

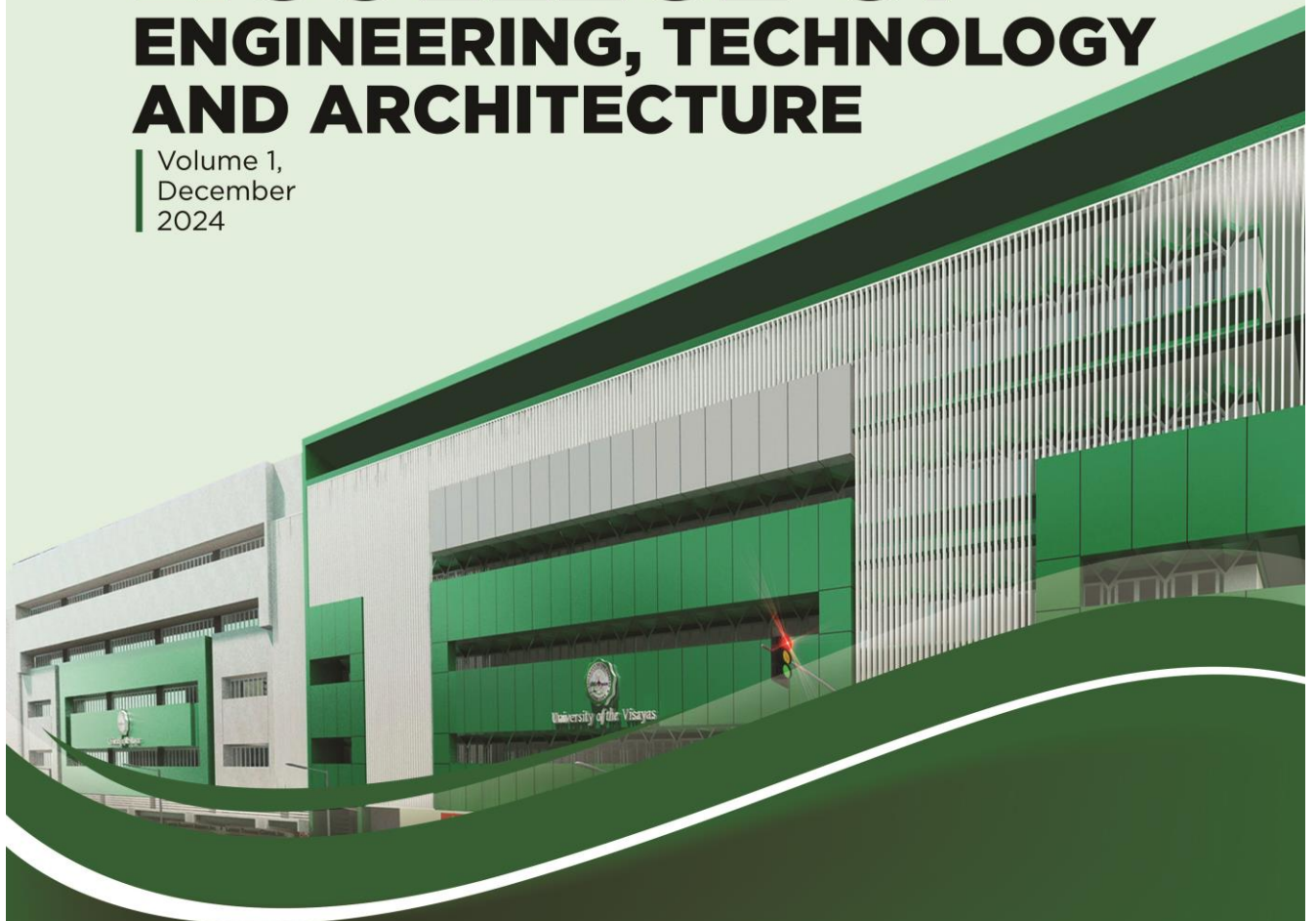
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University of the Visayas

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**UNIVERSITY OF THE VISAYAS - JOURNAL OF ENGINEERING,  
TECHNOLOGY AND ARCHITECTURE (UVJETA)**

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The University of the Visayas Journal of Engineering, Technology and Architecture is focused on the areas of Engineering, Technology, Architecture, Sustainable and Technology Developments which are depicted in the following researchable issues:

**Aims and Scope**

| <b>THRUST</b>  | <b>SUBPRIORITIES</b>  |
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| Holistic Approaches to Health and Wellness                                   | Determinants of Health  |
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University of the Visayas Journal of Engineering, Technology and Architecture (UVJETA) recognizes the importance of research and advocates for the development of new knowledge and processes that may improve existing practices not only in the academe but in the community as well.

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All manuscripts should be submitted electronically to \_\_\_\_\_.

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- ✓ Electrical
- ✓ Mechanical
- ✓ Industrial
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- ✓ Information Technology

The UV CETA Research Journal similarly caters to:

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## FOREWORD

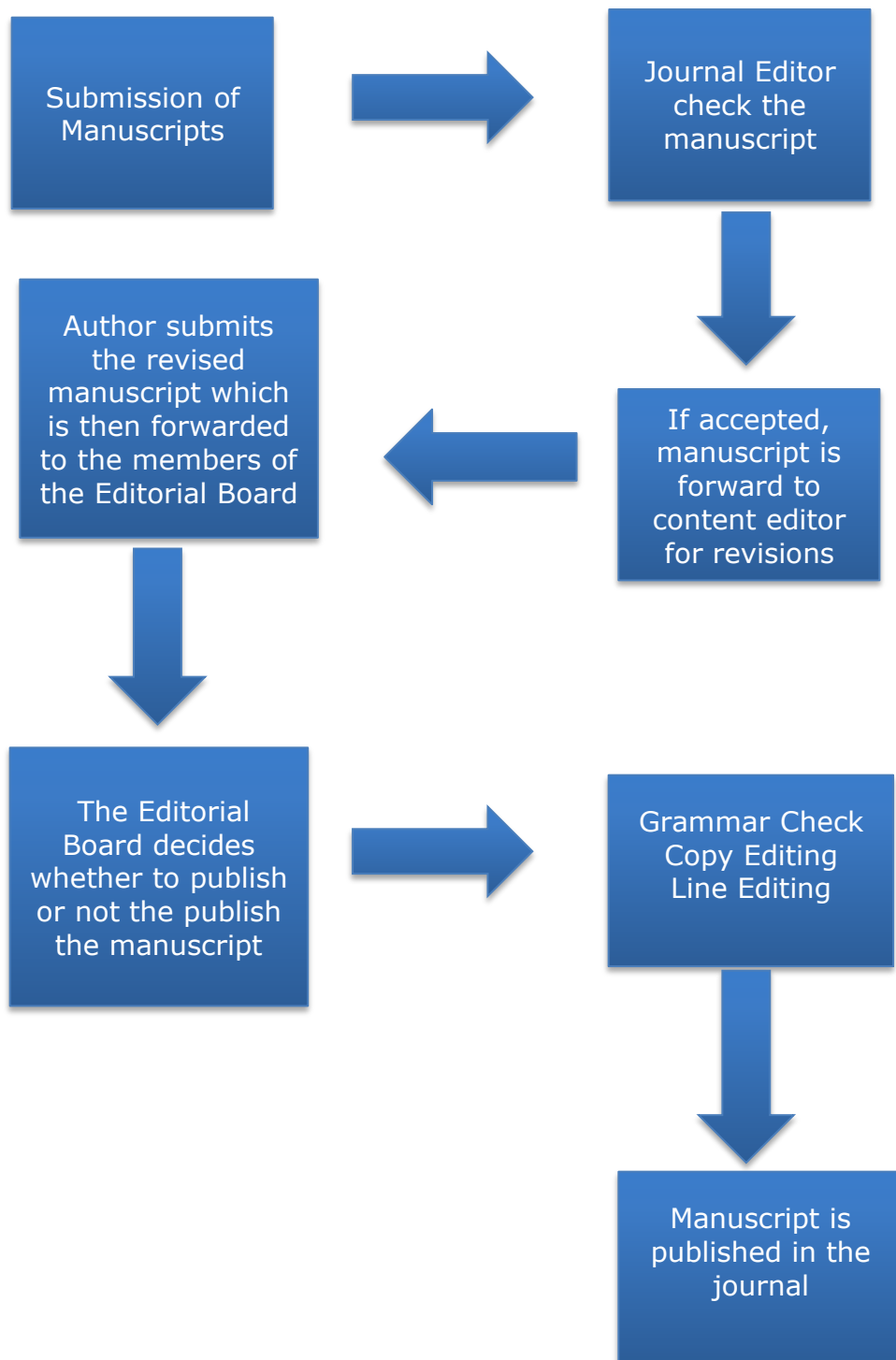
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- ✓ Technical appropriateness
- ✓ Ethical considerations

**Ethical Considerations.** The research article must have a passing rate of five points (5/9) or higher. The editorial board will assess the manuscripts based on:

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## A PROPOSED MIXED-USE BUILDING WITH A BOTANICAL CONSERVATORY IN CEBU AS A GLOBAL WARMING RESPONSE

**Mae Kyla D. Cañon, Kristy P. Ebillo, Gallo, Carylle O. Fiah,  
Ar. Freeli P. Berame**

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### ABSTRACT

This study examines a proposed mixed-use building with a botanical conservatory in Cebu City as a potential solution to combat global warming. It explores the demographic characteristics, environmental awareness, and attitudes toward sustainability of local residents in Cebu City, focusing on their perceptions of global warming, climate change, and sustainable development practices. Data shows a predominantly young population, with 50% of respondents aged 18-29. The gender distribution is balanced, though slightly skewed toward females (53%). A majority of respondents are single (57%), with a significant portion being employed (48%) or students (26%). The residents' awareness of global warming and its impact on human and environmental health is notably high, as evidenced by scores of 4.35 and 4.48, respectively, on a five-point scale. However, their familiarity with specific solutions, such as carbon-negative initiatives, is less pronounced (3.25 and 3.11). The study also highlights strong support for sustainable practices, with respondents expressing high levels of agreement on the importance of plants in reducing carbon dioxide, using renewable energy, and promoting water conservation (mean scores ranging from 4.6 to 4.73). Furthermore, participants strongly support the idea that the architecture, engineering, and construction industries should prioritize carbon negativity, and they show interest in mixed-use building projects designed to combat global warming. These findings suggest a population that is environmentally aware and supportive of eco-friendly initiatives, though there may be room for increased engagement with practical sustainability solutions.

**Keywords:** *mixed-use building, botanical conservatory, global warming, sustainable development, carbon negativity, Cebu City*

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### INTRODUCTION

The growing urgency to address climate change has placed architecture and urban development at the forefront of sustainable innovation. According to Malhi et al., (2021), the climate change is one of the most pressing challenges facing the world today. As cities expand, their ecological footprints increase, often exacerbating issues related to air pollution, carbon emissions, and loss of biodiversity. In recent years, architects and urban planners have increasingly turned to carbon-negative concepts—designs that actively reduce atmospheric carbon rather than merely minimizing emissions. This innovative concept's technological benefits can help with future climate adaptation and mitigation by taking a two-pronged approach to the greenhouse gas emission problem, (Full et al., 2021). These concepts challenge conventional construction methods by integrating carbon-absorbing materials, renewable energy technologies, and biophilic design features.

The proposed building design prioritizes sustainability by integrating green spaces, energy-efficient systems, and carbon-sequestering materials to reduce its carbon footprint, while also improving urban air quality and supporting biodiversity. A key feature is the inclusion of a botanical conservatory within a mixed-use structure, fostering a symbiotic relationship between nature and urban life. As urbanization accelerates worldwide, it is increasingly essential for policymakers, urban planners, and designers to implement strategies that make cities more sustainable (Colding et al., 2020). This building's design supports such efforts by using materials like carbon-sequestering concrete and reclaimed wood, which help reduce embodied carbon and minimize environmental impact. These efforts align with a broader carbon-negative strategy, aiming to remove more carbon from the atmosphere than the building emits over its life cycle.

Cebu's role as a rapidly urbanizing city makes it an ideal setting to explore the potential of carbon-negative building models. According to study of JICA (2015) Metro Cebu is regarded as the economic hub of the central part of the Philippines and is the country's second largest city, home to 2.55 million people as of 2010. Offering insights into how architecture can contribute to global climate resilience in Cebu, that rapidly urbanizing city within the tropics, faces unique climate and environmental challenges. This proposed building aims to address these challenges through a multifaceted approach. The design integrates a botanical conservatory within a mixed-use complex, combining residential, commercial, and green spaces. This configuration serves multiple functions: creating a visually appealing and functional building, promoting biodiversity, and sequestering carbon.

Moreover, this study will delve into the architectural, environmental, and social components of this carbon-negative mixed-use building concept. By situating a carbon-negative concept in a tropical city, this research explores how climate-responsive design strategies can be adapted to diverse environmental contexts. The botanical conservatory, for instance, could be a scalable feature adaptable to other urban landscapes worldwide. The botanical conservatory is not merely decorative; it acts as a "green lung" for the structure, absorbing carbon dioxide and releasing oxygen while also providing a natural habitat for diverse plant species. Nazir et al., (2014), claims that the primary purpose is to provide a range of information about the form, habitat, quality of life, and overall biological and ecological relationships of the local vegetation.

The aim of this research in assessing proposed mixed-use building with a botanical conservatory in Cebu as a global warming response. The study seeks to contribute to the broader discourse on sustainable urban development and the vital role of carbon-negative design in combating global warming. To explore the architectural, environmental, and social dimensions of this carbon-negative concept methods used to integrate a botanical conservatory within the structure, assess the carbon sequestering potential, and discuss the broader impact on urban sustainability in Cebu. Through this exploration, the research aims to contribute valuable insights to the global discourse on sustainable urban development, emphasizing the role of innovative, carbon-negative architecture in mitigating climate change and enhancing urban resilience.

## CONCEPTUAL FRAMEWORK

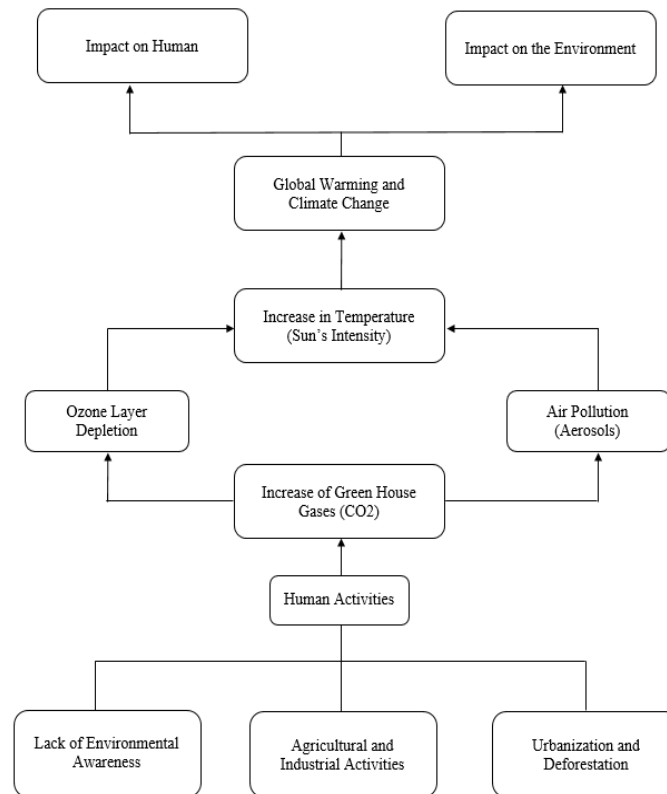


Figure 01: Conceptual Framework of the Study

## STATEMENT OF THE PROBLEM

This study intended to evaluate the proposed mixed-use building featuring a botanical conservatory in Cebu as a measure against global warming. Specifically, the study aims to address the following questions:

1. What is the profile of the respondents in terms of:
  - a. age;
  - b. gender;
  - c. civil status;
  - d. occupation;
  - e. address;
  
2. What is the significance of establishing a mix-use building with a botanical conservatory in the future in terms of:
  - a. Impact on local Residents
  - b. Environmental impact
  - c. Tourism and Economic growth

3. What are the key factors to be considered in achieving carbon negativity?
4. What methods do you employ to strategically manage the carbon emission of the mixed-use building?
5. What steps do you intend to take in incorporating sustainability to the design?

## **METHODS**

### ***Design***

The study employed a descriptive-survey method with a quantitative approach. The descriptive-survey method seeks to quantify data and generalize findings from a sample of the target population. In this case, the target population is the proposed mixed-use building featuring a botanical conservatory in Cebu, which is being evaluated as a potential measure against global warming. This method is particularly effective for capturing and describing the current conditions, while also identifying relationships and correlations between key variables. By gathering data through surveys, the study aims to offer insights into the perceptions, attitudes, and behaviors of relevant stakeholders concerning the use of green architecture as a tool for mitigating environmental challenges.

### ***Respondent Groups and Criteria***

The 250 respondents for this study were selected through random sampling to ensure a representative and unbiased sample from the target population. The study focused on two barangays, Barangays Mambaling and Basak San Nicolas which were strategically chosen for their location near Cebu City's South Road Properties (SRP). This area is significant due to its rapid urban development, ongoing infrastructure projects, and its role as a central hub for commerce, residential, and recreational activities. The proximity of these barangays to the SRP provides valuable insight into the potential effects of urbanization and development in the surrounding communities, making them an ideal setting for the study.

### ***Scoring Procedure***

This section outlines the scoring procedures for the data analysis phase of this research, focusing on three major variables: admission and retention, graduation, and licensure passing rates. These variables will be assessed using a four-point scale to determine their values.

Table 1: ***Scoring***

| <b>Scale</b> | <b>Range</b> | <b>Description</b>   |
|--------------|--------------|----------------------|
| 4            | 3.26 – 4.0   | Very Significant     |
| 3            | 2.51 - 3.25  | Significant          |
| 2            | 1.76 – 2.5   | Somewhat Significant |
| 1            | 1.0 – 1.75   | Not Significant      |



## RESULTS AND DISCUSSION

Table 2. *Age of the Respondents*

| CATEGORY | RATE | PERCENTAGE |
|----------|------|------------|
| 18-29    | 125  | 50%        |
| 30-39    | 79   | 32%        |
| 40-49    | 36   | 14%        |
| 50-59    | 9    | 4%         |
| 60-69    | 1    | 0%         |

The table above represents the distribution of a certain group of people or items across different age categories. The data shows a clear age distribution, with the highest concentration of individuals in the 18-29 age group (125 individuals, or 50% of the total) and the lowest in the 60-69 age group (1 individual, or 0%). This implies that the majority of the population or sample is relatively young, with half of the individuals falling between 18 and 29 years old. The sharp decline in the number of people as the age groups increase suggests a possible pattern where younger individuals are more prevalent, and older individuals are significantly underrepresented. According to PhilAtlas (2020), based on the 2015 population census, Brgy. Basak Nicholas has a population of 3,818, with the largest group falling within the 20-24 age range. Conversely, 63.9% of the population in Brgy. Mambaling, Cebu is within the 15 to 64 age range.

Table 3. *Gender of the Respondents*

| CATEGORY | RATE | PERCENTAGE |
|----------|------|------------|
| MALE     | 93   | 37%        |
| FEMALE   | 157  | 63%        |

The data above shows the distribution of males and females in a given population or sample. The male group consists of 93 individuals, accounting for 37% of the total, while the female group consists of 157 individuals, making up 63% of the total. This indicates that the sample is slightly skewed towards females, with a higher percentage of females than males. The relatively close distribution (63% female vs. 37% male) suggests a balanced gender representation, with a small but noticeable proportion of females in comparison to males. As stated by Philippine Statistics Authority (2014), the sex ratio of 97 men for every 100 women is comparable to the sex ratio of 96 men for every 100 women that was noted in 2000.

Table 4. *Civil Status of the Respondents*

| CATEGORY | RATE | PERCENTAGE |
|----------|------|------------|
| SINGLE   | 143  | 57%        |
| MARRIED  | 86   | 34%        |

|                   |    |    |
|-------------------|----|----|
| WIDOWED           | 9  | 4% |
| LEGALLY SEPARATED | 12 | 5% |

The data above reflects the distribution of individuals based on their marital status, highlighting significant differences in percentages for each category. The highest percentage, 57%, represents single individuals, indicating that more than half of the population in this group is not married. This suggests a trend of independence or delayed marriage in the population. The smaller percentages reflect those who are widowed (4%) and divorced (5%). These figures imply that the majority of the population has not experienced the end of a marriage or the loss of a spouse. The implications of these trends might indicate changing societal norms regarding marriage, with a higher percentage of single individuals possibly reflecting evolving attitudes towards relationships or later life choices. Additionally, the low percentage of widowed and divorced individuals could point to either a lower rate of marital dissolution or an older population where divorce and widowhood may have occurred at earlier stages of life. Based on the data on Philippine Statistics Authority (2014), there are 50.4 percent were males while 49.6 percent were females among the never-married persons.

Table 5. *Occupation of the Respondents*

| CATEGORY   | RATE | PERCENTAGE |
|------------|------|------------|
| STUDENT    | 66   | 26%        |
| EMPLOYED   | 120  | 48%        |
| UNEMPLOYED | 64   | 26%        |

The data above reveals a distribution of individuals across three categories: students, employed, and unemployed. The largest group, comprising 48% of the total, is employed, with 120 individuals in this category. The unemployed group follows, accounting for 26% or 64 individuals. The student group also represents 26% of the total, with 66 individuals. This distribution suggests that the employment rate is higher than both the student and unemployed groups, reflecting a relatively healthy job market for the population represented. However, the equal proportion of students and unemployed individuals highlights that while some are still pursuing education, a significant portion remains without employment, implying potential challenges in job acquisition for certain individuals. According to the Philippine Statistics Authority (2014), the overall dependence ratio is 50, meaning there were roughly 50 dependents (44 young dependents and 6 elderly dependents) for every 100 people of working age.

Table 6. *Address of the Respondents*

| CATEGORY          | RATE | PERCENTAGE |
|-------------------|------|------------|
| MAMBALING         | 110  | 44%        |
| BASAK SAN NICOLAS | 140  | 56%        |

The table above compares two areas, Mambaling and Basak San Nicolas, in terms of

their respective population rates. Basak San Nicolas has the larger share, representing 56% of the total with 140 individuals, while Mambaling accounts for 44% with 110 individuals. This indicates that Basak San Nicolas has a higher concentration or proportion of the population compared to Mambaling. The disparity in percentages could imply a larger or more densely populated area in Basak San Nicolas, or it could suggest differing levels of activity, focus, or resources between the two locations, with Basak San Nicolas potentially being more prominent in whatever context the data is presented. The Census of Population and Housing (2014) found that, out of the 80 barangays in Cebu City, Basak San Nicolas was one of the most populated, accounting for 4.0 percent while Mambaling contributed 3.7 percent of the total population. These areas are some of the most densely populated in Cebu City, reflecting their significant role in the urban landscape.

Table 7. *Impact on local residents*

| Questions  | Mean        | Interpretation         |
|--|-------------|------------------------|
| <b>Impact on local Residents</b>   |             |                        |
| I am aware of the causes and effects of global warming and climate change.   | 3.35        | Highly significant     |
| I am concerned about the impact of global warming on human beings and on the environment.  | 3.48        | Highly significant     |
| I am familiar with the concept of Carbon Negativity.   | 2.25        | Moderately Significant |
| I am familiar with some carbon-negative initiatives or projects.   | 2.11        | Moderately Significant |
| I believe that human activities including building construction and its operation are the primary causes of global warming.                              | 3.68        | Highly significant     |
| <b>Total Average Mean</b>  | <b>2.97</b> | <b>Significant</b>     |
| Legend:<br>3.26 – 4.0 – Highly Significant ;<br>2.51 - 3.25 - Significant ;<br>1.76 – 2.50- Somewhat Significant;<br>1.00 – 1.75- Not Significant at all |             |                        |

The table above shows reflect the awareness and concerns of local residents regarding global warming and climate change. The highest score is 3.68, associated with the belief that human activities, including building construction and its operation, are the primary causes of global warming. This suggests that respondents view human actions as a highly significant factor in climate change. The lowest score is 2.11, related to familiarity with carbon-negative initiatives or projects, which indicates that while the concept is recognized, there is a moderate level of awareness and understanding. The total average mean of 2.97 falls in the "Significant" range, implying that, overall, there is a moderate to strong awareness of climate-related issues among respondents. However, there is still a gap in knowledge and familiarity with specific solutions, such as carbon-negative projects, that

could mitigate the impacts of global warming. The findings suggest that while local residents are highly aware of the dangers posed by global warming and climate change, their knowledge and involvement in mitigation strategies like carbon-negative initiatives are relatively lower, highlighting a potential gap in awareness or action around practical solutions. Addressing environmental challenges requires the crucial contributions of individuals, society, and collective actions, Al-Masri (2023).

Table 8. *Environmental impact to the respondents*

| Questions  | Mean       | Interpretation            |
|--|------------|---------------------------|
| <b>Environmental impact</b>  |            |                           |
| I agree that plants can help reduce carbon dioxide in the atmosphere.  | 3.73       | Highly significant        |
| I am willing to support or participate in a carbon-negative initiative.  | 3.6        | Highly significant        |
| I am willing to apply and promote sustainable practices.   | 3.59       | Highly significant        |
| I am willing to use renewable energy sources (e.g., solar, wind) to combat global warming.   | 3.62       | Highly significant        |
| I agree that rainwater harvesting can help water conservation.   | 3.67       | Highly significant        |
| <b>Total Average Mean</b>  | <b>3.6</b> | <b>Highly significant</b> |
| Legend:<br>3.26 – 4.0 – Highly Significant ;<br>2.51 - 3.25 - Significant ;<br>1.76 – 2.50- Somewhat Significant;<br>1.00 – 1.75- Not Significant at all |            |                           |

The table above indicates a strong awareness and commitment to environmental sustainability, with participants agreeing that various eco-friendly practices are highly significant in addressing environmental issues. The highest score is 3.73, corresponding to the statement "I agree that plants can help reduce carbon dioxide in the atmosphere." This implies that the respondents strongly believe in the significant role of plants in reducing carbon dioxide, highlighting a high level of awareness and support for environmental sustainability through natural solutions. Nevertheless, the lowest score is 3.59, associated with the statement 'I am willing to apply and promote sustainable practices.' This suggests that the individual is committed to sustainable practices, but prioritizes actions like supporting carbon-negative initiatives or using renewable energy more. The total average of 3.6 suggests that the individual places a high level of importance on various sustainable

practices and environmental actions, with a clear emphasis on taking significant steps to combat climate change. Incorporating these approaches improves the built environment's overall resilience while also lessening the environmental impact of urban expansion, Omole et al., (2024).

Table 9. *Tourism and Economic growth among respondents*

| Questions  | Mean        | Interpretation            |
|--|-------------|---------------------------|
| <b>Tourism and Economic growth</b>   |             |                           |
| I think that corporations and the construction industry should prioritize carbon negativity in their business practices.                                 | <b>3.66</b> | Highly significant        |
| I believe that the architecture, engineering, and construction industry can make a positive impact in the fight against global warming.                  | <b>3.21</b> | Significant               |
| I support the proposal of a mixed-use building with a botanical conservatory as a step to battle global warming  | <b>3.6</b>  | Highly significant        |
| I am in favor of South Road Properties, Cebu City as the site of the proposed project.   | <b>3.49</b> | Highly significant        |
| I agree that the location of the proposal is accessible.   | <b>2.98</b> | Significant               |
| <b>Total Average Mean</b>  | <b>3.39</b> | <b>Highly significant</b> |
| Legend:<br>3.26 – 4.0 – Highly Significant ;<br>2.51 - 3.25 - Significant ;<br>1.76 – 2.50- Somewhat Significant;<br>1.00 – 1.75- Not Significant at all |             |                           |

The table above presents a range of responses regarding attitudes toward sustainable practices in the architecture and their relationship with tourism and economic growth. The highest mean value, 3.66, indicates that respondents strongly believe corporations and the construction industry should prioritize carbon negativity, highlighting a high level of concern for environmental sustainability. Similarly, the proposal for a mixed-use building with a botanical conservatory as a step to combat global warming (3.6) also received a highly significant rating. However, the statement about the accessibility of the location, with a mean of 2.98, is still significant but slightly lower, implying that while accessibility is important, it is less of a priority compared to environmental considerations. The study implies a strong support for eco-friendly initiatives in urban planning and construction, with an emphasis on environmental responsibility and sustainable site choices. Sustainable urban design plays a key role in tackling the challenges of rapid urban growth and the growing pressure on natural resources, Rehan (2014).

## CONCLUSION

In conclusion, the findings provide a comprehensive overview of local residents' awareness, attitudes, and willingness to engage in environmental sustainability practices. The data reveals a high level of awareness regarding the causes and consequences of global warming, with residents expressing strong concern about its impact on both human beings

and the environment. However, while there is notable recognition of these issues, knowledge and involvement in specific climate mitigation strategies, such as carbon negativity, are comparatively lower, suggesting a gap in education or practical engagement with these solutions. The respondents show a robust commitment to environmental sustainability, as evidenced by their support for eco-friendly practices such as the use of renewable energy, carbon-negative initiatives, and water conservation methods like rainwater harvesting. These actions are viewed as highly significant for combating global warming, indicating a strong willingness to actively contribute to global sustainability efforts.

Furthermore, the data demonstrates a clear support for integrating sustainable practices into urban development, particularly in the architecture and construction industries. Respondents strongly favor carbon-negative business practices and sustainable building proposals, including a mixed-use development with a botanical conservatory. While accessibility of the site is still considered important, environmental considerations were prioritized, signaling a strong alignment with the broader goals of sustainable urban planning. The results suggest that while local residents are deeply concerned about environmental issues and recognize the importance of sustainable practices, there remains an opportunity for further education and engagement on specific mitigation strategies. Incorporating these practices into urban design can enhance resilience to environmental challenges, and continued efforts to promote eco-friendly initiatives could further empower individuals and communities to play a proactive role in addressing global warming and climate change.

## **RECOMMENDATIONS**

Based on the findings of the study, several recommendations can be made to bridge the gaps in awareness and engagement, and to further promote sustainable practices within the local community. These suggestions aim to foster a more engaged, educated, and proactive approach to addressing environmental challenges at both the individual and community levels. By focusing on these areas, local communities can build on their existing environmental awareness and make stronger contributions to global sustainability efforts.

1. **Enhance Education on Climate Solutions:** While residents exhibit a strong awareness of global warming and its impacts, their familiarity with specific mitigation strategies like carbon negativity and carbon-negative initiatives is lower. Local governments, educational institutions, and environmental organizations should offer targeted educational campaigns or workshops to increase understanding of practical solutions to climate change, including carbon neutrality, energy-efficient construction, and sustainable urban planning.

2. **Promote Community-Based Carbon-Negative Initiatives:** The survey shows that respondents are willing to participate in carbon-negative initiatives, but their current involvement may be limited. To encourage active participation, local authorities and organizations can introduce community-based carbon-reduction programs such as tree planting, urban gardening, or promoting renewable energy use within neighborhoods. Creating incentives for local residents to engage in these initiatives can increase the sense of collective responsibility and strengthen community action.

3. **Increase Collaboration with the Construction Industry:** Given the significant belief that the construction industry should prioritize carbon negativity, it is essential to foster

partnerships between local government bodies, developers, and environmental organizations. This can involve incentivizing the adoption of sustainable building materials, promoting energy-efficient construction practices, and integrating green spaces in new developments. Incorporating these strategies into local planning codes and development regulations can help align urban growth with sustainability goals.

4. **Strengthen Support for Eco-Friendly Urban Projects:** Residents show strong support for environmentally conscious projects, such as the mixed-use building with a botanical conservatory. To build on this momentum, local authorities should prioritize and support the development of similar projects that blend sustainable practices with urban development. Public-private partnerships and collaboration with architects and engineers specializing in sustainable design could further facilitate the implementation of such initiatives.

5. **Address Site Accessibility Concerns:** While environmental considerations are a priority, the survey results indicate that accessibility is still a significant factor for residents when considering new development sites. Future urban planning efforts should ensure that sustainable projects are not only environmentally responsible but also accessible to a wide range of residents. This could include improving transportation links to eco-friendly developments and ensuring that they are within reach of key public services and infrastructure.

6. **Encourage Renewable Energy Adoption:** The high willingness of residents to use renewable energy sources suggests that initiatives to support the adoption of solar, wind, and other sustainable energy solutions would likely be well-received. Local governments and utility companies could offer incentives, such as subsidies, tax breaks, or rebates, to encourage the installation of renewable energy systems in homes and businesses. Public awareness campaigns about the benefits of renewable energy can also help increase adoption. **Facilitate Rainwater Harvesting Programs:** Given the support for rainwater harvesting as a water conservation method, local governments should promote and incentivize the installation of rainwater harvesting systems. This could include offering subsidies for the installation of rainwater collection systems or providing educational resources on how to implement them effectively.

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### **MOBILE-BASED GUIDANCE AND CONSULTATION SYSTEM**

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#### **ABSTRACT**

Mental health issues, particularly among vulnerable groups like the elderly and teenagers, remain a critical but often overlooked aspect of well-being. Despite growing recognition, stigma, emotional struggles, and limited access to mental health resources prevent many individuals from seeking support. This study introduces TambagMobile, a mobile-based platform aimed at providing confidential, stigma-free mental health support, especially for the elderly and teenagers. Through a descriptive-survey method, the study evaluates factors that influence mental health help-seeking behaviors and the effectiveness of mobile-based consultations. Results highlight the significant emotional struggles faced by respondents, particularly the younger demographic, and the barriers to accessing

traditional in-person counseling services. The findings reveal that mobile platforms are perceived as an effective, anonymous solution to reduce stigma and bridge gaps in mental health care. This study underscores the need for accessible, anonymous, and mobile-based mental health support systems to improve emotional well-being, reduce stigma, and make mental health services more accessible, especially for younger individuals and those facing societal judgment. Recommendations include expanding mobile-based platforms, ensuring privacy, targeting younger populations, and increasing awareness to combat stigma. TambagMobile seeks to facilitate a more inclusive and supportive approach to mental health care through technology.

**Keywords:** *mental health issues, mobile-based guidance and consultation system, stigma, emotional struggles, and limited access to mental health resources*

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## INTRODUCTION

Mental health issues remains critical, yet often an overlooked aspect of overall well-being, particularly for vulnerable groups such as the elderly and teenagers. According to Institute of Health Metrics and Evaluation (2023) approximately 14% of persons 60 years of age and older suffer from a mental illness. Likewise mental health challenges often emerge during the transition from childhood to adolescence, with one in five individuals encountering significant struggles before reaching 25, and half exhibiting symptoms by the age of 14, Colizzi (2020). Despite the growing recognition of these challenges, many individuals, especially in these age groups, continue to suffer in silence. Their struggles often go unnoticed, or worse, dismissed by those around them. This societal neglect, coupled with a lack of understanding about mental health, often leads to a reluctance to seek help. As a result, feelings of isolation, anxiety, and worsening mental health conditions become mental health services, (Corrigan et al., 2014).

A key factor that hinders individuals from seeking support is the stigma surrounding mental health issues. Stigma, often defined as an attitude that severely undermines or devalues a person's worth, continues to contribute to the reluctance to reach out for help (Mayor et al., 2022). For those experiencing overwhelming emotions such as sadness, loneliness, and anxiety, the lack of clarity about the root cause of their distress—coupled with the fear of judgment—makes it even more challenging to find help. Without support, these emotional states can negatively impact their well-being, social interactions, and relationships, perpetuating a cycle of isolation.

This study addresses a crucial gap by introducing TambagMobile, a mobile-based platform designed to empower individuals, particularly the elderly and teenagers, to seek mental health support in a confidential, judgment-free environment. The study aims to bridge lies in the lack of accessible, stigma-free mental health resources that encourage open conversations. TambagMobile offers users the opportunity to express their thoughts and emotions freely while providing seamless access to expert consultations. By reducing the stigma surrounding mental health and facilitating easier access to professional support, TambagMobile aims to ensure that no one feels alone in their mental health journey. By facilitating communication and offering professional support through an easy-to-use platform, we hope to ensure that no one feels alone on their mental health journey.

This study aims to investigate how mobile platforms can create a supportive environment for mental health, facilitate open conversations, and improve access to essential resources. In the end, TambagMobile seeks to make mental health care more

accessible, help individuals seek support without fear of judgment, and contribute to a larger societal movement toward better understanding and addressing mental health issues.

## **STATEMENT OF THE PROBLEM**

This study aims to evaluate the effectiveness of TambagMobile, an online platform designed to assist individuals facing mental health challenges. Specifically, the study seeks to address the following questions:

1. What is the profile of the respondents in terms of:
  - a. age;
  - b. gender;
  - c. occupation;
  
2. What are the factors preventing elderly individuals and teenagers from seeking mental health support in terms of :
  - a. emotional struggles
  - b. limited access and lack of awareness
  - c, stigma
  
- 3, Based on the study's findings, what are the recommendations that help enhance the TambagMobile application.

## **METHODS**

### ***Design***

The study employed a descriptive-survey method with a quantitative approach to examine the effectiveness of a mobile-based guidance system in addressing mental health challenges. Using structured surveys, the research aimed to identify patterns and relationships among key variables, including emotional struggles, limited access to mental health resources, lack of awareness, and stigma. By analyzing these factors, the study seeks to provide valuable insights into how a mobile-based consultation platform can foster a supportive environment for mental health, encourage open conversations, and improve access to essential resources. The results could contribute to the development of more effective digital tools for mental health support and potentially help reduce barriers to mental health care.

### ***Respondent Groups and Criteria***

The respondents for this study were selected 300 individuals through random sampling to ensure a representative and unbiased sample from Brgy. Quiot, Pardo, Cebu City. This study focuses on two key vulnerable groups: the elderly and teenagers. These groups are chosen due to their particular susceptibility to mental health challenges, which often remain unnoticed or untreated due to a variety of factors such as stigma, lack of resources, and a lack of awareness. Each of these groups faces unique challenges that make them particularly relevant to this research.

### ***Scoring Procedure***

This section describes the scoring methods for the data analysis stage of the research,

concentrating on three key variables: emotional struggles, limited access and lack of awareness and stigma. These variables will be evaluated using a four-point scale to establish their values.

Table 1: *Scoring*

| Scale | Range       | Description       |
|-------|-------------|-------------------|
| 4     | 3.26 – 4.0  | Strongly Agree    |
| 3     | 2.51 - 3.25 | Agree             |
| 2     | 1.76 – 2.5  | Disagree          |
| 1     | 1.0 – 1.75  | Strongly Disagree |

## RESULTS AND DISCUSSION

Table 2. *Age of the Respondents*

| CATEGORY | RATE | PERCENTAGE |
|----------|------|------------|
| 18-30    | 126  | 42 %       |
| 30-60    | 96   | 32%        |
| 70- 100  | 78   | 26 %       |

The data presented above shows a breakdown of values within different age groups and their respective percentages. The first group, ages 18-30, has 126 individuals, making up 42% of the total. The second group, ages 30-60, consists of 96 individuals, which represents 32% of the total. The third group, ages 70-100, has 78 individuals, corresponding to 26% of the total. This implies that the largest proportion of the population in the dataset is in the 18-30 age range, followed by the 30-60 range, and the smallest portion is in the 70-100 age group. These percentages give insight into the distribution of the population, suggesting that younger individuals (18-30) are more prevalent in this specific sample, while older individuals (70-100) make up a smaller proportion. According to Putra and Muhtadi (2023), individuals aged 10 to 30 years experience significant stress due to their unstable mental condition and pressures from both internal and external sources.

Table 3. *Gender of the Respondents*

| CATEGORY | RATE | PERCENTAGE |
|----------|------|------------|
| MALE     | 133  | 44%        |
| FEMALE   | 167  | 56%        |

The data shows a gender distribution where 133 individuals are male, accounting for 44% of the total population, while 167 individuals are female, representing 56%. This implies that the population is slightly more female than male. The distribution indicates a relatively balanced gender ratio, with a small difference in favor of females. This could be relevant for various analyses, such as understanding gender-specific trends or needs within the population being studied. Mental health conditions differ significantly between

genders, with females having a higher likelihood than males of developing depression, anxiety, and stress-related disorders, (Kuehner, 2017).

Table 4. *Occupation of the Respondents*

| CATEGORY   | RATE | PERCENTAGE |
|------------|------|------------|
| STUDENT    | 76   | 25%        |
| EMPLOYED   | 140  | 47%        |
| UNEMPLOYED | 84   | 28%        |

The table above shows the distribution of individuals in three categories: Student, Employed, and Unemployed. The respondents who are employed have the highest count, with 140 individuals, making up 47% of the total population. On the other hand, the students have the lowest count, with 76 individuals, representing 25% of the total population. This indicates that employment is the most prevalent status within the group, suggesting that a large portion of the population is working. Based on the PhilAtlas Census, (2015), the data shows that the age group with the largest population in Quiot Pardo is 5 to 9 years old, comprising 2,645 individuals. In contrast, the age group with the smallest population is those aged 80 and over, with only 107 individuals.

Table 5. *Mental Health Support needed by the Respondents*

| Question number   | Mean        | Interpretation        |
|---|-------------|-----------------------|
| <b>Emotional struggles</b>  |             |                       |
| I experience emotional struggles that affect my daily life.   | 2.51        | Agree                 |
| I find it difficult to manage my emotions without external support.   | 3.36        | Strongly Agree        |
| I feel that emotional support via mobile-based platforms could be as effective as face-to-face counselling.     | 2.82        | Agree                 |
| <b>Factor average</b>   | <b>2.9</b>  | <b>Agree</b>          |
| <b>Limited access and lack of awareness</b>   |             |                       |
| I face challenges in accessing in-person counselling services due to geographical location.                     | 3.12        | Agree                 |
| I believe mobile-based consultation systems can help bridge the gap in accessing mental health support.         | 3.47        | Strongly Agree        |
| Limited access to mental health professionals is a significant barrier for me.                                  | 3.45        | Strongly Agree        |
| <b>Factor average</b>   | <b>3.35</b> | <b>Strongly Agree</b> |
| <b>Stigma</b>   |             |                       |
| I believe that mobile-based consultations can help reduce the stigma associated with seeking emotional support. | 2.56        | Agree                 |
| I would be more comfortable using a mobile-based  | 3.72        | Strongly Agree        |

|   |             |                |
|---|-------------|----------------|
| consultation system due to its anonymous nature.  |             |                |
| I feel there is a stigma attached to seeking emotional support or counselling.  | 3.39        | Strongly Agree |
| <b>Factor average</b>   | <b>3.22</b> | <b>Agree</b>   |
| <b>Total Average Mean</b>   |             |                |
| Legend:<br>3.26 – 4.0 – Strongly Agree ;<br>2.51 - 3.25 - Agree ;<br>1.76 – 2.50- Disagree;<br>1.00 – 1.75- Strongly Disagree | <b>3.16</b> | <b>Agree</b>   |

The table above reveals a strong correlation between emotional struggles, limited access to mental health resources, and the stigma surrounding the perceived effectiveness of mobile-based platforms for emotional support. The data shows that many participants experience emotional struggles. The highest score here is 3.36, where participants "strongly agree" that they find it difficult to manage emotions without external support. On the other hand, the lowest score is 2.51, where participants "agree" that emotional struggles affect their daily life. The factor average of 2.9 indicates that most people feel that emotional struggles are present but manageable with external help, highlighting the importance of accessible emotional support. Most of the respondents experience emotional struggles, but the intensity may not be as high, or they may have coping mechanisms that are less disruptive to their day-to-day activities. This implies that most people feel that emotional struggles are present but manageable with external help, highlighting the importance of accessible emotional support.

Moreover, the table above also shows the challenges faced by individuals in accessing mental health support, particularly due to limited access and lack of awareness. The highest score in this factor is 3.47, where participants "strongly agree" that mobile-based consultation systems could help bridge the gap in accessing mental health support. lowest score. On the other hand, the lowest score is 3.12, reflects an agreement that geographical location limits access to in-person counseling services. With an average factor score of 3.35, this suggests a strong belief in the potential of digital solutions to overcome barriers to mental health care. This implies that while geographical limitations are a challenge, participants still believe that mobile-based services could alleviate these issues.

Furthermore, the table above also reflects an individual's belief that mobile-based consultations could play a significant role in reducing the stigma often associated with seeking emotional support or counseling. The highest score in the statements is "I would be more comfortable using a mobile-based consultation system due to its anonymous nature," with a rating of 3.72, indicating that the respondents feel that the anonymity provided by mobile-based consultations is a key factor in their comfort with seeking emotional support. help reduce the stigma associated with seeking emotional support," with a rating of 2.56, indicating agreement but to a lesser extent. This implies the importance of mobile-based consultations, especially in reducing the stigma related to emotional support, though there is some uncertainty about their effectiveness in completely overcoming the stigma. This suggest that mobile-based consultations are perceived as reducing stigma, particularly because of their anonymous nature, making individuals feel more comfortable seeking help. The study findings highlight the critical need for

accessible, anonymous, and effective mobile-based mental health support systems. Mobile-based platforms are considered nearly as effective as in-person counseling, and the majority agree that these platforms could help address challenges related to accessing in-person services. According to Kart et al., (2017), mobile technologies are gaining significance in delivering personalized support to healthcare users and offer a promising platform for health-related interventions.

## **CONCLUSION**

In conclusion, the study underscores the critical need for accessible, effective, and anonymous mental health support systems, particularly through mobile platforms, to meet the emotional and psychological needs of individuals. The findings reveal that younger people, especially those aged 18-30, are most affected by mental health challenges, with emotional struggles often stemming from mental instability and external pressures. Gender differences also emerge, with a higher prevalence of mental health issues such as depression and anxiety among females. Employment status plays a role in access to resources, as most respondents are employed, but challenges in accessing in-person counseling due to geographical limitations remain prevalent.

Mobile-based platforms are strongly supported by respondents as a viable solution, with their convenience, effectiveness, and ability to reduce stigma making them an essential tool for overcoming traditional barriers to mental health care. The study highlights the growing importance of mobile technology in providing accessible, anonymous mental health support, which could help address the increasing demand for mental health services and reduce societal stigma around seeking help. Overall, the results emphasize the need for more inclusive and accessible mental health care systems, leveraging technology to ensure that individuals, particularly younger people and those facing stigma, can receive the support they need.

## **RECOMMENDATIONS**

Based on the study's findings, the following recommendations can be made to improve mental health support and access, especially through mobile platforms:

1. **Develop and Expand Mobile-Based Mental Health Platforms:** Given the high support for mobile platforms, it is recommended that mental health services be further developed and optimized for mobile use. These platforms should offer a wide range of services, including counseling, self-help resources, and support groups, to provide convenient and accessible care, especially for those with geographical or logistical barriers to in-person therapy.
2. **Ensure Anonymity and Privacy:** To reduce stigma, it is essential that mobile mental health platforms maintain strict privacy and anonymity protocols. Ensuring that users can access support without fear of judgment will encourage more individuals, particularly younger users, to seek help and engage in ongoing care.
3. **Target Younger Populations (Ages 18-30):** Since younger individuals are more likely to experience emotional struggles, it is recommended that mental health programs and mobile platforms be tailored to meet the specific needs of this demographic. This can include offering content and support that addresses issues commonly faced by younger people, such as stress, anxiety, and emotional instability.

4. Provide Gender-Specific Resources: Given that females are more likely to experience mental health issues such as depression and anxiety, mobile platforms should offer gender-sensitive resources and counseling services. This could involve providing targeted support for female mental health issues, while also ensuring that services remain inclusive and accessible to all genders.

5. Address Employment-Related Stress: Since a significant portion of respondents is employed, it is recommended that mental health services cater to the mental health needs of workers. Mobile platforms could offer workplace stress management resources, tools for balancing work and mental health, and strategies for dealing with work-related emotional struggles.

6. Increase Awareness and Accessibility of Mental Health Support: To reduce stigma and increase the adoption of mental health services, it is important to increase awareness campaigns that highlight the benefits and availability of mobile mental health support. These campaigns should aim to educate the public, especially younger generations, on the importance of mental health and the accessibility of resources through mobile apps.

7. Enhance Integration with Traditional Services: While mobile platforms are valuable, they should be integrated with existing mental health services to offer a comprehensive care model. Collaborating with in-person counselors, therapists, and mental health professionals can help ensure that individuals receive holistic care that addresses both immediate emotional struggles and long-term mental health needs.

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## EVALUATING THE IMPACT OF A THESIS PLANNER WITH SMS NOTIFICATIONS ON TIME MANAGEMENT AND PROGRESS

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### ABSTRACT

This study explores the potential impact of integrating a thesis planner with SMS notifications on time management, user engagement, progress tracking, and completion rates among fourth-year students in the College of Engineering, Technology, and Architecture at the University of the Visayas, Main Campus. The research aims to determine whether digital tools, specifically a mobile thesis planner combined with SMS reminders, can enhance students' ability to manage their time effectively, stay on track with their thesis work, and reduce procrastination. Through structured surveys, the study assesses key factors including time management efficiency, user engagement, and progress tracking. Findings indicate that time management efficiency had the highest significance, showing that students who effectively plan and organize their tasks experience higher productivity and less stress. Progress tracking also showed significant results, with students emphasizing the importance of regularly monitoring milestones to maintain momentum and meet deadlines. However, user engagement, while still significant, showed areas for improvement, suggesting that more frequent and responsive interactions could further enhance the user experience. Based on these findings, recommendations include improving user engagement through personalized communication, offering additional time management resources, and providing enhanced progress tracking tools. This study provides insights into how integrating technology can address time management challenges, foster academic success, and improve the thesis writing process.

**Keywords:** *thesis planner, sms notification, time management efficiency, user engagement, and progress tracking*

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## INTRODUCTION

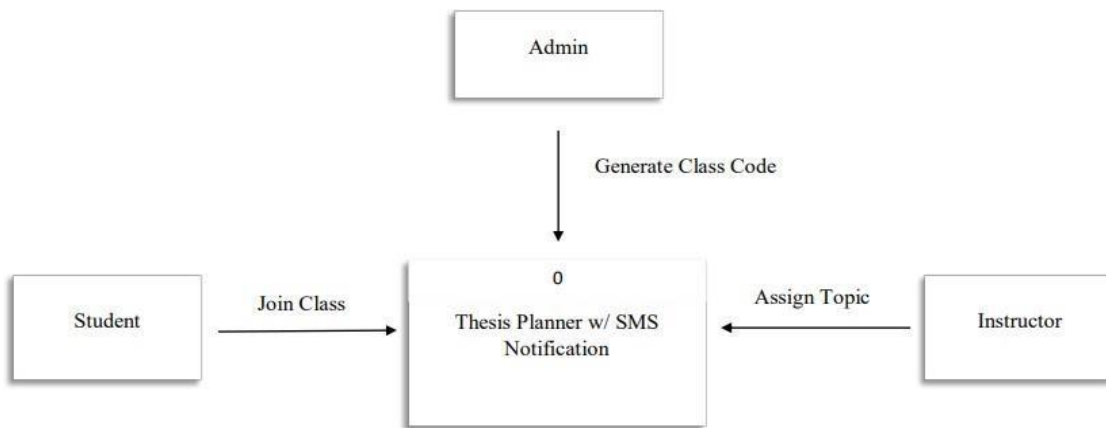
Writing a thesis is a major academic challenge that demands students to handle multiple tasks, such as conducting research, drafting, revising, and meeting tight deadlines. As noted by Ermiasi et al. (2021), a thesis is the written outcome of a thorough investigation carried out after a period of supervised research at a university. Due to the complexity and duration of the thesis process, managing time effectively and monitoring progress are essential for success. However, many students find it difficult to organize their tasks properly, stick to deadlines, and maintain consistent progress, which can lead to procrastination, stress, and, in some cases, late or unfinished thesis submissions.

Effective time management and progress tracking are crucial for successfully completing a thesis, which is a demanding and intricate task. Writing a thesis requires not only intellectual effort but also strong organizational skills, discipline, and sustained focus over an extended period. According to Azmat and Ahmad (2022), the thesis process is complex because students need to combine their knowledge and abilities to understand, analyze, describe, and explain issues related to their chosen scientific topic. During this journey, students frequently face challenges like meeting deadlines, organizing tasks, and staying motivated. As the process progresses, managing research, writing, and revisions while adhering to a strict timeline can become overwhelming, often resulting in procrastination, stress, and delayed submissions. As Wardi and Ifdil (2016) noted, students often face obstacles in the course of working on their thesis. Effective planning and progress tracking are essential to overcoming these challenges. Traditionally, students have turned to personal planners, calendars, and manual reminders as tools to stay on track. While these methods offer some structure, they also have significant limitations: they can easily be forgotten, overlooked, or improperly utilized. Such gaps in adherence to planning tools often result in missed deadlines and an overall lack of progress.

SMS (Short Message Service) is a widely used communication protocol that enables the exchange of short text messages between mobile devices. According to Nordby et al., (2022), it could serve as an efficient method for sending reminders, given its broad accessibility and low distribution costs. The simplicity, wide accessibility, and speed of SMS notifications make it a powerful tool for effective communication in both personal and professional contexts. This research aims to explore the role of SMS notifications in enhancing thesis completion by integrating them with a thesis planner. Specifically, it will examine how SMS reminders impact time management efficiency, user engagement, and progress tracking and completion rates, all of which are crucial for successful thesis completion. The study seeks to determine whether digital planning tools combined with SMS reminders can improve productivity, reduce procrastination, and help students stay on track with their academic milestones.

This research aims to explore the relationship between using a thesis planner with SMS notifications and the overall success of thesis completion. It will examine how integrating this planner can help students manage time effectively, improve organizational skills, and maintain consistent progress throughout the thesis-writing process. The study will specifically focus on time management, task organization, and meeting deadlines. By evaluating how students interact with the tool and its impact on their work habits, the research seeks to provide insights into the potential benefits of combining digital planning tools with SMS reminders to enhance the thesis-writing process.

## CONCEPTUAL FRAMEWORK



*Figure 1. Thesis Planner with SMS Notification Context Diagram*

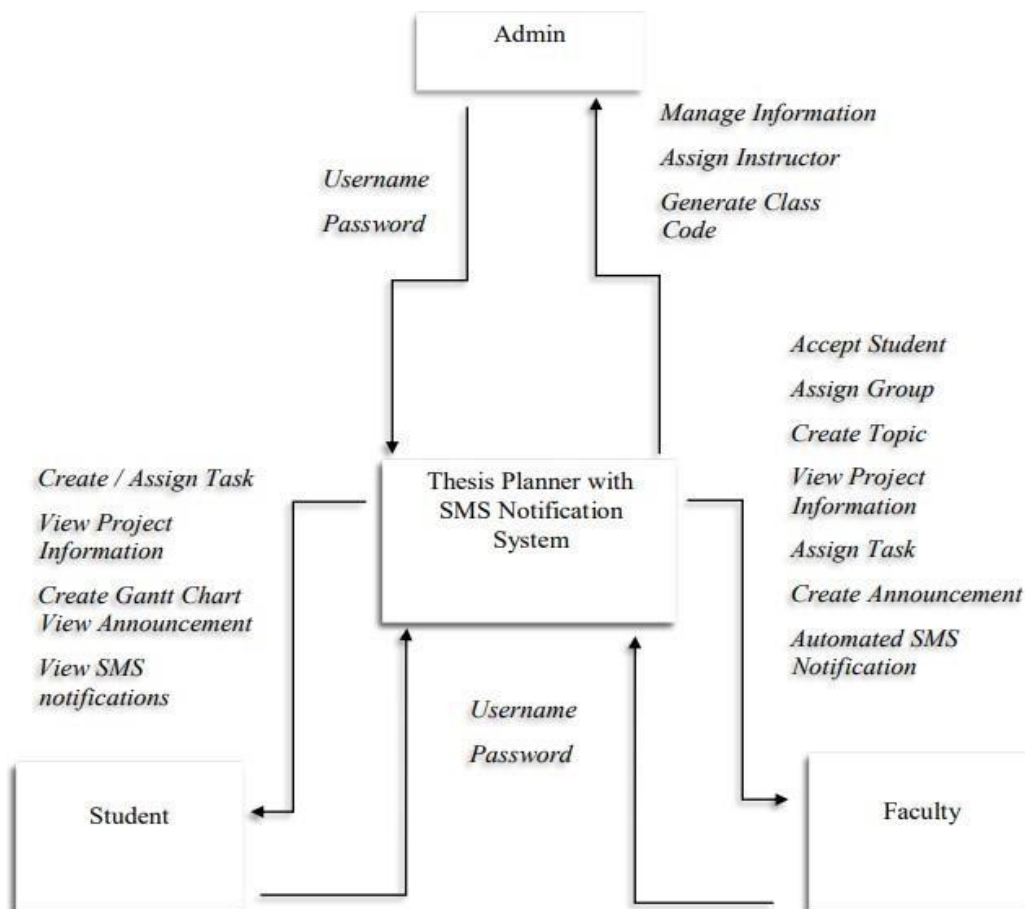


Figure 2. Thesis Planner with SMS Notification Data Flow Diagram

## STATEMENT OF THE PROBLEM

This study aims to assess the potential effects of a thesis planner with SMS notifications on time management and progress. It will specifically focus on answering the following questions:

1. What is the profile of the respondents in terms of:
  - a. age;
  - b. gender;
  - c. course
  
2. What are the potential effects of a thesis planner with SMS notifications on time management and progress in terms of:
  - a. time management efficiency
  - b. user engagement
  - c. progress tracking and completion rates
  
3. Based on the study's findings, what recommendations can be made to enhance the thesis planner with SMS notifications in order to improve overall thesis completion rates?

## METHODS

### ***Design***

This research design aimed to assess the impact of a mobile thesis planner equipped with SMS notifications on various factors influencing students' ability to manage their time, track their progress, and ultimately complete their theses. The structured surveys were distributed to participants, gathering data on key variables such as time management efficiency, user engagement, and thesis progress tracking. By analyzing the relationships between these variables and completion rates, the study aimed to identify patterns that may suggest the effectiveness of the mobile system in supporting students. Specifically, it sought to determine whether regular reminders and progress tracking through SMS notifications can improve users' engagement with their thesis projects, reduce procrastination, and enhance completion rates. The results are expected to provide valuable insights into how digital tools, like mobile-based planners, can alleviate mental health challenges (such as stress or anxiety) and improve academic outcomes. Ultimately, this research could contribute to the development of more effective academic support tools that integrate technology to address mental health concerns while fostering academic success.

### ***Respondent Groups and Criteria***

The respondents in this study were students enrolled in the College of Engineering, Technology, and Architecture at the University of the Visayas- Main Campus. Out of the 360 fourth-year students in this college, a sample of 189 students was selected using a random sampling technique to ensure a fair and unbiased representation.

The selection process was guided by a set of Inclusion-Exclusion criteria. Specifically, the inclusion criteria for participation in the study were as follows:

- 1) participants must be bonafide fourth-year students enrolled in the College of Engineering, Technology, and Architecture at the University of the Visayas Main Campus;
- 2) they must be of legal age;
- 3) they must be willing to participate in the study; and
- 4) they must voluntarily provide their consent to take part. These criteria ensured that the respondents were relevant to the study and ethically involved in the research process.

Those who do not fall within the bounds of the inclusion criteria are deemed excluded from the conduct of this research.

### ***Scoring Procedure***

This section outlines the scoring techniques used in the data analysis phase of the research, focusing on three primary variables: emotional challenges, limited access and lack of awareness, and stigma. These variables will be assessed using a four-point scale to determine their respective values.

Table 1: ***Scoring***

| <b>Scale</b> | <b>Range</b> | <b>Description</b> |
|--------------|--------------|--------------------|
| 4            | 3.26 – 4.00  | Strongly Agree     |
| 3            | 2.51 - 3.25  | Agree              |
| 2            | 1.76 – 2.50  | Disagree           |
| 1            | 1.00 – 1.75  | Strongly Disagree  |

## RESULTS AND DISCUSSION

Table 2. *Age of the Respondents*

| CATEGORY | RATE | PERCENTAGE |
|----------|------|------------|
| 25 – up  | 37   | 19.5       |
| 22- 24   | 106  | 56 %       |
| 19 – 21  | 46   | 24.3%      |

The table above represents a distribution of values within different age categories, along with their corresponding rates and percentages. The highest rate are found in the age "22-24" category with for 56%. On the other hand, the lowest rate are in the age "25 – up" category, making up only 19.5% of the total population. This implies that the majority of the respondents falls within the 22-24 age range, accounting for more than half of the total population. According to Philippine Statistics Authority (2020), the implementation of the K-12 program in the Philippines has likely contributed to the increased number of individuals aged 20 to 24 who have reached or completed at least a college education. With the K-12 program, which added two additional years to the basic education cycle, students now complete a more comprehensive and rigorous curriculum before entering higher education.

Table 3. *Gender of the Respondents*

| CATEGORY | RATE | PERCENTAGE |
|----------|------|------------|
| MALE     | 82   | 43.4%      |
| FEMALE   | 107  | 56.6 %     |

The table shows that the highest rate in the given data is for females, with a percentage of 56.6%, while the lowest rate is for males at 43.4%. This suggests that, within the context of the category being measured, females represent a larger portion (56.6%) compared to males, who make up 43.4%. This indicates that females account for a greater proportion of the measured category, suggesting a gender-based disparity where females are more represented than males in the given context.

Table 4. *Course of the Respondents*

| CATEGORY | RATE | PERCENTAGE |
|----------|------|------------|
| BSARCH   | 43   | 22.75%     |
| BSCE     | 46   | 24.33%     |
| BSEE     | 17   | 8.99%      |
| BSME     | 21   | 11.11%     |

|      |    |        |
|------|----|--------|
| BSIT | 62 | 32.80% |
|------|----|--------|

The table above shows the different courses of the respondents. The highest rate in this category is for the BSIT (Bachelor of Science in Information Technology), with a rate of 62, representing 32.80% of the total. This indicates a strong interest or demand for the program, possibly reflecting the growing importance of IT professionals in various industries. In contrast, the lowest rate is for the BSEE (Bachelor of Science in Electrical Engineering), with a rate of 17, representing just 8.99%. This lower percentage could imply a reduced interest in electrical engineering compared to other fields, which could be attributed to various factors such as market trends, perceived career opportunities, or competition from other technology-related programs. The difference between the highest and lowest rates highlights the varying levels of appeal or demand across different fields of study, which may have implications for resource allocation, recruitment strategies, or curriculum development in academic institutions.

Table 5. *Potential effects of a Thesis planner with SMS notifications*

| Question number   | Mean        | Interpretation |
|---|-------------|----------------|
| <b>Time Management Efficiency</b>   |             |                |
| I consistently plan and organize my day to ensure I focus on the most important tasks, maximizing my efficiency in all aspects of my life       | 3.10        | Agree          |
| I am skilled at breaking down tasks into manageable steps, which allows me to stay on track and complete my work ahead of schedule.             | 2.84        | Agree          |
| I am disciplined in planning my day to ensure tasks are completed efficiently, leading to enhanced productivity and less stress.                | 3.06        | Agree          |
| I maintain a proactive approach to time management, regularly reassessing priorities to ensure I'm always working on the most impactful tasks.  | 3.53        | Strongly Agree |
| <b>Factor average</b>   | <b>3.13</b> | <b>Agree</b>   |
| <b>User Engagement</b>  |             |                |
| I consistently engage with users by responding promptly to their feedback, fostering strong relationships, and ensuring their needs are met.    | 2.67        | Agree          |
| I maintain a strong focus on user engagement by providing timely, relevant updates that keep users informed and excited about new developments. | 2.98        | Agree          |

|  |             |                |
|--|-------------|----------------|
| I utilize data-driven insights to tailor my approach, ensuring that users feel engaged, supported, and motivated to continue interacting.      | 3.04        | Agree          |
| I actively listen to user input, making adjustments and improvements based on their preferences to enhance their experience and satisfaction.  | 2.86        | Agree          |
| <b>Factor average</b>  | <b>2.89</b> | <b>Agree</b>   |
| <b>Progress Tracking And Completion Rates</b>  |             |                |
| I effectively track my progress, using key metrics to assess my performance and stay motivated towards completing my tasks and goals           | 3.12        | Agree          |
| By regularly monitoring my progress, I can adjust my approach to ensure I meet deadlines and achieve high completion rates on all projects.    | 3.44        | Strongly Agree |
| I regularly review my progress and adjust my workflow to maintain a steady pace, ensuring that I achieve high completion rates for every task. | 2.67        | Agree          |
| I maintain a clear record of my achievements and milestones, enabling me to track progress and ensure consistent progress toward my objective  | 3.01        | Agree          |
| <b>Factor average</b>  | <b>3.06</b> | <b>Agree</b>   |
| <b>Overall Mean</b>  | <b>3.03</b> | <b>Agree</b>   |
| Legend:<br>3.26 – 4.0 – Strongly Agree ;<br>2.51 - 3.25 - Agree ;<br>1.76 – 2.50- Disagree;<br>1.00 – 1.75- Strongly Disagree                  |             |                |

The table presented above displays the highest and lowest per factor in the data reflect different levels of significance in various aspects of personal and professional development. The highest average score is in "Time Management Efficiency" with a factor average of 3.13, signifying a focus on planning and organizing tasks to maximize productivity and minimize stress. This score reflects a significant attention to planning and organizing daily tasks. The specific items that contributed to this high average, such as maintaining a proactive approach to time management (score of 3.53), demonstrate that the individual is highly disciplined and efficient when it comes to managing their time. This indicates that effective time management is highly significant in achieving success. This focus on efficiency implies that the person is likely successful in balancing multiple responsibilities, reducing stress, and increasing productivity. According to Sahito and Vaisanen (2017), time management is an essential skill for both the students and school, as it involves identifying and implementing effective strategies to complete tasks within a set timeframe while maintaining the required level of quality.

Conversely, the "Progress Tracking and Completion" factor, with an average of 3.06, falls in between the extremes. It indicates a strong focus on tracking progress and using



key metrics to stay motivated and ensure high completion rates. The relatively high scores in items like monitoring progress (3.44) suggest that the individual values clear, measurable goals and adjusts their approach when necessary. This implies they are committed to continuous improvement and can adapt their strategy to maintain momentum. As highlighted by Young et al. (2024), the lack of awareness, along with the pressure to meet each milestone promptly, can lead to students falling behind and struggling to make sufficient progress.

Furthermore, the lowest score is in "User Engagement," with an average of 2.89. While still significant, it suggests that user interaction and feedback responsiveness could be improved, highlighting areas where attention and enhancements are needed to strengthen relationships and engagement. This suggests that enhancing user engagement could involve increasing the frequency and quality of communication, ensuring that feedback is not only acknowledged but actively incorporated into service or product development. These implications show that while the individual is performing well in areas like time management and progress tracking, there is room for improvement in maintaining consistent user engagement. According to Habibipour et al., (2016), it is important to understand how users should be engaged in the development process and how to address the challenges that arise from involving them.

## **CONCLUSION**

In conclusion of the study, the analysis of the potential effects of a Thesis planner with SMS notifications reveals that time management efficiency is the most highly significant factor, suggesting that respondents place considerable importance on planning and organizing tasks to improve productivity and reduce stress. Progress tracking and completion rates also emerged as significant, demonstrating the value placed on clear, measurable goals and the importance of monitoring progress to maintain momentum. However, the area of user engagement, though still significant, shows that there is room for improvement in fostering stronger relationships and responding to feedback, which could further enhance the overall user experience. These findings indicate that while time management and progress tracking are strong suits, there is a clear opportunity to improve user engagement, ensuring that all aspects of personal and professional development are optimized for success. Enhancing user engagement could involve refining the interaction process, increasing responsiveness, and creating more personalized and relevant updates. Addressing these areas could foster stronger relationships and improve user satisfaction, ultimately leading to better outcomes. These insights provide valuable guidance for further improving strategies that address time management, user interaction, and overall task completion.

## **RECOMMENDATIONS**

Based on the findings, the following recommendations are made:

1. **Enhance User Engagement:** Since user engagement scored the lowest, efforts should be made to improve communication with users. This could include increasing the frequency of updates, actively responding to feedback, and ensuring that suggestions are integrated into the system. Implementing personalized communication and offering more interactive features could further improve user satisfaction.
2. **Support Time Management Tools and Resources:** Since time management is highly valued, offering additional tools, resources, or workshops focused on efficient task

management could further enhance productivity and reduce stress for students and users. Encouraging the use of digital planners or apps with integrated notifications can complement the Thesis planner system already in place.

3. Monitor Progress Continuously: As progress tracking is crucial, it is recommended to provide more robust metrics and dashboards that help users clearly see their milestones and areas that need improvement. Regularly updating these tools will help users stay motivated and on track with their academic and professional goals.

By addressing these areas, it is possible to further improve the user experience, academic success, and overall engagement with the programs and tools being used.

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## PROPOSED ACTION PLAN FOR OR ENHANCING THE SUSTAINABLE MAINTENANCE PROGRAM AT CEBU ENERGY DEVELOPMENT CORPORATION

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### ABSTRACT

The growing demand for sustainable energy solutions has prompted companies like Cebu Energy Development Corporation (CEDC) to adopt eco-friendly practices in their operations. As a leader in clean energy, CEDC is committed to integrating sustainable strategies in its maintenance practices to improve operational efficiency, reduce maintenance costs, enhance safety, and minimize environmental impact. This study examines the current maintenance processes at CEDC, focusing on the potential benefits of a sustainable maintenance program designed to enhance asset reliability and reduce operational downtime. Through a descriptive qualitative method, the research investigates how improved maintenance practices could address key factors such as operational efficiency, cost reduction, safety, and sustainability. The findings suggest that automation, preventive maintenance, and employee involvement are critical to optimizing maintenance operations. However, further improvements in safety and sustainability training are necessary. The study draws on Deming's Management Theory and Sustainability Theory to frame the investigation, illustrating the importance of continuous improvement and long-term viability in achieving corporate and environmental goals. The results will inform actionable recommendations for refining CEDC's maintenance strategies, ensuring the company's continued commitment to reliable, sustainable energy production.

**Keywords:** *sustainable maintenance program, action plan, enhancing operational efficiency, reducing maintenance costs, improving safety and sustainability*

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### INTRODUCTION

In today's rapidly evolving energy landscape, there is an increasing emphasis on sustainability—requiring companies to go beyond conventional maintenance protocols and integrate eco-friendly strategies, resource conservation, and waste reduction in their day-to-day operations. According to Lund (2024), sustainable energy refers to energy sources that are anticipated to last for a period relevant to the human lifespan without being exhausted. Through the implementation of this action plan, Cebu Energy Development Corporation (CEDC) aims to enhance the performance and longevity of its energy infrastructure while also reducing its carbon emissions and environmental impact. This approach reflects the corporation's commitment to corporate social responsibility and its

role in promoting sustainable energy solutions.

Cebu Energy Development Corporation (CEDC) is a leading provider of sustainable energy, committed to the generation of efficient and reliable power to meet the growing needs of the region. As per Global Business Power (2025), Cebu Energy Development Corporation (CEDC) owns and manages a 246 MW clean coal-fired power plant situated in Toledo City, Cebu. Like any energy production facility, maintaining and prolonging the lifespan of its assets is essential for ensuring continuous service, cost-effectiveness, and operational safety. As per stated by Kłosowski (2015), maintenance involves engineering decisions and related actions required to optimize the performance of specific equipment. Recognizing the importance of strategic maintenance practices, CEDC aims to enhance its approach to asset management by implementing a comprehensive sustainable maintenance program. This program is designed to improve asset reliability, reduce downtime, optimize operational performance, and align with the company's long-term sustainability goals. The core of the proposed action plan for CEDC's sustainable maintenance program emphasizes strategies aimed at enhancing operational efficiency, reducing maintenance costs, improving safety and sustainability.

Moreover, the sustainable maintenance program at Cebu Energy Development Corporation (CEDC) is designed to address the growing need for both operational efficiency and environmental stewardship in the energy sector. As a leading energy provider, CEDC recognizes that maintaining a high level of operational reliability is not only essential for ensuring uninterrupted power supply but also crucial for minimizing environmental footprints and adhering to industry best practices. The proposed action plan outlines strategies and specific initiatives for implementing these maintenance practices, ultimately supporting the company's mission to provide reliable and sustainable energy to its stakeholders while optimizing resource usage and minimizing waste.

This study will conduct a comprehensive assessment of CEDC's current maintenance practices, identifying opportunities for improvement in areas such as preventive maintenance, equipment diagnostics, and performance monitoring. The findings of this study will inform the development of an optimized, sustainable maintenance strategy that aligns with company's operational goals and environmental commitments.

## **THEORITICAL BACKGROUND**

This section houses the various theories used in the conduct of this investigation. This study revolves around the study of the following variables operational efficiency, reducing maintenance costs, improving safety and sustainability and are supported by the discussion of the following theories as follows: Deming's Management Theory. and Sustainability Theory.

In this section, we will demonstrate how these theories are integral to the successful implementation of the concepts discussed.

### **DEMING'S MANAGEMENT THEORY**

Deming's Management Theory focuses on improving the quality and productivity of organizations through continuous improvement, employee involvement, and systemic thinking. Deming's management theory highlights the essential steps for transforming a company's quality culture, stressing that quality is primarily driven by people rather than

products, Alauddin and Yamada, (2019). The importance of employee involvement in driving quality improvements. Employees are considered essential to the survival and success of any business, as they serve as the foundation of the organization and the driving force behind its growth and productivity (Nwaeke and Obiekwe, 2017). Creating a work environment where employees at all levels feel empowered to contribute ideas, identify problems, and suggest solutions. When employees feel invested in the success of their work, they are more likely to take ownership of quality issues and contribute to finding innovative solutions.

A key component is to the focus on long-term quality and process improvement rather than short-term fixes, which aligns well with the concept of sustainability. By adopting Deming's philosophy, CEDC can establish a culture of constant monitoring, data-driven decision-making, and proactive problem-solving in its maintenance operations.

## **SUSTAINABILITY THEORY**

Sustainability Theory focuses on the long-term viability of processes, systems, and practices, ensuring that actions taken today do not compromise the ability of future generations to meet their needs. As stated by Lung and Levrat (2014), sustainability is often defined as development that fulfills the needs of the present generation without compromising the ability of future generations to meet their own needs. This theory applies to various domains, including environmental management, social responsibility, and economic performance.

In relation to CEDC's maintenance program, this theory promotes practices that enhance resource efficiency, reduce environmental harm, and support both community welfare and the corporation's economic longevity. By integrating sustainable strategies into its operations, CEDC can secure its long-term viability while positively impacting environmental and social outcomes. This may include improving energy efficiency, cutting waste, adopting green technologies, and aligning business operations with social and ethical values, thus establishing a solid foundation that ensures the company's future resilience.

## **STATEMENT OF THE PROBLEM**

This study aims to assess the potential effects in improving maintenance process at Cebu Energy Development Corporation. This research will investigate how these tools might enhance the overall maintenance processes, focusing on key factors such as operational efficiency, maintenance costs, safety, and sustainability. It will specifically focus on answering the following questions:

1. What is the profile of the respondents in terms of:
  - a. age;
  - b. position in the company
  
2. What are the potential effects in improving maintenance process at Cebu Energy Development Corporation in terms of:
  - a. enhancing operational efficiency
  - b. reducing maintenance costs
  - c. improving safety and sustainability

3. Based on the results of this study, actionable recommendations will be developed to enhance the maintenance process at Cebu Energy Development Corporation.

## **METHODS**

### ***Design***

The study used a descriptive qualitative method. The study aims to identify key factors that influence the effectiveness of maintenance practices and propose actionable solutions to improve operational efficiency and sustainability. A survey will be administered to employees at various levels within the maintenance department to assess current practices, challenges, and areas for improvement. The findings will inform the development of a comprehensive action plan aimed at operational efficiency, maintenance costs, safety, and sustainability.

### ***Respondent Groups and Criteria***

The respondents in this study were the 30 employees directly involved in the day-to-day maintenance activities at Cebu Energy Development Corporation. This group will be selected based on their roles and experience in maintaining equipment and systems. Participants must have at least one year of experience in the maintenance department to provide meaningful insights into current practices and challenges.

### ***Scoring Procedure***

This section outlines the scoring techniques used in the data analysis phase of the research, focusing on three primary variables: emotional challenges, limited access and lack of awareness, and stigma. These variables will be assessed using a four-point scale to determine their respective values.

Table 1: *Scoring*

| <b>Scale</b> | <b>Range</b> | <b>Description</b> |
|--------------|--------------|--------------------|
| 4            | 3.26 – 4.00  | Very Effective     |
| 3            | 2.51 - 3.25  | Effective          |
| 2            | 1.76 – 2.50  | Somewhat Effective |
| 1            | 1.00 – 1.75  | Not Effective      |

## **RESULTS AND DISCUSSION**

Table 2. *Age of the Respondents*

| <b>CATEGORY</b> | <b>RATE</b> | <b>PERCENTAGE</b> |
|-----------------|-------------|-------------------|
| 40 – up         | 7           | 23.3 %            |
| 31 – 40         | 13          | 43.3 %            |
| 21 - 30         | 10          | 33.4%             |

This table above shows a breakdown of a certain category based on the age of the respondents. The respondents in the "40 and up" category have the highest total, which is 23.3% of the total population. The respondents aged "31–40" make up 43.3% of the total population, with a rate of 13. Lastly, the "21–30" category shows the lowest rate, with 10 respondents, representing 33.4% of the total. This implies that the proportion of each group

within the total, with the largest share falling within the 31-40 age range.

Table 3. *Position In The Company of the Respondents*

| CATEGORY                       | N | PERCENTAGE |
|--------------------------------|---|------------|
| Maintenance Department         |   |            |
| Supervisors / Upper Management | 2 | 6.66%      |
| Junior Engineers / Technicians | 8 | 26.67 %    |
| Technical Services             |   |            |
| Planner                        | 2 | 6.66%      |
| NDT Engineers                  | 1 | 3.34%      |
| Operation Services             |   |            |
| Manager                        | 1 | 3.34%      |
| Superintendent                 | 4 | 13.33%     |
| Supervisors                    | 4 | 13.33%     |
| Control Operator               | 8 | 26.67 %    |

The table above presents the positions held by the respondents within the company. It provides a clear breakdown of the various job titles and ranks, helping to identify the roles and responsibilities of the individuals involved in the study. The highest percentage in the data is 26.67%, which is shared between two categories: Junior Engineers / Technicians and Control Operators. This implies that these two groups make up the largest portions of the workforce within their respective departments, potentially indicating the operational importance or larger number of staff in these roles. On the other hand, the lowest percentage is 3.34%, which is represented by Operation Services Manager, and NDT Engineers. This suggests that these positions are less numerous, possibly reflecting more specialized roles or higher-level expertise that is not as widespread within the organization. According to Sari et al., ( 2015), maintenance objectives at the operational level will be synchronized with corporate business strategies by establishing key performance indicators for each level.

Table 4. *Enhancing Operational Efficiency*

| Question number  | Mean | Interpretation |
|--|------|----------------|
| Auto generation of work orders as well as completion through computerized maintenance management system (CMMS) | 3.80 | Very Effective |
| The manner of checking and reviewing procedures and work instructions is thorough and effective                | 3.23 | Effective      |
| Regular routine inspections of plant equipment and   | 3.34 | Very Effective |

|  |             |                       |
|--|-------------|-----------------------|
| auxiliaries are conducted thoroughly and consistently.   |             |                       |
| The manner of executing every maintenance task is efficient and effective  | 3.11        | Effective             |
| The approach for ensuring the safety of personnel and company assets during maintenance  | 3.51        | Very Effective        |
| <b>Total Mean</b>  | <b>3.39</b> | <b>Very Effective</b> |
| Legend:<br>3.26 – 4.0 – Very Effective;<br>2.51 - 3.25 - Effective ;<br>1.76 – 2.50- Somewhat Effective;<br>1.00 – 1.75- Not Effective |             |                       |

The table 4 above evaluates various aspects of maintenance processes based on their effectiveness, with mean scores representing how well each process is perceived to perform. The highest mean score of 3.8, which corresponds to the "Auto generation of work orders as well as completion through computerized maintenance management system (CMMS)," is considered "Very Effective." It indicates that the process of automating work orders and completing them through CMMS is highly efficient and contributes positively to operational efficiency. Conversely, the lowest mean score of 3.11, related to "The manner of executing every maintenance task," falls under the "Effective" category. While this still shows a relatively strong performance, it is not as high as the other areas, implying that there may be room for improvement in how maintenance tasks are executed. This implies that while the system for generating and completing work orders is extremely effective, certain areas of routine maintenance and task execution could be enhanced for greater operational efficiency. Based on the study of Daniewski et al., (2018), in order to produce a large number of high-quality products, the maintenance department must be in charge of carrying out a defined maintenance strategy that details how the company's machinery and equipment are to be handled.

Table 5 . *Reducing Maintenance Costs*

| Question number   | Mean | Interpretation |
|---|------|----------------|
| Performing regular preventive maintenance, such as pump inspections, contributes to lowering overall maintenance costs.   | 3.21 | Effective      |
| Training employees to strengthen the technical skills of maintenance personnel improves maintenance procedures and helps lower maintenance costs.                           | 3.09 | Effective      |
| Monthly monitoring through regular inspections and audits of maintenance performance helps identify potential issues before they result in costly problems.                 | 3.33 | Very Effective |
| Employee engagement and involvement in the maintenance process help cut down unnecessary costs.   | 3.35 | Very Effective |
| Establishing a comprehensive maintenance plan reduces unnecessary maintenance costs and helps identify problems through root cause analysis to prevent recurring incidents. | 3.05 | Effective      |



|  |             |                  |
|--|-------------|------------------|
| <b>Total Mean</b>  | <b>3.21</b> | <b>Effective</b> |
| Legend:<br>3.26 – 4.0 – Very Effective;<br>2.51 - 3.25 - Effective ;<br>1.76 – 2.50- Somewhat Effective;<br>1.00 – 1.75- Not Effective |             |                  |

The table 5 above highlights various aspects of reducing maintenance costs. The factor of employee engagement and involvement in the maintenance process earned the highest mean score of 3.35, which is categorized as "Effective" according to the given scale. On the other hand, the lowest mean score, 3.05, is associated with the statement, "Establishing a comprehensive maintenance plan reduces unnecessary maintenance costs and helps identify problems through root cause analysis to prevent recurring incidents," which, despite being lower, is still considered "Effective."

This difference suggests that there may be areas for improvement in the implementation or perception of comprehensive maintenance planning. While both scores fall within the "Effective" range, they indicate that, although these maintenance practices are generally effective, there is still room for optimization to maximize their impact. As noted by Beekeeper (2023), maintenance management is a regular business expense, and yet companies often exceed their budgets due to inefficiency. This underlines the importance of continually refining maintenance practices to enhance both their effectiveness and efficiency.

Table 6 . *Improving Safety And Sustainability*

| <b>Question number</b>  | <b>Mean</b> | <b>Interpretation</b> |
|---|-------------|-----------------------|
| Sustainable workplace practices enhance safety by addressing inconsistencies in the implementation of Computerized Maintenance Management Systems (CMMS). | 2.29        | Somewhat Effective    |
| Improving safety standards is key to sustainability, especially regarding improper data collection and evaluation.  | 2.22        | Somewhat Effective    |
| Improving safety practices can lead to long-term sustainability, particularly by addressing the lack of training in pump repair and maintenance.          | 2.82        | Effective             |
| Safety innovations are just as important as sustainability innovations for a better future, particularly given the absence of advanced technology.        | 2.35        | Somewhat Effective    |
| There should be more investment in training programs that focus on both safety and sustainability.  | 3.07        | Effective             |
| <b>Overall Mean</b>   | <b>2.55</b> | <b>Effective</b>      |
| Legend:<br>3.26 – 4.0 – Very Effective;   |             |                       |

|                                  |  |  |
|----------------------------------|--|--|
| 2.51 - 3.25 - Effective ;        |  |  |
| 1.76 – 2.50- Somewhat Effective; |  |  |
| 1.00 – 1.75- Not Effective       |  |  |

The table above presents a summary of various factors that contribute to improving safety and sustainability. The highest score, 3.07 indicates that investing in training programs focused on both safety and sustainability is seen as effective, suggesting that such programs are crucial for fostering long-term improvements. In comparison, the lowest score, 2.22 refers to improving safety standards in the context of improper data collection and evaluation, indicating that while this is considered somewhat effective, it needs more attention. The mean scores show that while safety innovations and improvements in maintenance practices are acknowledged as somewhat effective, training programs are viewed as more impactful. The overall mean of 2.55 suggests that while safety and sustainability practices are seen as effective, there is still room for further improvement. This implies that improving safety and sustainability in the workplace requires a balanced approach, with particular emphasis on addressing training needs. According to Lee (2018), workplace safety has a direct impact on productivity and overall performance.

## CONCLUSION

In conclusion, the data presented in the various tables provides valuable insights into the demographic profile, job positions, and operational processes within the organization. The respondents predominantly fall within the 31-40 age range and hold various positions across different departments, with Junior Engineers/Technicians and Control Operators making up the largest share. The operational efficiency of maintenance processes is generally perceived as very effective, with the computerized maintenance management system being the standout performer. However, there is room for improvement in the execution of routine maintenance tasks. In terms of reducing maintenance costs, employee engagement and preventive maintenance strategies are seen as particularly effective, though comprehensive maintenance planning could be further optimized. Additionally, while safety and sustainability improvements are recognized, there is a notable need for enhanced training programs to ensure long-term success in these areas. Overall, the findings highlight the importance of continuous improvement in maintenance practices, employee training, and safety protocols to achieve higher operational efficiency and sustainability within the company.

## RECOMMENDATIONS

Based on the findings from the tables, several recommendations can be made to enhance operational efficiency, reduce maintenance costs, and improve safety and sustainability within the organization:

- 1. Optimize Routine Maintenance Execution:** While the auto-generation of work orders through CMMS is highly effective, the execution of routine maintenance tasks could be further refined. A review of standard operating procedures, along with additional training

for maintenance personnel, could ensure that tasks are executed more efficiently, minimizing downtime and maximizing productivity.

**2. Enhance Comprehensive Maintenance Planning:** Although establishing a comprehensive maintenance plan is considered effective, there is still room for improvement. A more thorough approach to root cause analysis and proactive problem-solving can help prevent recurring issues and reduce unnecessary maintenance costs. Regular audits and reviews of the maintenance plan should be conducted to ensure its continuous relevance and effectiveness.

**3. Invest in Continuous Training Programs:** The effectiveness of training programs, particularly those focused on safety and sustainability, has been highlighted. It is essential to prioritize these programs and expand their scope to ensure all employees, especially in critical roles like pump repair and maintenance, are up-to-date with the latest standards and technologies. Enhanced training on the use of CMMS could also improve the overall effectiveness of maintenance operations.

**4. Focus on Employee Engagement in Maintenance Processes:** The high effectiveness of employee engagement in reducing maintenance costs emphasizes the need for fostering a strong culture of involvement. Encouraging workers to actively participate in maintenance planning and problem-solving will lead to better outcomes and cost reduction. Regular feedback loops and recognition programs for employees involved in maintenance tasks can further drive engagement.

**5. Improve Safety and Sustainability Standards:** The organization should place a greater emphasis on addressing the gaps in safety and sustainability practices, particularly in areas where data collection, evaluation, and technological advancements are lacking. Investing in advanced safety innovations, upgrading systems, and adopting more sustainable practices will not only improve safety but also contribute to long-term organizational sustainability.

**6. Monitor and Adjust Performance Indicators:** Finally, regular monitoring and adjustment of key performance indicators (KPIs) at all levels of the organization will ensure alignment with business strategies. By establishing clear KPIs and tracking progress, the company can continue to optimize its maintenance processes, reduce costs, and enhance overall performance.

Implementing these recommendations will contribute to continuous improvement in maintenance operations, cost efficiency, safety standards, and sustainability, ultimately enhancing the organization's long-term success.

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**A PROPOSED REHABILITATION INSTITUTION THROUGH A  
BIOPHILIC DESIGN APPROACH IN THE CITY OF TOLEDO, CEBU**

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**ABSTRACT**

This study investigates the potential benefits of integrating biophilic design

principles into rehabilitation centers, particularly in Toledo, Cebu. Biophilic design emphasizes creating environments that connect people to nature, promoting both physical and mental well-being. By incorporating natural elements such as greenery, water features, natural lighting, and sustainable materials, biophilic design aims to reduce stress, enhance cognitive function, and improve overall health outcomes, which are crucial in rehabilitation settings. The research assesses how biophilic design influences patient recovery, architectural functionality, staff productivity, and environmental sustainability. Results show that natural elements positively impact patient recovery and staff satisfaction, although improvements are needed in certain aspects such as layout, emotional comfort, and sustainability awareness. The study highlights the importance of refining facility design to optimize therapeutic outcomes and foster an environment that supports both physical and emotional healing.

**Keywords:** *biophilic design, rehabilitation institution, patient recovery, architectural functionality, staff productivity, and environmental sustainability*

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## INTRODUCTION

Biophilic design is a type of architectural design that aims to create buildings and spaces connected to nature, with which humans have a deep and intrinsic connection. Incorporating natural elements in rehabilitation spaces enhances both physical and mental recovery processes. Biophilic design focuses on creating spaces that connect people to nature through natural elements, such as the incorporation of greenery, natural lighting, open spaces, water features, and sustainable materials. As stated by Gillis and Gatersleben (2015), biophilic design proposes that humans naturally have a deep connection to the environment and that exposure to the natural world is therefore important for human well-being. Numerous psychological benefits, such as reduced stress and anxiety, have been demonstrated for patients exposed to nature. Natural lighting and ventilation, natural landscapes, and other elements can improve patients' performance and enhance productivity. Makram, A., & Razek, S. A. A. (2019) suggested a "central pathway" linking nature and health, which could unintentionally contribute to improved immune function.

Rehabilitation centers play an essential role in supporting individuals through their healing process. Whether focused on physical recovery after an injury, mental health recovery, or emotional healing from trauma, the environment can either support or hinder the recovery process. As stated by Ouf et al., (2021), patients who have access to nature and maintain ongoing connections with family, friends, and dedicated social workers are likely to recover more quickly and be discharged sooner. Positive environmental design can encourage relaxation, reduce feelings of anxiety or depression, and promote a sense of safety and comfort, all of which are essential for people undergoing rehabilitation.

The proposed study aims to investigate the potential benefits of applying a biophilic design approach to the development of a rehabilitation institution in Toledo, Cebu. This study will examine how the principles of biophilic design can address not only the functional needs of such institutions but also foster a healing environment. The research will explore how incorporating elements of nature into the design can contribute to patient well-being by reducing anxiety and enhancing cognitive function—both essential in rehabilitation. Furthermore, it will consider the environmental benefits of using sustainable

materials and designing spaces that harmonize with the local natural surroundings, thereby promoting environmental stewardship.

This study aims to explore the potential of biophilic design in a rehabilitation context. It will examine how integrating natural elements into the design of rehabilitation spaces can contribute to better recovery outcomes, enhancing both physical and mental healing. The study could address how biophilic design principles can be applied to rehabilitation institutions in the Toledo, Cebu region, considering both the physical healing process and the mental and emotional needs of patients.

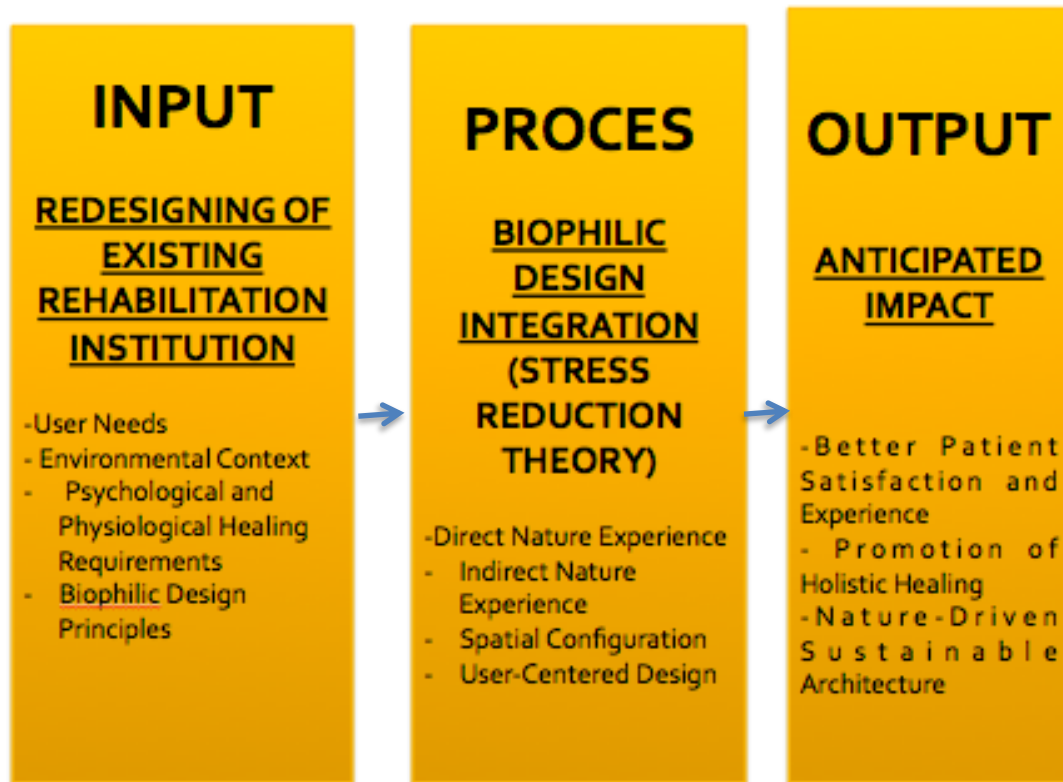
## **THEORITICAL BACKGROUND**

### **STRESS REDUCTION THEORY**

Stress reduction theory emphasizes the therapeutic effects of natural environments on reducing stress and enhancing well-being. Ulrich (2023), explains that the stress reduction theory (SRT) highlights how nature exposure reduces stress, boosts cognitive performance, and improves health outcomes. The impact of nature exposure extends beyond mental health, influencing physical health outcomes, such as lowering blood pressure, reducing heart rates, and boosting immune function. The theory underscores the idea that natural environments offer restorative qualities that modern, often stressful, urban settings cannot provide. Thus, the integration of nature exposure into daily life as a means of mitigating the harmful effects of stress, promoting mental clarity, and fostering overall health.

In this context, incorporating biophilic design into a proposed rehabilitation center in Toledo City, Cebu, could greatly enhance the recovery experience for patients. By integrating natural elements into the built environment, biophilic design creates calming, restorative spaces that help reduce the stress commonly found in urban areas. As Escolà-Gascón and Houran (2021), suggest this design approach leverages the human tendency to seek connections with nature, fostering environments that support healing and well-being. Such restorative spaces can help alleviate stress and support overall well-being, offering patients a more conducive environment for recovery. Ultimately, biophilic design would not only enhance the rehabilitation process but also offer long-term health benefits, helping to counteract the negative effects of stress typically associated with city life.

### **CONCEPTUAL FRAMEWORK**



*Figure 1. Conceptual Framework of the Study*

## STATEMENT OF THE PROBLEM

This study aims to assess the potential impacts and benefits of establishing a rehabilitation institution that integrates a biophilic design approach in the City of Toledo, Cebu. Specifically, it seeks to explore how incorporating natural elements and principles of biophilic architecture can enhance the healing environment, promote the well-being of patients and staff, and support sustainable design practices. The research will further evaluate the feasibility, functionality, and therapeutic advantages of such a facility, with the goal of proposing an innovative and holistic rehabilitation institution that aligns with the environmental and socio-cultural context of the region. It will specifically focus on answering the following questions:

1. What is the profile of the respondents in terms of:
  - a. age;
  - b. gender
  
2. What are the possible impacts of enhancing a rehabilitation institution through the integration of a biophilic design approach in terms of:
  - a. patient recovery and well-being
  - b. architectural functionality and aesthetics
  - c. staff productivity and satisfaction
  - d. environmental sustainability

3. Based on the results of this study, valuable insights were identified that can be used as recommendations to enhance both the physical environment and the overall recovery experience of patients. The findings can serve as a foundation for future architectural designs, policy-making, and rehabilitation strategies tailored to the needs of both patients and staff in the City of Toledo, Cebu.

## **METHODS**

### ***Design***

This study employed a descriptive qualitative research method to explore critical aspects of healthcare facility design and operations. The primary objective is to identify key factors that impact patient recovery and well-being, architectural functionality and aesthetics, staff productivity and job satisfaction, and environmental sustainability.

To gather relevant data, a structured survey will be administered to employees across different levels of the maintenance department. The survey aims to assess existing practices, identify operational challenges, and uncover potential areas for improvement. The insights gained from the study will be instrumental in crafting evidence-based recommendations that can guide the enhancement of healthcare environments, ensuring they are more supportive, efficient, and sustainable for both patients and staff.

### ***Respondent Groups and Criteria***

The respondents in this study consisted of a randomly selected group of fifty (50) individuals, including employees and potential individuals currently undergoing drug rehabilitation. These participants were chosen based on their direct involvement in the day-to-day operations and experiences within the rehabilitation facility. This group was carefully selected considering their specific roles, responsibilities, and firsthand experience, which are crucial in providing meaningful insights into the current practices, challenges, and opportunities for improvement in the rehabilitation environment.

### ***Research Environment***

The study was conducted across various rehabilitation centers located in Toledo City, a third-class component city in the province of Cebu, Philippines. Toledo City spans a total land area of approximately 216.28 square kilometers (or 21,628 hectares), making it one of the larger cities in the province in terms of geographic size.

As a third-class city, Toledo plays a significant role in the region's socio-economic development, and it houses several healthcare and rehabilitation facilities that cater to individuals recovering from substance abuse. The city's urban and rural mix provides a diverse setting, making it an ideal location for assessing the effectiveness and functionality of rehabilitation environments in different contexts.

### ***Scoring Procedure***

This section outlines the scoring techniques used in the data analysis phase of the research, focusing on three primary variables: patient recovery and well-being,



architectural functionality and aesthetics, staff productivity and job satisfaction, and environmental sustainability. These variables will be assessed using a four-point scale to determine their respective values.

Table 1: *Scoring*

| Scale | Range       | Description       |
|-------|-------------|-------------------|
| 4     | 3.26 – 4.00 | Strongly Agree    |
| 3     | 2.51 - 3.25 | Agree             |
| 2     | 1.76 – 2.50 | Disagree          |
| 1     | 1.00 – 1.75 | Strongly Disagree |

## RESULTS AND DISCUSSION

Table 2. *Gender of the Respondents*

| CATEGORY | RATE | PERCENTAGE |
|----------|------|------------|
| MALE     | 36   | 72%        |
| FEMALE   | 14   | 28%        |

The table above shows a clear gender disparity among the respondents, with 36 males (72%) and only 14 females (28%) participating in the study. This notable imbalance suggests that a significantly higher number of males are either employed in or undergoing rehabilitation within the facilities surveyed. This could imply that men are more frequently affected by substance abuse issues, or they are more commonly admitted into rehabilitation centers compared to women in the study area. According to the study of McHugh et al., (2018), the gender gap in substance use disorders is decreasing, emphasizing the need to understand how sex and gender influence their causes and persistence.

Table 3. *Age of the Respondents*

| CATEGORY                   | RATE | PERCENTAGE |
|----------------------------|------|------------|
| 18 years old -25 years old | 13   | 26%        |
| 26 years old -35 years old | 23   | 46%        |
| 36 years old -45 years old | 14   | 28%        |
| 45 years old - up          | 0    | 0%         |

Table 2 presents a breakdown of a specific category based on the age groups of the respondents. The data provided suggests that the highest percentage of individuals falls within the 26 to 35 years old category, with 46%, while the lowest percentage is seen in the 45 years old and above category, with 0%. This implies that the majority of individuals in the sample are concentrated in the 26 to 35 years old group, indicating that this age range is the most represented or active in whatever context is being measured. On the other hand, the absence of individuals in the 45 and up category (0%) suggests that this age group is either not involved or represented in the dataset, which could indicate a lack of engagement or participation from older individuals in the context being examined. According to Pardini

et al. (2015), substance use was most prevalent and exhibited the most significant changes from mid-adolescence to the early 30's.

**Table 4. Possible Impacts on Patient Recovery and Well-being**

| <b>Question number</b>  | <b>Mean</b> | <b>Interpretation</b> |
|---|-------------|-----------------------|
| The environment significantly contributes to patient recovery and well-being.   | 3.45        | Strongly Agree        |
| The layout and design of the space support patients' physical and emotional comfort.  | 2.94        | Agree                 |
| Patient recovery time is positively impacted by the design and features of the space.   | 3.22        | Agree                 |
| The medical facility promotes a sense of calm and healing for patients.   | 3.19        | Agree                 |
| <b>Total Average</b>  | <b>3.2</b>  | Agree                 |
| Legend:<br>3.26 – 4.0 – Strongly Agree ;<br>2.51 - 3.25 - Agree ;<br>1.76 – 2.50- Disagree;<br>1.00 – 1.75- Strongly Disagree |             |                       |

The table above shows the possible impacts of the of enhancing a rehabilitation institution through the integration of a biophilic design approach in terms of its patient recovery and well-being. The highest score is 3.45, which corresponds to the statement, "The environment significantly contributes to patient recovery and well-being," where respondents strongly agree. The majority of participants believe the environment plays a crucial role in patient recovery, highlighting the importance of creating spaces that enhance patient health and well-being. Nevertheless , the lowest score is 2.94, which corresponds to the statement, "The layout and design of the space support patients' physical and emotional comfort," where respondents agree but to a lesser extent. This suggest that while the layout and design are generally seen as supportive, there may be room for improvement in how they address both physical and emotional aspects of patient comfort. Furthermore, the respondents believe the facility contributes positively to patient recovery, as reflected by the total average score of 3.2. It suggests that while the facility is generally effective, there are areas where improvements could be made. These areas may involve aspects such as the physical environment, design, or layout that could be further optimized to enhance both the physical and emotional comfort of patients, ultimately supporting a more effective recovery process. According to the study of Wichrowski et al., (2021), the inclusion of biophilic elements, such as nature imagery, in hospital rooms had a noticeable impact on how patients rated their rooms and significantly improved patient satisfaction scores.

**Table5. Possible Impacts on Architectural Functionality and Aesthetics**

|   |      |                |
|---|------|----------------|
| The architectural design is functional and meets the needs of the facility. | 3.61 | Strongly Agree |
| The aesthetics of the building enhance the overall                          | 3.06 | Agree          |

|   |            |                       |
|---|------------|-----------------------|
| experience for users.   |            |                       |
| The building's layout is easy to navigate and supports efficient movement.  | 3.44       | Strongly Agree        |
| The architectural style of the facility is visually appealing and modern.   | 3.09       | Agree                 |
| <b>Total Average</b>  | <b>3.3</b> | <b>Strongly Agree</b> |
| Legend:<br>3.26 – 4.0 – Strongly Agree ;<br>2.51 - 3.25 - Agree ;<br>1.76 – 2.50- Disagree;<br>1.00 – 1.75- Strongly Disagree |            |                       |

The table above illustrates the potential effects of improving a rehabilitation facility by incorporating a biophilic design approach, focusing on its architectural functionality and aesthetics. The data shows that the highest score is 3.61, suggesting that the building's design is highly effective in fulfilling its purpose, which is crucial for the facility's overall success. In comparison, the lowest score is 3.06, which implies that the building's appearance may not have as strong an impact on the user experience compared to other factors, such as functionality and layout. This difference indicates that while the building is functional and well-designed, there may be room for improvement in its aesthetic appeal to enhance the overall user experience. Furthermore, the total mean score of 3.3 falls within the "Strongly Agree" range, indicating a generally positive assessment of the building's architectural aspects. This score suggests that respondents believe the facility's design is highly effective in meeting its intended purpose, offering both functional and aesthetic value. Asim et al. (2020) state that humans react positively not only to direct interaction with the natural environment but also to artificial representations of nature, like fractal patterns, and to organic or conceptual mimicking of natural forms.

**Table 5. Possible Impacts on Staff Productivity and Satisfaction**

|  |             |                |
|--|-------------|----------------|
| Having access to outdoor spaces or views of nature helps me reduce stress and improve focus during work.                           | 2.26        | Agree          |
| A biophilic workplace environment positively impacts my mental and physical well-being   | 3.44        | Strongly Agree |
| Biophilic design (including the presence of plants, water features, and natural light) contributes to my overall job satisfaction. | 2.67        | Agree          |
| I am satisfied with my work environment, particularly due to the incorporation of natural elements.                                | 3.61        | Strongly Agree |
| <b>Total Average</b>   | <b>2.99</b> | <b>Agree</b>   |
| Legend:<br>3.26 – 4.0 – Strongly Agree ;<br>2.51 - 3.25 - Agree ;<br>1.76 – 2.50- Disagree;  |             |                |

|                                |  |  |
|--------------------------------|--|--|
| 1.00 – 1.75- Strongly Disagree |  |  |
|--------------------------------|--|--|

The table above highlights the potential impact of enhancing a rehabilitation facility through a biophilic design approach, with an emphasis on staff productivity and satisfaction. The highest score is 3.61, which shows that the presence of natural elements in the work environment contributes significantly to their overall contentment. This implies that the individual strongly agrees with the positive impact that nature (such as plants, water features, and natural light) has on their satisfaction with their workplace. On the other hand, the lowest score is 2.26, indicates that this factor might not have as immediate or significant of an impact on their work performance or well-being compared to other factors. This suggests that while the individual agrees that nature can help reduce stress and improve focus, the agreement is not as strong as the other aspects of biophilic design. The total average score of 2.99, the respondents agrees that biophilic design has a positive influence but doesn't perceive every aspect of nature in the workplace as having a uniformly strong impact on reducing stress or boosting focus. This implies that the individual generally agrees with the positive impact of biophilic design on their well-being, but their agreement is not particularly strong across all aspects of nature in the workplace. According to Gonçalves (2023) , Human behavior is shaped by individual traits and the physical and social aspects of the environment, which can impact individuals in different ways.

**Table5. Possible Impacts on Environmental Sustainability**

|   |             |              |
|---|-------------|--------------|
| Biophilic design in the workplace makes me more aware of environmental sustainability issues.   | 2.69        | Agree        |
| Being surrounded by natural elements at work increases my personal commitment to environmental sustainability.  | 3.02        | Agree        |
| The biophilic design elements in my office are in alignment with broader organizational goals of environmental sustainability (e.g., energy efficiency, waste reduction). | 2.91        | Agree        |
| Biophilic design in the workplace encourages employees to participate in sustainability efforts, such as recycling or reducing energy consumption.                        | 3.28        | Agree        |
| <b>Total Average</b>  | <b>2.97</b> | <b>Agree</b> |
| Legend:<br>3.26 – 4.0 – Strongly Agree ;<br>2.51 - 3.25 - Agree ;<br>1.76 – 2.50- Disagree;<br>1.00 – 1.75- Strongly Disagree   |             |              |

The table above shows the potential impact of enhancing a rehabilitation facility through a biophilic design approach on the possible impacts on environmental

sustainability. The highest score is 3.28, suggests that the individual strongly agrees that the presence of natural elements in the workplace motivates employees to take part in sustainability actions, highlighting a strong connection between biophilic design and proactive environmental behavior. In contrast, the lowest score is 2.69, implies that while the individual agrees that biophilic design raises awareness of environmental sustainability, the impact is moderate rather than strong. The connection between biophilic design and increased environmental awareness may not be as powerful for this person compared to other aspects of sustainability. The total average score of 2.97 indicates a general agreement with the role of biophilic design in supporting environmental sustainability, though the impact is more moderate than extremely strong, showing a recognition of its influence without it being transformative in every aspect. Reconnecting with nature is considered as one of the most critical challenges in modern urban architecture (Ives et al., 2018).

## **CONCLUSION**

In conclusion, the findings of this study underscore the significant role of biophilic design in improving the overall effectiveness of rehabilitation facilities. The results highlight notable gender and age disparities, with a higher representation of males and individuals in the 26-35 age range, which may indicate specific trends in substance abuse and rehabilitation needs. Biophilic elements, such as natural features, have been found to positively influence patient recovery and well-being, with respondents strongly agreeing that the environment is essential for healing. However, the study also reveals areas for improvement in the layout and design, particularly in supporting both physical and emotional comfort. On the architectural front, while the design of the facility excels in functionality, there is room to further enhance the visual appeal to create a more inviting atmosphere. Staff members expressed strong satisfaction with the positive effects of biophilic design on their well-being, though the direct impact of outdoor spaces on work performance was less pronounced. Additionally, the study suggests that while biophilic design encourages sustainability practices, its influence on fostering deeper environmental awareness could be strengthened. Overall, while the positive effects of biophilic design are evident, the findings suggest that there is still potential for further refinement in both the design and its application to fully optimize patient recovery, staff satisfaction, and environmental sustainability within rehabilitation settings.

## **RECOMMENDATIONS**

Based on the findings of this study, several recommendations can be made to enhance the effectiveness of biophilic design in rehabilitation facilities:

- 1). **Address Gender Disparities:** Given the noticeable gender imbalance in the study, it would be beneficial for rehabilitation centers to consider strategies that encourage greater female participation in rehabilitation programs. This could include targeted outreach, support programs, or creating female-friendly spaces within the facility.
- 2). **Optimize Facility Layout for Patient Comfort:** While the biophilic design elements are positively impacting patient recovery, the study suggests that the layout and design could be improved to further enhance physical and emotional comfort. This may include more flexible spaces, better accessibility, and private or semi-private areas to allow patients to feel more at ease during their recovery.
- 3). **Enhance Aesthetic Appeal:** Although the facility design is functional, there is room for

improvement in its aesthetics. Incorporating more visually pleasing natural elements, art, and design features could help create a more welcoming and soothing atmosphere, further supporting the healing process.

4). **Improve the Integration of Outdoor Spaces:** While outdoor spaces and views of nature are acknowledged for their positive impact on staff satisfaction and well-being, their influence on work focus was less pronounced. To maximize the potential of these spaces, rehabilitation centers could consider designing more engaging outdoor areas that promote relaxation and focus for both staff and patients.

5). **Strengthen Sustainability Efforts:** While biophilic design elements encourage sustainability practices, the study suggests a more moderate impact on broader environmental awareness. To enhance this, rehabilitation centers could integrate more comprehensive sustainability initiatives, such as energy-efficient technologies, waste reduction programs, and staff training on environmental issues, alongside the natural elements already in place.

6). **Further Research on Biophilic Design's Long-Term Effects:** To better understand the full scope of biophilic design's impact on rehabilitation, future studies could explore its long-term effects on both patient recovery and staff satisfaction. This would provide valuable data for refining design strategies and improving the overall rehabilitation experience.

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