (2) sizes :

1- **Pm 2.5**
2- **Pm 10**

2.6.4.1 PM 2.5

Particle pollution is a mixture of solid particles and liquid droplets. EPA Victoria monitors the air for two categories of particle size: $PM_{2.5}$ and PM_{10}. These particles are very small and are measured in micrometres (µm).

$PM_{2.5}$ particles are smaller than 2.5 micrometres (0.0025 mm) in diameter. Often described as fine particles, they are up to 30 times smaller than the width of a human hair. (PM 2.5 particle in air, 27/8/2018)

2.6.4.2 PM 10

PM_{10} is particulate matter 10 micrometers or less in diameter, $PM_{2.5}$ is particulate matter 2.5 micrometers or less in diameter. $PM_{2.5}$ is generally described as fine particles. By way of comparison, a human hair is about 100 micrometres, so roughly 40 fine particles could be placed on its width.

PM_{10} and $PM_{2.5}$ are not used for any application.

Particles of any substances that are less than 10 or 2.5 micrometres diameter. Particles in this size range make up a large proportion of dust that can be drawn deep into the lungs. Larger particles tend to be trapped in the nose, mouth or throat. (Particulatte matter (pm 2.5 and pm10))

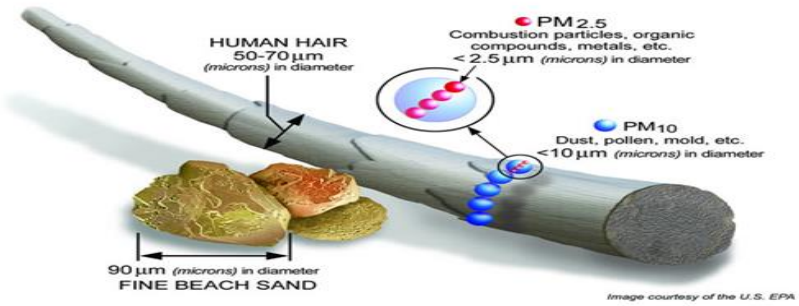


Figure 4 explanation about size of pm2.5 and pm10 dust

2.3.4 CHEMICAL ABLE TO ABSORB NOISE

2.3.4.1 POLYURTHENE FOAM (PU FOAM)

Polyurethane foam is an outstanding material for various applications. It is manufactured by propelling liquid isocyanate-polyol mixture to form foams in the presence of a blowing agent. This paper comprises an experimental study on acoustic properties improvement of rigid polyurethane closed-cell foam, by incorporating various quantities of textile waste into the matrix. In order to obtain a homogenous, easy to handle material, an optimal percent of 10-50% textile waste was used. The sound absorption coefficient of the composite materials was measured using an impedance tube. The composite materials obtained have better sound absorption properties compared to rigid polyurethane foam. The noise reduction coefficient (NRC) of the composite material with 40% textile waste and 60% rigid polyurethane foam is twice as high as the 100% rigid polyurethane material. (PROCEDIA, january 2016)

ADVANTAGES OF PU FOAM

- High performance insulation
- Structural stabilisation
- Air tightness
- Condensation control
- Building regulations
- Fire ratings
- Reduction of sound transmission
- Energy saving
- (Association)

Figure 5 shows PU foam

2.3.4.2 ROCKWOOL

Rockwool insulation is a rock-based mineral fiber insulation made from Basalt rock and recycled slag.

Basalt is a volcanic rock that's naturally made by the Earth. Think Hawaiian islands.

Slag is a by-product of the steel and copper industry. Think Pittsburgh Steelers.

We're from the Burgh – couldn't resist a Steelers reference.

Rockwool is made when Basalt and slag are melted then spun into fibers. Those fibers are then made into batts which slide between studs or joists.

(Truini, Rockwool Insulation, 15.9.2019)

ADVANTAGES OF ROCKWOOL

- Rockwool stone wool fibres can withstand more than 1000°C without melting – this means it can slow the spread of fire in a property where it to catch fire.
- Rockwool has fantastic thermal insulating properties. 120mm of our dual density slabs when attached to the exterior of a property will take the u-value down to 0.3 which means the building will then conform to building regulations. For the occupants, it means improved thermal comfort since the property will stay at more even temperatures and also lower energy bills.
- Rockwool stone wool has great acoustic insulating properties, so it can really can help with sound reduction if installed on a busy road for example.
- The final advantage is that Rockwool is breathable, therefore it allows moisture to travel across the wall which can help dissipate damp (from in the house). (James, 24/2/2017)

Figure 6 shows Rockwoo

2.3.5 RESEARCH GAP

The gap, also considered the missing piece or pieces in the research literature, is the area that has not yet been explored or is under-explored. This could be a population or sample (size, type, location, etc.), research method, data collection and/or analysis, or other research variables or conditions.

Research gaps	**Deficiencies in research**	**references**
Reflective and non-reflective highway barrier	- Reflective might be worse than nothing in some instances. Differences in sound absorbing panels coefficient of less than perhaps 0.3 is worth squat. Before putting in reflective barriers do a study to see if it makes sense	K. Polcak (MD SHA) And R.J. Peppin (Scantek, Inc.) 17 april 2015
Highway traffic noise	- must be tall and long w-effective within 61 meters (200 feet) of a highway (usually the first row of homes) - do not *completely* block all noise they only reduce overall noise levels. th no openings. - Walls require less space, but they are usually limited to eight meters (25 feet) in height for structural and aesthetic reasons.	Federal highway administration

Existing Noise Barriers :Vegetation, Concrete Hollow Block, and Panel Concrete	the function of the noise barrier is only as noise reducer but not completely block the sound annoyance. - Vegetation recorded the lowest insertion loss in this study. – the concrete hollow blocks also need to rely on wall joint between the blocks; rather than depending only on the cavities to reduce the noise	Effectiveness of Existing Noise Barriers: Comparison between Vegetation, Concrete Hollow Block, and Panel Concrete HerniHalima RamdzaniAbdullaha AbangAbdullah AbangAlib Mohd. Jailani Mohd.Norc,2015
Kapok fiber	- can cause harmful effects to the health of consumers. -good sound absorption at low frequency from 0 Hz up to 900 Hz where the maximum absorption coefficient was 0.950 while the maximum absorption at high frequencies was 0.799.	-R. Zulkifli, Zulkarnain and M.J. Mohd Nor, M., J., American Journal of Applied Science **7**, 260–264 (2010). -A. Veerakumar and N. Selvakumar, Journal of Fibre and Textile Research **37**, 385–388 (2012).

2.4 CHAPTER COMPULSORY

During this study we find that there are many existing barriers. This barrier is more use on the road compared to other places. There is no doubt that there are many noise barriers.

Our project brings advantages to the use of barrier that is we add dust barrier to front of barrier surface and behind it we add panel to absorb sound.

In addition, we also find materials that can be used as sound traps. There are many types of materials that can be used in our project. Whatever we are still in the process of reviewing.

on how to trap dust, no more easier way and practical way of installing nets. This is because at the beginning of the plan we want to use mist sprayer as dust control. but after conducting the investigation, it allows the occurrence of slips, wet areas which are considered hazardous at construction sites.

CHAPTER 3
METHODOLOGY

3.1 INTRODUCTION

Research methodology is a method and technique of forming, collecting and analysing data so as to produce evidence that can support a study.

In particular, it is to examine the effectiveness of the study on the project being MULTI-NOISE AND DUST GUARDIAN. The effectiveness is examined to ensure that panels made to be hung on barriers and barriers located beneath the panels can accommodate panel loads and dust net. As there are many types of barrier sizes available, it is intended that panel holders are suitable for all types of barriers in the scope of places such as construction sites, quarries, workshops and factories in particular. In addition, the noise panel and dust net are influenced by the composition of the dust and the noise level itself.

In order to ensure that the noise and dustproof panels are working properly and can be used properly, they should be carefully crafted and should be monitored from time to time. This makes the noise panel and dust net last longer and thus save on maintenance costs to replace new ones. Not only that, the more innovative design makes the area look more modern and sophisticated.

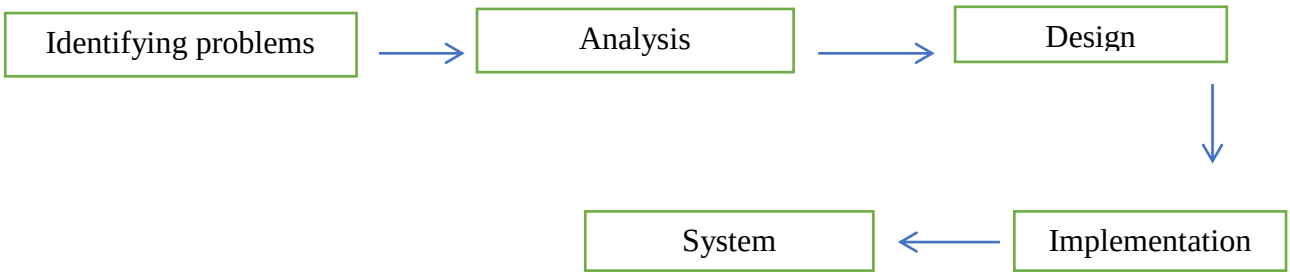
Hence this chapter will describe the methodology of the study which is a set of systematic methodology that is carried out to achieve the objectives and questions of the study. In order to ensure that the research findings are well done, a researcher should be able to plan his research using a design that is appropriate to the purpose of the study.

Therefore, this chapter will also discuss the overall assessment methodology. The use of appropriate methods determines the best possible results and research results as well as achieving the goals and objectives set. The aspects discussed include the design of the survey, the selection of respondents and study sites, pilot studies, information acquisition procedures, data collection and data analysis procedures and formulas.

3.2 RESEARCH DESIGN

Researchers need to know about the study of the research first. The design of the study should be clear to understand the overall study we will run. If the researcher does not really understand the design of the study, it will be a disaster for the study. This is because if the start is incorrect it will affect its end.

3.2.1 Methodology Flow Chart



Identifying problems

Every Project that need to concern is about problem statement first. The start of the project we wanted to do, we have been looking for some issues related to air pollution and noise that disturb the population in certain areas. Hence, careful planning is implemented to address the problem by creating tools that can be installed on existing roadblocks and putting some functions to solve the problem stated. The occurrence of air pollution is due to work such as at construction sites, quarries, workshops and manufacturing areas. The missed dust head is not properly controlled as well as strong noise can disturb the residents in the area.

3.2.3 Analysis

Analysis is detailed examination of the elements or structure of something. The data collected are collected, processed and analyzed to enable the next steps to be taken and the determination of the research done as required in the objective.

3.2.4 Design

Design is a plan or drawing produced to show the look and function or workings of a building, garment, or other object before it is made. Before we implemented this project at the workshop, we have rendered this project roughly before draw the full picture. We also take into account the stability, stiffness and neatness of this project in order to attract others if it is marketed. In fact, this design is intended to be prior to execution, it can be described before the project is implemented and even this design will provide more detailed information to produce a more effective product. Design planning is very important because from this process also makes the project appear more obvious in terms of materials to be used as well and also the manufacturing costs.

3.2.5 Implementation

Implementation is the process of putting a decision or plan into effect. When the project is completed, stiffness and stability should be tested to ensure that existing roadblocks can accommodate the weight of our project that will install on the existing barrier. After that, project should be planned to test on every scope studied to test its effectiveness. The scopes we surveyed include quarries, workshops, construction sites and factories.

3.2.6 System

Once the project is completed, it will be tested for its effectiveness and if it achieves the objectives that have been written, then it will be used on a rolling basis in areas with the stated problems.

3.3 DATA COLLECTION METHODS

According to Abdul Rashid Moten (Moten, 1988), no matter what method In use, an investigator is required to adhere to and follow the procedures so that the data obtained in such a way can help produce a valid, relevant and valued study according to the nature of the field the study. Neat design in the process of collecting data can also be helping researchers to manage time and research costs well.

According to Idris Awang (Awang, 2001), basically there are four methods of data collection often used in research2 namely interviews, questionnaires, observations and interviews experimental. However, experimental methods are rarely used in social research except in the field of education where a method.
Newly formed lessons will be experimented in the classroom to find out its effectiveness and weakness.

To carry out this study, data collection methods have been practiced to obtain the data that are essential for the analysis stage. Among the methods of data collection is the questionnaire. This is because using the questionnaire method is much younger as the form and the study can be disseminated among polytechnic students. Data collection can be classified into two types, primary data and secondary data.

3.3.1 PRIMARY DATA

Primary data is data derived from natural resources collected for answer the question. These data are collected by researchers through experimental processes or field surveys such as questionnaires, observations, interviews and so on. Perimeter data refers to a data source that is not available in a file or report. In the area of science research social, these data can be collected from individuals, focus groups or through expert panels.
Primary data collection can be done passively and actively.
The data collection process was carried out through the distribution of questionnaires to respondents. Methods of questionnaire distribution use the internet where respondents need to fill in the form provided on the internet

3.3.2 SECONDARY DATA

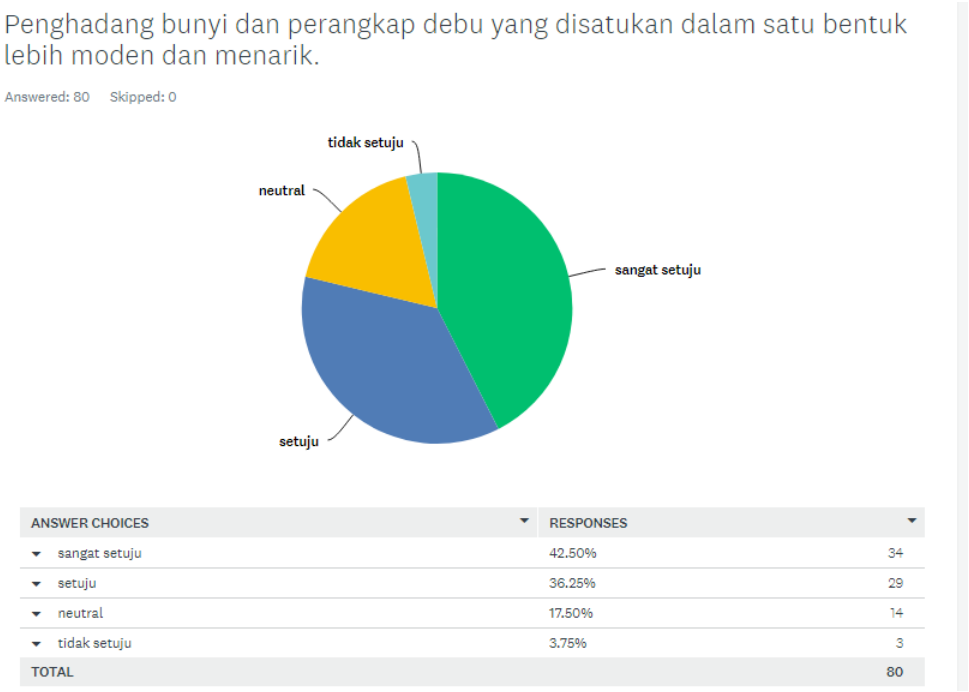
Secondary data can be referred to as data that has been collected by other researchers. For example, past or past data is collected for research purposes. The data is still appropriate and relevant to be used to answer questions of research or developed to new information or formulations for current studies.

Secondary data comprises literature studies and other sources such as thesis, books related to study field, local newspapers, journals and other publications related to research conducted. These materials are analyzed accordingly and become the basis of reference to this study.

3.4 STUDIES INSTRUMENTS

In this research instrument, the questionnaire was chosen. Respondents' selection consists of residents of Shah Alam Polytechnic. Questionnaire used consists of Likert type 4 scale (1 = strongly agree to 4 = disagree). The questionnaires form will be divided into three (3) main sections namely:

a) Part A: - Respondents Demographics (Gender, Age)
b) Part B: - A general view of the study
c) Part C: - The respondent's perspective on the MULTI-DUST & NOISE GUARDIAN (Based on the objective of the study)



ANSWER CHOICES	RESPONSES	
sangat setuju	42.50%	34
setuju	36.25%	29
neutral	17.50%	14
tidak setuju	3.75%	3
TOTAL		80

Figure 7 shows result of respondents

Figure 3.4.1

Figure 3.4.1 above shows the responses taken by using questionnaires using the internet and the respondents with whom the respondents are polytechnic students of Shah Alam.

3.4.1 PRODUCT MANUFACTURING

Here are ways to generate MULTI-NOISE AND DUST GUARDIAN:

Diagram 3.4.1 i: Plastic safety road barrier

Diagram 3.4.1 i) shows the first step in producing MULTI-NOISE AND DUST GUARDIAN. Prepare plastic safety road barrier for measuring the thickness of the barrier. The barrier thickness is to make the first part of holders so as to fit the sound panel frame. Its thickness is 13cm after we measure it.

Figure 3.4.1 ii: Cut iron for holders

After the barrier and measured, the aluminum iron is cut using grinder on top by 5cm to insert the sound panel with a thickness of 5cm such as **Figure 3.4.1 ii** prototype panel sound that has been inserted into the holder. Our sound panel prototype is red and green.

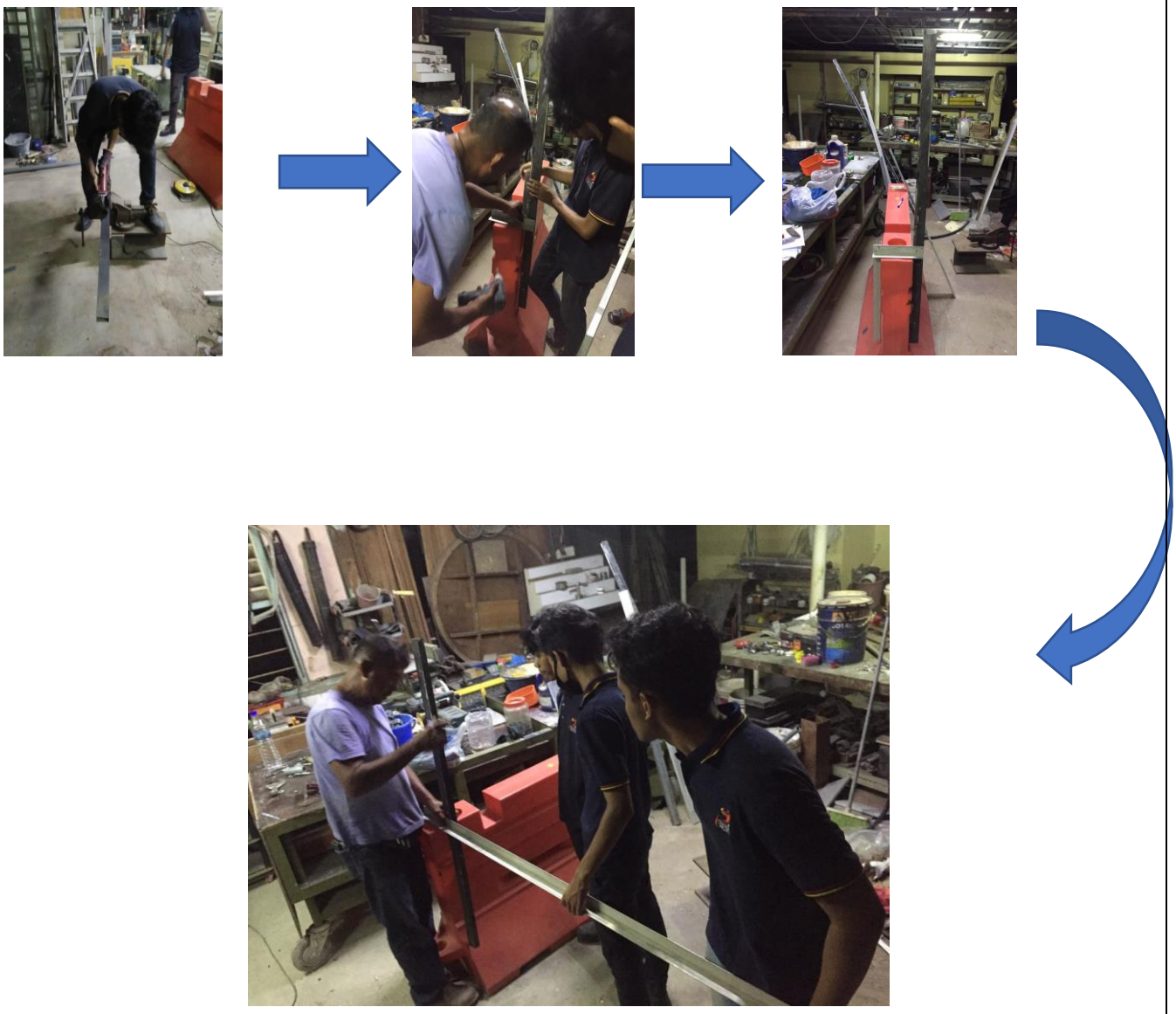


Figure 3.4.1 iii: Cut iron, drill and plug on to barrier

Aluminum iron is cut according to size using an iron cutting tool grinder machine. The iron will be cut and plugged into or attached to the barrier such as **Figure 3.4.1 iii**. After that, the iron has been cut will be connected or paired at the barrier using the BOSCH branded drill machine.

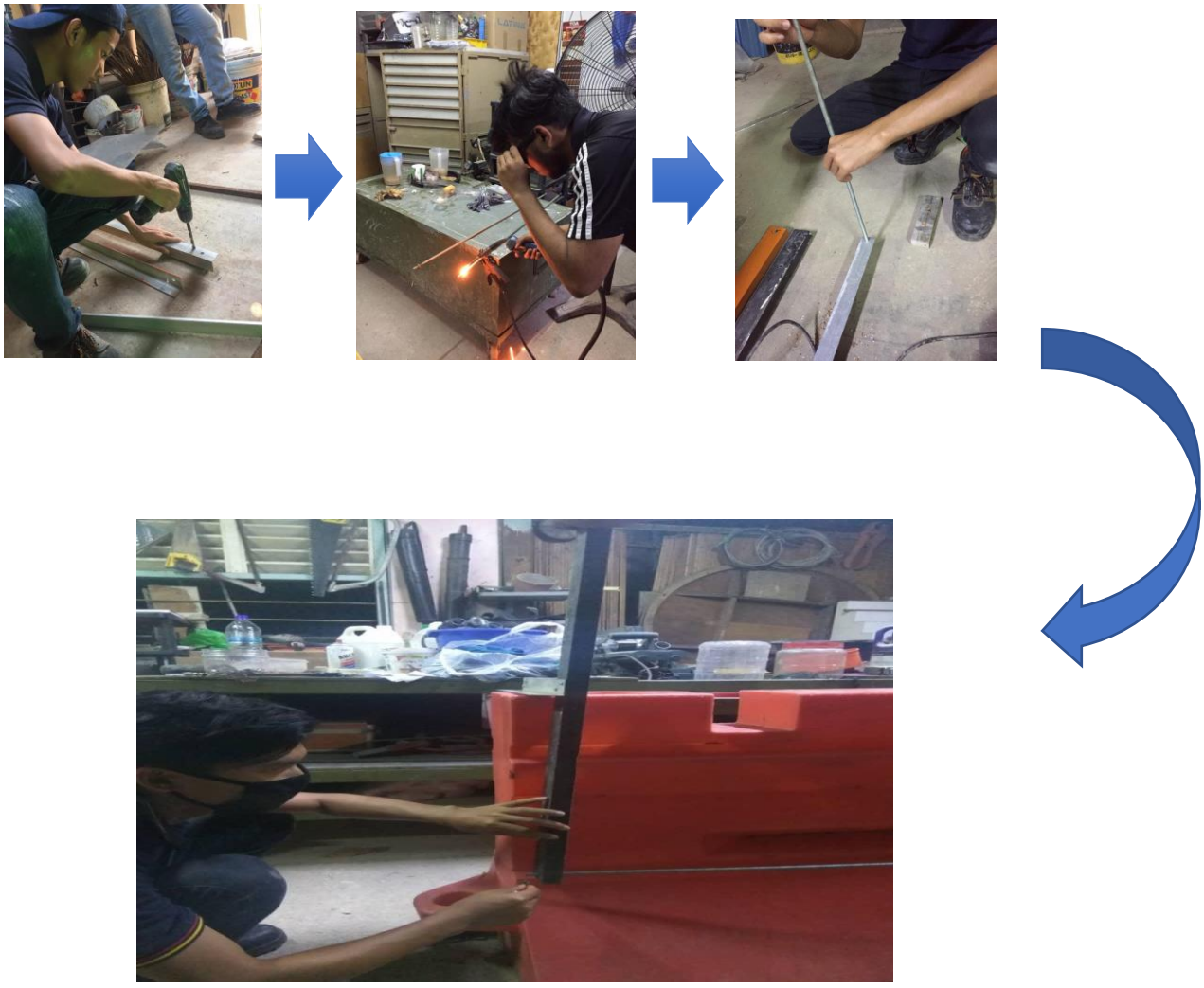


Figure 3.4.1 iv: punching holes and iron welding

Take the cut iron aluminum and cut the hole. The hole is to place the iron bar to support the noise panel from falling down as shown in **Figure 3.4.1 iv**. Afterwards, the iron bars to accommodate the panel's noise will be welded at the tip of the screw to turn it off or so its size does not run as shown in **Figure 3.4.1 iv.**

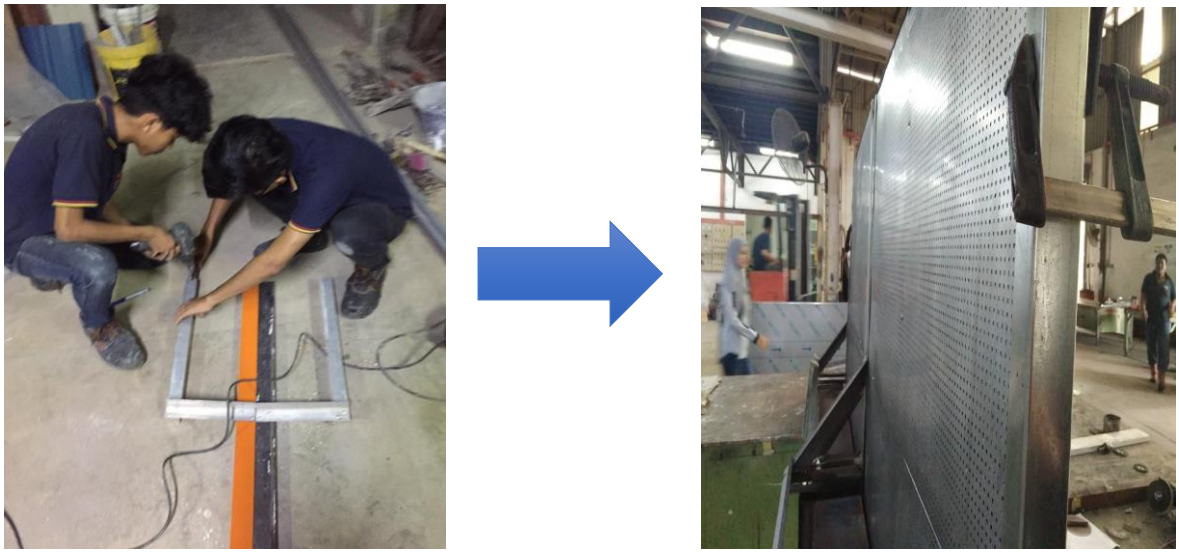


Figure 3.4.1 v : Cut the iron, measure, puncture and drill

Make another 1 of the panel noise frame for the other side at the barrier like **figure 3.4.1 v**. Repeat all the steps that have been made for another side of frame of panel noise.

Figure 3.4.1 vi: Cut the wood, drill the hole and painting the panel frame.

Take the wood and cut it in size as measured by a measuring tape. The wood is cut using saws and cutting tools that is machine grinder such as figure 3.4.1 vi. After that the wood will be attached to a frame to make a dust barrier and netting. For the panel frame, we decided to paint it to yellow due to good combination with barrier's colour.

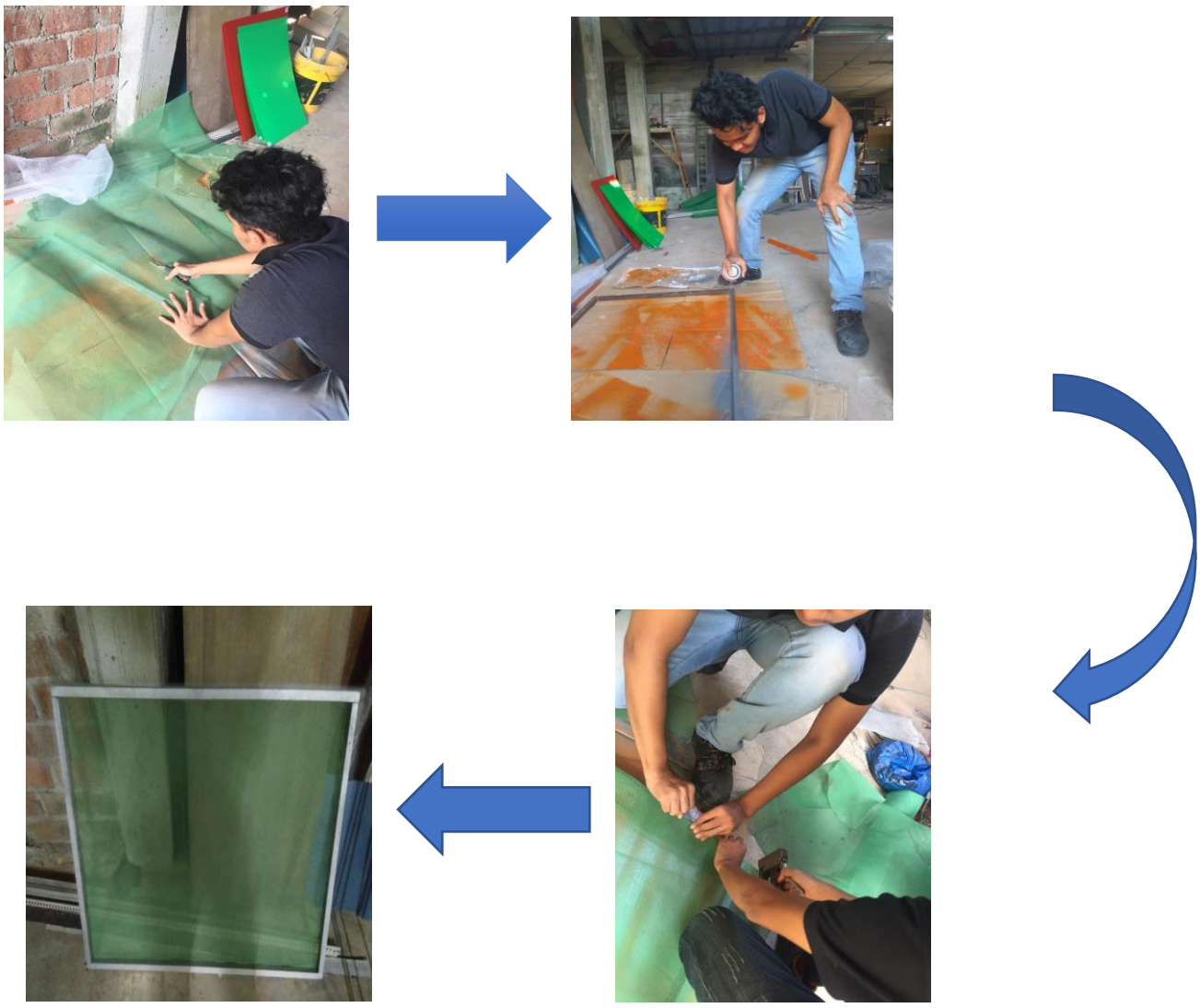


Figure 3.4.1 vii : cut the net, stapler the net and spray the frame

For the dust barrier, first we take the dust net and cut it according to size that has been measured. Then we take the frame for the dust net and spray it using spray color, we are using silver color for the frame of dust net. After that we stapler the dust net onto the frame that we have make it before this step using the stapler gun as **figure 3.4.1 vii**.

Figure 3.4.1 viii: Barrier is completed and done

Combine noise panel and dust frame barrier at barrier using screw and nut screw. Then, the project is done and completed as **figure 3.4.1 viii**.

3.5 SAMPLING TECHNIQUE

According to Mohd Sheffie Abu Bakar (Bakar, 1991), sampling is a process at which a small population of the entire population is selected and reviewed to enable us to make generalizations about the population.

The sampling definition is the process of selecting elements in the population for the purpose of representing the population of a study. The selected sample has at least the same nature as the population in the investigation. A good and perfect design process can help make generalization through hypothesis testing.

The purpose of this sampling is to reduce the cost of the study, save time and energy and get the maximum accuracy and expectation that will occur in research.

After collecting data through questionnaires and sampling done, data analysis was created using (GRAPHPAD). The software will analyse 80 questionnaires containing 8 questions related to the study. Data analysers can be divided into two parts: forming analytical and quantitative analysis models.

3.5.1 Analysis Model

In doing this analysis model, mathematical model is used. It aims to facilitate data analysts. The applied mathematical model refers to a predictive model. Given the effectiveness and relevance of the model, the technique of recreation is used. It was able to control the variability of variability with other variables of variability that were also tested in analysts.

The findings of this study will be presented using a pie chart, bar graph and table. Selection of the method is done because the assessment is easy to do and the results obtained are easy to understand.

3.5.2 Quantitative Analysis

For quantitative analysis, the data collected must have a uniform distribution. It is aimed not to have extreme values that would cause the bias and inaccuracies in the analysis. To carry out this analysis, the SPSS (Statistical Package for Social Science) / (GRAPHPAD) package is used.

3.6 DATA ANALYSIS METHOD

This chapter reports on the results of tests and tests the responses provided by the respondents to the questionnaire run. In this chapter, researchers also present the findings. Things that contained in this chapter is the subject and place of study, the instrument of study, the way analysing data and analysing findings. This chapter will describe the findings of the results of the collection of primary data on respondents' samples. The questionnaire on the online survey comprises studies related to the project that we run.

The primary data were collected using the survey method. The instrument is used is a questionnaire distributed through online to students several Departments in Shah Alam Polytechnic. Questionnaire contains two main functions namely the first, to collect information of respondents' demographic information such as gender, age, income and so forth and secondly, to obtain information in the form the measurement of the variable either individual or group.

3.6.1 COLLECTION METHODOLOGY AND DATA ANALYSIS

In the context of this study, questions for questionnaires were developed for measuring the level of acceptance of Shah Alam Polytechnic students on existing barriers and dust nets. Questions are also being made to look at the perceptions and assessments of the students about existing noise barriers and dust net is more efficient or not.

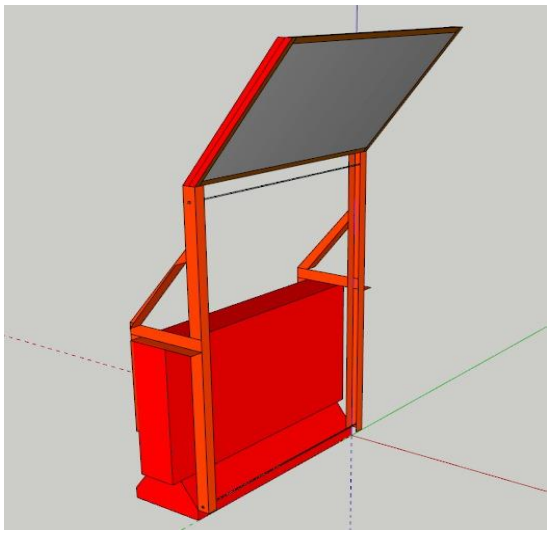
To facilitate the measurement, Likert Scale is used for viewing attitude tendency, perception and respondent's assessment of a statement. Respondents were asked whether they were, disagree, neutral, agreed or strongly agree with a given statement. To see ratings respondents to something, such as weak, weak, simple, good scale and very well used.

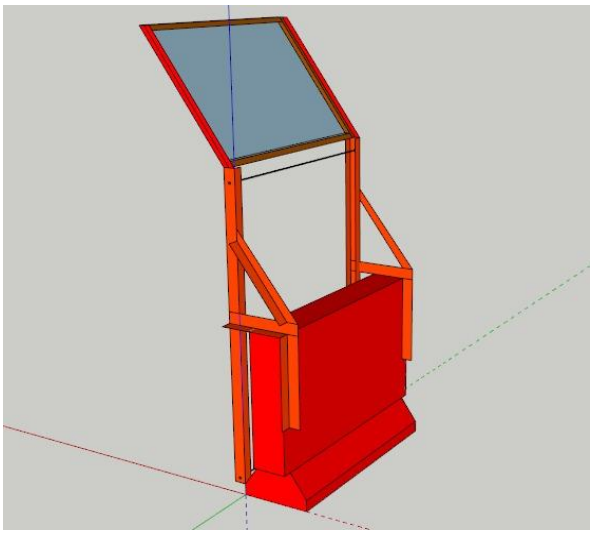
3.7 SUMMARY

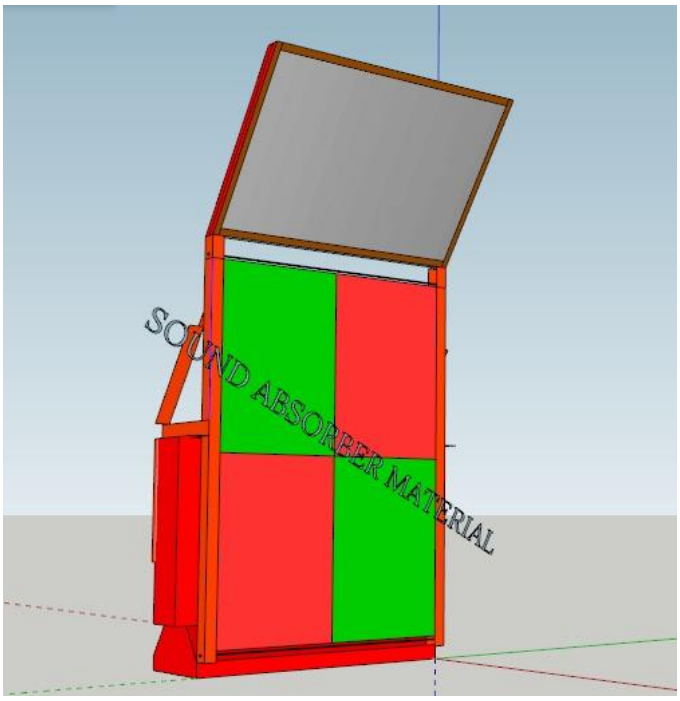
Surely a good study, is a result of the method and good rules. By using some of the methods specified, researchers hope this study can be in accordance with its own unique standards and qualities. The methodology of this study also aims to facilitate researchers to obtain data and information from research respondents. It's like that a guide to the researcher in producing this study. In the researcher, we get this information as well, researchers agree with the ethics of research that researchers should observe.

After analysing the data, it is important to make conclusions or conclusions on the results and hypotheses ie whether the trap is effective or not. A researcher must provided a comprehensive explanation of the purpose of the investigation, especially when the researcher has no full authority over the subject and respondent. All of these ethics are to ensure the quality and quality of the research generated.In the initial stages, the design of the study, data collection methods, research instruments, data sampling techniques and data analysis methods were systematically made in the methodology study to find out the facts and information to support the research instrument and illustrate more clearly in this study.

3.8 SKETCHUP







CHAPTER 4
RESULTS

INTRODUCTION

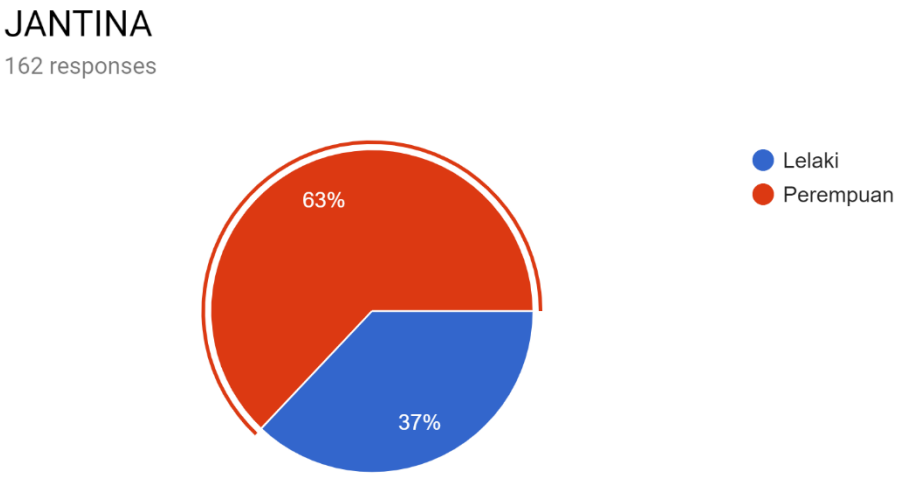
Once all the data and information has been obtained, the analysis is performed to see the effectiveness of sound absorption panels and dust nets across the scope.

The results obtained in this chapter are the results obtained from the questionnaire and experiments conducted in the study area. The results of the experiments in the study area are analysed in more detail to draw conclusions based on the stated objectives of the study.

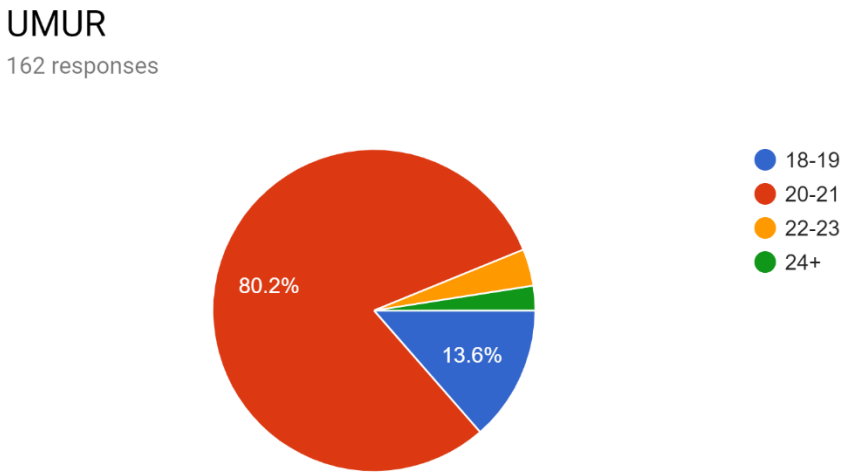
The study was conducted using 163 respondents from PSA and external communities. There are several aspects that are the main focus:

1) Respondent Demographics (gender and age)
2) General view of the study
3) Response Perspective on *Multi Dust & Noise Guardian (NAD G)*:-
    i. Shapes
    ii. Functions
    iii. Material used
    iv. Advantages

RESPONDENT DEMOGRAPHICS

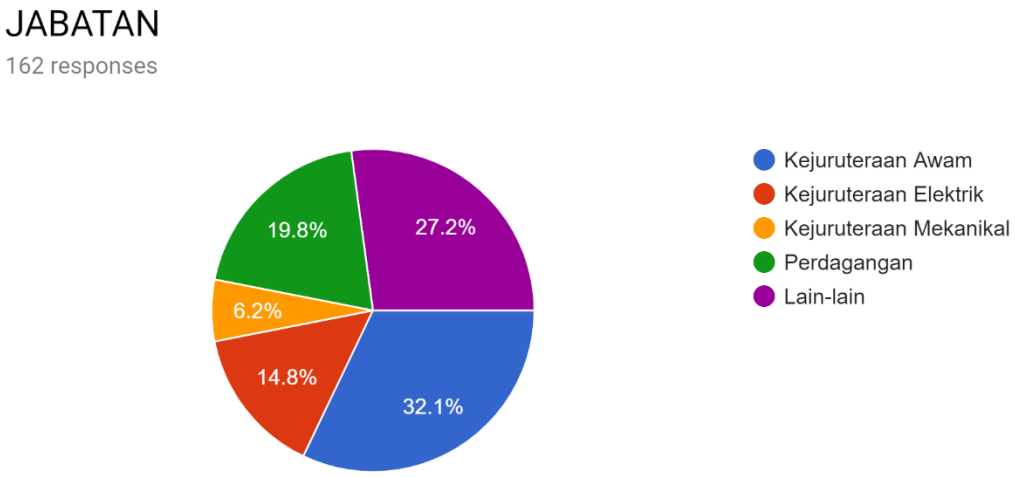


Rajah 4.2 i shows the number of PSAs & external communities responding to the study. A total of 37% of respondents were male while 63% of respondents were female. The high number of female respondents due to the distribution of this questionnaire was more open to women than men.



Rajah 4.2 ii : Age of respondent

Further, the results of the survey found that 130 respondents of 80.2% of the 20-21 years old age group responded to this questionnaire. As a result, they consist of final year students 4 and 5. In addition, 22 respondents were 13.6% aged 18-19. Most of them consist of first year students 1, 2 and 3. In addition, 6 respondents were from 22-23 years of 3.7%. Meanwhile, 4 respondents of 2.5% consisted of 24 or above. Of these, it comprises PSA residents & external communities.



Rajah 4.2 iii: Department of respondent

Further, the results of the survey found that 52 respondents were 32.1% more respondents to this questionnaire and the respondents were from the civil engineering department. In addition, 44 respondents, of whom 27.2% were foreigners, chose the alternative. In addition, 32 respondents were 19.8% from the trade department. A total of 24.8% of the respondents were 14.8% from the electrical engineering department. And for the mechanical department, there were 10 respondents, of which 6.2% were from the mechanical department. Of these, it comprises PSA residents & external communities.

Results

4.2.1 Site Study Data

The data obtained during the product testing activities will be evaluated from 4 different locations namely in factories, workshops, construction sites and roads. The data will be presented in graph form to make it easier to understand. Each place has a different reading. Used tools such as dB meters and tripods.

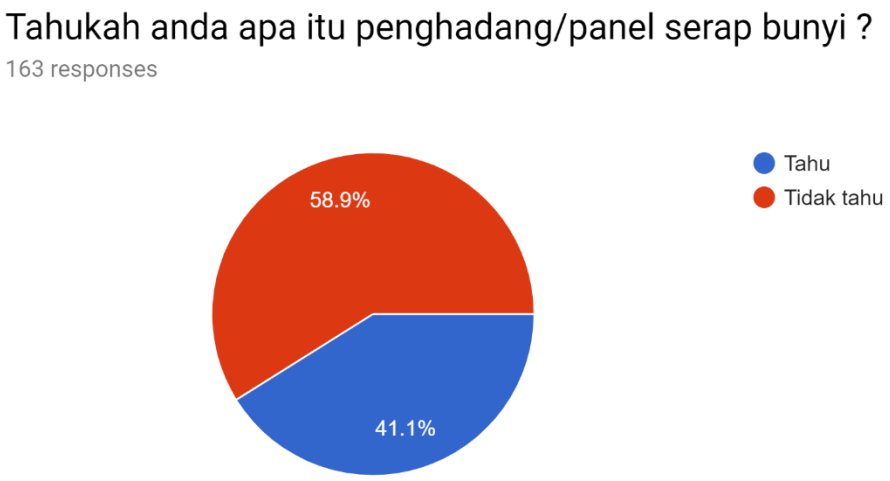
4.2.2 Analysis of Study Data

The process of analyzing the research data will be shown in the form of graphs, tables and charts. This panel and dust net analysis is based on the noise and dust generated in each tested area. The results of the data analysis results will be presented in the form of graphs and tables. In the observation method, 4 scopes are suitable for project testing because the emitted noise and dust are different from those of other places.

4.2.3 Survey Questionnaire

To further strengthen this research, the questionnaire was conducted by involving PSA students and the external community. The data obtained will be made in the form of a bar graph to facilitate the information being analyzed and analyzed. The following is information related to the survey conducted.

General view of the study

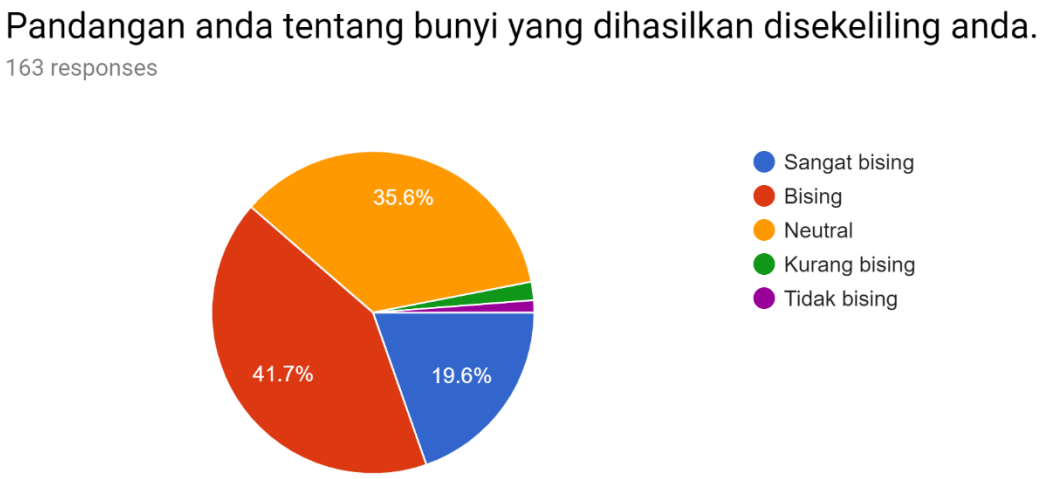


4.2.2.1 i: General view of panel & net research.

Figure 6.3.2.1 i shows the number of PSAs & external communities providing a general overview of the study ie. This statement is to obtain respondents' response to the project study data. Based on the diagram above, 96 respondents of 58.9% did not know about sound absorption panels and dust jarring. The figure shows that the number of respondents did not exceed the number of respondents who know this because the questionnaire was mostly filled by PSA residents and not the outside community or more precisely the workers associated with this study. Meanwhile, 67 respondents (41.1%) knew about the Multi Noise & dust Guardian (NAD G) project.

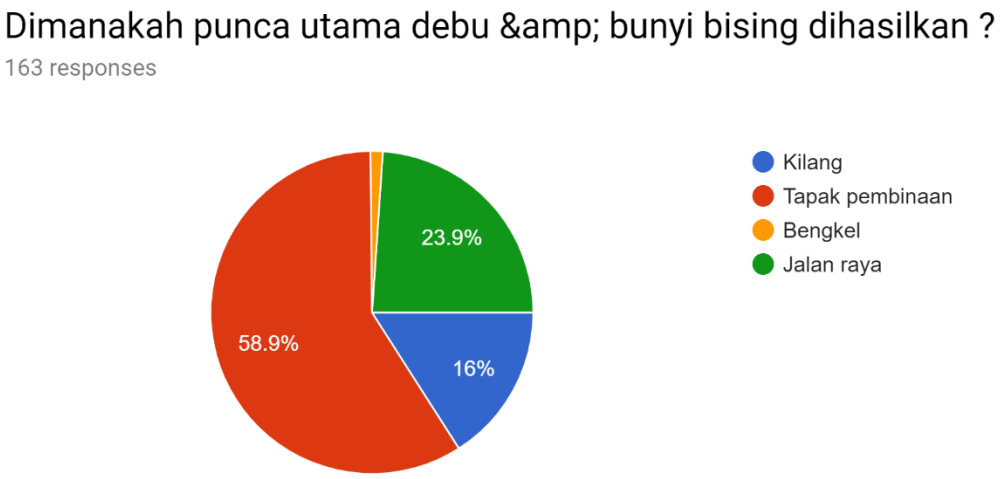
4.2.2.1 ii: Respondent data on dust trap knowledge

Figure 4.3.2.1 ii shows data collection from PSA residents & external communities. A total of 69 respondents of which 42.6% were unaware of the dust trap. Meanwhile, a total of 93 respondents, of whom 57.4% knew about the dust net. At first this statement was a bit confusing, but the questionnaire was also attached to the project picture. Thus, respondents are easier to understand this project. In conclusion, respondents know more about dust nets than sound absorption panels.



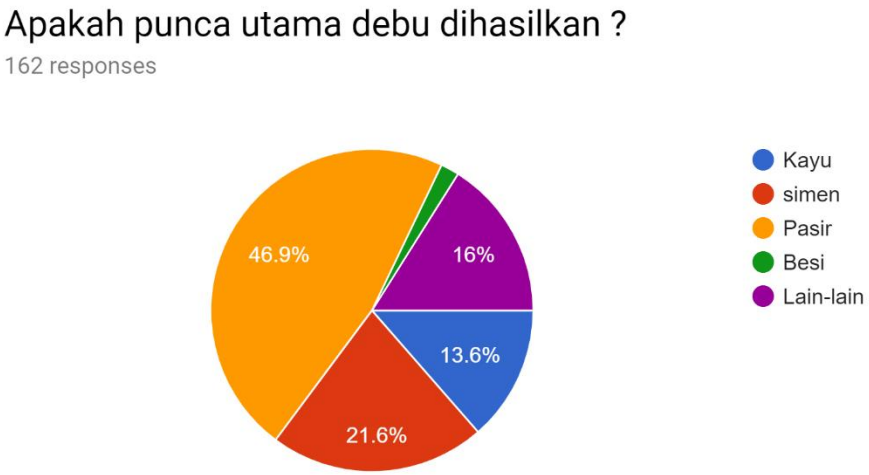
4.2.2.1 iii: Respondents' views of the noise produced around them.

Figure 4.3.2.1 iii reflects the respondents' perception of the noise produced around them. 68 respondents of 41.7% said their surroundings were noisy. In addition, 58 respondents, 35.6% said they were neutral. In addition, 32 respondents, 19.6% said their surroundings were very noisy. Usually, these areas and areas are very close to roads, construction sites and industrial plants. Meanwhile, 3 respondents of 1.8% said they were noisy. And finally, 1 respondent of 1.2% said her area was noisy. Usually, the noisy place is in the village or away from the industry.



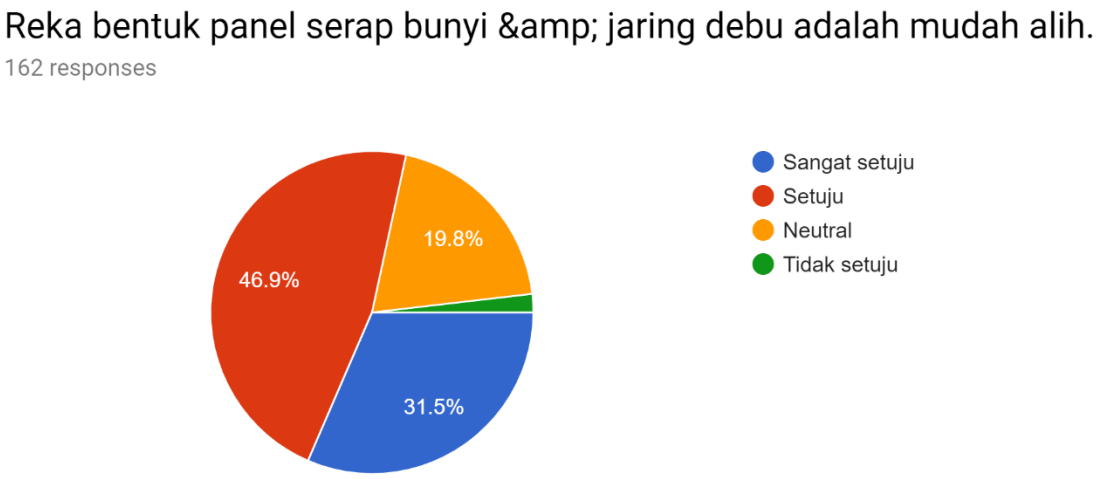
4.2.2.1 iv: The main sources of dust & noise are generated.

Figure 4.3.2.1 iv showing the respondent's views on the major causes of dust and noise. Based on the diagram above, 96 respondents, 58.9% chose the construction site as the main source of noise and dust. In addition, 39 respondents, 23.9% chose the road as the main source of dust and noise. In addition, 26 respondents of which 16% chose the factory as their main source. And lastly, 2 respondents of whom 1.2% chose the workshop as the main cause. This is because workshops usually operate when processing takes place while the construction site runs from 8.00 a.m. to 6.00 p.m.



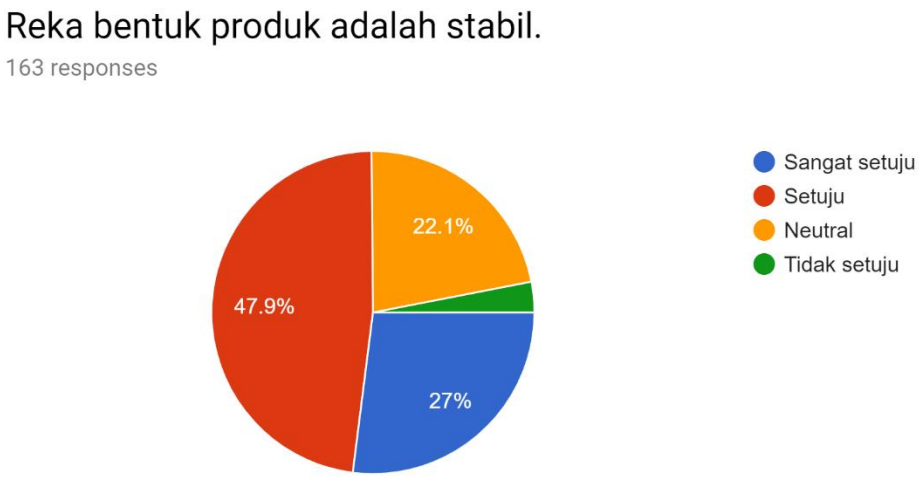
4.2.2.1 v: Respondents' views on the main causes of dust were generated.

Figure 4.3.2.1 v shows data on the views of PSAs and the general public on the sources of dust. According to the chart shown, 76 respondents of 46.9% chose sand as the main source of dust. Further, 35 respondents of 21.6% chose cement as the main source of dust. Most of them live in industrial areas. In addition, 26 respondents of which 16% said other options as sources of dust were produced. It is highly likely that chemicals and organic matter will be the source of the dust. Meanwhile, 22 respondents (13.6%) chose wood as the source of dust. Finally, iron choice was the lowest of the 3 respondents with 1.9%.



4.2.2.1 vi: Respondents' views on the design of the panel and dust net.

Figure 4.3.2.1 shows respondent's views on panel design and whether jarring is mobile or not. The chart above shows 76 respondents with 46.9% choosing the option to agree that the product design is mobile. Furthermore, a total of 51 respondents, 31.5%, strongly agree that the design of this panel is mobile. Meanwhile, a total of 32 respondents, 19.8% chose neutral options on this product design. This proves that they are not sure if this product is mobile or not. Most likely they will not be able to see a clear picture of this product. Finally, 3 respondents of 1.9% chose to disagree that this product is mobile. The answer to this disagreement is entirely from the PSA's point of view. Products are created 100% mobile because every part of the product is removable.

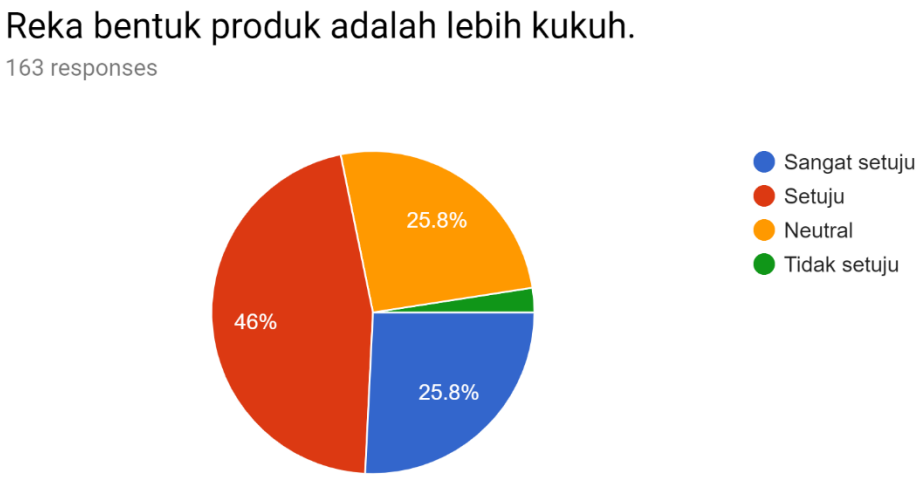


4.2.2.1 vii: Respondent's views about stability of the product.

Figure 4.3.2.1 vii shows respondent's views on product stability. A total of 78 respondents, of whom 47.9% chose the "agree" option, were product stable. Furthermore, 44 respondents of which 27% chose the "strongly agree" option that the product was stable. Meanwhile, 36 respondents chose the "neutral" option, with 22.1% saying that the panel was stable. Obviously, they are not sure about the barrier used in the market. Generally, the barrier is stable as it has a base area of 450 mm and the panel above it does not exceed 20 kg. Finally, 5 respondents of 3.1% chose to disagree that the product was stable. This proves that they are uncertain about product stability. The barriers on the market are stable as they have a relatively large area of 450 mm.

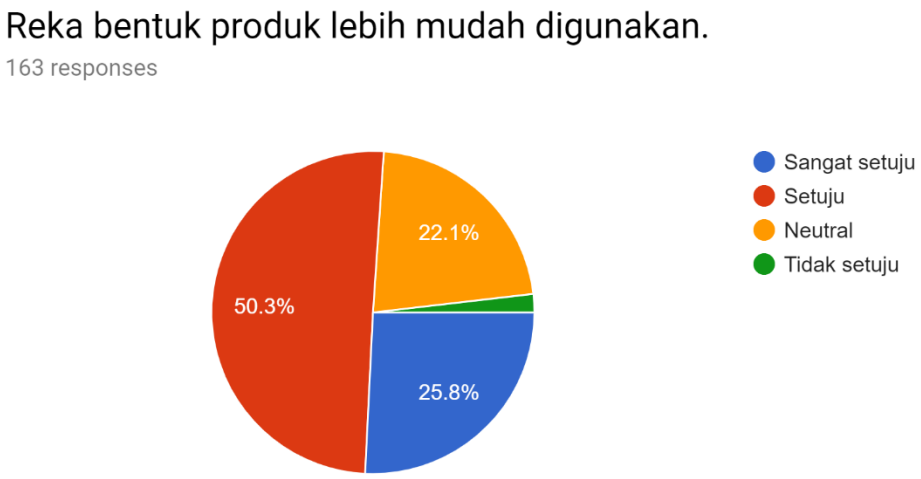
4.2.2.1 viii: Respondent's views about product safety.

Figure 4.3.2.1 viii shows respondent's views on safer product design. The chart above shows that 78 respondents, of whom 48.1% had the option of agreeing that the product was safe and did not pose any danger to employees or consumers. In addition, 47 respondents of which 29% chose the option strongly agree that the product is safe. Furthermore, 4 respondents of 2.5% disagreed that the product was safe. Finally, a total of 33 respondents chose a neutral choice of product safety of 20.4%. With the existing stability, it is ensured that the bottom panel will not collapse & fall.



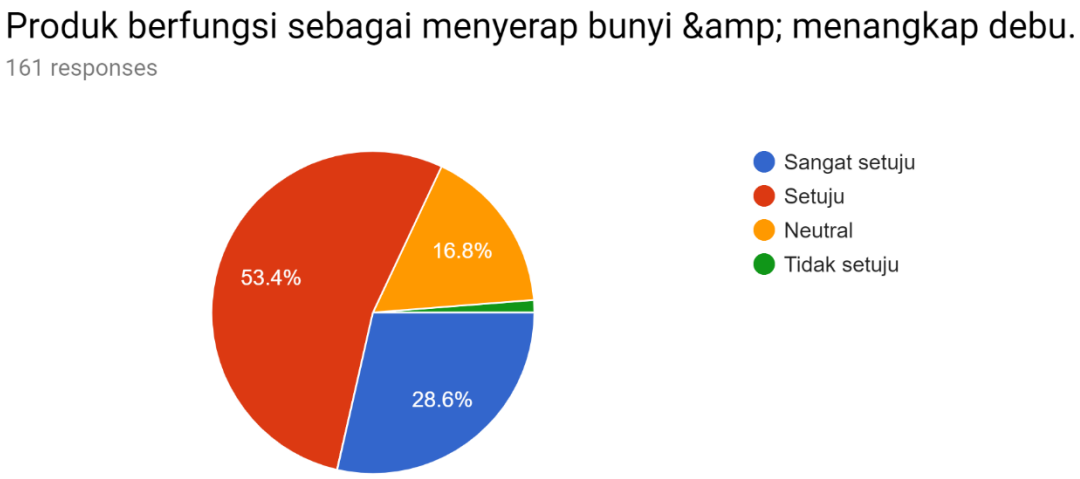
4.2.2.1 xi: Respondent's views about how strong product is

Figure 4.3.2.1 xi shows respondent's general view of the extent to which this product is strong. First, 75 respondents of which 46% agreed that the design of this product is solid. In addition, 42 respondents of 25.8 strongly agree that this product is strong. Meanwhile, a total of 42 respondents, of which 25.8 chose neutral options on panel strength. However, 4 respondents of 2.5% chose to disagree that this product is strong. To the best of our knowledge, this product is made of iron, aluminum and galvanized which is strong and durable in poor weather.



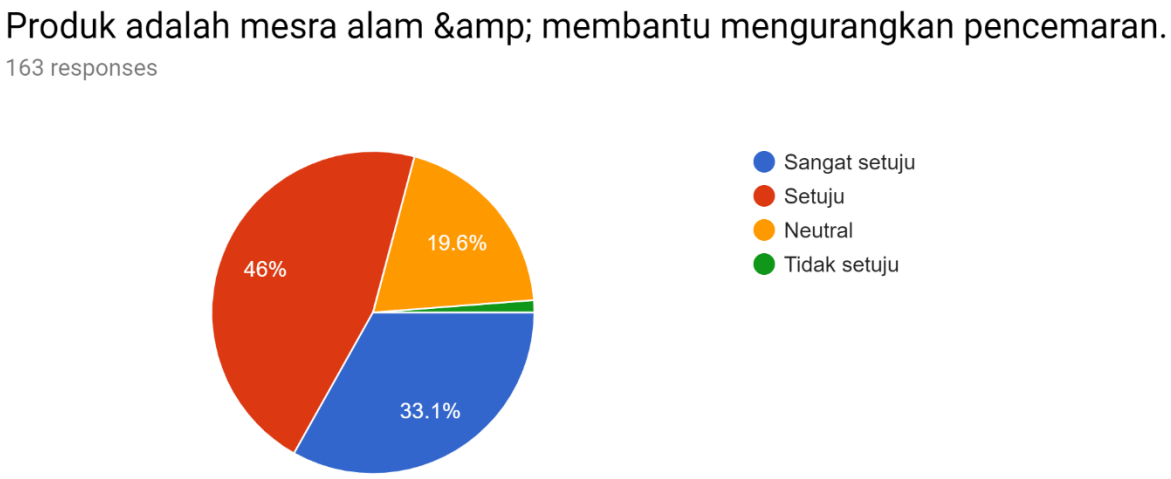
4.2.2.1 xii: Respondent's views about how product is easy to use.

Figure 4.3.2.1 xii above shows the views of PSA and external communities on products that are easy to use. A total of 82 respondents, of which 50.3% said they agree that product design is easy to use. In addition, 42 respondents of 25.8% strongly agree with the above statement. Meanwhile, 36 respondents were neutral in their views on how easy the product was to use. Finally, 3 respondents of 1.8% disagreed that the product design was not easy to use. At the end of the project, the product proved to be easy to use as the whole product did not use electricity. This product is also removable for easier cleaning and installation work when you want to use it. There is no button to turn on, but it works just like the existing sound absorber panels on the market that do not use any electricity.



4.2.2.1 xiii: Respondent's views about function of the product.

Figure 4.3.2.1 xiii above shows the respondent's view of the product's function in absorbing / blocking noise and capturing dust. 86 respondents of which 53.4% agreed with this product that it can absorb noise and capture dust. In turn, 46 respondents of 28.6% strongly agreed that this product works as a sound absorber and captures dust. In addition, a total of 278 respondents, of which 16.8% were neutral about the function of this panel and dust net. Finally, as many as 1.2% disagree about this product as a sound absorbing panel and a net to capture dust. To our knowledge, this sound absorption panel is designed to absorb dust no matter how much dB is set. Dust nets are also a net that can hold and capture dust no matter how many microns of dust it can get. However, the purpose and function is that way. Respondents who make informed choices do not know the basics of this product.

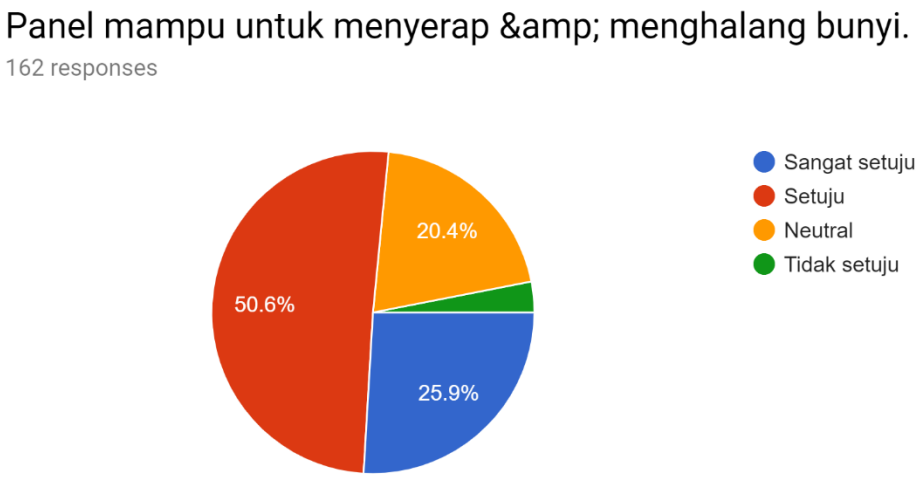


4.2.2.1 xiv: Respondent's views about product can reduce a pollution.

Figure 4.3.2.1 xiv shows how respondent's views on products can reduce pollution. A total of 75 respondents of which 46% agreed that this product could reduce their environmental pollution in terms of noise and dust in particular. In addition, 54 respondents of 33.1% strongly agree that this product can reduce noise and air pollution. Meanwhile, 32 respondents, of which 19.6% chose neutral. Finally, 2 respondents of 1.2% disagreed that the product would reduce pollution. In general, this product can only reduce the noise behind the panel as it absorbs and prevents 35dB of noise. Similarly, the net where it catches only the dust that passes through it.

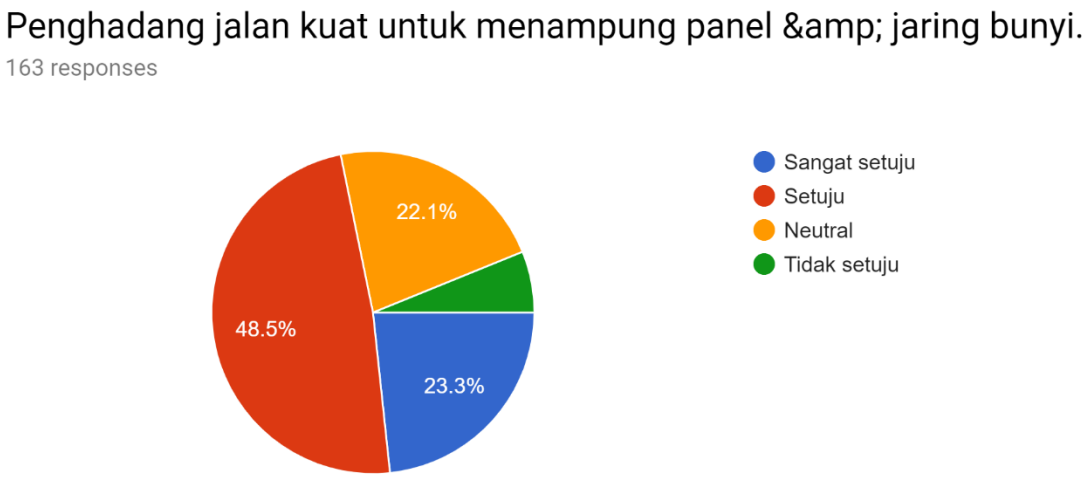
4.2.2.1 xv: Respondent's views how effective the dust net can hold the dust.

Figure 4.3.2.1 xv shows the respondent's view of how effective the net can cope with the dust. Based on the chart above, this shows that 83 respondents of which 50.9% agreed that the net is effective for dust collection. In addition, 44 respondents of which 27% strongly agreed that the net can handle dust. Meanwhile, 32 respondents, 19.6% chose neutral because they were unsure of how effective the net can be in catching and catching dust. Finally, 4 respondents of 2.5% disagreed that the net was effective in dusting. In fact, after the study was conducted, the dust could still pass through the net as the 2.5micron dust could still release it. So, the alternative to this product is to use a sponge and net too. Indirectly, the sponge not only absorbs dust, it acts as a sound absorber.



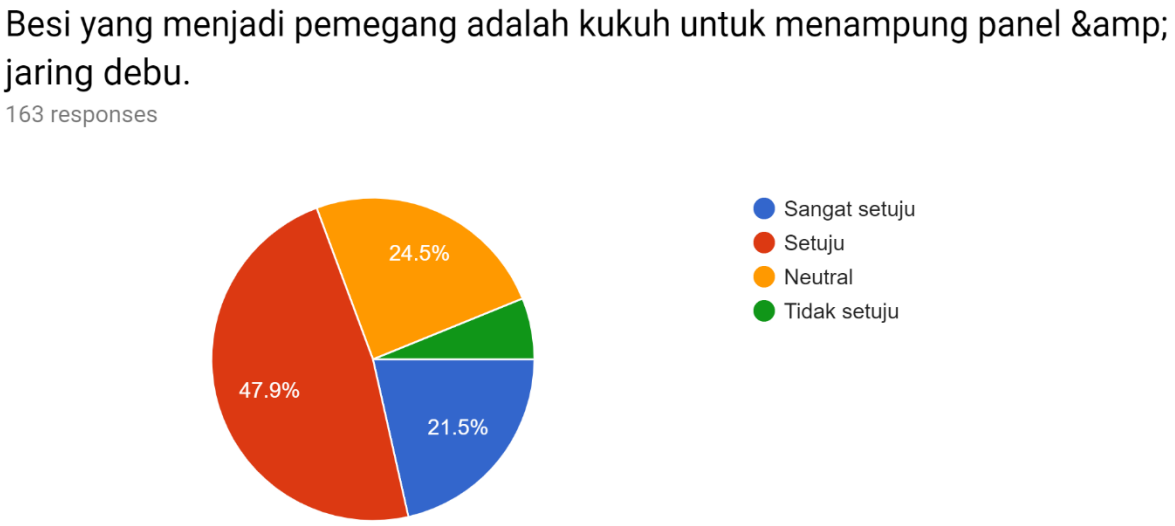
4.2.2.1 xvi: Respondent's views about how effective sound panel can absorb and block noise

The diagram above shows how the sound panel can absorb and block the sound. Based on the chart above, a total of 82 respondents of which 50.6% agreed that this panel could prevent noise. In addition, 42 respondents of 25.9% strongly agreed that this sound absorption panel can block and absorb sound. Meanwhile, 33 respondents were 20.4% neutral on the above statement. Finally, 5 respondents of 3.1% disagreed that the panel could absorb and prevent noise. Clearly, this panel uses materials such as galvanic and sponge that can prevent and absorb 35 dB of sound and are effective. Thus, respondents who make informed choices may not be aware of each function of the material used in this product.



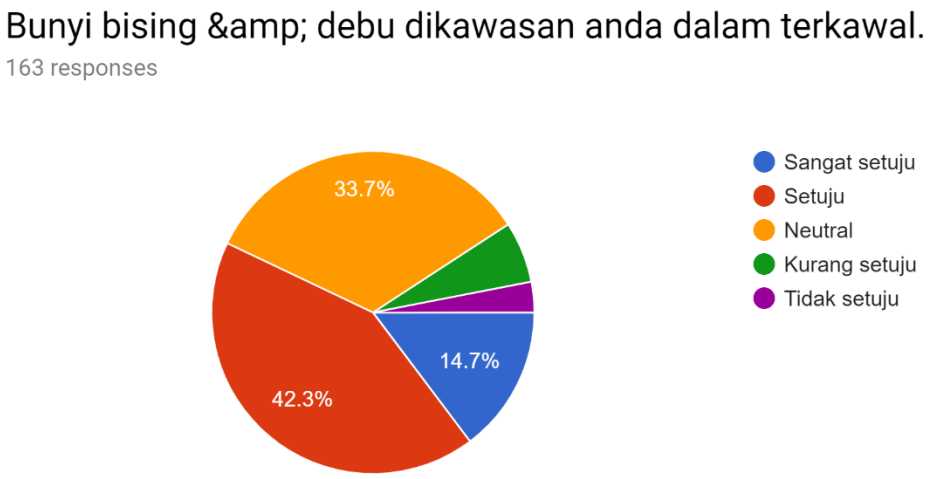
4.2.2.1 xvii: Respondent's views about how strong road barrier can hold the panel and dust net.

Figure 4.3.2.1 xvii above shows the respondent's view of the product in terms of its strength in accommodating panels and sound nets. Based on the pie chart above, 79 respondents of which 48.5% agreed that roadblocks could accommodate panels and dust nets. In addition, 38 respondents (23.3%) strongly agreed with the statement. Meanwhile, 36 respondents of which 22.1% were neutral on the roadblock. Finally, 10 respondents of 6.1% disagree that roadblocks can accommodate panels and nets. After doing research, roadblocks are of two types: concrete and plastic. The nature of the roadblock is also waterproof and cold resistant. It can also support the weight of the panel as the experiments on it have been carried out. No damage was detected after the panel was placed on the roadblock.



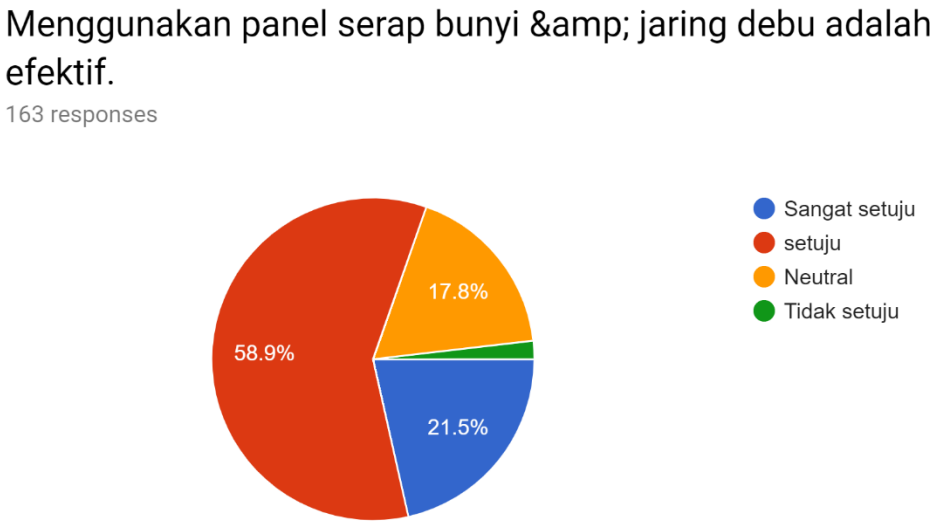
4.2.2.1 xviii: Respondent's views about material used for the product.

Figure 4.3.2.1 xviii shows the respondent's views of the iron holding pan and the net. A total of 78 respondents of which 47.9% agreed that the steel used was strong and strong enough to support the panel and dust net. In addition, 35 respondents, 40 respondents of which 24.5% chose neutral. Further, 35 respondents of 21.5% strongly agreed that the iron was strong enough to support the panel and dust mesh. Finally, as many as 10 people disagree that steel can hold panels and dust nets. After investigating the iron used, the iron is an alloy. Alloy iron can improve electrical conductivity, increase heat resistance, provide corrosion resistance and to maintain high strength to weight ratio.



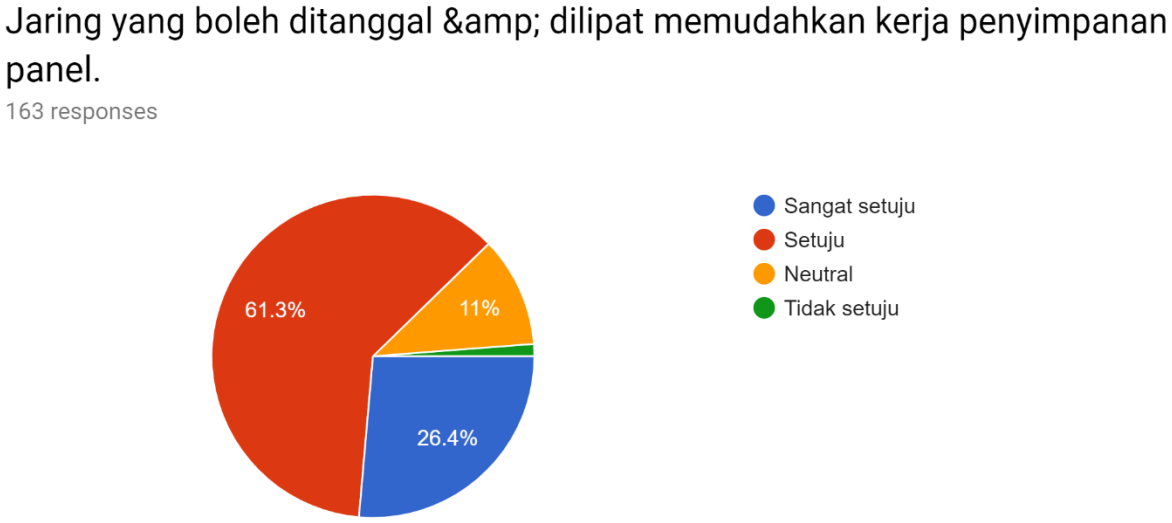
4.2.2.1 xix: Respondent's views about dust & noise release at their places.

Figure 4.3.2.1 xix shows the respondent's views of the noise and dust that lie within them. Of the 69 respondents, 42.3% agreed that the dust and noise in their surroundings was within their control. In addition, 55 respondents of 33.7% were neutral in the dust and noise environment. Meanwhile, 24 respondents of 14.7% strongly agreed that dust and noise are in control. Meanwhile, 10 respondents of 6.1% disagreed about the release of noise and dust in their controlled space. Finally, 5% of 3.1% disagree with the above statement. Based on the research conducted, the respondents disagreed were residents of urban and industrial neighborhoods. While neutral responders usually release noise and dust periodically. And the respondents who made the most informed choices were the rural residents of the urban and industrial areas.



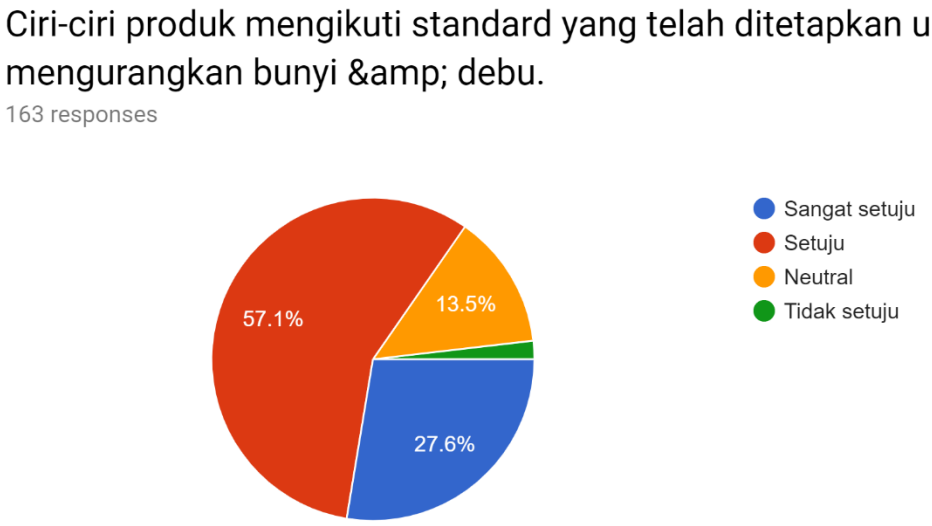
4.2.2.1 xx: Respondent's views about effectiveness by using the product.

Figure 4.3.2.1 xx above shows the respondent's views on the effectiveness of the panel. Based on the chart above, 96 respondents of 58.9% agreed that the panel was effective. In addition, 35 respondents of 21.5% voted strongly agree that this panel is an effective way of absorbing 35% of noise. Subsequently, a total of 29 respondents, 17.8% made a neutral choice on the above statements. Finally, as many as 1.8% disagree that this panel is effective in absorbing and blocking noise. Respondents need to be aware that the function and purpose of this panel is to absorb noise and prevent noise. Obviously, this panel can absorb sound because the material used is standard on the market.



4.2.2.1 xxi: respondent's view about netting that can removed can makes storage work easy to be done.

Figure 4.3.2.1 xxi above shows the respondent's view of the extent to which respondents agree on removable nets to facilitate storage work. Of the 100 respondents, 61.3% agreed that with removable nets, storage work was easy. In addition, 43 respondents of 26.4% strongly agreed with the above statement. Furthermore, a total of 18 respondents, of whom 11% chose neutral in the statement. Finally, 2 respondents of 1.2% disagree on this. What can be concluded here is that the respondents who made the disagreeable choice were dissatisfied with how mobile the product was. They may want to find another way to make the storage work easier.



4.2.2.1 xxii: Characteristic of product is followed the standards.

Figure 4.3.2.1 xxii shows the respondent's agreement on the features of this product according to the standards set. Based on the chart above, a total of 93 respondents, 57.1% agreed that this product meets the standards set. In addition, 45 respondents and 27.6% of the selections strongly agreed that this product meets the standards set. Meanwhile, 22 respondents of 13.5% were neutral on the above statement. Finally, 3 respondents of 1.8% disagree on the above. For respondents who chose the neutral and disagreed options, most of them did not know the actual standard set.

The questionnaire conducted on PSA citizens is to know the general view of the study. From the results obtained, it is known that:

70% agree that the invention of this product can help absorb / prevent and capture dust more effectively.

The design has received positive reviews from PSA residents and the public in terms of resilience, strength, stability and strength.

Improvement products have also been made to rectify deficiencies in projects such as those in the net where dust can still pass through the net by adding a sponge to it.

58.9% of respondents stated that the source of dust and noise was from construction sites.

DATA COLLECTION METHOD

4.3.1 Experiment method

1- Identify the area for ensure the place that can release noise and dust to outside
2- Identify the source of noise and dust.
3- Take a reading of noise at the source of noise.
4- Identify size of dust even Pm2.5 or PM10
5- Take a reading of noise without panel while the operation at scope working.
6- Take a reading of air quality without filtering net.
7- Take a reading of noise behind 500mm of panel then 1m behind panel.
8- Take the reading of air quality behind the filtering net.
9- Repeat step 6 to 8 at every I hour.

4.3.2 Measuring devices

1- **dB meter for measuring sound**
2- **AirQualityMeter Apps for dust .**

Figure 8 shows taking a reading infront panel

Figure 9 shows taking a reading behind panel (500mm)

Figure 10 shows taking air quality reading behind net

4.4. SCOPE TESTING

4.4.2 :Type of scope: i) Wood factory (Kerjakayu.com)

By : Muhammad Adli Mirza Bin Faizal

No matrix : 08DPB17F1206

Date : 24 – 26 July 2019

Place : TTDI Jaya, Shah Alam

Decibel noise readings in the workspace:

92.5 dB

Air quality reading in the workspace:

83 AQI

While using panel (26 JULY 2019)

Masa	Decibel (Db)
9.00 a.m	-
10.00 a.m	87.3 to 52.2 dB
11.00 a.m	89.5 to 54.9 dB
12. 00 p.m	91.7 to 56.7 dB
1.00 p.m	81.6 to 46.2 dB

Masa	Decibel (Db)
2.00 p.m	86.7 to 51 dB
3.00 p.m	80.1 to 45.1 dB
4.00 p.m	89.9 to 54.9 dB
5.00 p.m	87.4 to 52.1 dB
6.00 p.m	78.5 to 43.2 dB

Average: $\frac{52.2+54.9+56.7+46.2+51+45.1+54.9+52.1+43.2}{9}$

= 459.3

While using panel (27 JULY 2019)

Masa	Decibel (Db)
9.00 a.m	-
10.00 a.m	-
11.00 a.m	90.2 to 55 dB
12. 00 p.m	85.7 to 50.9 dB
1.00 p.m	87 to 52.2 dB

Masa	Decibel (Db)
2.00 p.m	87.4 to 52.3 dB
3.00 p.m	79.7 to 47.9 dB
4.00 p.m	92.5 to 58.4 dB
5.00 p.m	89.2 to 55.3 dB
6.00 p.m	85.4 to 51. 8 dB

AVERAGE : $\frac{55+50.9+52.2+52.3+47.9+58.4+55.3+51.8}{8}$

= 423.8

Time	Decibel (Db)
9.00 a.m	75.3 to 41.2 dB
10.00 a.m	85.7 to 51.6 dB
11.00 a.m	89.5 to 58.4 dB
12. 00 p.m	91.7 to 57.7 dB
1.00 p.m	83.4 to 50.6 dB

Time	Decibel (Db)
2.00 p.m	82.6 to 50.3 dB
3.00 p.m	87.9 to 55.5 dB
4.00 p.m	90.1 to 55.2 dB
5.00 p.m	83.9 to 50.9 dB

AVERAGE : $\frac{41.2+51.6+58.4+57.7+50.6+50.3+55.5+55.2+50.9}{9}$

= 474.7

Tools That Make Noise:

a) Grinder

b) Circular Table Saw

c) Miter saw

d) Radial Arm Saw

Sound (Db) Generated by Noise Source:

a) 71.2 - grinder
b) 86.0 - circular table saw
c) 86.7 – miter saw
d) 92.2 – radial arm saw

lain-lain:

-

Dust Source Formed:

a) wood dust

wood dust size:

2.5 microns

PM10 : inhalable particles, with diameters that are generally 10 micrometers and smaller; and

PM2.5 : fine inhalable particles, with diameters that are generally 2.5 micrometers and smaller.

How small is 2.5 micrometers? Think about a single hair from your head. The average human hair is about 70 micrometers in diameter – making it 30 times larger than the largest fine particle.

Time	AIR QUALITY
1ST DAY 9.00 a.m	FONT OF THE NET PM10: 147 PM2.5: 102 AQI: 92 BACK OF THE NET PM10:120 PM2.5:90 AQI1:85
5.00 p.m	FRONT OF THE NET PM10: 110 PM2.5: 81 AQI: 78 BACK OF THE NET PM10:101 PM2.5:75 AQI:71
2nd DAY 9.00 a.m	PM10: 145 PM2.5: 107 AQI: 96
5.00 p.m	PM10: 123 PM2.5:90 AQI: 80
3RD DAY 9.00 p.m	FRONT OF THE NET PM10: 150 PM2.5: 97 AQI: 84

	BACK OF THE NET PM10:142 PM2.5:92 AQI:79
5.00 p.m	FRONT OF THE NET PM10: 125 PM2.5: 91 AQI: 81 BACK OF THE NET: PM10: 118 PM2.5: 89 AQI: 72

AQI	Levels of Health Concern	Colors
0 to 50	Good	Green
51 to 100	Moderate	Yellow
101 to 150	Unhealthy for Sensitive Groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very Unhealthy	Purple
301 to 500	Hazardous	Maroon

Figure 11

IPU SHAH ALAM : <u>63 IPU (SEDERHANA) (15 JULY 2019)</u>

Reference: Air Pollutant Index of Malaysia

<u>Work sounds before operating.</u>

Max : 53.0

Hold: 52.3

Min: 48.0

<u>Work sounds before operating.</u>

Max: 55.0

Hold: 53.6

Min: 53.0

AQI in workspace

PM10: 300

PM2.5: 223

AQI : 173

AQI out of workspace (with wind)

PM10: 224

PM2.5: 156

AQI: 135

AQI out of workspace (no wind)

PM10: 139

PM2.5: 103

AQI: 93

Compressor of airconditioning (other sources)

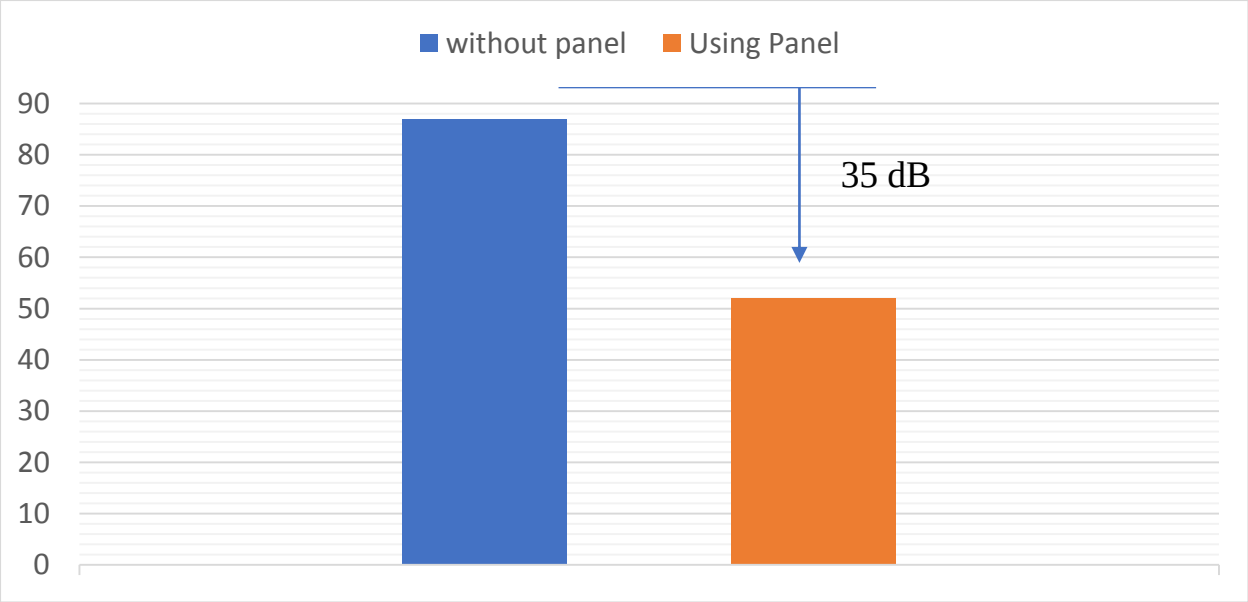
72.8 dB – while operation

58.3 dB – while not in operation

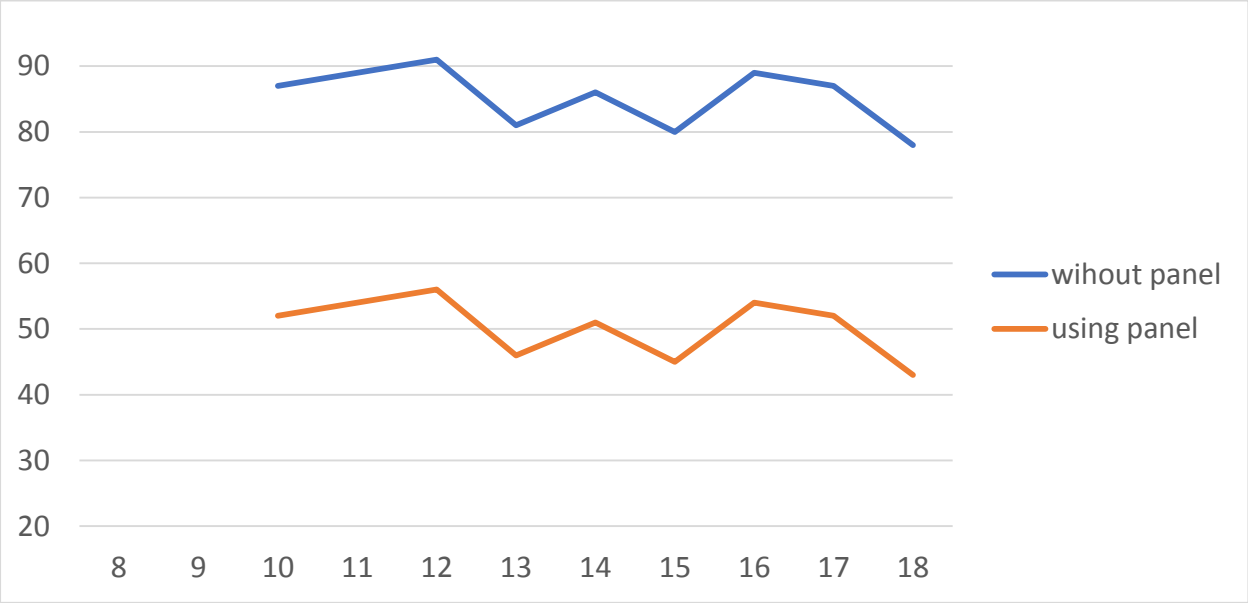
72.8 – 56.3 = 16.5 (compressor sound with distance of 15 meter)

58.3 is the real sound of the situation outside the workplace.

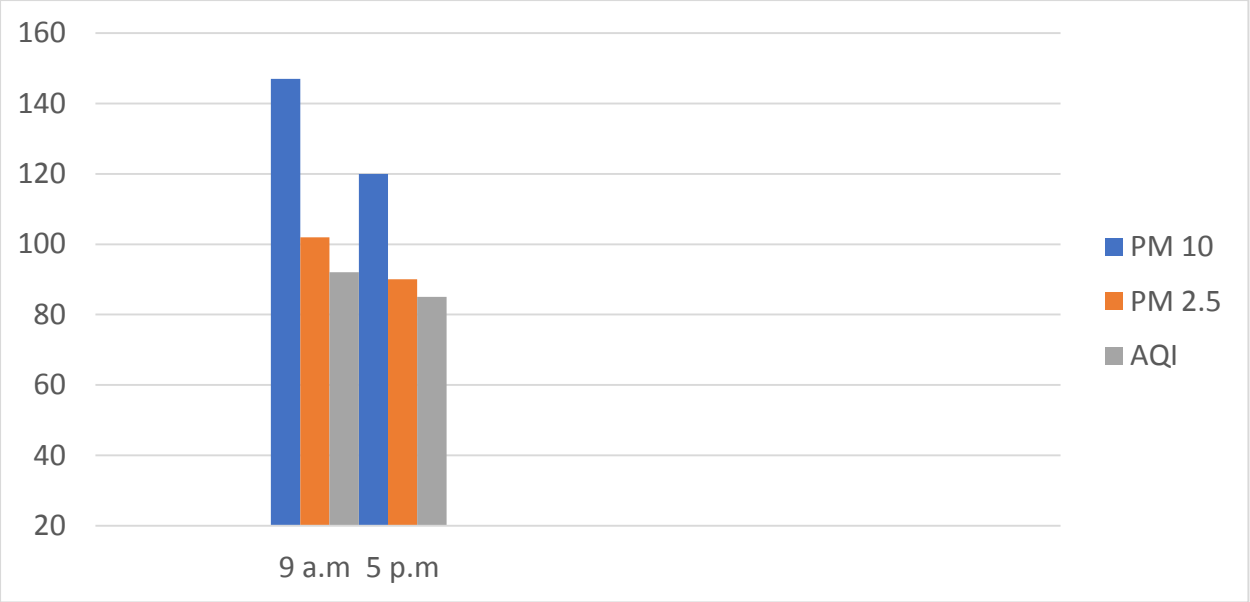
Sound readings before and after using the panel.



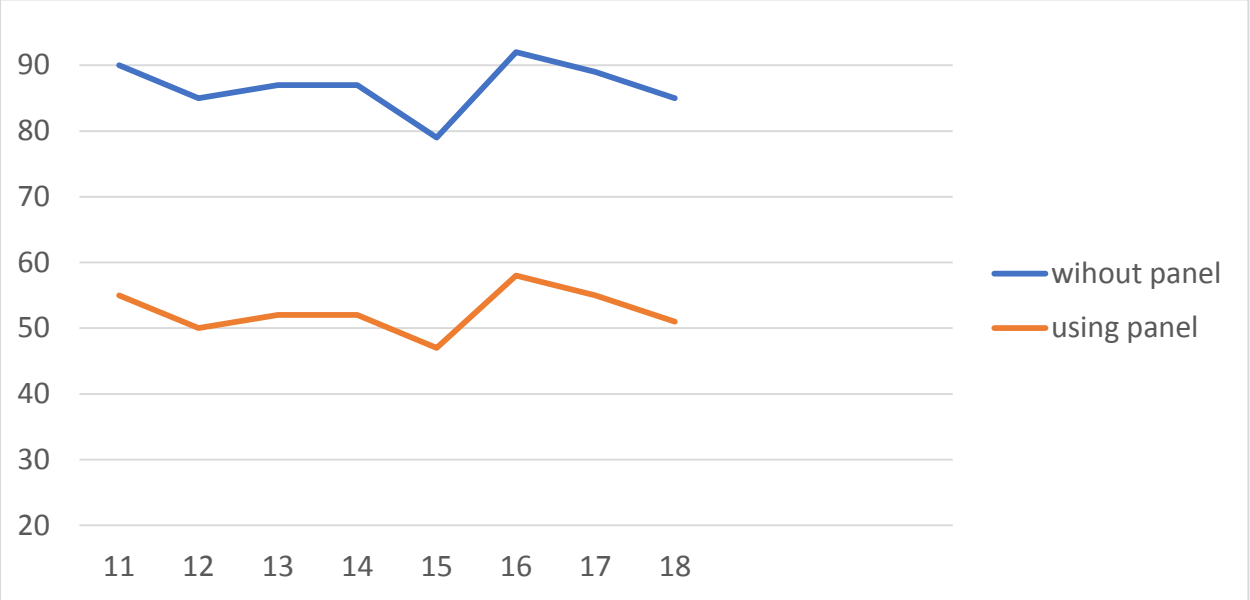
Sound readings before and after using the panel day 1



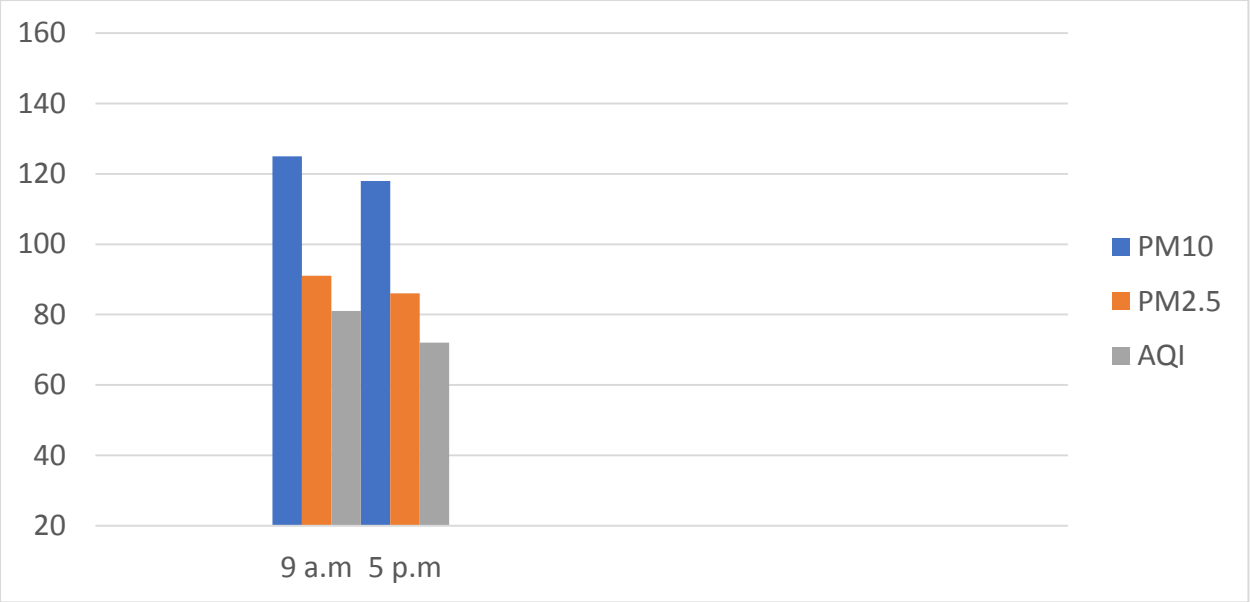
AIR QUALITY READINGS INFRONT AND BACK OF THE NET day 1



Sound readings before and after using the panel day 2



AIR QUALITY READINGS INFRONT AND BACK OF THE NET day 2



GRAPH ANALYSIS

1) Noise:
   - Day 1, The place started operating at 10am while the machines were being maintained.
   - in the first reading, the data shows the beginning of the recorded sound of 87 dB as the machine was operating.
   - At 11am, the noise data was recorded as it was peak time.
   - from 12 to 1 pm, the reading was recorded to decline as it was time for some workers to rest and some of the machines were out of operation.
   - at 4 to 5 hours, the data recorded readings at 89 to 87 dB as almost all machines were used and operating.
   - at 6 o'clock it dropped to 78 dB because of less processed wood.

2) - Day 2, working hours start at 11 because the day is Sunday.

- At 11 o'clock recorded 90 dB of noisy data as the machine was operating.

- At peak times from 12am to 1pm, the reading is at 87dB as there is a lot of wood to be trimmed.

- At 4 o'clock is the highest reading time of 92dB. This is because from my observation, the time is when all the machines are turned on.

- At 6 o'clock, the reading decreased slightly as more wood was processed and some machines were out of operation.

3) Dust:

- The first reading got a PM 10 of 125 as that time the dust started to rise.

- Reading decreased to PM 10 by 118 after using the dust jarring.

- AQI in the workplace records reading 81 because of the large amount of dust that flies in the air while outside the building receives an AQI of 72 due to lack of air.

Testing result :

1) When the reading is taken right behind the panel, the reading is very accurate which can absorb a 35 dB sound. Meanwhile, when taking a reading of 1 m distance from the panel, the panel reading can absorb as much as 10 dB. This was inferred from this test because 2 panels for a large space were difficult to obtain accurate data due to many other noise sources. This was also referred to by Mr. Fariz as an expert in sound panel construction. He said to do a panel test, it would have to be at least 10m2 panels. But we only have 2.4m2 panels. The project objectives have also been achieved by us.

2) For dust nets, dust greater than 2.5 microns cannot pass through the net, but 2.5 micron dust can still pass the net. Therefore, the net should be thickened and look for a smaller hole.

3) The net has been raised slightly to allow more dust to be caught by the net

4) An alternative way we add new material is sponge and indirectly acts as a soundproof and dust capture. The spacing is located throughout the net.

5) Inaccurate reading to absorb 35 dB, but still above 30dB.

6) The net is able to catch the dust with the help of the wind that pushes past the dust in front of the net.

4.4.3 : Type of scope: ii) Engineering Workshop

By : Muhammad Azam Bin Ahmad

No matrix : 08DPB17F1245

Date : 14 – 16 August 2019

Place : Muar, Johor

Decibel readings in the workspace:

106.3 dB

Air quality readings in the workspace:

92AQI

When using a panel (500mm from panel):

TABLE FOR DATA COLLECTION FOR THE FIRST DAY:

Time	Decibel (Db)
10.00 a.m	89.2 to 79.0
11.00 a.m	90.5 to 80.2
12.00 p.m	86.3 to 76.5
Waktu rehat 1.00 p.m	71.6 to 60.5
Waktu rehat 2.00 p.m	72.3 to 60.9

Time	Decibel (Db)
2.30 p.m	85.6 to 74.8
3.00 p.m	87.5 to 76.2
4.00 p.m	88.6 to 79.4
5.00 p.m	81.2 to 71.5
6.00 p.m	79.6 to 68.6

AVERAGE : $\frac{79 + 80.2 + 76.5 + 60.5 + 60.9 + 74.8 + 76.2 + 79.4 + 71.5 + 68.6}{10}$

$= 72.76$

GRAF FOR THE FIRST DAY FOR NOISE:

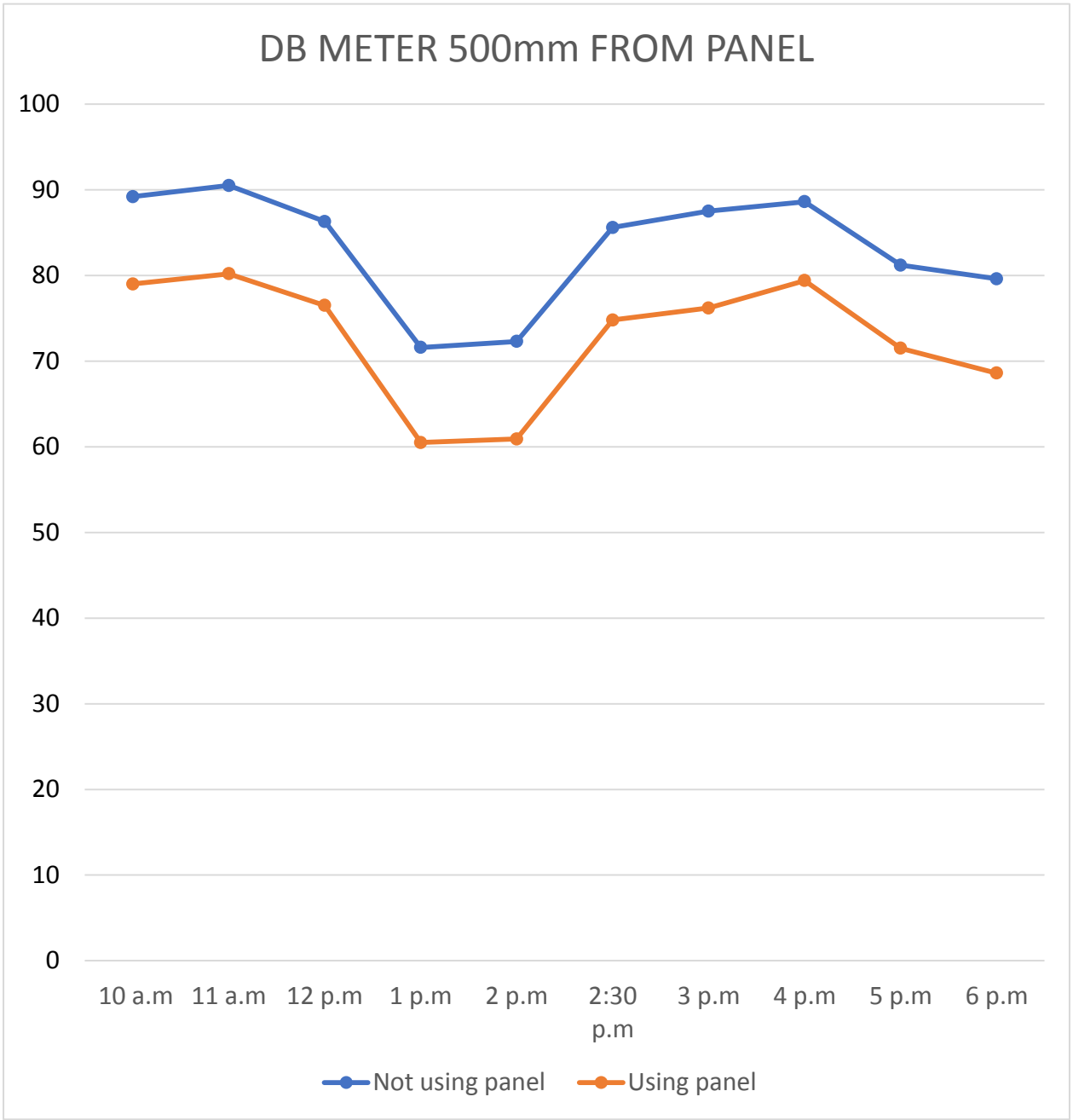


TABLE FOR DATA COLLECTION FOR DAY 2:

Time	Decibel (Db)
10.00 a.m	88.5 to 77
11.00 a.m	85.3 to 76.1
12.00 p.m	89.5 to 78.5
Waktu rehat 1.00 p.m	72.3 to 61.9
Waktu rehat 2.00 p.m	71.5 to 61.3

Time	Decibel (Db)
2.30 p.m	89.6 to 78.4
3.00 p.m	87.3 to 76.6
4.00 p.m	85.2 to 73.4
5.00 p.m	76.1 to 66.0
6.00 p.m	77.8 to 68.1

AVERAGE: $\frac{77 + 76.1 + 78.5 + 61.9 + 61.3 + 78.4 + 76.6 + 73.4 + 66 + 68.1}{10}$

$= 71.73$

GRAF FOR THE SECOND DAY FOR NOISE:

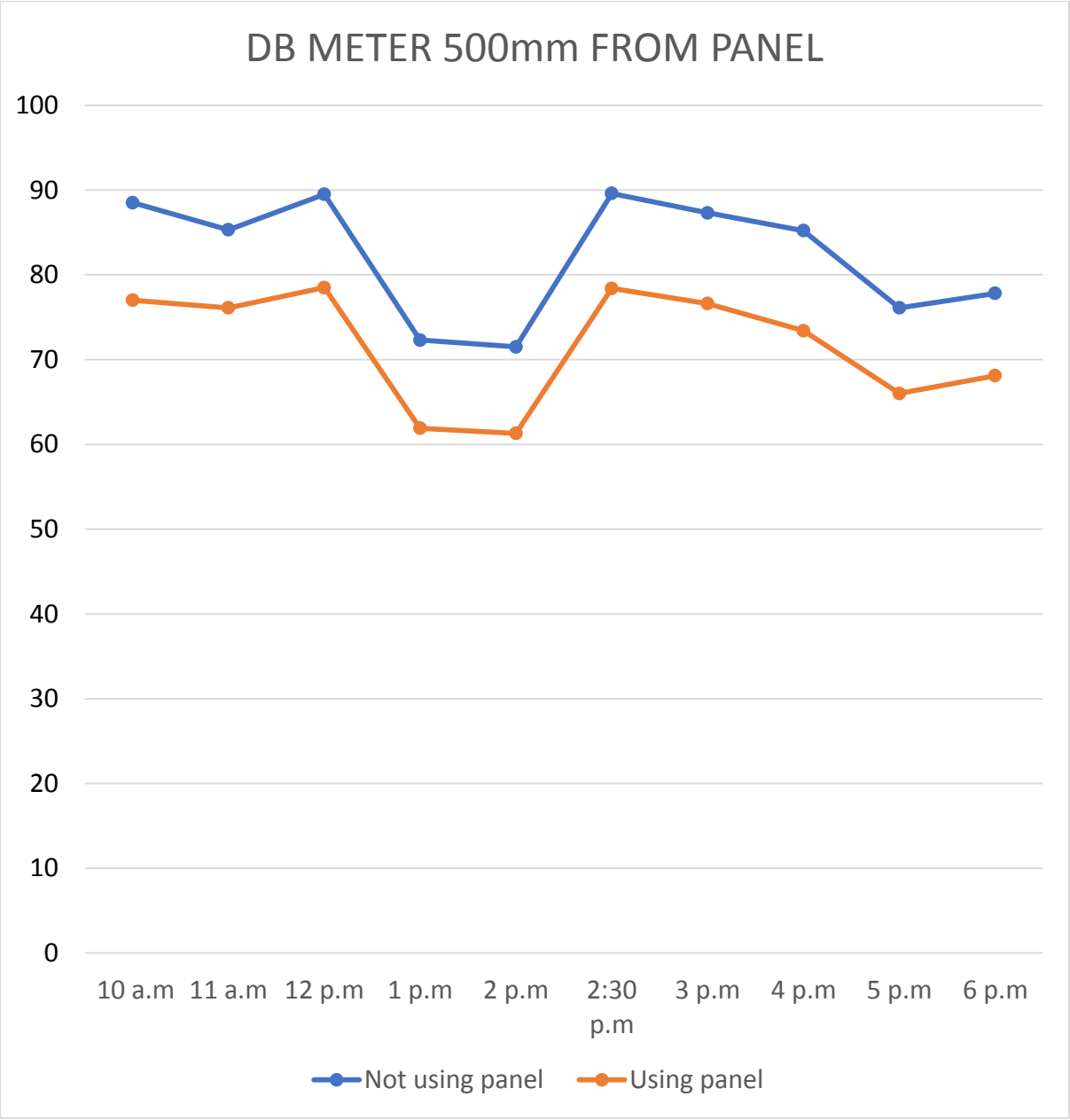


TABLE FOR DATA COLLECTION FOR DAY 3:

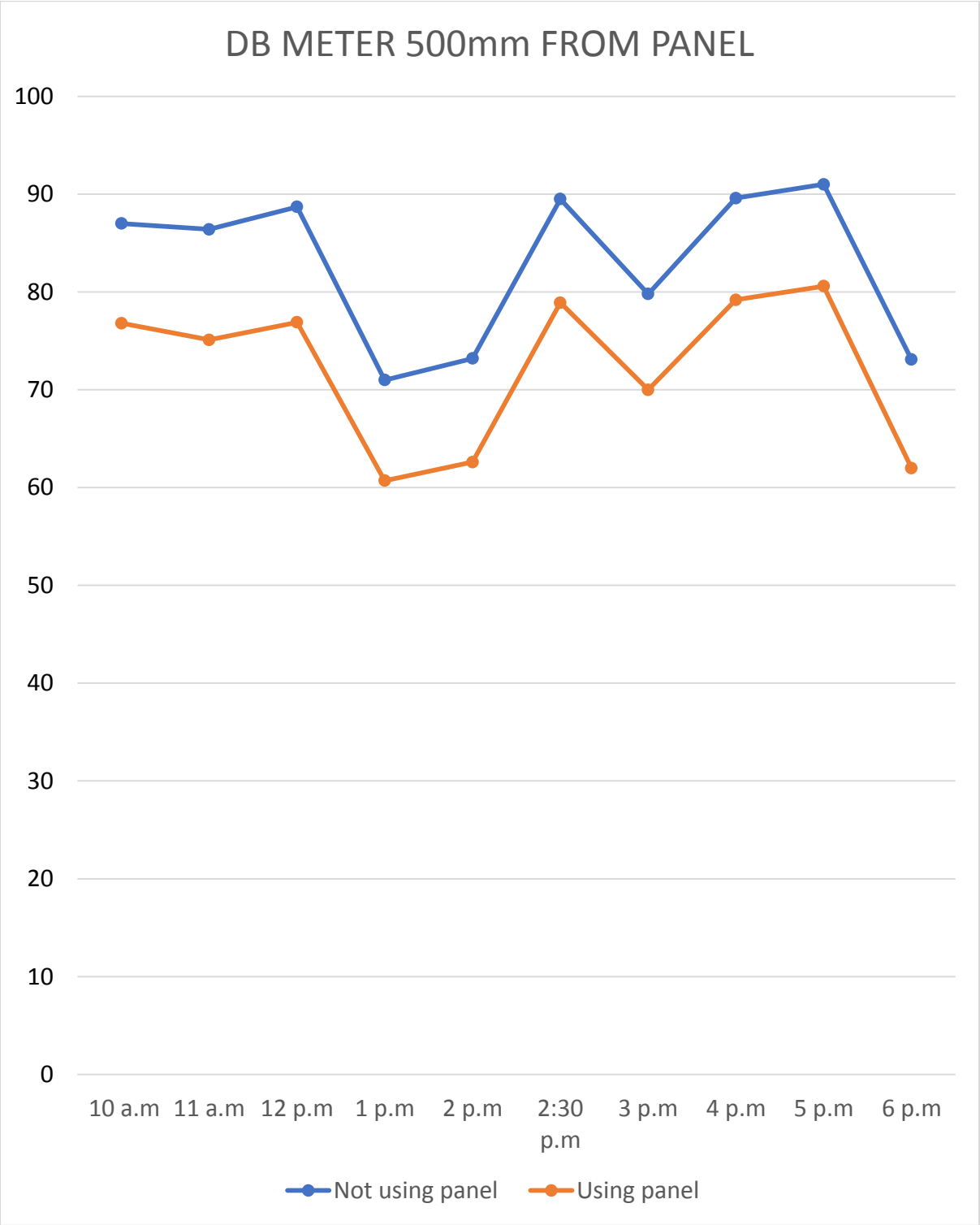
Time	Decibel (Db)
10.00 a.m	87 to 76.8
11.00 a.m	86.4 to 75.1
12.00 p.m	88.7 to 76.9
Waktu rehat 1.00 p.m	71.0 to 60.7
Waktu rehat 2.00 p.m	73.2 to 62.6

Time	Decibel (Db)
2.30 p.m	89.5 to 78.9
3.00 p.m	79.8 to 70.0
4.00 p.m	89.6 to 79.2
5.00 p.m	91.0 to 80.6
6.00 p.m	73.1 to 62.0

AVERAGE: $\frac{76.8 + 75.1 + 76.9 + 60.7 + 62.6 + 78.9 + 70.0 + 79.2 + 80.6 + 62.0}{10}$

$= 72.28$

GRAF FOR THE THIRD DAY FOR NOISE:



When using panels (1 m from panel):

TABLE FOR DATA COLLECTION FOR DAY 3:

Time	Decibel (Db)
10.00 a.m	92.5 to 83.5
11.00 a.m	93.0 to 82.7
12.00 p.m	90.2 to 79.5
Waktu rehat 1.00 p.m	72.3 to 61.6
Waktu rehat 2.00 p.m	71.9 to 60.5

Time	Decibel (Db)
2.30 p.m	89.7 to 78.1
3.00 p.m	88.3 to 79.0
4.00 p.m	89.5 to 78.1
5.00 p.m	80.0 to 69.8
6.00 p.m	81.2 to 70.0

PURATA : $\frac{83.5 + 82.7 + 79.5 + 61.6 + 60.5 + 78.1 + 79.0 + 78.1 + 69.8 + 70.0}{10}$

$= 74.28$

GRAF FOR THE FIRST DAY FOR NOISE:

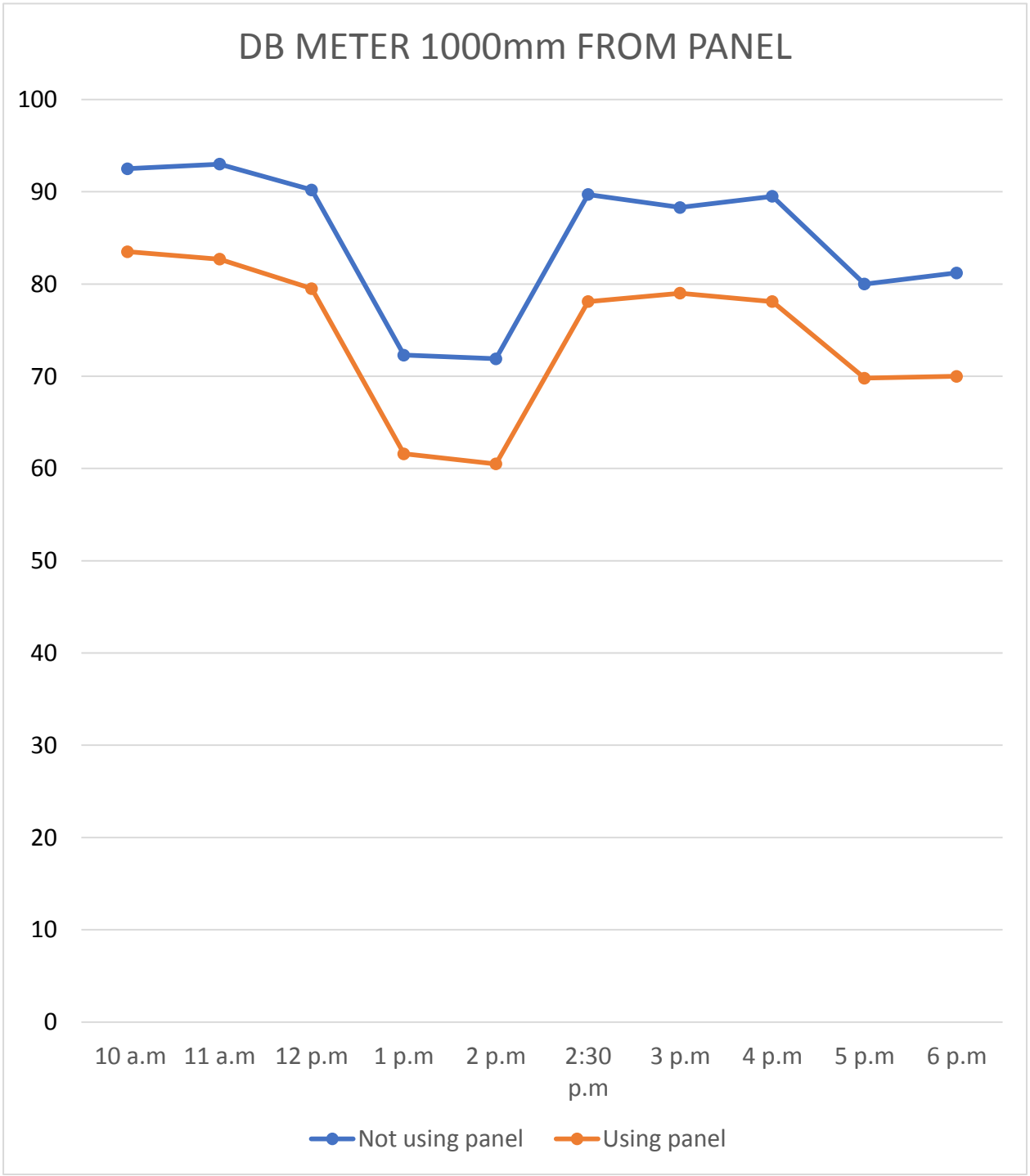


TABLE FOR DATA COLLECTION FOR DAY2:

time	Decibel (Db)
10.00 a.m	90.2 to 81.8
11.00 a.m	87.5 to 76.4
12.00 p.m	91.6 to 80.9
1.00 p.m	72.1 to 60.6
2.00 p.m	70.0 to 59.9

time	Decibel (Db)
2.30 p.m	89.6 to 78.7
3.00 p.m	90.5 to 81.2
4.00 p.m	88.0 to 79.6
5.00 p.m	77.9 to 66.0
6.00 p.m	79.0 to 69.7

AVERAGE : $\frac{81.8 + 76.4 + 80.9 + 60.9 + 59.9 + 78.7 + 81.2 + 79.6 + 66.0 + 69.7}{10}$

$= 73.51$

GRAF FOR THE SECOND DAY FOR NOISE:

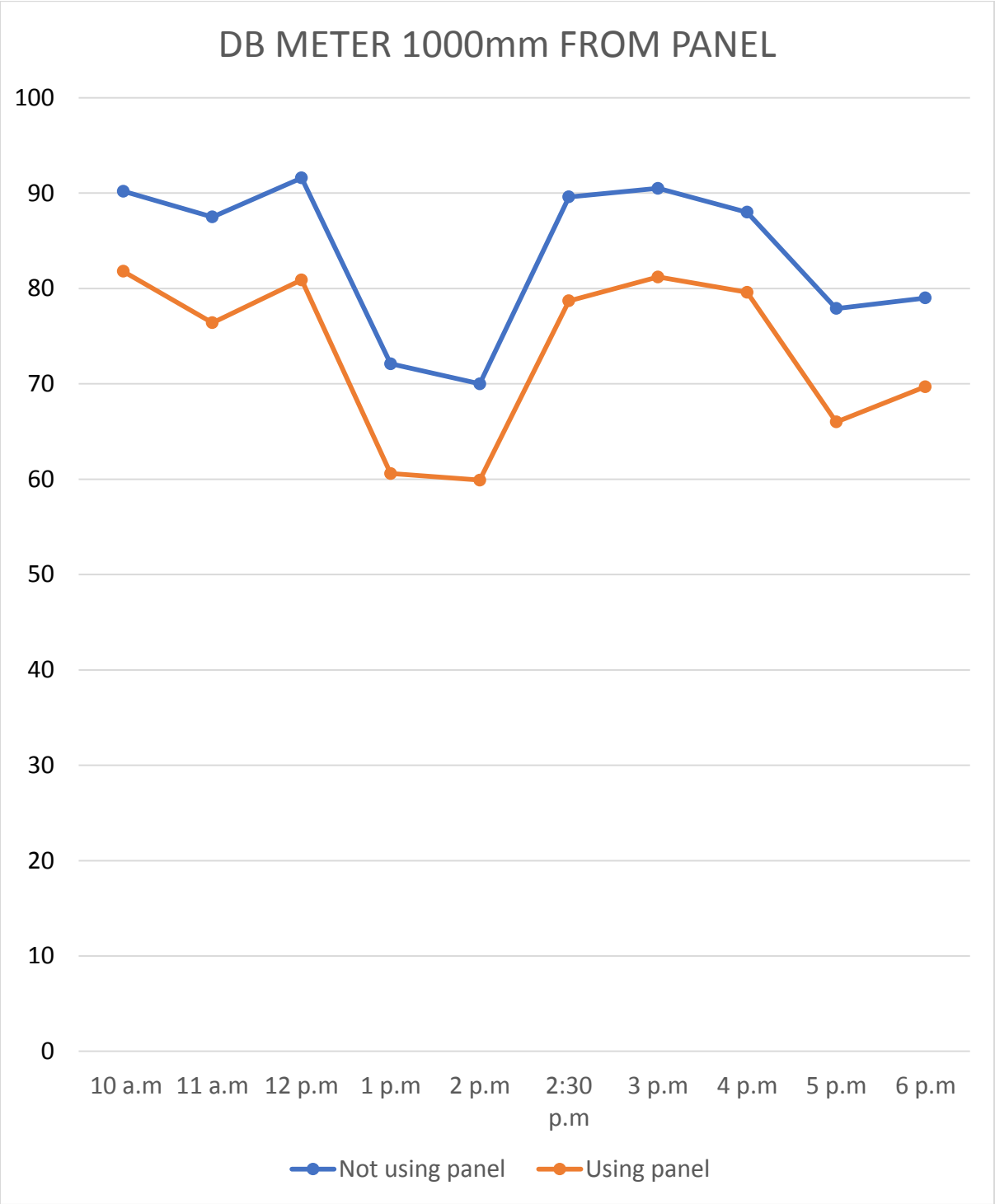


TABLE FOR DATA COLLECTION FOR DAY3:

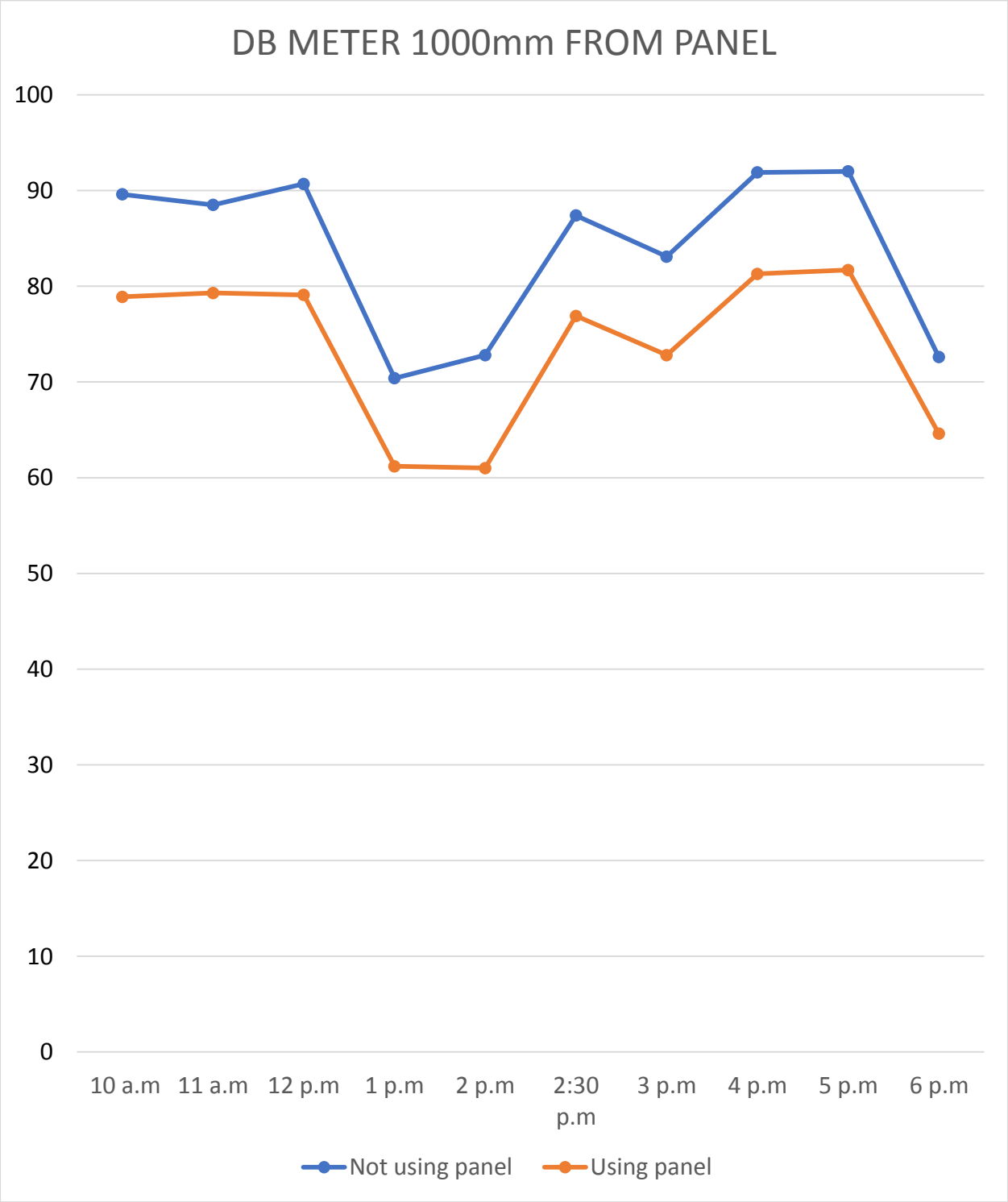
TIME	Decibel (Db)
10.00 a.m	89.6 to 78.9
11.00 a.m	88.5 to 79.3
12.00 p.m	90.7 to 79.1
Waktu rehat 1.00 p.m	70.4 to 61.2
Waktu rehat 2.00 p.m	72.8 to 61.0

TIME	Decibel (Db)
2.30 p.m	87.4 to 76.9
3.00 p.m	83.1 to 72.8
4.00 p.m	91.9 to 81.3
5.00 p.m	92.0 to 81.7
6.00 p.m	72.6 to 64.6

AVERAGE : $\frac{78.9 + 79.3 + 79.1 + 61.2 + 61.0 + 76.9 + 72.8 + 81.3 + 81.7 + 64.6}{10}$

$=73.68$

GRAF FOR THE THIRD DAY FOR NOISE:



Noise Generating Tools:

a) Steel cutter

b) Wood cutter

c) Grinder

d) Welding

Dust Source Formed:

a) Dust from sand

b) Dust from drill

c) Dust from wood

PM10 : Coarse dust particles (PM10) are 2.5 to 10 micrometers in diameter. Sources include crushing or grinding operations and dust stirred up by vehicles on roads. These tiny particles which are about 30 times smaller than the width of a hair on your head are small enough to get inhaled past our defensive nose hairs and into our **lungs.**

PM2.5 : Fine particles (PM2.5) are 2.5 micrometers in diameter or smaller, and can only be seen with an electron microscope. Fine particles are produced from all types of combustion, including motor vehicles, power plants, residential wood burning, forest fires, agricultural burning, and some industrial processes. While PM10's story ends at the lungs, PM2.5 can pass from our lungs into our blood supply and be carried throughout our bodies thereby making them **"the invisible killer"**

TABLE FOR DATA COLLECTION FOR THE FIRST DAY:

TIME	AIR QUALITY		
10.00 a.m	**PM 10 :** 125 **PM2.5 :** 103 **AQI : 83**	**to**	**PM 10 :** 117 **PM2.5:** 96 **AQI : 78**
3.00 p.m	**PM 10 :** 152 **PM2.5 :** 108 **AQI : 99**	**to**	**PM 10 :** 146 **PM2.5:** 99 **AQI : 91**
6.00 p.m	**PM 10 :** 134 **PM2.5 :** 98 **AQI : 85**	**to**	**PM 10:** 128 **PM2.5:** 93 **AQI :** 78

GRAF FOR THE FIRST DAY FOR THE DUST:

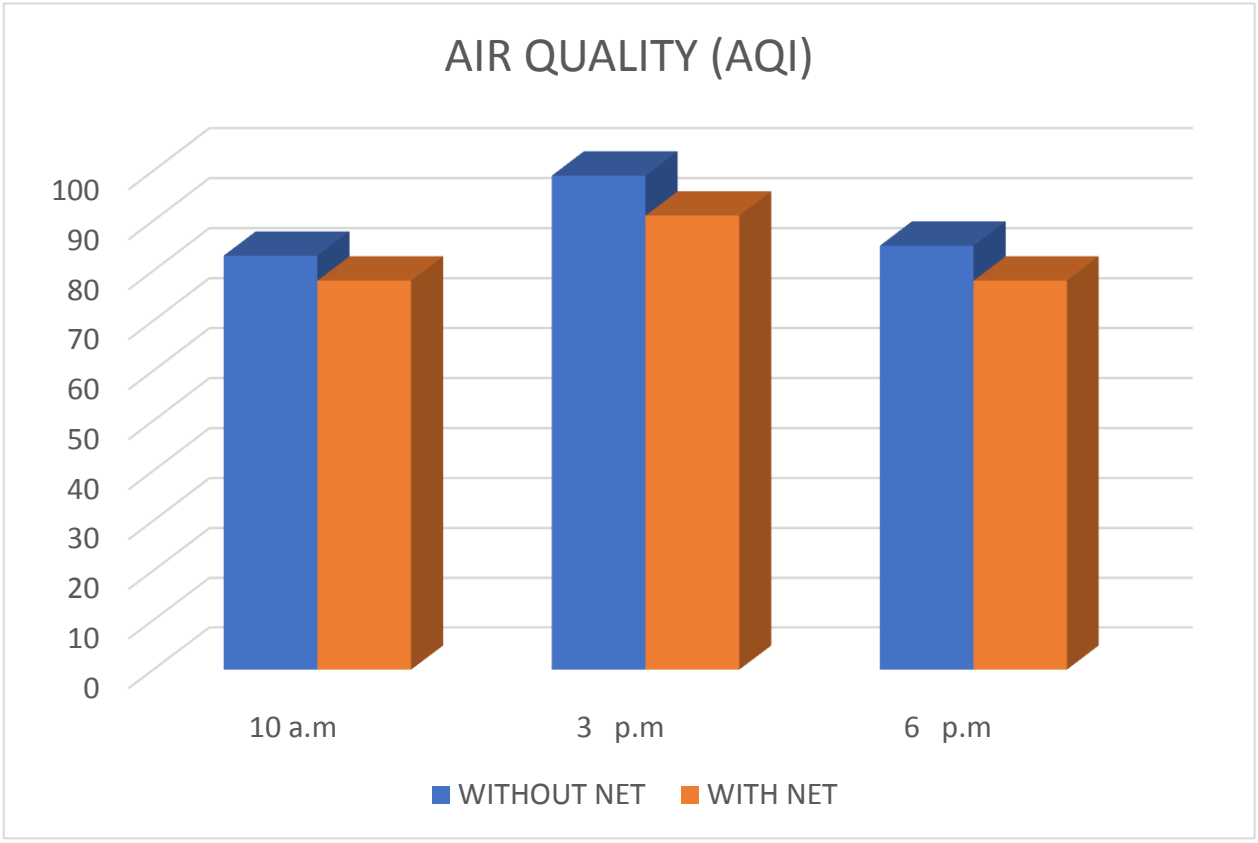


TABLE FOR DATA COLLECTION FOR DAY 2 :

TIME	AIR QUALITY		
10.00 a.m	**PM 10 :** 116 **PM2.5 :** 94 **AQI : 80**	**to**	**PM 10 :** 110 **PM2.5:** 88 **AQI : 73**
3.00 p.m	**PM 10 :** 160 **PM2.5 :** 108 **AQI : 93**	**to**	**PM 10 :** 153 **PM2.5:** 101 **AQI : 90**
6.00 p.m	**PM 10 :** 125 **PM2.5 :** 97 **AQI : 84**	**to**	**PM 10 :** 121 **PM2.5:** 93 **AQI : 80**

GRAF FOR THE SECOND DAY FOR DUST:

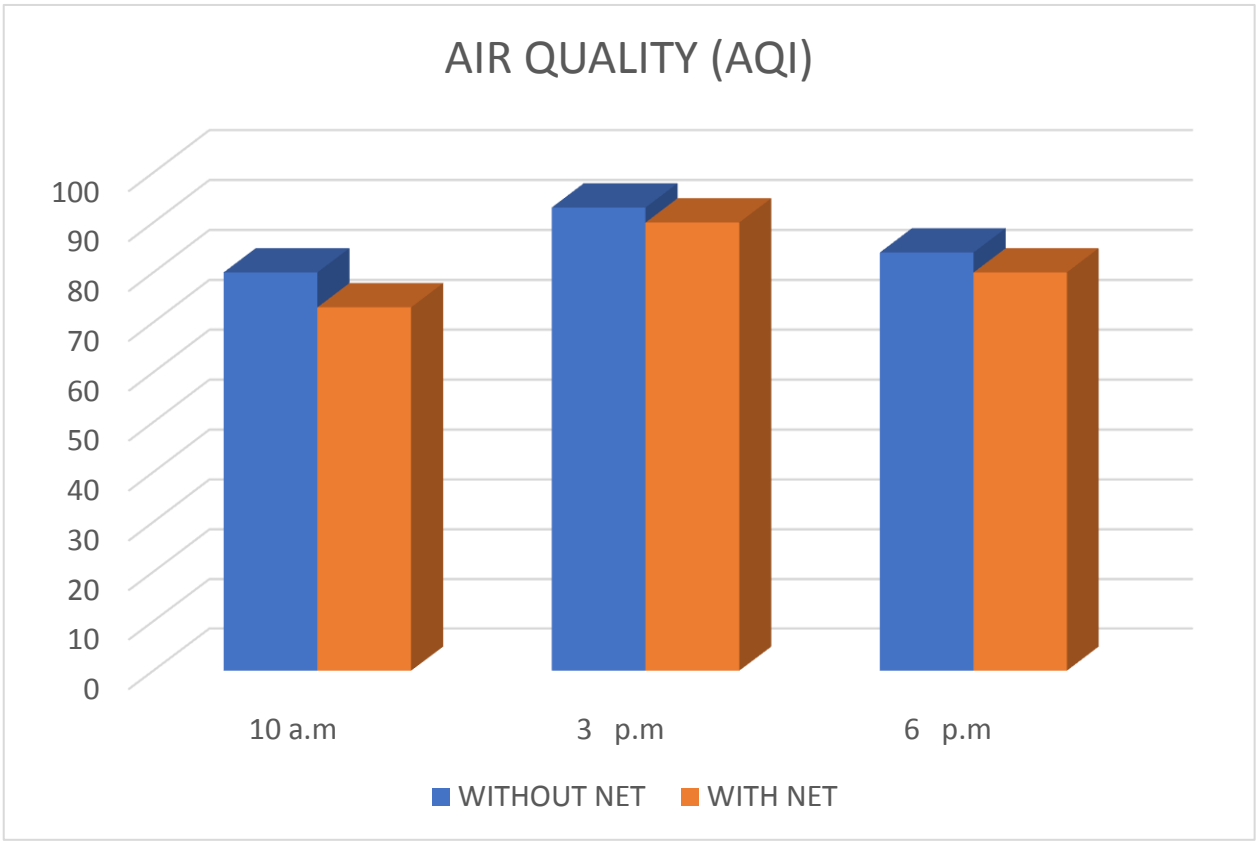
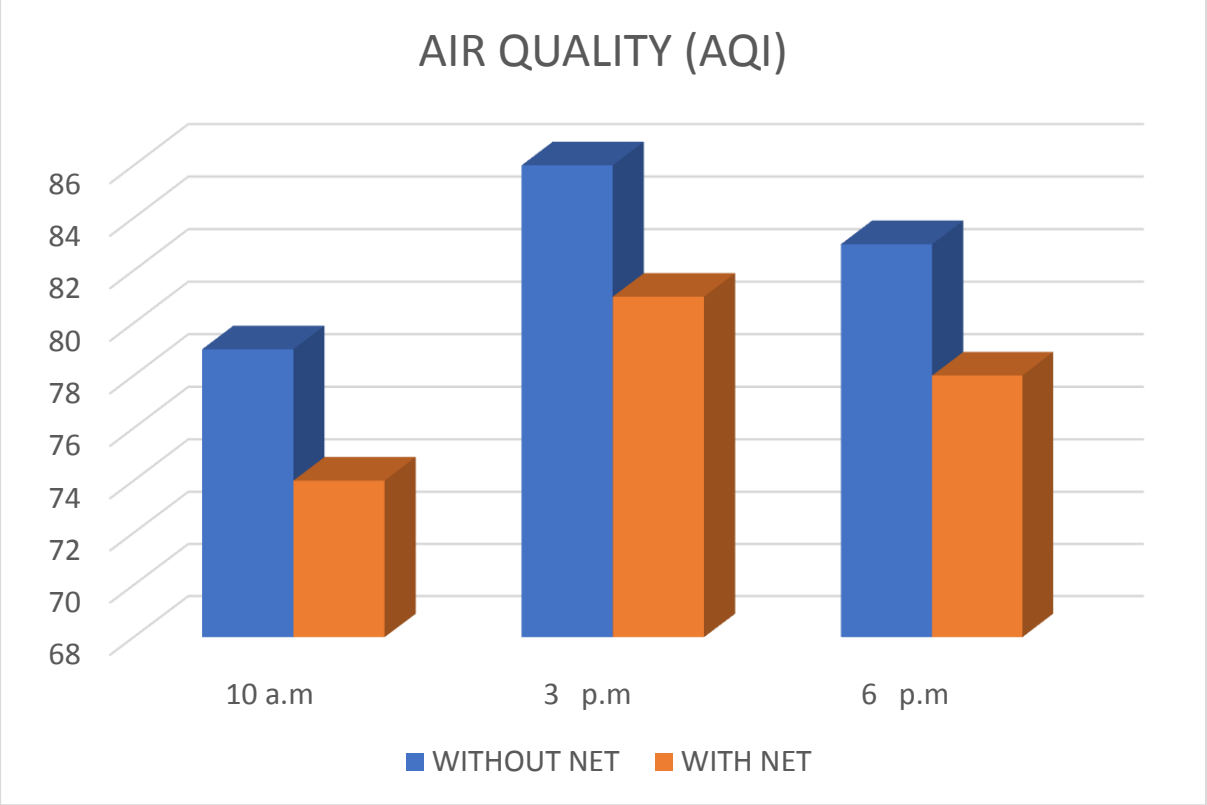


TABLE FOR DATA COLLECTION FOR DAY 3 :

TIME	AIR QUALITY		
10.00 a.m	**PM 10 :** 105 **PM2.5 :** 91 **AQI : 79**	**to**	**PM 10 :** 101 **PM2.5 :** 87 **AQI : 74**
3.00 p.m	**PM 10 :** 143 **PM2.5 :** 110 **AQI : 86**	**to**	**PM 10 :** 139 **PM2.5:** 106 **AQI : 81**
6.00 p.m	**PM 10 :** 120 **PM2.5 :** 102 **AQI : 83**	**to**	**PM 10 :** 113 **PM2.5:** 95 AQI : 78

GRAF FOR THE THIRD DAY FOR DUST:



Pictures of Tools Used in Workshops:

(1) Iron Cutter

(2) Wood Cutter

(3) Grinder

SUMMARY

- Testing, analyzing and retrieval of data was done for 3 days, on the 14th of August 16th.
- The products we have installed are stable and last for 3 days during data collection.
- Data retrieval is taken every 1 hour and recorded, data retrieval for sound (dB) has used a special tool to record the sound value in dB units called dB Meters. The data collection for dust used an application downloaded in the handset, the application can record the data for air quality around the workshop.
- First day, the value of dB at a distance of 500mm from the panel is 90.5 dB to 80.2 dB. This is because the sound has been absorbed about 10 dB by the panel. Next day was 89.6 dB to 78.4 dB and third day was 91.0 dB to 80.6 dB. Whereas the dB value of 1m from the panel received on the first day was 93.0 dB to 82.7 dB. The next day was 91.6 dB to 80.9 dB and the third day was 92.0 dB to 81.7 dB.
- The first day, the AQI value received on that day was from 99 AQI to 91 AQI. This is because the filter has prevented some dust from coming out of the filter and there have been changes caused by the wind blowing and the AQI has dropped slightly. Next day is 93 AQI to 90 AQI and the third day is 86 AQI to 81 AQ

4.4.4 type of scope : iii) site construction
By : Muhammad Irfan Bin Mohamad Uzir

No matrix : 08DPB17F1209

Date : 16 – 18 September 2019

Place : Muar, Johor

Decibel readings in the workspace:

57.3 dB to 88.1 dB

Air quality readings in the workspace:

133AQI (haze)

When using a panel (500mm from panel):

TABLE FOR DATA COLLECTION FOR THE FIRST DAY:

Time	Decibel (Db)
9.00 a.m	52.5 to 45.0
10.00 am	55.7 to 45.0
11.00 am	59.6 to 48.0
12.00 pm	45.6
1.00 pm	45.6

Time	Decibel (Db)
2.00 pm	63.4 to 45.0
3.00 p.m	70.8 to 62.8
4.00 p.m	76.8 to 61.9
5.00 p.m	57.3 to 53.2
6.00 p.m	-

AVERAGE : $\frac{45.0 + 45.0 + 48.0 + 45.6 + 45.6 + 45.0 + 62.8 + 61.9 + 53.2}{9}$

= 50.23

GRAF FOR THE FIRST DAY FOR NOISE:

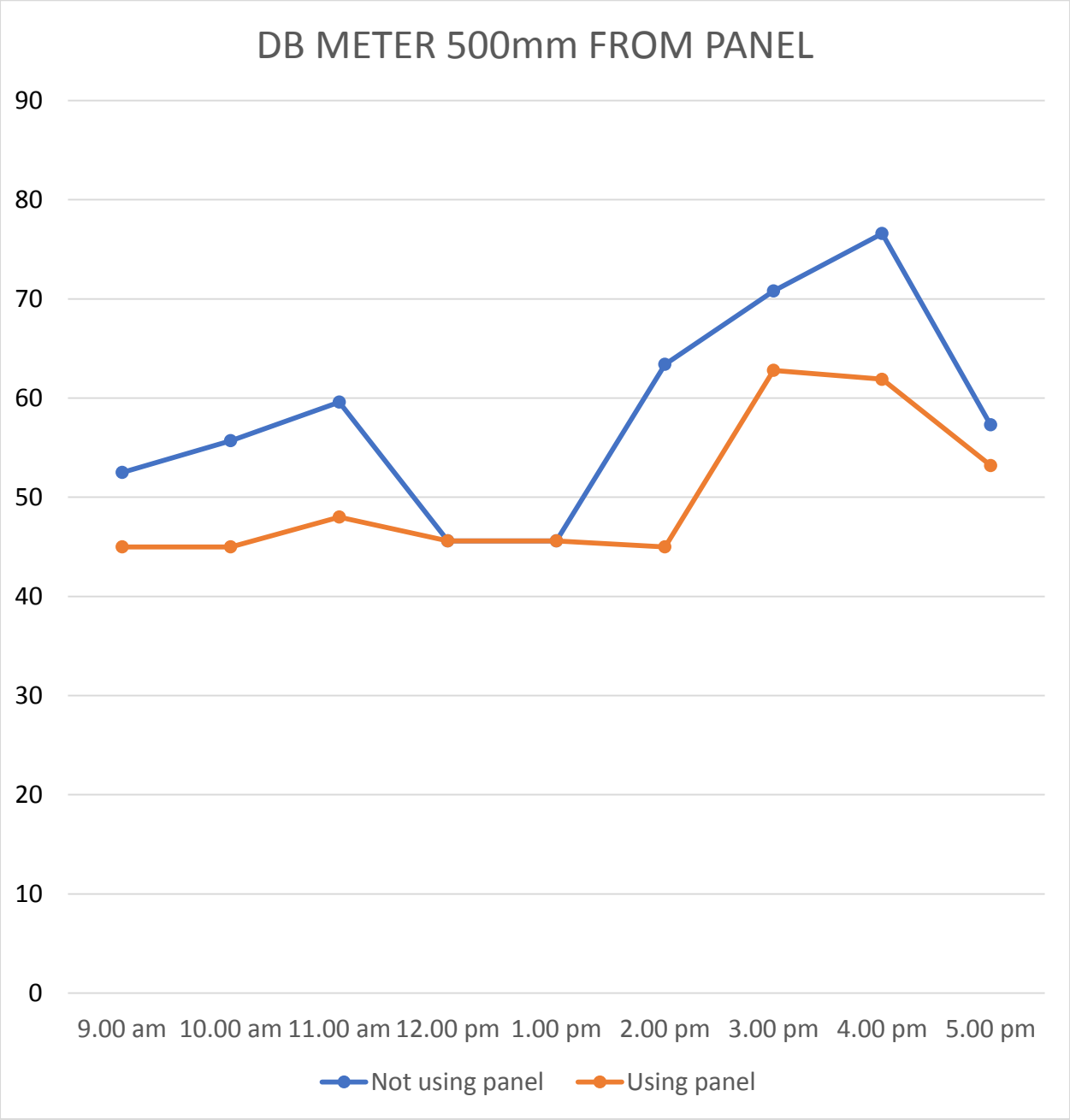


TABLE FOR DATA COLLECTION FOR DAY 2:

Time	Decibel (Db)
9.00 am	40.5 to 38.9
10.00 am	42.3 to 33.4
11.00 am	42.3 to 32.8
12.00 pm	50.3 to 40.1
1.00 pm	52.4 to 41.7

Time	Decibel (Db)
2.00 pm	55.5 to 43.7
3.00 p.m	60.8 to 50.8
4.00 p.m	68.9 to 50.3
5.00 p.m	58.7 to 42.0
6.00 p.m	-

AVERAGE: $\frac{38.9 + 33.4+32.8+40.1+41.7+43.7+50.8+50.3+42.0}{9}$

= 41.52

GRAF FOR THE SECOND DAY FOR NOISE:

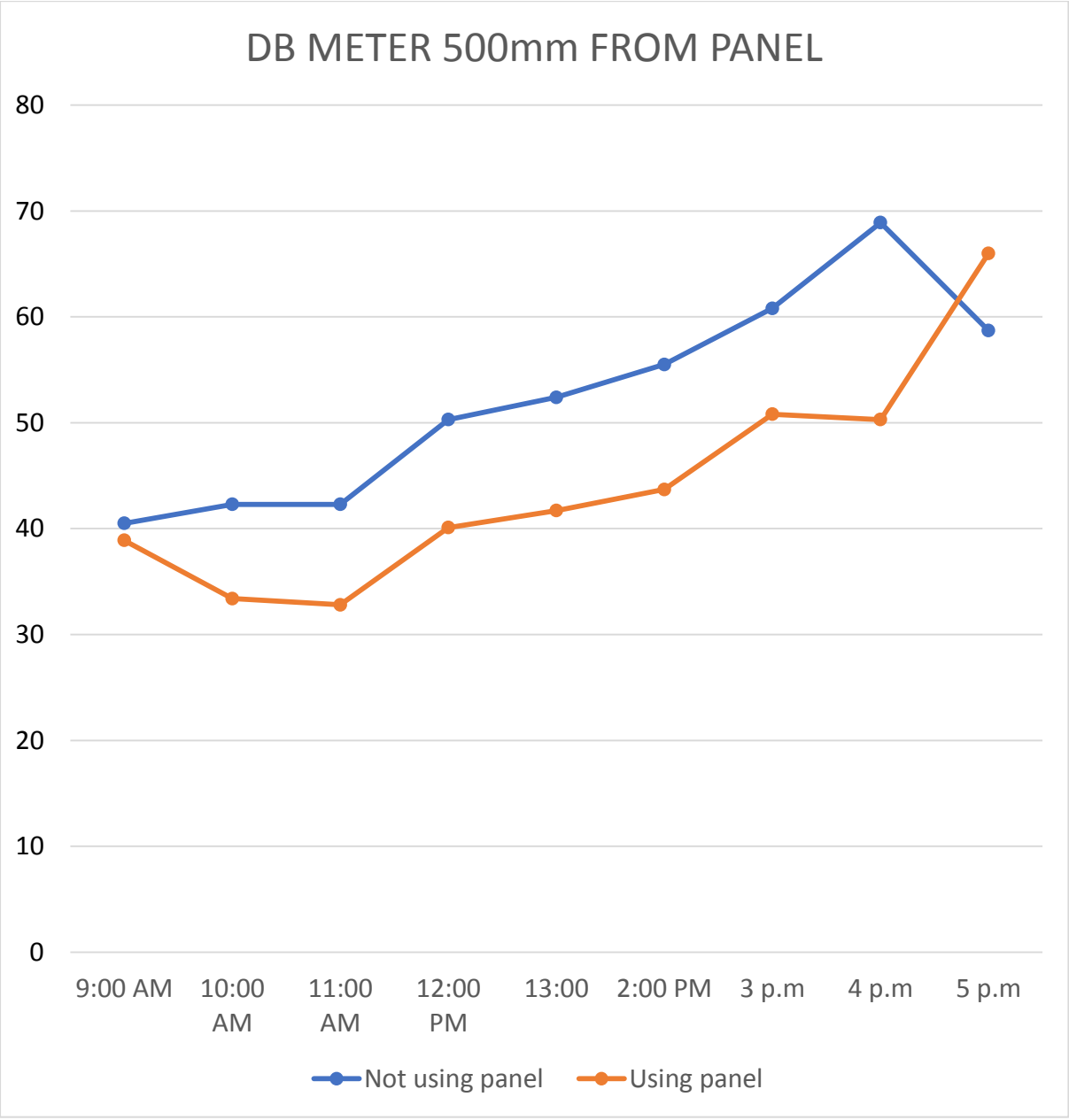


TABLE FOR DATA COLLECTION FOR DAY 3:

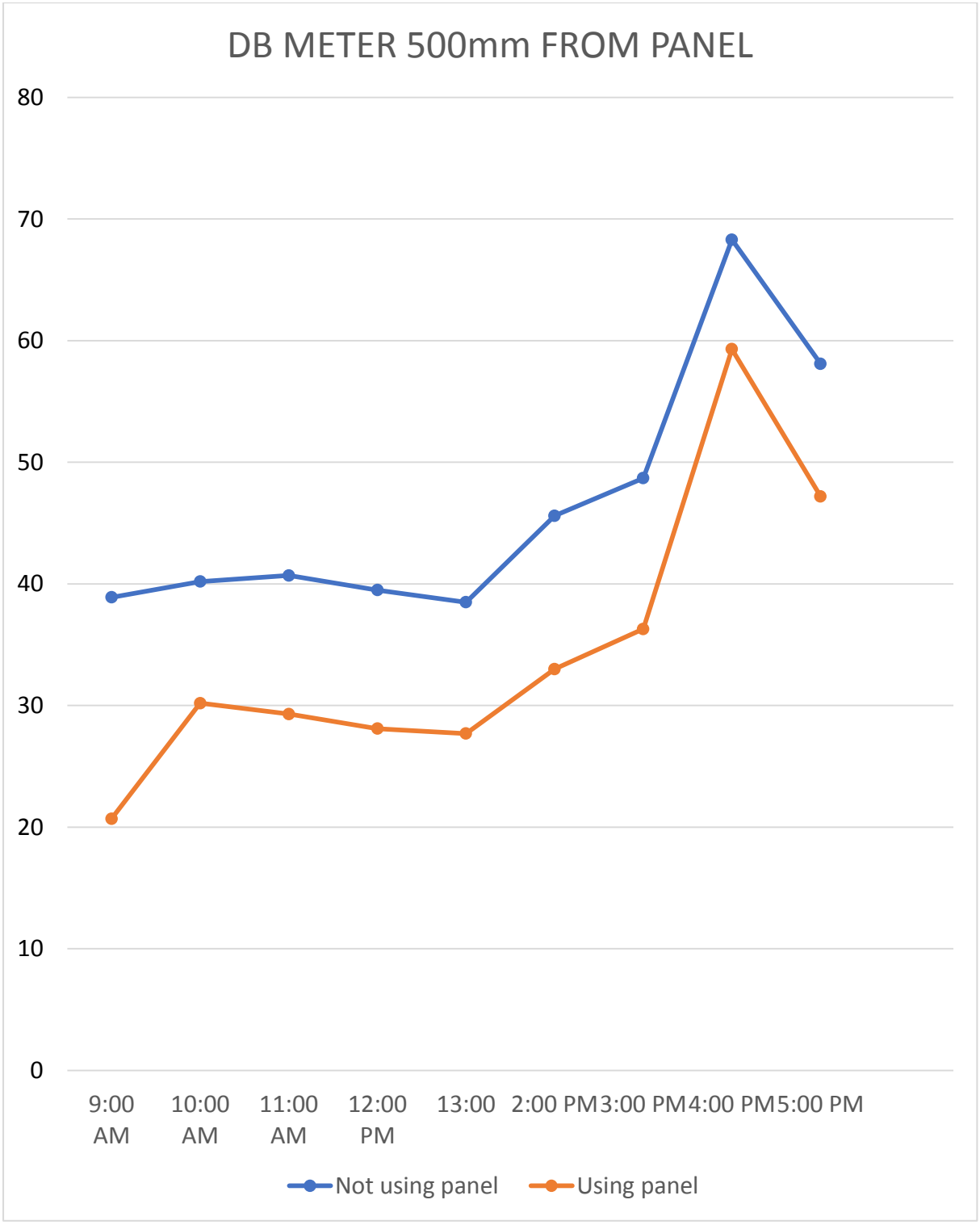
Time	Decibel (Db)
9.00 am	38.9 to 20.7
10.00 am	40.2 to 30.2
11.00 am	40.7 to 29.3
12.00 pm	39.5 to 28.1
1.00 pm	38.5 to 27.7

Time	Decibel (Db)
2.00 pm	45.6 to 33.0
3.00 p.m	48.7 to 36.3
4.00 p.m	68.3 to 59.3
5.00 p.m	68.3 to 59.3
6.00 p.m	-

AVERAGE: $\frac{20.7+30.2+29.3+28.1+27.7+33.0+36.3+59.3+47.2}{9}$

$= 34.64$

GRAF FOR THE THIRD DAY FOR NOISE:



Noise Generating Tools:

b) Tiles hacker

b) vehicles

Dust Source Formed:

d) Dust from sand

e) Dust from drill

f) Dust from soil (excavation works)

PM10 : Coarse dust particles (PM10) are 2.5 to 10 micrometers in diameter. Sources include crushing or grinding operations and dust stirred up by vehicles on roads. These tiny particles which are about 30 times smaller than the width of a hair on your head are small enough to get inhaled past our defensive nose hairs and into our **lungs.**

PM2.5 : Fine particles (PM2.5) are 2.5 micrometers in diameter or smaller, and can only be seen with an electron microscope. Fine particles are produced from all types of combustion, including motor vehicles, power plants, residential wood burning, forest fires, agricultural burning, and some industrial processes. While PM10's story ends at the lungs, PM2.5 can pass from our lungs into our blood supply and be carried throughout our bodies thereby making them **"the invisible killer"**

TABLE FOR DATA COLLECTION FOR THE FIRST DAY:

time	Air Quality		
10.00 a.m	**PM 10 :** 162 **PM2.5 :** 219 **AQI : 133**	**to**	**PM 10 :** 140 **PM2.5:** 103 **AQI : 93**
3.00 p.m	**PM 10 :** - **PM2.5 :** - **AQI : -**	**to**	**PM 10 :** - **PM2.5:** - **AQI : -**
6.00 p.m	**PM 10 :** 99 **PM2.5 :** 134 **AQI : 90**	**to**	**PM 10:** 81 **PM2.5: 111** **AQI :** 79

GRAF FOR THE FIRST DAY FOR THE DUST:

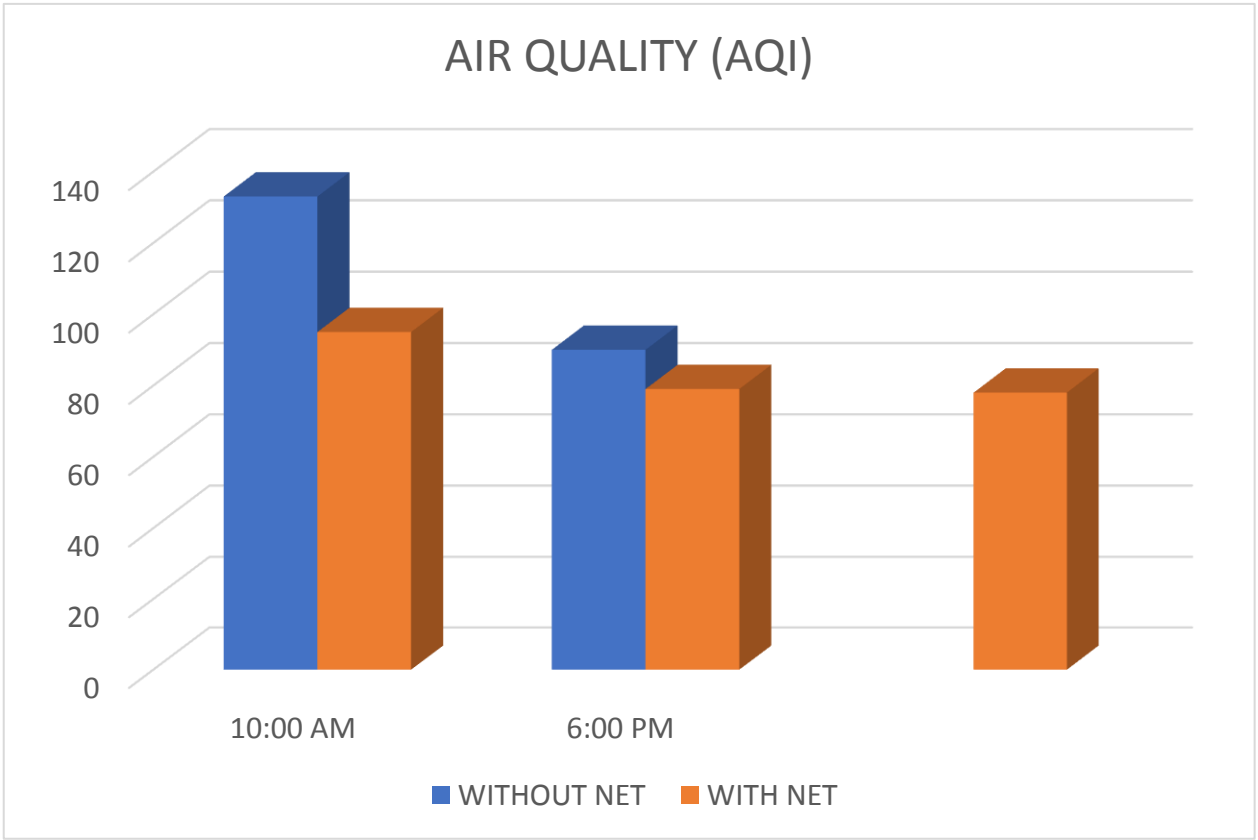


TABLE FOR DATA COLLECTION FOR DAY 2 :

Time	Air Quality		
10.00 a.m	**PM 10 :** 179 **PM2.5 :** 133 **AQI : 113**	**to**	**PM 10 :** 117 **PM2.5: 86** **AQI : 82**
3.00 p.m	**PM 10 :** - **PM2.5 :** - **AQI : -**	**to**	**PM 10 :** - **PM2.5:** - **AQI : -**
6.00 p.m	**PM 10 :** 117 **PM2.5 :** 86 **AQI : 82**	**to**	**PM 10 :** 102 **PM2.5:** 75 **AQI : 74**

GRAF FOR THE SECOND DAY FOR DUST:

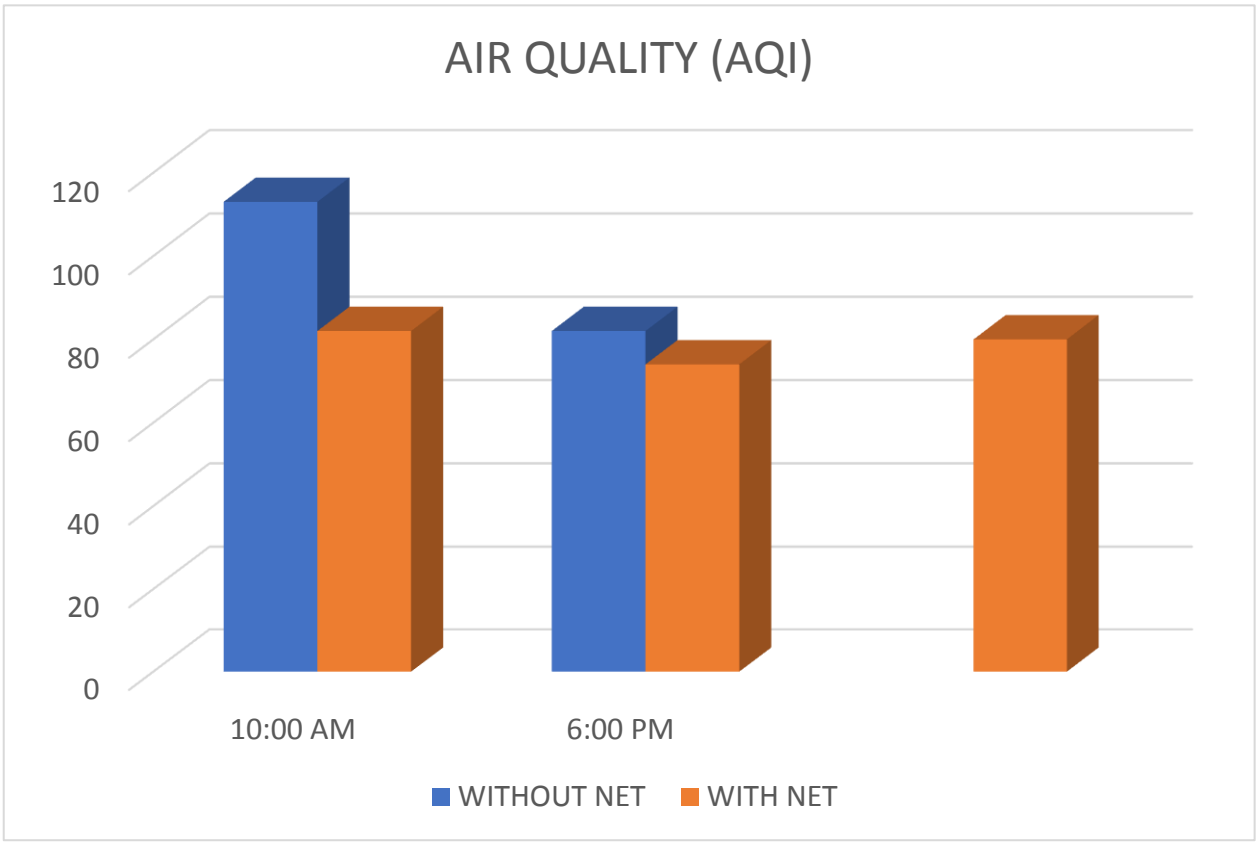
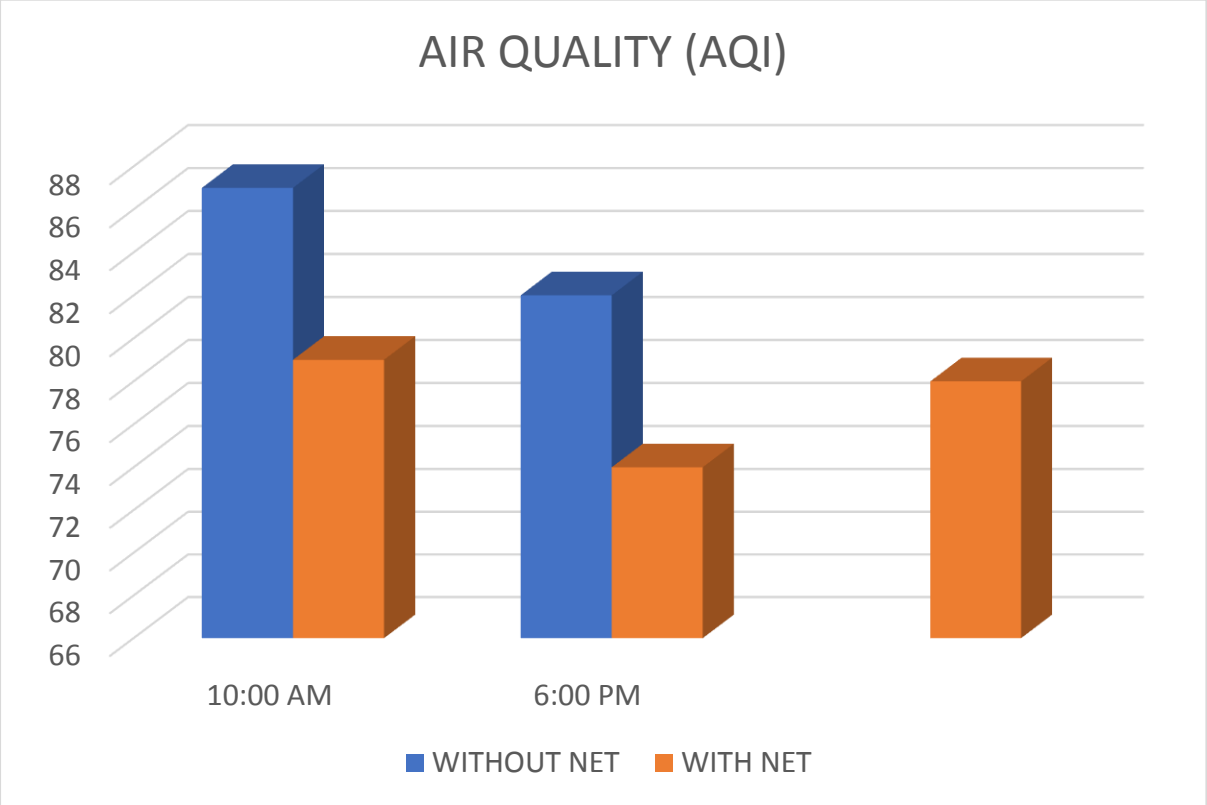


TABLE FOR DATA COLLECTION FOR DAY 3 :

Time	Air Quality		
10.00 a.m	**PM 10 :** 128 **PM2.5 :** 94 **AQI : 87**	**to**	**PM 10 :** 111 **PM2.5 :** 81 **AQI : 79**
3.00 p.m	**PM 10 : -** **PM2.5 : -** **AQI : -**	**to**	**PM 10 : -** **PM2.5: -** **AQI : -**
6.00 p.m	**PM 10 :** 117 **PM2.5 :** 86 **AQI : 82**	**to**	**PM 10 :** 102 **PM2.5:** 75 AQI : 74

GRAF FOR THE THIRD DAY FOR DUST:



SITE CONSTRUCTION AREA :

Figure 12 shows site area

Figure 13 shows site area

Figure 14 shows testing process

Figure 15 dB taking by dB meter

SUMMARY

- Testing, analyzing and retrieval of data was done for 3 days, on the 16th of September until 18th of September 2019.
- Testing was done at site construction at Muar. The site is constructing building for Majlis Perbandaran Muar.
- On the day , Malaysia has been facing with haze. So, the air quality index is distracted with haze.
- The building also give impacts on testing because of its level.
- Along the days of testing, we observe that the site is lack of activities. So, the noise is partially come from road adjacent with it.
- The site become busy starting from 3 pm because the work of hacking tiles at 8th floor.
- Because of its high level of source noise, the data have to take 500mm from panel to take the real reading. The 1m from panel will make the reading distracted with other background noise.
- The products we have installed are stable and last for 3 days during data collection.
- Data retrieval is taken every 1 hour and recorded, data retrieval for sound (dB) has used a special tool to record the sound value in dB units called dB Meters. The data collection for dust used an application downloaded in the handset, the application can record the data for air quality around the site.

4.4.5 : type of scope: iv) Road

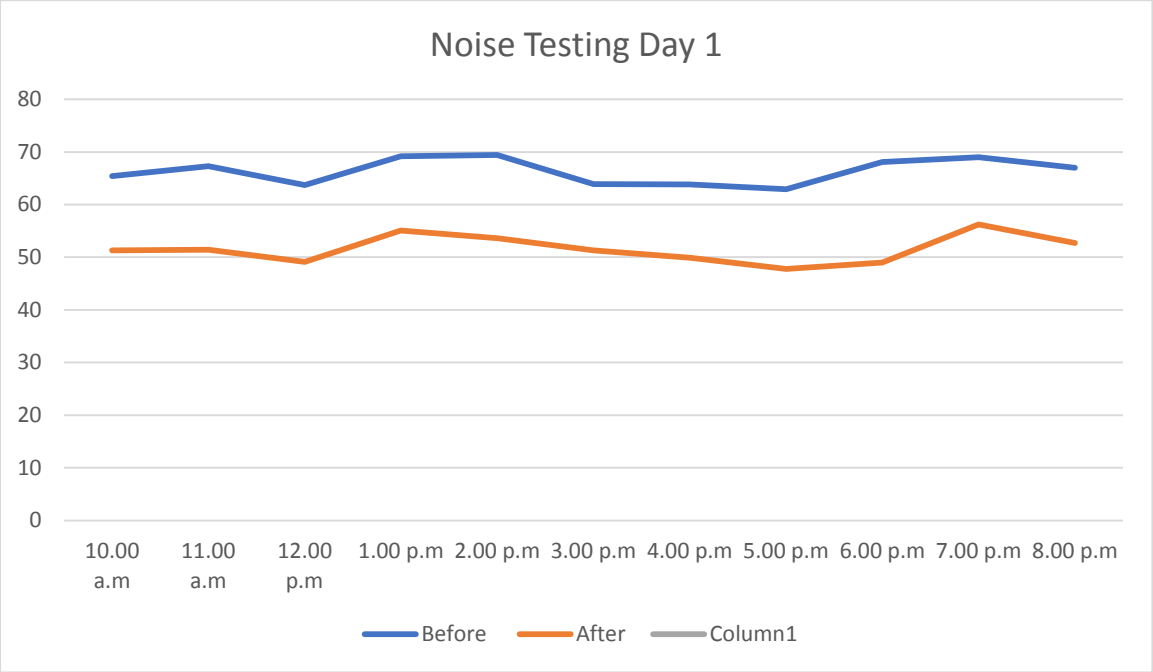
By : Mohammad Hamzy Fitri Bin Hamzah

No matrix : 08DPB17F1202

Date : 21 – 23 September 2019

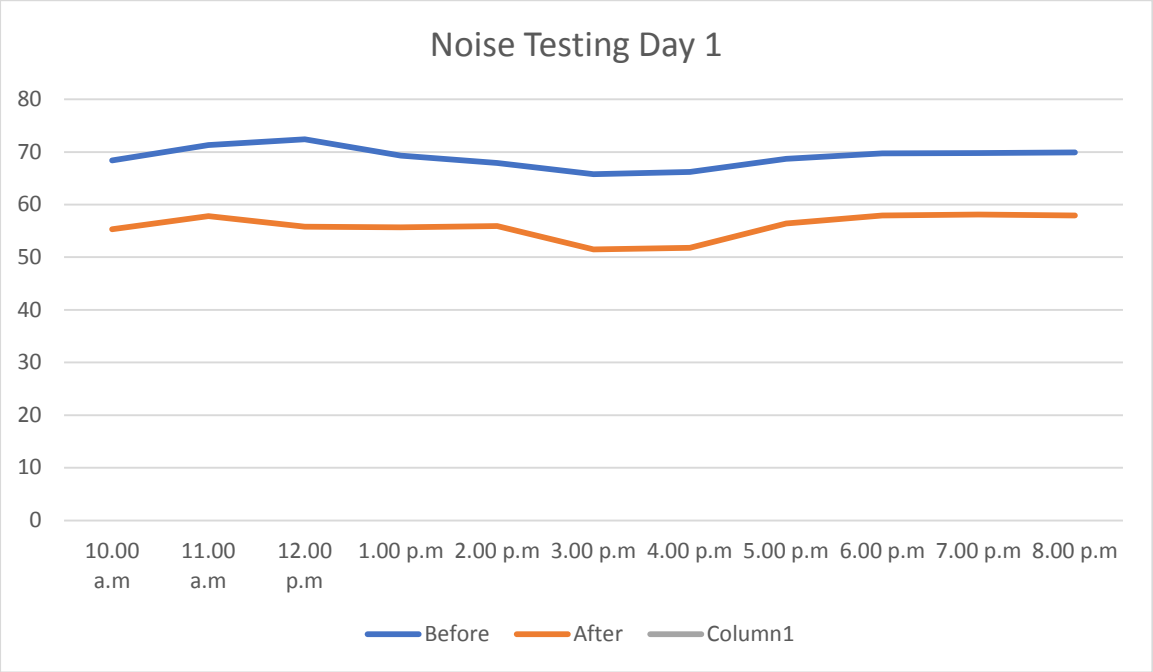
Place : Muar,Johor

Noise Testing Day 1(500mm)



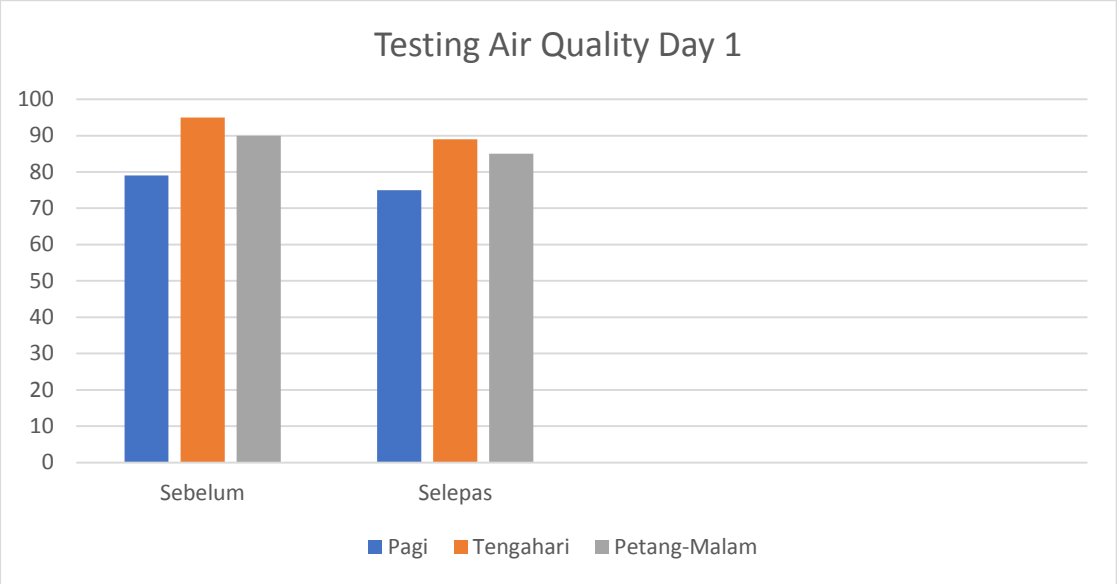
Time	Decibel(dB)before and after
10.00 a.m	65.4 - 51.3
11.00 a.m	67.3 - 51.4
12.00 p.m	63.7 - 49.1
1.00 p.m	69.2 - 55.1
2.00 p.m	69.4 - 53.6
3.00 p.m	63.8 - 51.3
4.00 p.m	63.8 - 49.9
5.00 p.m	62.9 - 47.8
6.00 p.m	68.1 - 49
7.00 p.m	69 - 56.2
8.00 p.m	67.8 - 52.7

Noise Testing Day 1(1 m)



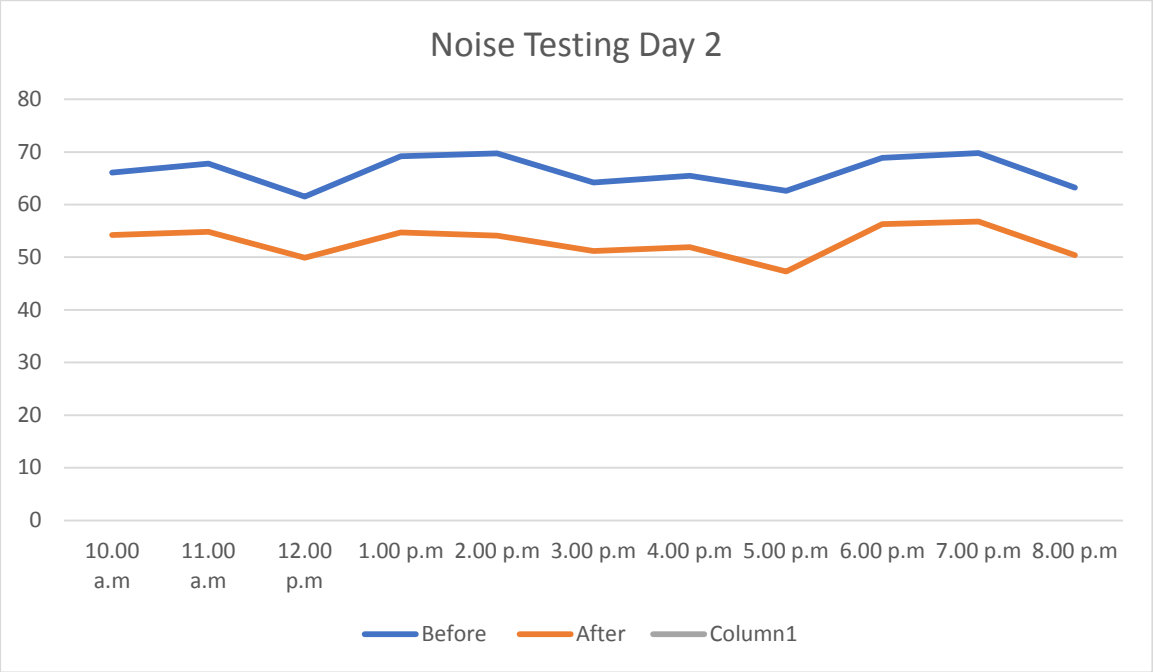
Time	Decibel(dB)before and after
10.00a.m	68.4-55.3
11.00a.m	71.3-57.8
12.00p.m	72.4-55.8
1.00p.m	69.3-55.7
2.00p.m	67.9-55.9
3.00p.m	65.8-51.5
4.00p.m	66.2-51.8
5.00p.m	68.7-56.4
6.00p.m	69.7-57.9
7.00pm	69.8-58.1
8.00p.m	69.9-57.9

Air Quality Test (Day 1)



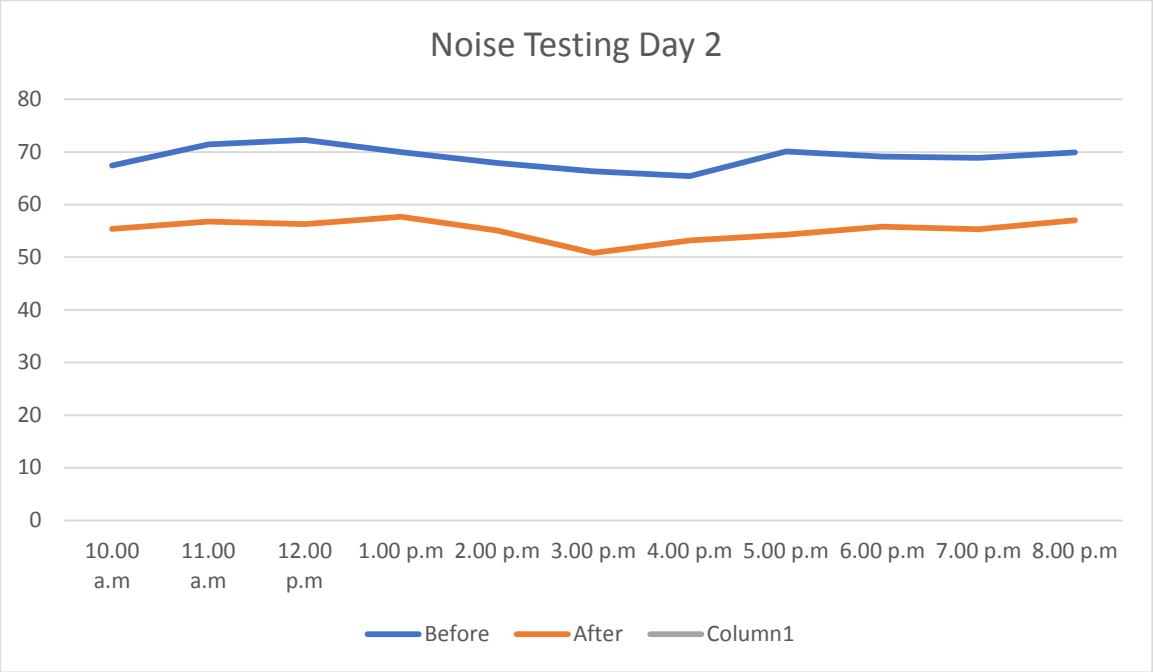
Time	Air Quality
Morning(10.00a.m-12p.m)	PM10-115 to 109 PM2.5-99 to 94 AQI-79 to 75
Noon(1.00p.m-3.00p.m)	PM10-140 to 134 PM2.5-106 to 99 AQI-95 to 89
Afternoon(3.00p.m-8.00p.m)	PM10-120 to 115 PM2.5-111 to 107 AQI-90 to 85

Noise Testing Day 2 (500 mm)



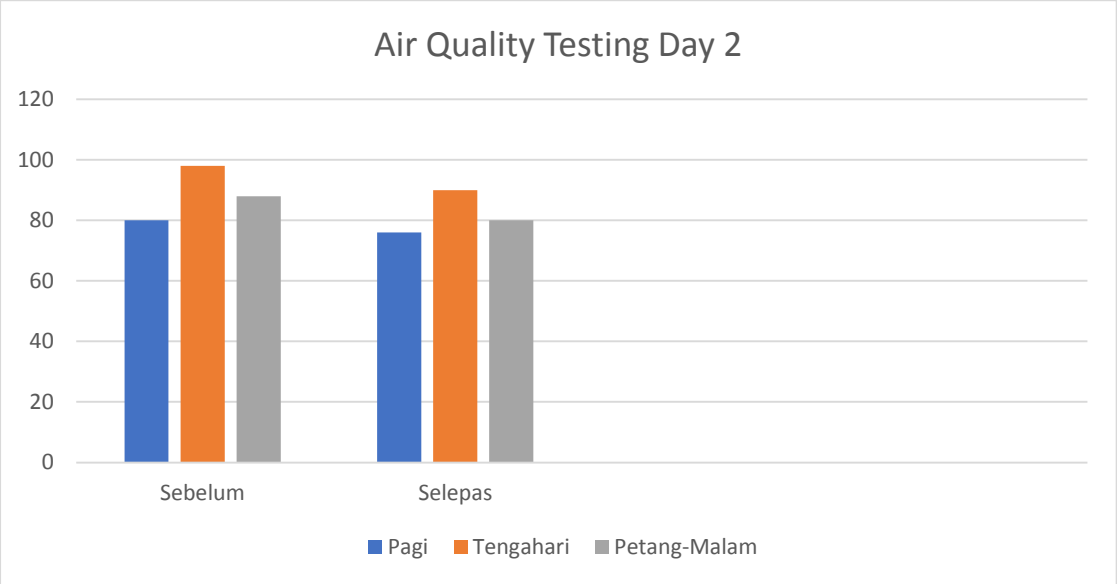
Time	Decibel(dB)before and after
10.00 a.m	66.1 - 54.2
11.00 a.m	67.8 - 54.8
12.00 p.m	61.5 - 49.9
1.00 p.m	69.2 - 54.7
2.00 p.m	69.7 - 54.1
3.00 p.m	64.2 - 51.2
4.00 p.m	65.5 - 51.9
5.00 p.m	62.6 - 47.3
6.00 p.m	68.9 - 56.3
7.00 p.m	69.8 - 56.8
8.00 p.m	63.2 - 50.4

Noise Testing Day 2 (1 m)



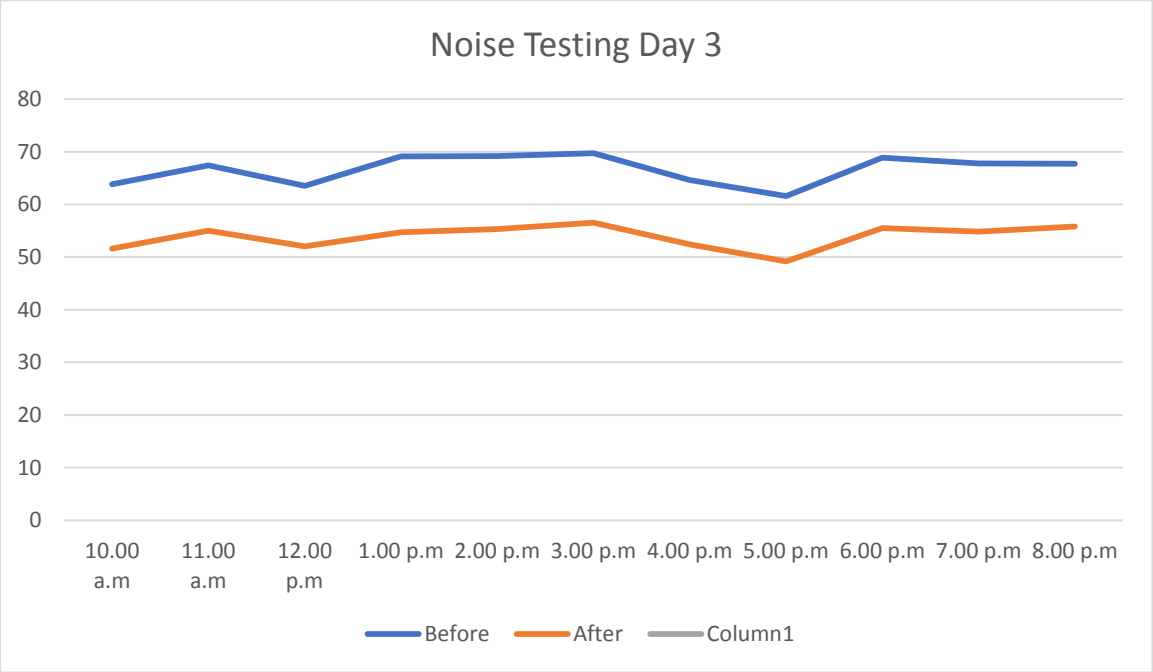
Time	Decibel(dB)before and after
10.00a.m	67.4-55.4
11.00a.m	71.4-56.8
12.00p.m	72.3-56.3
1.00p.m	70-57.7
2.00p.m	67.9-55.1
3.00p.m	66.3-50.8
4.00p.m	65.4-53.2
5.00p.m	70.1-54.3
6.00p.m	69.1-55.8
7.00p.m	68.9-55.3
8.00p.m	69.9-57

Air Quality Testing Day 2



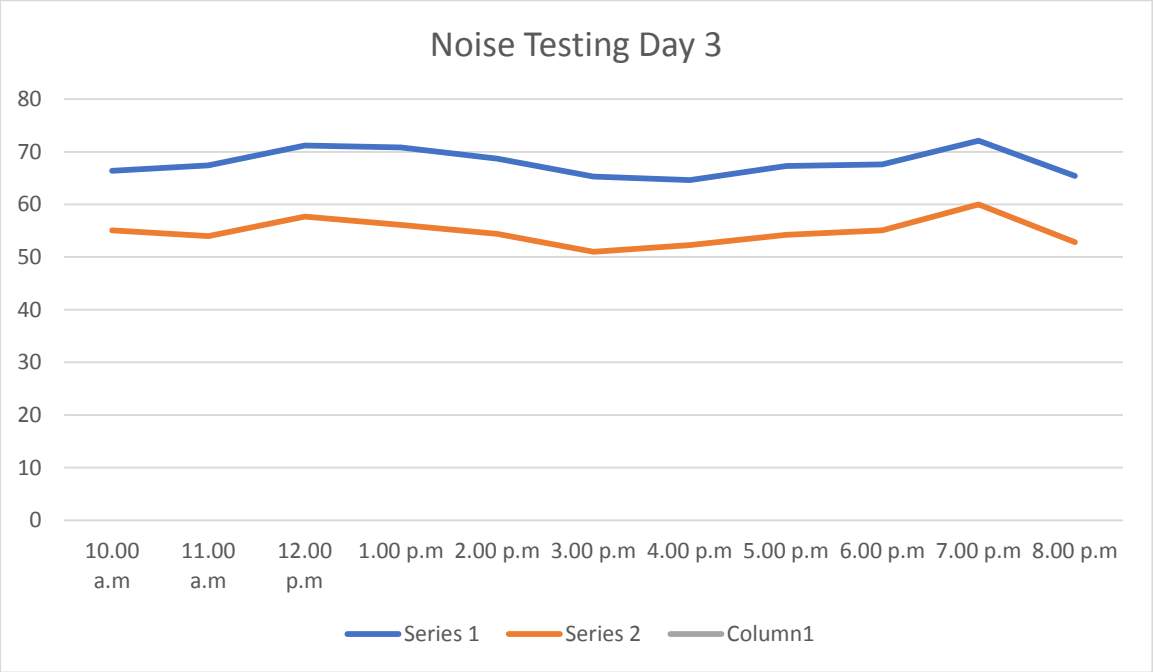
Time	Air Quality
Morning(10.00a.m-12.00p.m)	PM10-117 to 110 PM2.5-99 to 93 AQI-80 to 76
Noon(1.00p.m-3.00p.m)	PM10-141 to 136 PM2.5-109 to 98 AQI-98 to 90
Afternoon(4.00a.m-8.00p.m	PM10-118 to 110 PM2.5-108 to 102 AQI-88 to 82

Noise Testing Day 3(500 mm)



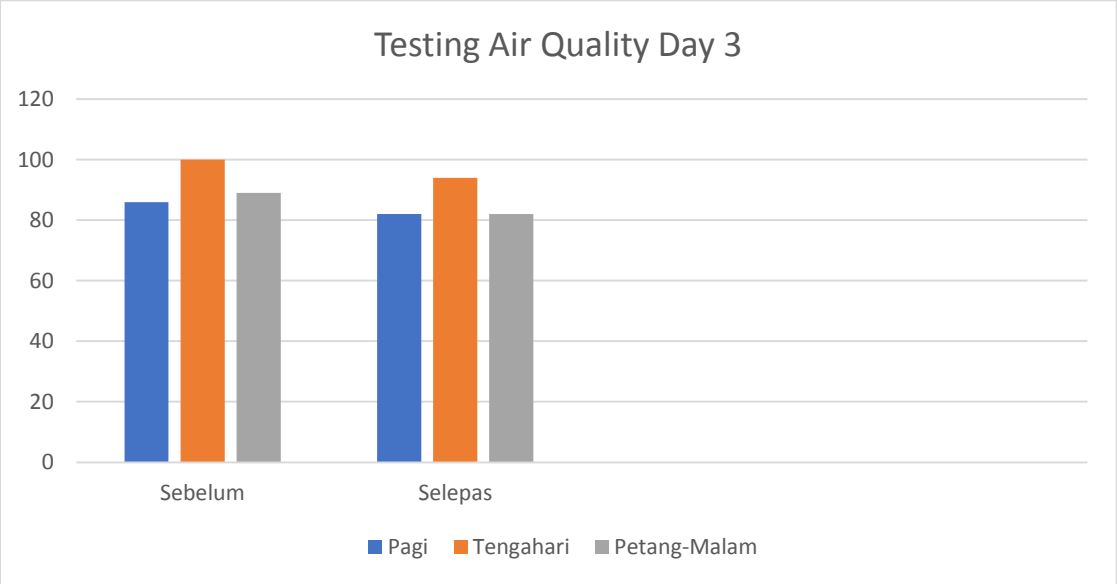
Time	Decibel(dB)before and after
10.00a.m	63.8 - 51.6
11.00a.m	67.4 - 55
12.00p.m	63.5 - 52
1.00p.m	69.1 - 54.7
2.00p.m	69.2 - 55.3
3.00p.m	69.7 - 56.5
4.00p.m	64.6 - 52.4
5.00p.m	61.6 - 49.2
6.00p.m	68.9 - 55.5
7.00p.m	67.8 - 54.8

Noise Testing Day 3 (1m)



Time	Decibel(dB)before and after
10.00a.m	66.4-55.1
11.00a.m	67.4-54
12.00p.m	71.2-57.7
1.00p.m	70.8-56.1
2.00p.m	68.7-54.4
3.00p.m	65.3-51
4.00p.m	64.6-52.3
5.00p.m	67.3-54.2
6.00p.m	67.6-55.1
7.00p.m	72.1-60
8.00p.m	65.4-52.8

Air Quality Day 3



Morning(10.00a.m-12.00p.m)	PM10-117 to 111 PM2.5-97 to 93 AQI-86 to 82
Noon(1.00p.m-3.00p.m)	PM10-135 to 129 PM2.5-111 to 101 AQI-100 to 94
Afternoon(4.00a.m-8.00p.m	PM10-117 to 109 PM2.5-106 to 102 AQI-89 to 84

GRAPH ANALYSIS

4) Noise:
   - Day 1(21 September), The road are started to being busy and noisy at 10.00 p.m.

   - The increase of the sound that we are found out are at 12.00 to 1.00 pm.At this time,the panel can reduce the sound by 15Db.

   - The noise reading are getting decrease by 4-5 Db at 3.00 pm-5.00 pm due to number of vehicles on the road that are also getting decrease.Overall the panel are doing a great job by reducing the sound by 13Db.

   - The road are getting busy between 8.00pm-9.00pm.We found that the vehicle are getting more busier during this time.The Db are getting increase and started to decrease before 8.00pm.

   - Day 2(22 September),overall the graph are shown the decreasing of the Db(around 13-16 Db).

   - 22 September,Sunday was a working day at Muar,Johor.The sound are increasing overall during this day than the day 1.

   - Day 3(23 September),like day 1 and 2,the reading of the noise shown the average decline by 15-16 Db.

   - By 10.00 am to 11.00 am,the reading are getting increase about 5-6 Db due to the road that are getting increase for the number of vehicles.

   - The graph is getting higher starting at 12.00 p.m and getting lower back after 3.00pm-5.00 pm because the number of the road user are getting decrease in number.

   - During evening(6.00 pm),the graph are getting higher and it reach the highest point at 7.00 pm.The panel are really doing well by reducing the noise about 17Db.

5) -For the dust testing,overall the bar of the day 1,2 and 3 shown a decrease of AQI.
   -We found out that the AQI reading are at the highest point during the day to compare with during the morning and evening/night.
   -The main factor of the the increasing number of AQI is because of the vehicles that are increasing more and more,it causing the sand to rise above the airspace and make the rise of AQI reading.

Noisy sources from road:

-Modified motorcycle

-Lorry/heavy duty vehicles

-Regular vehicle/car

Dust sources :

g) Sand /dust

h) Dust from the heavy vehicles that stored cement/sand for construction.

PM10 : Coarse dust particles (PM10) are 2.5 to 10 micrometers in diameter. Sources include crushing or grinding operations and dust stirred up by vehicles on roads. These tiny particles which are about 30 times smaller than the width of a hair on your head are small enough to get inhaled past our defensive nose hairs and into our **lungs.**

PM2.5 : Fine particles (PM2.5) are 2.5 micrometers in diameter or smaller, and can only be seen with an electron microscope. Fine particles are produced from all types of combustion, including motor vehicles, power plants, residential wood burning, forest fires, agricultural burning, and some industrial processes. While PM10's story ends at the lungs, PM2.5 can pass from our lungs into our blood supply and be carried throughout our bodies thereby making them **"the invisible killer"**

PICTURE THAT ARE RELATED TO THE PICTURE:

Figure 16 shows testing process

Figure 17 shows testing on night

Figure 18 shows take a reading of road noise

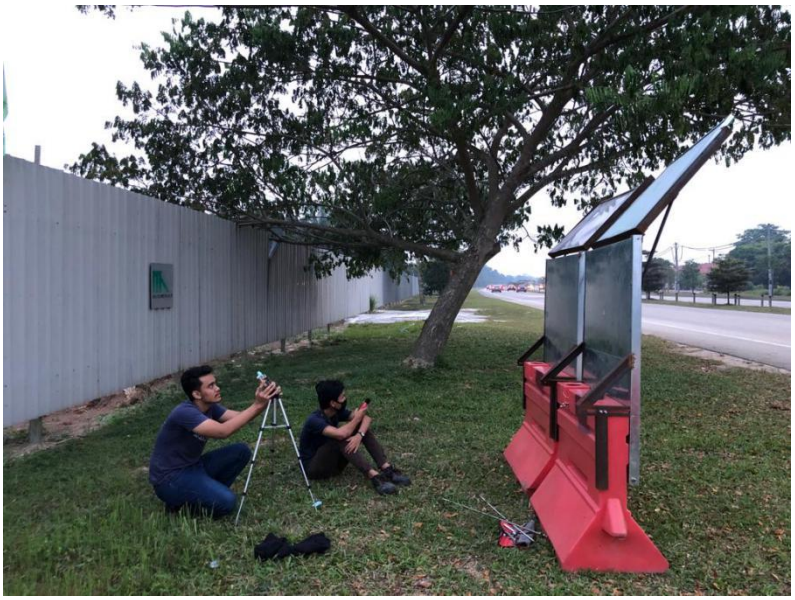


Figure 19 shows taking a reading of air quality

Figure 20 shows taking a reading of road noise

CHAPTER 5
DISCUSSION AND SUMMARY

5.1 INTRODUCTION

For this chapter, the decisions made are based on all the results obtained from the experiments and discussions in the preceding chapters. In this chapter also, the relevant matters pertain to the objectives of the study as well as the recommendations of the research undertaken. In addition, conclusions have been drawn for this experiment. Descriptions are also related to discussion of how the data obtained is related to the research question or topic of study. Descriptions also link the results of the study with the previous study's theories and findings in the review of the work. The research questions and the conclusions of the study are re-presented in the conclusions section to summarize the report.

5.2 DISCUSSION

For the Multi Noise & Dust Guardian (NAD G), test projects were carried out in their respective areas such as workshops, factories, roads and construction sites. All went well with no time constraints, transportation problems and lack of materials. The test panel carried a rough estimate of the absorption and prevented the noise from emitting 35 dB. These readings are taken from just behind the panel to get a more accurate reading. This product was also tested by experts as we collaborated with ISTIQ NOISE CONTROL SDN BHD. Resilience was also tested during the test project. The stability of this product has also been made and the results are stable.

Dust capture nets consisting of 2 layers of nets and 1 set of sponges are evaluated based on the difference in dust attached to nets using only 1 layer and nets with multiple layers and 1 set sponge. These nets are also heat resistant so they are not easily broken and rot.

5.3 CONCLUSION

Once the site testing and research has been carried out, the product has achieved its stated objectives. The objective is to upgrade existing barriers to newer innovations by using sound panels and nets to absorb and capture dust. The scope of the project is to carry out a test project based on scattered dust residues such as wood dust and dust. Uncontrolled noise is also the main reason for our testing project. After the data was recorded for 3 days, it turned out to be very effective and absorbed dust and captured the waste.

In this study, the effectiveness of sound absorption panels can be measured successfully because of the materials used namely galvanized iron and sponge. The net is also effective after the second refinement is done on the net by placing a sponge to make the net two functions namely sound absorption and prevent dust. This idea came out of a net problem that allowed the delicate smoothness to be removed. From the assessment, this panel absorbent noise and dust net is effective in terms of absorption noise that can absorb 35 dB and the net can also block dust like PM 10 and PM 2.5. The design also adheres to good and good safety features as the product is sturdy and stable to use. The special thing about this product is that it is portable and can be carried anywhere as each component can be removed for easy storage.

Overall, with the presence of this Multi Noise & Dust Guardian (NAD G), workers who are away from machines are easier to do other jobs because they are less noise. Out-of-place users are distracted by the noise generated by industrial machines and roads. Dust will also be blocked by the presence of net dust and allow more controlled dust release. This product can also be used by PSAs such as PB workshops and wood workshops.

5.4 SUGGESTION

Sound absorption panels and dust capture nets are one of the methods used to reduce noise and dust emission from beyond the panel.

Following are some of the things that are being looked at to improve the quality of the product and the research that will be done on noise and dust absorption panels to determine their effectiveness:

- Increases the net dust to prevent more dust passing through it.
- Use iron on the net with lighter steel such as stainless steel or aluminium.
- Uses lighter materials besides galvanized steel for easier storage and installation work.
- Expand the target market and not just the 4 places the test project has been created.

5.5 CHAPTER SUMMARY

After conducting studies from chapters 1 to 5, we have been able to conduct project tests in each of the designated areas. As a result of the experiments conducted on the sound absorption panels and dust nets, it can be concluded that NAD G has achieved the objective of the study of improving existing barriers and absorbing and suppressing noise by 35 dB. There are many obstacles we face in finding data. However, we have succeeded in shaping an innovation that is yet to be marketed. The collected data were analyzed and the findings of the study were presented in graph and table form in chapter 4 of the report. It is hoped that with the existence of this study, it will inspire future studies to delve deeper into relevant studies.

Thanks to everyone who helped to make this project a success, especially to our supervisor PN. NUR HAZLINA BINTI LAMLI for giving us so much support. Thanks also to the portals for providing us with information.

Finally, hopefully the innovations in noise and dust will attract a lot of young people to create new innovation products to meet the demands of consumers out there.

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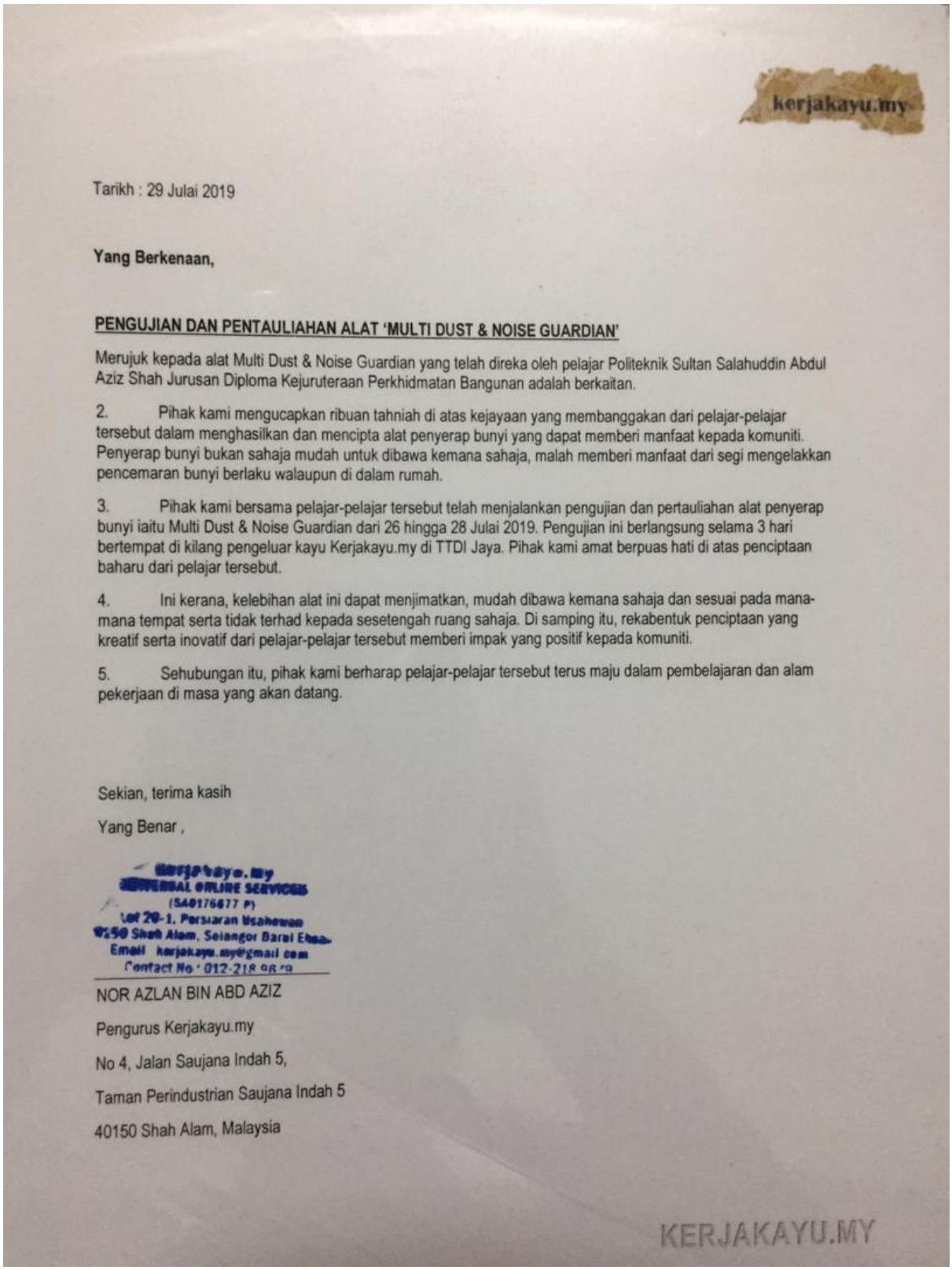
APPENDIX

APPENDIX A	**INDUSTRY CERTIFICATION : KERJAKAYU.COM**
APPENDIX B	**INDUSTRY CERTIFICATION : WARISAN ATHIRA**
APPENDIX C	**INDUSTRY CERTIFICATION : MISIKHAS SDN BHD**
APPENDIX D	**COST OF COMPONENTS**
APPENDIX E	**INVOICE**
APPENDIX F	**GANT CHART**
APPENDIX G	**FABRICATION DRAWING**

APPENDIX A

1) Industry certification from Kerjakayu.com
Scope : factory



kerjakayu.my

Tarikh : 29 Julai 2019

Yang Berkenaan,

PENGUJIAN DAN PENTAULIAHAN ALAT 'MULTI DUST & NOISE GUARDIAN'

Merujuk kepada alat Multi Dust & Noise Guardian yang telah direka oleh pelajar Politeknik Sultan Salahuddin Abdul Aziz Shah Jurusan Diploma Kejuruteraan Perkhidmatan Bangunan adalah berkaitan.

2. Pihak kami mengucapkan ribuan tahniah di atas kejayaan yang membanggakan dari pelajar-pelajar tersebut dalam menghasilkan dan mencipta alat penyerap bunyi yang dapat memberi manfaat kepada komuniti. Penyerap bunyi bukan sahaja mudah untuk dibawa kemana sahaja, malah memberi manfaat dari segi mengelakkan pencemaran bunyi berlaku walaupun di dalam rumah.

3. Pihak kami bersama pelajar-pelajar tersebut telah menjalankan pengujian dan pertauliahan alat penyerap bunyi iaitu Multi Dust & Noise Guardian dari 26 hingga 28 Julai 2019. Pengujian ini berlangsung selama 3 hari bertempat di kilang pengeluar kayu Kerjakayu.my di TTDI Jaya. Pihak kami amat berpuas hati di atas penciptaan baharu dari pelajar tersebut.

4. Ini kerana, kelebihan alat ini dapat menjimatkan, mudah dibawa kemana sahaja dan sesuai pada mana-mana tempat serta tidak terhad kepada sesetengah ruang sahaja. Di samping itu, rekabentuk penciptaan yang kreatif serta inovatif dari pelajar-pelajar tersebut memberi impak yang positif kepada komuniti.

5. Sehubungan itu, pihak kami berharap pelajar-pelajar tersebut terus maju dalam pembelajaran dan alam pekerjaan di masa yang akan datang.

Sekian, terima kasih

Yang Benar ,

Kerjakayu.my
GENERAL ONLINE SERVICES
(S40176877 P)
Lot 20-1, Persiaran Usahawan
U1/50 Shah Alam, Selangor Barat Ehsa
Email : kerjakayu.my@gmail.com
Contact No : 012-218 98 79

NOR AZLAN BIN ABD AZIZ

Pengurus Kerjakayu.my

No 4, Jalan Saujana Indah 5,

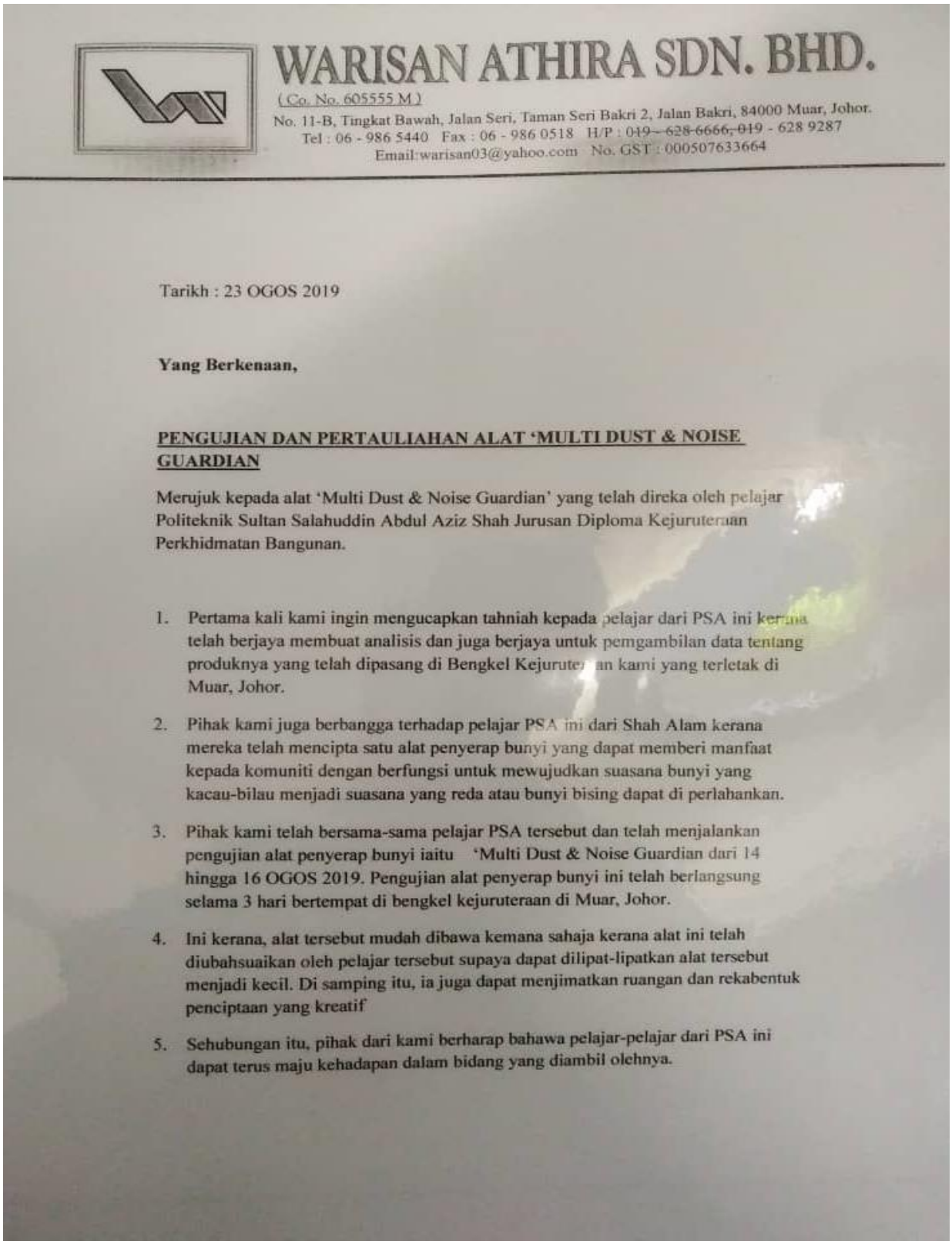
Taman Perindustrian Saujana Indah 5

40150 Shah Alam, Malaysia

KERJAKAYU.MY

APPENDIX B

2) Industry certification from Warisan Athira SDN BHD
Scope : Engineering workshop



WARISAN ATHIRA SDN. BHD.
(Co. No. 605555 M)
No. 11-B, Tingkat Bawah, Jalan Seri, Taman Seri Bakri 2, Jalan Bakri, 84000 Muar, Johor.
Tel : 06 - 986 5440 Fax : 06 - 986 0518 H/P : 019 - 628 6666, 019 - 628 9287
Email:warisan03@yahoo.com No. GST : 000507633664

Tarikh : 23 OGOS 2019

Yang Berkenaan,

PENGUJIAN DAN PERTAULIAHAN ALAT 'MULTI DUST & NOISE GUARDIAN

Merujuk kepada alat 'Multi Dust & Noise Guardian' yang telah direka oleh pelajar Politeknik Sultan Salahuddin Abdul Aziz Shah Jurusan Diploma Kejuruteraan Perkhidmatan Bangunan.

1. Pertama kali kami ingin mengucapkan tahniah kepada pelajar dari PSA ini kerana telah berjaya membuat analisis dan juga berjaya untuk pemgambilan data tentang produknya yang telah dipasang di Bengkel Kejuruteraan kami yang terletak di Muar, Johor.
2. Pihak kami juga berbangga terhadap pelajar PSA ini dari Shah Alam kerana mereka telah mencipta satu alat penyerap bunyi yang dapat memberi manfaat kepada komuniti dengan berfungsi untuk mewujudkan suasana bunyi yang kacau-bilau menjadi suasana yang reda atau bunyi bising dapat di perlahankan.
3. Pihak kami telah bersama-sama pelajar PSA tersebut dan telah menjalankan pengujian alat penyerap bunyi iaitu 'Multi Dust & Noise Guardian dari 14 hingga 16 OGOS 2019. Pengujian alat penyerap bunyi ini telah berlangsung selama 3 hari bertempat di bengkel kejuruteraan di Muar, Johor.
4. Ini kerana, alat tersebut mudah dibawa kemana sahaja kerana alat ini telah diubahsuaikan oleh pelajar tersebut supaya dapat dilipat-lipatkan alat tersebut menjadi kecil. Di samping itu, ia juga dapat menjimatkan ruangan dan rekabentuk penciptaan yang kreatif
5. Sehubungan itu, pihak dari kami berharap bahawa pelajar-pelajar dari PSA ini dapat terus maju kehadapan dalam bidang yang diambil olehnya.

Sekian, terima kasih.

Yang Benar,

WARISAN ATHIRA SDN BHD
(CO. NO. 405555-M)
NO. 11, TINGKAT SATU (1),
JALAN SERI, TAMAN SERI BAKRI 2,
JALAN BAKRI, 84000 MUAR, JOHOR.
TEL: 06-9865440 FAX: 06-9860518
H/P: 019-6289287 / ~~019-6284666~~

AHMAD BIN HASHIM

Pengurus Bengkel Kejuruteraan

No. 132-2, Jalan Temenggung Ahmad,

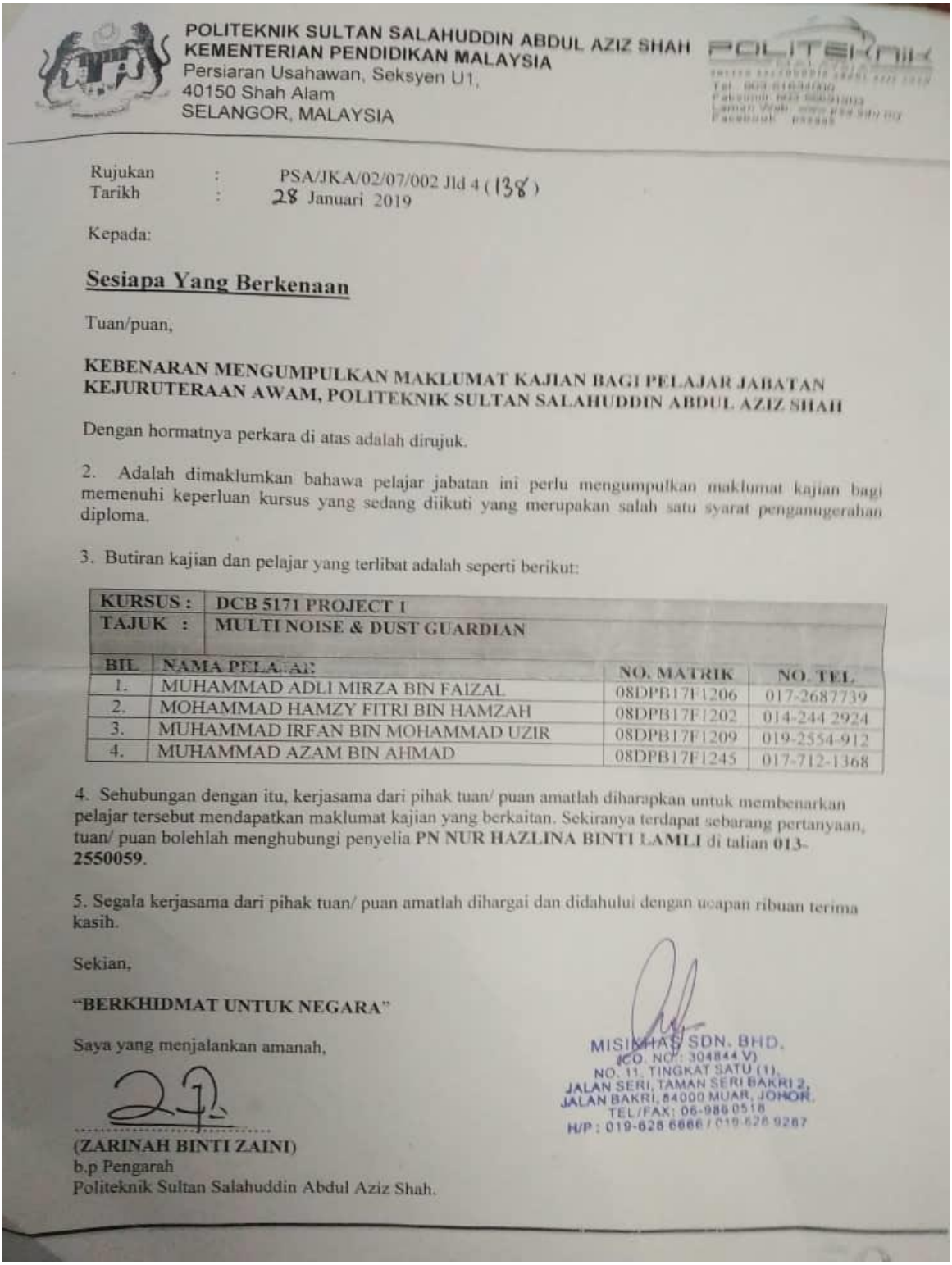
Parit Prupok,

84000 Muar,

Johor.

APPENDIX C

3) Industry certificated from MISIKHAS SDN BHD
Scope : site construction and road.



POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH
KEMENTERIAN PENDIDIKAN MALAYSIA
Persiaran Usahawan, Seksyen U1,
40150 Shah Alam
SELANGOR, MALAYSIA

Rujukan : PSA/JKA/02/07/002 Jld 4 (138)
Tarikh : 28 Januari 2019

Kepada:

Sesiapa Yang Berkenaan

Tuan/puan,

KEBENARAN MENGUMPULKAN MAKLUMAT KAJIAN BAGI PELAJAR JABATAN KEJURUTERAAN AWAM, POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

Dengan hormatnya perkara di atas adalah dirujuk.

2. Adalah dimaklumkan bahawa pelajar jabatan ini perlu mengumpulkan maklumat kajian bagi memenuhi keperluan kursus yang sedang diikuti yang merupakan salah satu syarat penganugerahan diploma.

3. Butiran kajian dan pelajar yang terlibat adalah seperti berikut:

KURSUS :	**DCB 5171 PROJECT I**
TAJUK :	**MULTI NOISE & DUST GUARDIAN**

BIL	NAMA PELAJAR	NO. MATRIK	NO. TEL
1.	MUHAMMAD ADLI MIRZA BIN FAIZAL	08DPB17F1206	017-2687739
2.	MOHAMMAD HAMZY FITRI BIN HAMZAH	08DPB17F1202	014-244 2924
3.	MUHAMMAD IRFAN BIN MOHAMMAD UZIR	08DPB17F1209	019-2554-912
4.	MUHAMMAD AZAM BIN AHMAD	08DPB17F1245	017-712-1368

4. Sehubungan dengan itu, kerjasama dari pihak tuan/ puan amatlah diharapkan untuk membenarkan pelajar tersebut mendapatkan maklumat kajian yang berkaitan. Sekiranya terdapat sebarang pertanyaan, tuan/ puan bolehlah menghubungi penyelia **PN NUR HAZLINA BINTI LAMLI** di talian **013-2550059**.

5. Segala kerjasama dari pihak tuan/ puan amatlah dihargai dan didahului dengan ucapan ribuan terima kasih.

Sekian,

"BERKHIDMAT UNTUK NEGARA"

Saya yang menjalankan amanah,

.....
(ZARINAH BINTI ZAINI)
b.p Pengarah
Politeknik Sultan Salahuddin Abdul Aziz Shah.

MISIKHAS SDN. BHD.
(CO. NO: 304844 V)
NO. 11, TINGKAT SATU (1),
JALAN SERI, TAMAN SERI BAKRI 2,
JALAN BAKRI, 84000 MUAR, JOHOR.
TEL/FAX: 06-986 0518
H/P : 019-628 6666 / 019-628 9287

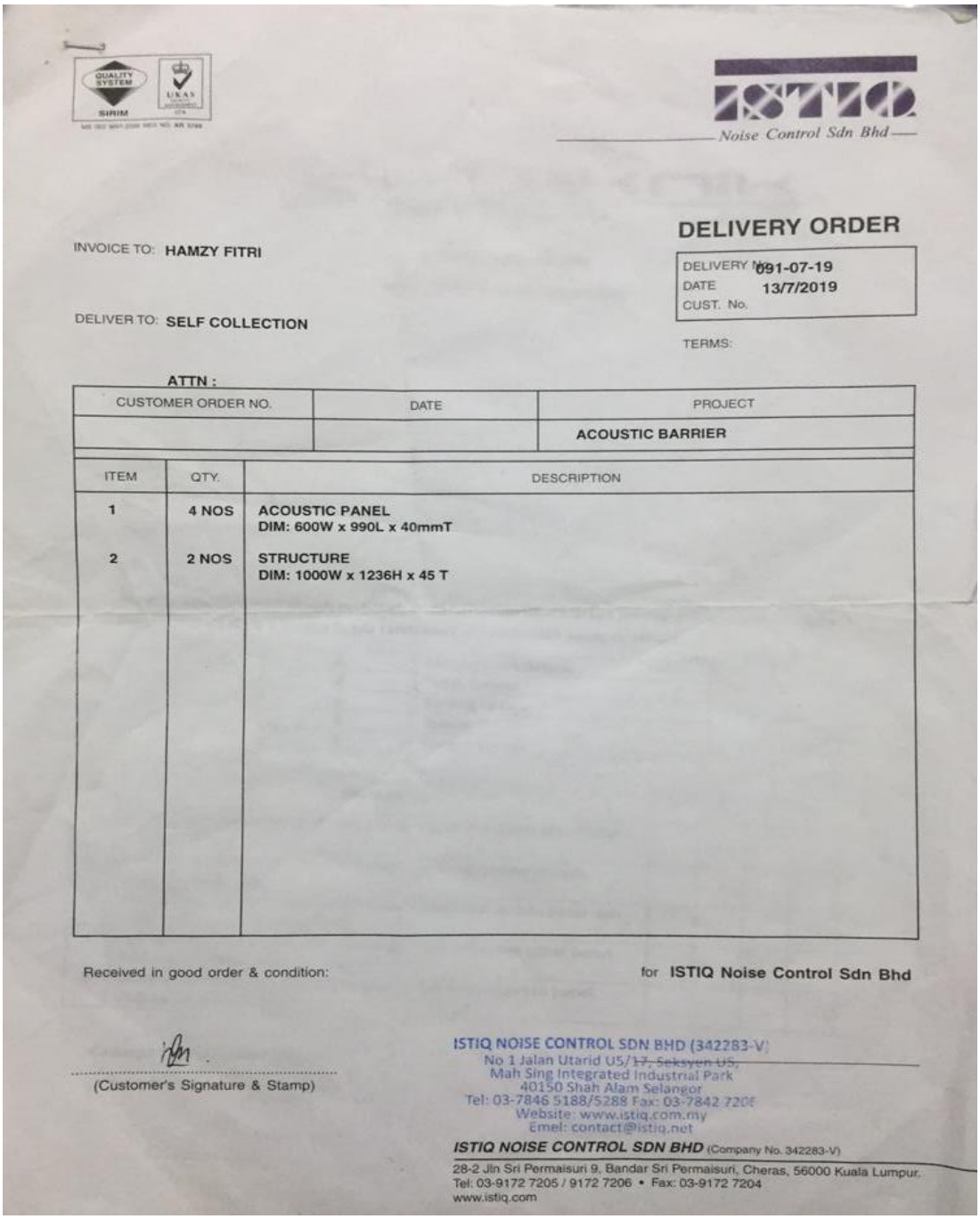
APPENDIX D

4) component cost

No.	Component	Quantity	per unit price (RM)	Total (RM)
1.	Butterfly wing nut	2	RM 3.15	RM 6.30
-	-	-	RM-	RM-
2.	Hex nut	6	RM 1. 23	RM 7.38
3.	Hex bolt	4	RM 1.00	RM 4.00
4.	*Drop in anchor*	4	RM 1.00	RM 4.00
5.	*Washer*	12	RM 0.50	RM 6.00
6.	Warning Reflection Light	6	RM 4.30	RM 4.30
Total cost				**RM 31.98**

APPENDIX E

5) invoice panel manufacturing



Noise Control Sdn Bhd

DELIVERY ORDER

INVOICE TO: **HAMZY FITRI**

DELIVERY No. **091-07-19**
DATE **13/7/2019**
CUST. No.

DELIVER TO: **SELF COLLECTION**

TERMS:

ATTN :

CUSTOMER ORDER NO.	DATE	PROJECT
		ACOUSTIC BARRIER

ITEM	QTY.	DESCRIPTION
1	4 NOS	**ACOUSTIC PANEL** **DIM: 600W x 990L x 40mmT**
2	2 NOS	**STRUCTURE** **DIM: 1000W x 1236H x 45 T**

Received in good order & condition:

for **ISTIQ Noise Control Sdn Bhd**

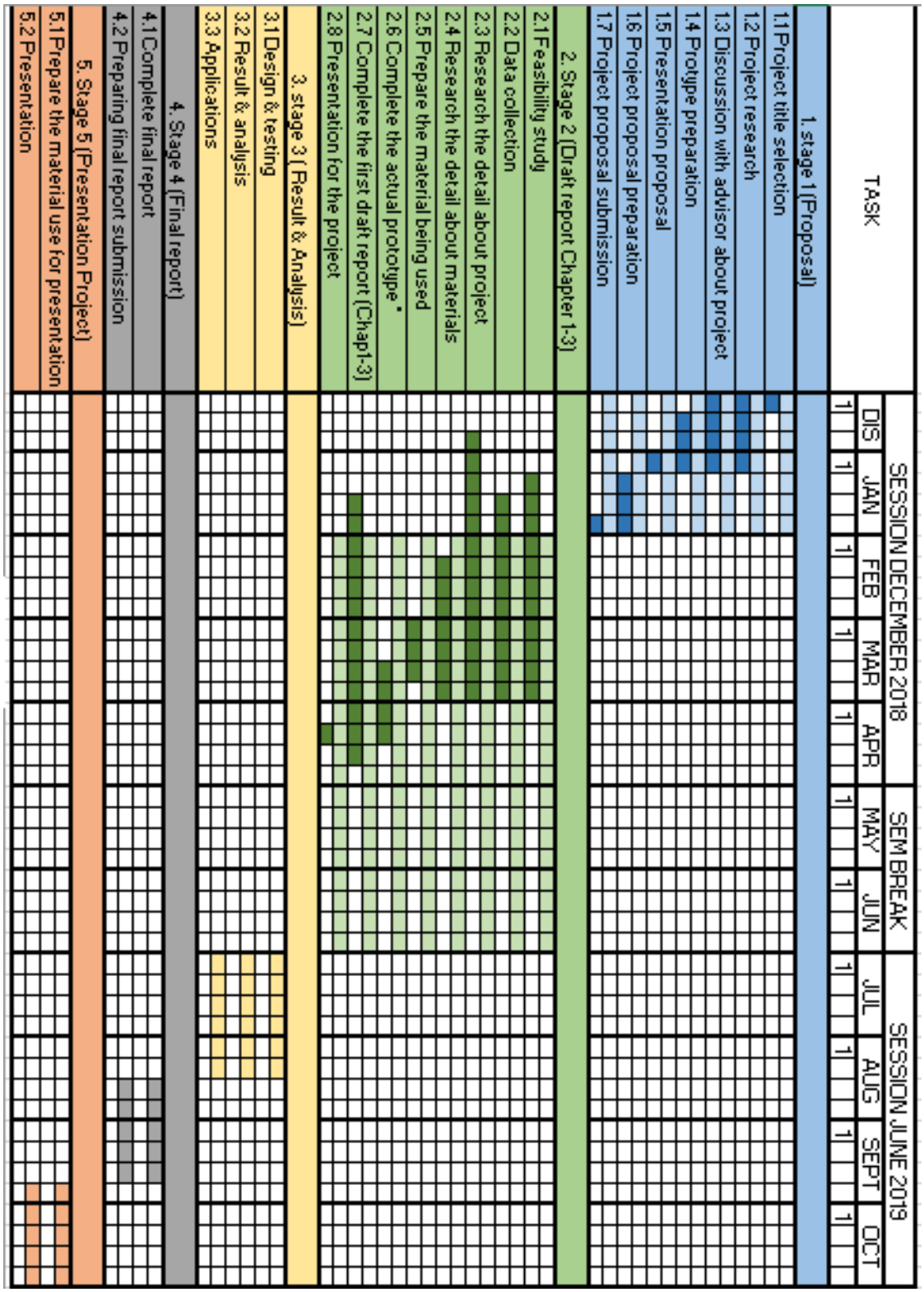
(Customer's Signature & Stamp)

ISTIQ NOISE CONTROL SDN BHD (342283-V)
No 1 Jalan Utarid U5/17, Seksyen U5,
Mah Sing Integrated Industrial Park
40150 Shah Alam Selangor
Tel: 03-7846 5188/5288 Fax: 03-7842 720[illegible]
Website: www.istiq.com.my
Emel: contact@istiq.net

ISTIQ NOISE CONTROL SDN BHD (Company No. 342283-V)
28-2 Jln Sri Permaisuri 9, Bandar Sri Permaisuri, Cheras, 56000 Kuala Lumpur.
Tel: 03-9172 7205 / 9172 7206 • Fax: 03-9172 7204
www.istiq.com

APPENDIX F

6) Gant Chart



APPENDIX G

7) Fabrication drawing