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Maun Terra: Coconut Coir and Banana Pseudo-Stem Noise Reduction Wall Panel

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***Abstract*: Sound is everywhere; it is part of everyday life, but excessive sound can turn into loud noise that creates noise pollution. Noise pollution is an environmental problem that harmfully affects human beings due to too much noise. The European Environment Agency (2020) stated that 48,000 new cases of acute heart disease and 12,000 early deaths happen each year because of noise pollution. This research aims to create a prototype called "Maun Terra" that reduces noise that causes environmental noise pollution. The objective of the study is to develop noise-reduction wall panels using natural resources made of fibers like banana pseudo-stem and coconut coir. The focus of the study is to distinguish the decibels of noise that Maun Terra can lessen. The prototype's length is 11.5 inches, 11 inches in width, and 9 inches in height. The test results for the decibels with and without Maun Terra and from inside and outside of Maun Terra showed good results. The testing was conducted in an open space that is noise pollution-free. The prototype is placed 1 meter away from the 1150 Hz. The testing result of the mean without Maun Terra was 60.81 dB, 51.11 dB with Maun Terra, 51.11 dB coming from the inside, and 50.17 dB coming from the outside. The outcome showed that there is a 13.792 difference in the noise decibels between with and without Maun Terra. Thus, there is a significant difference in the decibels between without Maun Terra and the decibels with Maun Terra. Along with that, the difference in the decibels between the inside and outside of Maun Terra was 1.648. Thus, there is no significant difference in the decibels between the inside and the decibels from the outside of Maun Terra. To sum it up, it is proven that "Maun Terra: Coconut Coir and Banana Pseudo-Stem Noise Reduction Wall Panel" is a cheaper and eco-friendly alternative solution for environmental noise pollution. For the recommendation, the researchers had a hard time perfecting the shape, so the researchers suggested using a silicon molder for a more perfect and precise shape. The researchers suggest that future researchers find another alternative method to dry the prototype faster. The researchers also recommend finding alternative shapes that can be effective noise-reduction wall panels. Furthermore, the researchers recommend that future researchers improve the aesthetics of the prototype.**

***Keywords*: Maun Terra, Coconut Coir, Banana Pseudo-Stem, Noise Reduction.**

1. Introduction

The sound resembles water in many ways. Since sound has no structure or form, sound adapts to the surroundings, and like water, both may be absorbed and retained by different materials. Sound is everywhere, but when the sound gets too loud, the sound turns into noise pollution that harms living beings on Earth. According to the European Environment Agency (2020), noise pollution causes 48,000 new cases of acute heart disease and 12,000 early deaths each year. However, noise pollution does not apply to all sounds. Noise pollution is defined by the World Health Organization (2010) as noise higher than 65 decibels (dB). Particularly, noise becomes harmful over 75 decibels and lethal above 120 decibels.

The Philippines has always been a noisy country, especially in times of celebration. One factor that increases noise pollution is the usage of karaoke during Filipino celebrations. Due to the extensive use of karaoke in the nation, noise has increased and become a source of annoyance for the public (Xinhua, 2018). House Bill 1035, "An Act forbidding extensive usage of karaoke, speakers, and other sound- amplifying devices that can lead to unwanted disruption to the people within residential areas and giving punishments," was presented to Congress in the year 2015 to manage the usage of karaoke and other sound-amplifying devices that cause disturbance to the people (Conventus Law, 2021). However, the bill is still not passed into law (Romero, 2022).

In one of the articles by Javaid (2022), the city of Bangladesh, Dhaka, ranked as the top 1 nosiest city in the world with 119 decibels, while Manila was ranked 12th with 92 decibels. In addition, according to Car Guide PH (2021), Manila has been named one of the noisiest cities in the ASEAN region by the World Health Organization. The U.N.-based organization suggests having 30 decibels below is ideal to have a good night's sleep, however, Manila has 99.3 decibels, exceeding the average of 83 decibels in ASEAN regions. Studies have revealed that exposure to high or ongoing noise levels can have many adverse health effects. According to the World Health Organization (2010), constant exposure to 70 decibels may cause noise-related issues. According to the United States Environmental Protection Agency (2023), noise-related health problems include high blood pressure, sleep disturbances, speech obscuration, hearing loss, stress-related disorders, and lost productivity. The Centers for Disease

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Control and Prevention (2021) states that damage to the inner ear's sound-responsive structures and/or nerve fibers can cause hearing loss. Also, often known as "noise-induced hearing loss," is typically brought by exposure to deafening sound and cannot be treated medically or surgically. A single exposure to a deafening sound, blast, or impulse can cause noise-induced hearing loss, as can constantly listening to loud noises.

The effects of noise pollution may not be given much attention, but people encounter noise pollution every day. Musicians and gamers/streamers are also some of the most affected by noise pollution since playing games and creating songs require a quiet environment. A calm environment reduces stress, improves cognitive functions, increases creativity, enhances mood, and helps to focus on work (Sirk, 2024). According to Cameron (2023), the highest musical noise is rock music, with a decibel of 150, which is destructive to the ears. In addition, 125 artists with five years of work experience underwent hearing checkups, and half of the professionals showed hearing loss at least one ear.

A. Coconut Coir

The coconut tree's scientific name is Cocos Nucifera. Various coconut products include tender coconut water, copra, coconut oil, raw kernel, coconut cake, coconut toddy, coconut shell, wood-derived goods, coconut leaves, and coir pith (Debmandal & Mandal, 2011). According to Yapa (2015), Asia-Pacific countries lead global coconut production, with the Philippines and Indonesia having the largest coconut-growing regions. Coconuts serve diverse purposes, providing societal benefits through coconut-derived products like beverages and medicinal items, as well as generating young coconut shells and coir waste as byproducts (Budianto, Kursdarini, Mangkurat, & Nurdiana, 2021).

Furthermore, one of the waste products that can be obtained from the husk of the coconut fruit is called coconut coir. Coconut coir is a natural fiber readily available in tropical areas (Ali, 2011). Mahendru (2013) notes that coconut coir, being a fine fiber, can be used for crafting doormats, decorative objects, and within the upholstery industry. Coir fiber exhibits a good coefficient value, making coconut coir suitable for sound absorption. Due to the coir's sound-absorbing properties, coconut coir can be used as a noise- reducing material by creating a multi-layer panel. While coconut coir decomposes, coir remains durable for years (Gardening Channel, 2022). Substituting other commercial porous sound-absorbing materials with coconut coir makes significant cost reductionspossible, as coconut coir fiber is more accessible, cost-effective, and easier to work with (Dullah, Tamiri, Ghazali, & Ayog, 2016).

B. Human Hair

The same principles apply to human hair. Human hair primarily comprises proteins, particularly keratin, and has a familiar structure. Within a strand of human hair is a central area called the medulla, loosely arranged and surrounded by the cortex. The cortex holds most of the hair's mass and consists of keratin proteins and structural lipids. Essentially, hair strands are fibers (Yang, Zhang, & Rheinstädter, 2014). In one of the experimental researchers of Salih and Al-Zubaydi (2021), an epoxy composite reinforced with 15% human hair was examined for thermal conductivity, sound insulation, and a set of mechanical properties (tensile strength and flexural strength). The findings of the sound insulation tests showed that adding hair resulted in a drop in sound intensity of roughly 75% when compared to the sound intensity observed for the unreinforced specimen. Hence, mixing hair with coconut coir for the multi-layer panel is possible because hair has noise-absorption properties.

C. Banana Pseudo-stem

Bananas are one of the most well-known plants in the world. Banana is the next most-produced fruit right after citrus, making 16% of the total fruit production worldwide (Mohapatra, Mishra, & Sutar, 2010). According to the Rainforest Alliance (2021), nowadays, banana plants mostly grow in hot, rainy places in tropical, humid regions of Central and South America, Africa, and Southeast Asia. Furthermore, according to the United Nations agency, the Philippines remained the 2nd top exporting country worldwide in 2021 for four consecutive years despite the tough competition against Latin American exporters (Department of Agriculture, 2022).

Bananas are large plants with big leaves, and a non-wood-like stem called a pseudo-stem. As Saklani (2022) stated, bananas are classified as plants, even though bananas grow like trees. At the same time, bananas consist of stalks that are enclosed with layered leaves. The pseudo-stem is the body-like part of the banana tree, which has a soft inner core and is densely wrapped in up to 25 leaf sheaths. Moreover, because the pseudo- stem will only be used once for harvesting, the stems will be cut to rot and become biomass waste. About 100kg of bananas are dismissed in every heap of harvested bananas, and approximately lots of biomass waste will emerge (Subagyo & Chafidz, 2018).

In addition, instead of wasting the other parts of the banana plants, several studies used the pseudo-stem fiber for pulping and making paper.

According to Singh and Bandyopadhyay (2013), banana pseudo-stems are now used as an alternative source of raw material for making paper pulp. The pulp is usually used to create different types of papers. Moreover, as specified by Sim, Zulkifli, Tahir, and Elwaleed (2014), the paper has fibers that possess high fiber porosity and can be made in a way where the properties can be easily manipulated, making papers suitable to be produced into sound absorbers. In addition, the pulp is more easily made into various shapes, does not pose health threats, and is biodegradable. Furthermore, material orientation is also a crucial factor in guaranteeing the effectiveness for sound absorption panels. Based on the concluded research, the triangle or pyramid orientation provides culminating absorption for high-level frequency among all the given orientations, such as hemisphere, rectangular, and plate. The pyramid orientation can be noticed and easily obtained from egg cartons. Also, egg-shaped cartons can disperse and bounce sound waves (Kaamin et al., 2018).

Furthermore, the objective of the study is to develop noise-reduction wall panels using coconut coir and banana pseudo-stem as the main materials.

D. Maun Terra

The researchers used coconut coir, paper pulp made of banana pseudo-stem, and human hair to lessen the loud sounds that cause notable environmental noise pollution. As stated by Kaamin et al. (2018), coir fiber can replace conventional materials, such as synthetic and wooden ones, due to the coir's high coefficient value, making the coir suitable for sound absorption. Furthermore, the egg tray's pyramid-like shape results in a large surface area, which helps ensure the sound is reflected uniformly. In Maun Terra, what is used is coconut coir, human hair and paper pulp made from banana fiber in the shape of egg cartons. Banana pseudo-stems are nowadays used as an alternative source of raw material in making paper pulp (Singh & Bandyopadhyay, 2013). Maun Terra reduced the noise that vehicles, industrial equipment, human activities, loudspeakers, and such cause. Thus, the researchers aim to take advantage of the materials made up of fibers, which have an excellent potential to absorb noise.

The researchers used banana pseudo-stem and coconut coir as the bedding internal parts of the product, effectively reducing unwanted noise in two ways. Maun Terra reduces the sounds coming from outside and possible sounds from inside the room.

By utilizing renewable natural resources, the study seeks to develop noise reduction that effectively decreases sounds and enhances concentration levels that do not pollute the environment.

E. Statement of the Problem

Being unable to sleep, focus on work, or do other things because of noise is one of the problems people face. Thus, the researchers aim to develop noise-reduction wall panels using coconut coir and paper pulp that can reduce the unwanted noise coming from the inside and outside of the room.

Specifically, the study answered the following questions:

1. How may the Maun Terra be described in terms of dimensions?
2. How may the decibels of noise be described in terms of:
   2.1 Without Maun Terra; and
   2.2 With Maun Terra?
3. How may the noise reduction of Maun Terra be described in terms of:
   3.1 Decibels from the inside; and
   3.2 Decibels from the outside?
4. Is there a significant difference in the decibels between Maun Terra and without Maun Terra?
5. Is there a significant difference in the decibels between inside and outside of Maun Terra?

Hypothesis

H_{01}: There is no significant difference in the decibels between without Maun Terra and the decibels with Maun Terra.

H_{02}: There is no significant difference in the decibels between from the inside and the decibels from the outside of the Maun Terra.

F. Significance of the Study

As noise pollution affects people every day, especially at work, the research intends to develop a noise-reduction wall panel using coconut coir and banana pseudo- stem as the main variables. The materials that were used are organic and cheap but can last for years. The following are the people who will benefit from the findings of the study:

Community: The findings of the study will help in reducing waste materials like banana pseudo-stem and coconut coir. In addition, the study will help people prevent any noise disturbances from the environment and simultaneously avoid background noise distractions.

Gamers/Streamers: The findings of the study will lessen the noise pollution gamers and streamers produce, as well as focus on playing or streaming since the noise coming from the outside will lessen.

Studio Artists/ Music Producers: The findings of the study will help people working in a studio to focus on work without being distracted, such as broadcasting, making music records, and filming motion pictures. The study will help music producers and studio artists to have an ideal environment for recording projects.

Future Researchers: The findings of the study will provide information and a basis that can be used as a guide for future researchers. Future researchers may also improve or add improvements to the prototype.

G. Scope and Delimitation

The research focuses on practical noise reduction methods for both interior and exterior spaces. The research targeted noise reduction within specific environments, like game rooms and recording studios. The study is delimited to the resonance of sounds and will not cover noise reduction measures for larger spaces. Since noise reduction wall panel made out of organic materials is fundamental research, the efficiency and capabilities of the materials is first tested in a smaller space before proceeding to larger spaces. In addition, the aesthetic looks of the prototype were not considered since the prototype's capabilities were still unknown.

2. Methodology

A. Research Design

The researchers used both developmental and experimental research as a design. Developmental research is a systemic study of designing, developing, and evaluating instructional processes to have a new and developed product (Ahmad, 2016). The main goal of developmental research is to provide information to developers during product development to enhance both the product and the developers' creative abilities. On the other hand, experimental research design is a scientific approach involving two sets of variables within a framework of protocols and procedures, wherein the first set of variables serves as a constant and is used to measure the difference between the second set and the first set. To determine the facts of a research study and make better research decisions, a

researcher can obtain the information needed through experimental research (Sirisilla, 2023).

The researchers used quantitative research as a research method. According to Bhandari (2023), quantitative research is the process of gathering and evaluating numerical data and can be used to test causal relationships, identify patterns and averages, and create predictions. The researchers used numerical characters to analyze and measure the collected data to assess the capability and efficiency of Maun Terra. The researchers aimed to enhance and develop the existing prototype, wherein the coconut coir and banana pseudo-stem are the main variables in creating the wall panel. The study seeks to develop noise reduction that effectively decreases sounds and enhances concentration levels that do not pollute the environment.

B. Locale of the Study

The researchers created the prototype at Guemasan Arayat, Pampanga, and Plazang Luma Arayat, Pampanga since most of the materials that are used are available at the two locations. The study was conducted at San Nicolas Arayat, Pampanga; The researchers chose the location to test the capabilities of Maun Terra since the area was noise-pollution-free.

C. Research Instrument

In the study, the researchers used three tools to gather data on the prototype called Maun Terra. First, a cellphone was used to record the collected decibels. Then, the Sound Meter was used to measure the decibels. The decibel meter application was used for measuring sound intensity, or loudness, in a specific space in decibels. The software measures the volume of sound in the surroundings by using the microphone of the device. A decibel meter is also known as an SPL (sound pressure level) meter or a sound level meter. Lastly, a measuring tape to measure the distance of the frequency and the Sound Meter and to measure the dimension of Maun Terra.

D. Research Materials

The researchers used the following materials to make the prototype called Maun Terra. In the prototype, the researchers utilized the following materials to test and evaluate the prototype's capabilities in measuring the overall prototype.

- Banana Pseudo- Stem – material served as a paper pulp.
- Coconut Coir – material that served as a sound absorber.
- Human Hair – another material that served as a sound absorber.
- Cooking Solution – material that was used in making paper pulp.

E. Research Procedure

The process was divided into two parts including the making of Maun Terra and the testing of the prototype device.

1) Making of the Maun Terra

a) Banana Pseudo-stem into a Paper Pulp

First, the researchers cut the banana pseudo-stem into smaller pieces with a knife. Then, the banana pseudo-stem was rinsed thoroughly before being weighed on the weighing scale. A 2,500-gram banana pseudo-stem was then weighed on a weighting scale and put in a stainless-steel pot. After that, the researchers made a cooking solution that consisted of 120 grams of caustic soda per 4 liters of water. Once the cooking solution was done and the caustic soda was already dissolved, the cooking solution was poured into the stainless-steel pot with the banana pseudo-stem. That mixture was then cooked for an hour on medium heat, and once the pseudo-stem was cooked, the pseudo-stem was set aside to cool overnight. That process was then repeated three times. The next day, once the cooked banana pseudo-stem had finally cooled down, the pseudo-stem was poured on a sheer cloth placed on top of a colander to drain the excess cooking solution. Then, the pseudo-stem was placed again on the sheer cloth and was rinsed thoroughly. Finally, the rinsed pseudo-stem will be put in a blender with water to make the paper pulp. After the pseudo-stem is blended, the mixture will be poured again on a sheer cloth that is placed on a colander to be rinsed thoroughly. Lastly, the sides of the sheer cloth were gathered to squeeze out the excess water from the pulp.

b) Mixing Paper Pulp and Hair

The researchers cooked 1,250 grams of pseudo-stem with a cooking solution of 60 grams of caustic soda per 2 liters of water. The banana pseudo-stem was cooked for an hour in medium heat and then was left to cool down. Once the pseudo-stem was already cooled down the pseudo-stem was blended into a paper pulp. The researchers cut the hair strands shorter with scissors. After that, the researcher weighed 10 grams of hair on a weighing scale. Then, the paper pulp together with the 10 grams of hair and a little bit of water will be blended. After blending and the mixture was well incorporated, the mixture was poured on a sheer cloth and squeezed to remove the excess water.

c) Mixing Paper Pulp and Coconut Coir

The researchers cooked 3,750 grams of pseudo-stem with a cooking solution of 180 grams of caustic soda per 6 liters of water. The banana pseudo- stem was cooked for an hour in medium heat and then was left to cool down. Once the pseudo-stem was already cooled down, the pseudo-stem was blended into a paper pulp. The researchers shredded the strands of the coconut coir, then placed the coir in the blender and blended the coir to remove the coir pith. According to Mishra and Basu (2020), coconut pith, or non-fibrous parenchymatous cells of the husk, accounts for up to 50%–70% of the total weight of the husk and the nails help in the further opening of the exposed splitting fiber emerging from the feed path, removing the pith and discarding the cleansed fibers. Once the coir pith was removed, the researchers weighed 80 grams of the shredded coconut coir. After that, the 80 grams of shredded coconut coir and the paper pulp were blended in the blender. Then, after blending, the mixture was put on a sheer cloth and squeezed to remove the excess water.

d) Shaping of Maun Terra

First, the researchers covered the holes of the egg tray with masking tape. Once the molder was all covered, the researchers poked small holes using a needle as a vent for the excess water. After that, the first layer was placed in the egg tray, which is the

paper pulp. Then the paper pulp and hair mixture were put next as the second layer of the panel. Finally, the coconut coir and paper pulp mixture were placed on top. The prototype was placed in an area exposed to the sun around 2-5 pm for two to three hours in 3 days and air-dry for two days.

Testing

After the product was complete, the researchers measured the dimensions of Maun Terra and to determine if the prototype was working, Maun Terra's efficiency was assessed. In testing the prototype, the researchers first checked to see if the place was noise-pollution-free. After checking the area, the researchers tested the capabilities of the prototype. The researchers conducted 10 tests in each phase due to the researcher's time and capabilities. The sound frequency is 1 meter away from the sound meter. According to LGM Products (n.d.), the sound level emitted by a sounder is typically measured in decibels at one meter. The sounder's audible level decreases as one moves away from the sounder. In addition, each test consists of 1 minute to avoid harming the ears of the researchers. Hearing loss can develop as a result of repeated exposure to loud sounds. Hearing loss occurs more quickly when the sound is louder (NCEH, n.d.).

Phase I

The researchers measured the decibels at 1150 Hz by playing the sound frequency on a phone. At a given distance of 1 meter, a decimeter app was used to measure the decibels of the sound frequency for 1 minute.

Phase II

With the same distance, the phone that was playing the sound frequency was placed inside the Maun Terra to measure the decibels that were reduced. In the second phase, the researchers can also measure the noise reduction from inside to outside of the prototype.

Phase III

Lastly, the phone that has a decibel meter app was placed inside the Maun Terra to measure the decibels coming from the outside of the prototype at the same distance as Phases I and II.

F. Ethical Considerations

The researchers ensured that conducting the research did not create a hazard or danger to plants, animals, the environment, or humans. According to Diaz (2024), Republic Act No. 3571 is legislation that forbids the removal, destruction, or harming of flowering plants, shrubs, or plants with scenic value along public roads, in parks, plazas, school premises, or any other public area. To preserve the climate, the Act protects flowers, plants, and trees from being felled and destroyed. The authorized authority will be the Director of Parks and Wildlife. The researchers made sure not to cut or destroy planted or growing bananas and coconut trees. In addition, the researchers asked permission from the owners of the banana stem and coconut coir that was collected and explained the purpose and use of the study that is being conducted.

3. Results

This section shows the results of the study. The researcher explained all the data and the table of results gathered about the Maun Terra. The researchers gathered the dimensions, decibel of noise without Maun Terra and with Maun Terra, noise reduction from the inside and the outside of the Maun Terra, noise decibel with and without Maun Terra, and the decibels from the inside and outside of Maun Terra.

Table 1
Dimensions of Terra (dB)

Dimensions	Measurements (inches)
Length	11.5
Width	11
Height	9

Table 1 shows that the dimensions of Maun Terra have a length of 11.5 inches, a width of 11 inches, and a height of 9 inches.

Table 2
Noise without Maun Terra (dB)

Maun Terra	Decibels
Test 1	63.70
Test 2	61.00
Test 3	61.10
Test 4	61.80
Test 5	62.00
Test 6	61.30
Test 7	59.90
Test 8	58.80
Test 9	59.90
Test 10	58.60
$\bar{x}$	60.810

Table 2 shows the test conducted in terms of noise decibels without Maun Terra. As observed, Test 1 has the highest decibel of 63.70. Meanwhile, Test 10 has a lowest decibel of 58.60. Overall, the $\bar{x}$ = 60.810 dB without Maun Terra.

Table 3
With Maun Terra (dB)

Maun Terra	Decibels
Test 1	48.30
Test 2	48.90
Test 3	51.50
Test 4	50.50
Test 5	52.50
Test 6	52.10
Test 7	51.20
Test 8	52.70
Test 9	50.40
Test 10	53.00
$\bar{x}$	51.110

Table 3 shows the test conducted in terms of noise decibels with Maun Terra. As observed, Test 10 has the highest decibel of 53.00. Meanwhile, Test 1 has a lowest decibel of 48.30. Overall, the $\bar{x}$ = 51.110 dB with Maun Terra.

Table 4 shows the test conducted in terms of decibels from the inside. As observed, Test 10 has the highest decibel of 53.00. Meanwhile, Test 1 has a lowest decibel of 48.30. Overall, the $\bar{x}$ = 51.110 dB from the inside of Maun Terra.

Table 5 shows the test conducted in terms of decibels from the outside. As observed, Test 4 has the highest decibel of 51.60. Meanwhile, Test 7 has a lowest decibel of 48.80. Overall, the $\bar{x}$ = 50.170 dB from the outside of Maun Terra.

Table 4
Decibels from the Inside (dB)

Maun Terra	Decibels
Test 1	48.30
Test 2	48.90
Test 3	51.50
Test 4	50.50
Test 5	52.50
Test 6	52.10
Test 7	51.20
Test 8	52.70
Test 9	50.40
Test 10	53.00
$\bar{x}$	51.110

Table 5
Decibels from the Outside (dB)

Maun Terra	Decibels
Test 1	50.50
Test 2	49.60
Test 3	50.00
Test 4	51.60
Test 5	51.40
Test 6	50.00
Test 7	48.80
Test 8	49.80
Test 9	49.60
Test 10	50.40
$\bar{x}$	50.170

Table 6
T-Test (Noise Decibels with and without Maun Terra)

Tabular Value	2.101
Computed Value	13.792

Table 6 shows the test conducted in terms of the significant difference in the decibels between Maun Terra and without Maun Terra. Since the Tv = 13.792 is greater than the Tc = 2.101 therefore, the null hypothesis is rejected. Thus, there is a significant difference in the decibels between Maun Terra and without Maun Terra.

Table 7
T-Test (Noise Decibels inside and outside Maun Terra)

Tabular Value	2.101
Computed Value	1.648

Table 7 presents the test conducted in terms of the significant difference in the decibels between inside and outside of Maun Terra. Since the Tv = 1.648 is less than the Tc = 2.101 therefore, the null hypothesis is accepted. Thus, there is no significant difference in the decibels between the inside and the outside of Maun Terra.

4. Discussion

The researchers developed a noise reduction wall panel, which is the "Maun Terra Coconut Coir and Banana Pseudo-Stem Noise Reduction Wall Panel". Using the meter app and measuring tape, the researchers gathered the needed data. The researchers used the formula of mean to compute the results of the decibels with Maun Terra and without the Maun Terra and decibels from inside and outside of the Maun Terra. Moreover, the researchers used a two-sample (independent sample) t-test to determine the significant difference in the decibels with and without and decibels from inside and outside the Maun Terra.

The researchers measured the dimensions of the wall panel. The prototype has a length of 11.5 inches, a width of 11 inches, and a height of 9 inches. The first testing was without the Maun Terra and the highest value was 63.70 dB the lowest value was 58.60 dB. For the second testing was with Maun Terra, the highest value is 53.00 dB while the lowest value is 48.30 dB. The third testing was from the inside of the Maun Terra, the highest value was 53.00 dB and the lowest value was 48.30 dB. The last testing was from the outside of the Maun Terra, the highest value was 51.60 dB and the lowest value was 48.30 dB. After getting the average mean of each testing, the first testing showed that the mean was 60.810 dB. The second testing showed that the mean was 51.110 dB. The third testing has a mean of 51.11 dB. While the last testing has a mean of 50. 17 dB. The researchers then proceeded to compute the significant difference between the two sample means using a two-sample (independent sample) t-test. The first computed value showed 13.792 which is greater than the tabular value of 2.101, therefore, rejecting the first null hypothesis. On the other hand, the second computed value showed 1.648 which is less than the tabular value of 2.101, therefore, the second null hypothesis is accepted.

5. Conclusion

From the findings of the researchers in the recent tests, the researchers concluded and interpreted the data. The first null hypothesis was rejected. Therefore, the study shows that there is a significant difference in the decibels between Maun Terra and without Maun Terra. Thus, proving that Maun Terra can reduced noise. On the other hand, the second null hypothesis is accepted. Therefore, the study shows that there is no significant difference in the decibels between the inside and outside of Maun Terra. Thus, the Maun Terra can reduce noise coming from the inside and outside of the wall panel. In conclusion, the "Maun Terra Coconut Coir and Banana Pseudo-stem Noise Reduction Wall Panel" is an effective alternative wall panel to noise pollution.

6. Recommendation

After a thorough examination and conducting studies with the Maun Terra project, the researchers suggest the following recommendations for the betterment of the study. 1) First, to prevent any potential cracking of the prototype, the researchers suggest increasing the thickness of the surface area of the prototype. This means adding more pseudo-stem of banana, especially in vulnerable spots like thin sections of the prototype. By doing so, the prototype becomes sturdier, better able to handle stress, and less likely to crack under pressure. 2) Next, the shape of the prototype, the researchers recommend that future researchers find different shapes for newer studies, utilizing molder silicon. Rather than using plastic egg trays, the researchers suggest the use of silicon molders as a more easy way to achieve a precise shape and look. Silicone molds offer greater ease and precision in achieving precise shapes, resulting in prototype with improved aesthetics and functionality. 3) In

the drying process of the prototype, future researchers are advised to find faster drying methods such as using an incubator. Incubators offer controlled environments with regulated temperature and humidity levels, ideal for drying the prototype efficiently. This controlled setting ensures consistent drying conditions, reducing the risk of uneven drying or damage to the prototype. Additionally, the drying process enabled by an incubator helps researchers manage timeframes more effectively. 4) For the aesthetic look of the prototype, the researchers suggest improving the color of the physical appearance of the prototype with the supporting related studies that do not absorb sound to ensure that both aesthetic appeal and functional requirements are met.

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