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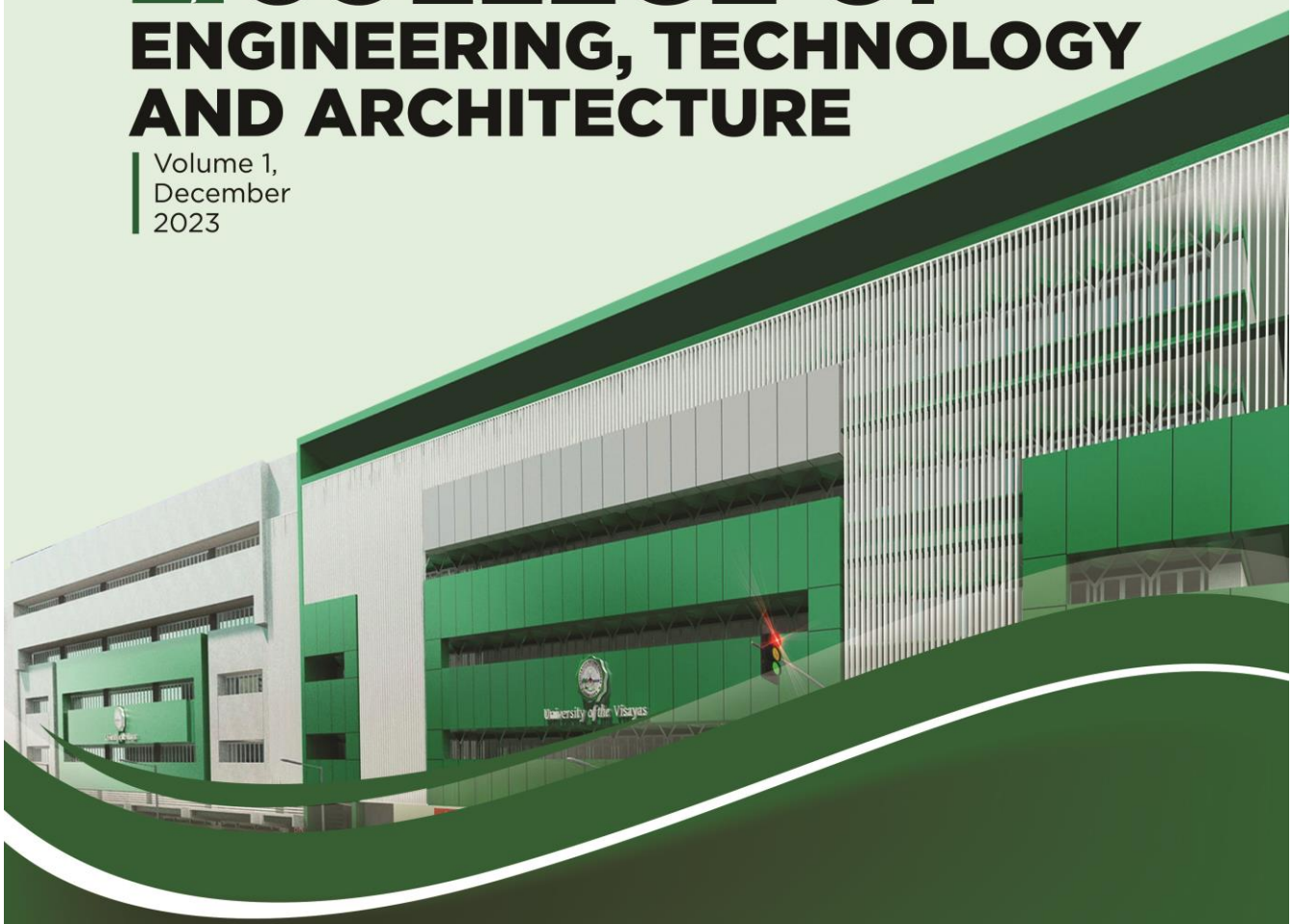

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The UV Journal of Engineering, Technology, and Architecture is a peer-reviewed academic journal that focuses on various aspects of Engineering, Technology, and Architecture. Published annually and available free of charge, the journal serves as an essential platform for sharing research and advancements in these fields.

The journal aims to foster a culture of publication among faculty members from both undergraduate and graduate programs, encouraging them to disseminate their scholarly work and contribute to the academic community. Additionally, it actively invites non-teaching staff to participate in the publication process, recognizing the value of diverse perspectives in enriching the dialogue surrounding engineering and technological innovations.

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Aims and Scope

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:

THRUST	SUBPRIORITIES
Holistic Approaches to Health and Wellness	Determinants of Health
Ensuring Ecological Integrity, Clear and Healthy Environment	Sustain Biodiversity and Functioning of Ecosystem Services Climate Change Resilient Environment
Life on Land and Below Water	Agriculture, Aquatic and Natural Resources Knowledge, Attitude, and Behavior Equity and Human Rights
Societal Impact	Socio-economic Studies History, Arts, Culture, and Sports
Quality Education	Outcomes-Based Education and Institutional Sustainability Mathematics, Language, and Performing and Visual Arts Inclusive Nation Building Pedagogies in Philippine Educational System (Kto12 And HEI Studies)
Health Resiliency	Disaster Risk Reduction and Health Emergencies
Social Resiliency	Climate Change
Policy Impact	Environmental Threats to Health
Knowledge Development, Technology Generation, Transfer and Commercialization	Sustainable Development Outcomes Policy Making
Industry, Energy and Emerging Technology	Technology Development
Educational Management	Competitive Industries School and Classroom Operation

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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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✓ Empirical articles

✓ Theoretical articles

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The University of the Visayas takes pride in having a top-notch research center that supports the research initiatives of faculty members and students from several colleges from inception to production, publication, dissemination, and utilization. All papers go through thorough but reasonable peer-review procedures, including statistical tools, Turn-it-in (a tool that checks for plagiarism), critic reading services, and support with classic publication.

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Additionally, this publication offers cutting-edge ideas and insights and works to uphold the highest standards of excellence in the scientific community.

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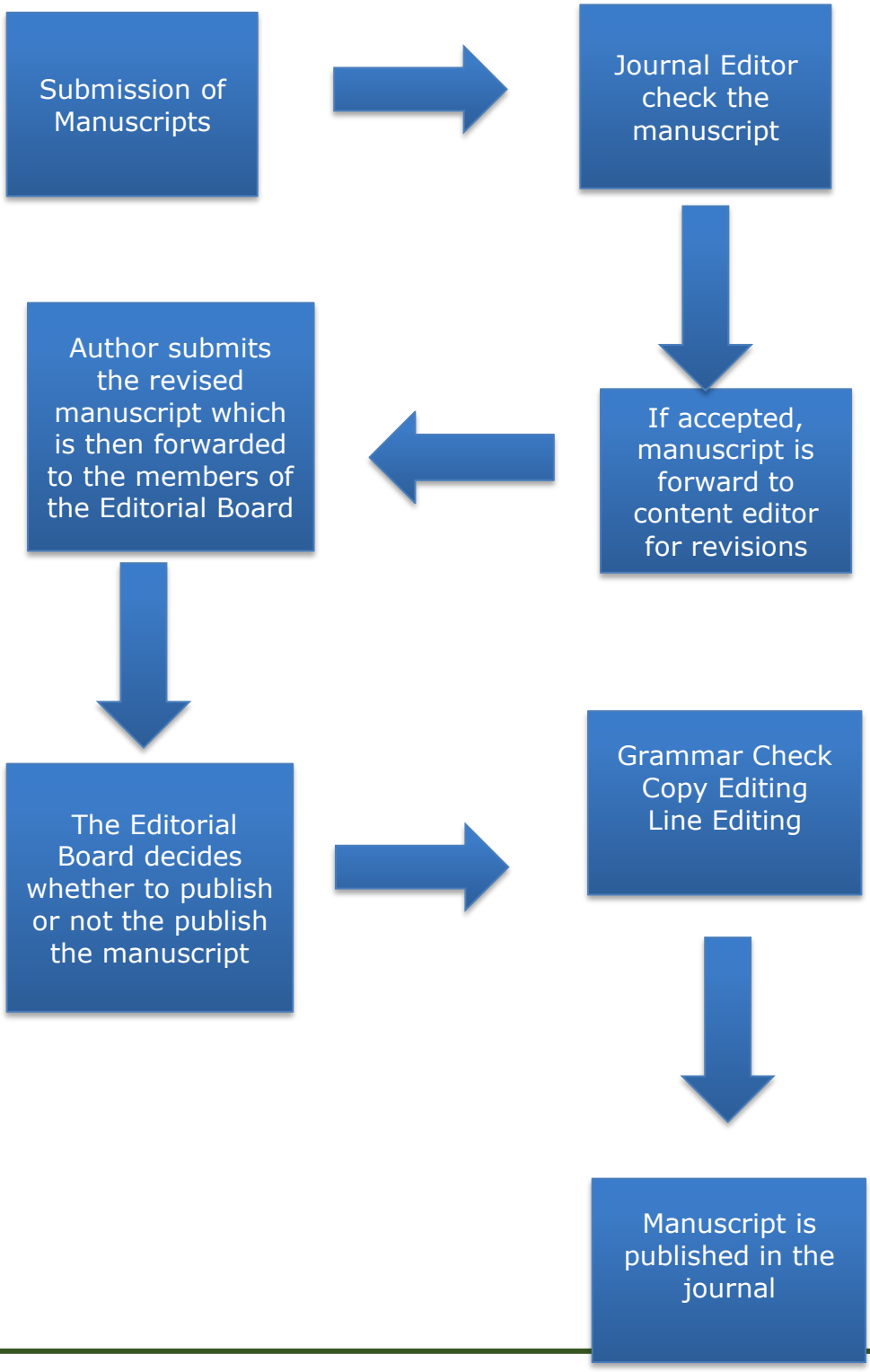
Journal Publication Process



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- Research Objectives- The paper must clearly and concisely states the paper' s purpose which is engaging and thought provoking.
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- Organization and Structural Development of the Idea – The writer demonstrate

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AN EVALUATION OF THE MECHANICAL ENGINEERING EDUCATION PROGRAM OF NORTHWEST SAMAR STATE UNIVERSITY

Ramil S. Catamora
Master of Science in Management Engineering
University of the Visayas – Main Campus

ABSTRACT

This study investigates the current status of mechanical engineering education programs by evaluating three key factors: Admission and retention, graduation, and licensure passing percentage. Using a descriptive-survey methodology, data were collected from 56 respondents via adapted questionnaires and analyzed using frequency counts, percentages, and means. Results showed fluctuating perceptions of the program's status, with student numbers peaking at 247 (41.17%) in academic year 2018-2019 before declining to 217 (36.16%) in academic year 2019-2020, suggesting a need for strategic adjustments to maintain enrollment. Graduate numbers increased positively, from 9 (17.30%) in academic year 2017-2018 to 30 (57.7%) in academic year 2019-2020, reflecting successful student support. Moreover, the licensure exam passing rates initially exceeded national averages in school year 2017 but later declined, highlighting a need for curriculum revisions. However, discrepancies between faculty and student views versus administrators indicate a need for policy improvement. The findings suggest that there is a significant need for policy enhancements to address the areas where faculty and students feel improvements are necessary.

Keywords: *evaluation, mechanical engineering program, admission and retention, licensure passing percentage*

INTRODUCTION

Mechanical engineering is a challenging and diverse field within the broader engineering discipline. This knowledge is essential for the design, development, and evaluation of devices, systems, and processes that are significant to many industries, including automotive, aerospace, energy, and manufacturing. Mechanical engineering is one of the oldest and most comprehensive branches of engineering, giving it a unique position among fields of knowledge (Okokpujie et al., 2019). The discipline has evolved over time, responding to new challenges and possibilities created by technological breakthroughs and shifting market demands. Given rapid technology advancements and increasing industrial requirements, mechanical engineering education must develop in order to remain relevant and successful. According to Kamp (2014), the engineering education should be viewed as a crucial foundational component, on par with technical research, in developing the capacity for innovation.This integration is necessary not only to equip graduates with the technical competencies required to address current challenges but also to empower them to drive future innovations.

Aligning educational programs with professional practice is essential. Mechanical engineering education should go beyond technical skills to emphasize problem-solving, critical thinking, and hands-on experience. These abilities are crucial for graduates to handle new challenges in their field effectively. According to Dym (2014), the

mechanical engineering education departments face the task of improving design and engineering education to better prepare students for real-world complexities. By adopting a progressive approach that includes these skills, educational programs can ensure that students have the technical knowledge and adaptability necessary to address the evolving needs of the industry, thus contributing to the advancement of the field and maintaining leadership in technological innovation.

Moreover, Northwest Samar State University (NwSSU), a government academic institution in Calbayog City, Philippines, has a mechanical engineering curriculum designed to prepare students for professional success. This study conducts a thorough evaluation of the mechanical engineering department at NSSU, concentrating on three major factors: admission, retention requirements, and licensure passing rate. To ensure that the curriculum meets contemporary educational standards and industry requirements, its many components must be critically evaluated.

Conversely, admission, retention, graduation, and licensure pass rates are critical indicators of an academic program's quality and reputation, particularly in demanding fields like engineering. These metrics offer initial insights into the program's appeal and effectiveness. It reflects the program's ability to attract and develop skilled students. Institutions that maintain high completion rates often enjoy a positive reputation. Schools that achieve higher completion rates tend to have a favorable reputation, (Aljohani, 2016). Admission and retention rates are early indicators of an academic program's appeal and performance. In highly competitive fields such as engineering, admission standards are typically stringent, ensuring that only students with strong foundational knowledge and the necessary skills are admitted. Additionally, student retention is challenging and complex (Burke, 2019), involving numerous interactions among students, faculty, and administrators within the higher education system (Villano et al., 2018). These rigorous standards contribute significantly to the program's reputation and the general quality of the student body. High admission standards and strong retention rates are frequently connected with higher-quality educational outcomes and more program prestige.

On the other hand, the number of graduates among the student population are a direct indicator of how effectively a program supports students in completing their degrees. Graduates are the program's most visible results, and their performance is frequently connected to the institution's reputation. A small percentage of graduates who successfully complete a degree program might lead to negative remarks from students, which could harm the college's reputation, (Merrill, 2014). High graduation rates in engineering programs indicate that the curriculum is well-structured, the faculty is skilled at teaching complicated content, and students are adequately prepared to fulfill the program’s demands. This connection between graduation rates and program quality underscores the importance of strong educational support systems and effective teaching methods in maintaining a positive institutional reputation.

Furthermore, the licensure passing percentage is an important aspect, especially in professional schools such as engineering. The percentage of graduates who pass licensure examinations on the initial attempt is sometimes regarded as a direct indicator of the program's effectiveness in preparing students for the difficulties of the professional world. The performance of graduates on licensing exams often serves as a general reflection of the school's overall effectiveness, (Flores ,2019). High passing rates indicate that the program's curriculum is well associated with industry standards and that students

are obtaining the information and training they require to flourish in their vocations. This metric not only improves the program's position in academic and professional organizations, but it also influences how prospective students and employers perceive the program's value.

The aim of this research in assessing these important areas is to evaluate the mechanical engineering program at Northwest State University for the academic years 2018–2020. This will help in identifying program strengths and areas for improvement, ultimately leading to policy enhancement that will bring the program in line with modern standards and industry needs. Such enhancements will assist promote the area of mechanical engineering and its practical applications, ensuring that NSSU graduates are well-prepared to contribute meaningfully to industry and society.

STATEMENT OF THE PROBLEM

This study aimed to determine the status of the Mechanical Engineering Education Program at Northwest Samar State University. Specifically, the study should answer the following questions:

1. Measure the profile of the Mechanical Engineering Education Program at Northwest Samar State University for the last three years the in terms of :
    a. The number of students admitted and retained to the mechanical engineering program;
    b. The number of graduates from mechanical engineering programs
    c. The school passing percentage in the licensure examination for the mechanical engineering program.

2. Determine what problems are encountered in the implementation and recommendations made by the respondents along the three major factors that may affect the Mechanical Engineering Education Program at Northwest Samar State University.

3. Generate a policy enhancement that can be implemented to improve the Mechanical Engineering Education Program at Northwest Samar State University.

METHODS

Design

The study employed a descriptive-survey method with a quantitative approach. The descriptive-survey method was chosen because it allows for the systematic collection of data from a large number of respondents, which is ideal for assessing the current status of the Mechanical Engineering education program at Northwest Samar State University (NwSSU). This method is particularly useful for understanding and describing the conditions as they exist in the present, as well as identifying relationships between variables.

Respondent Groups and Criteria

The respondents for this study were randomly selected students and graduate students of mechanical engineering education program at Northwest Samar State University (NwSSU).
The basis for the selection of the study was based on the Inclusion-Exclusion Criteria set:

The following are the inclusion parameters considered in this research:

1. bonafide student of Northwest Samar State University (NwSSU).
2. must be of legal age
3. must be currently enrolled or an alumni in the mechanical engineering program within the last 3 years
4. willing to participate.
5. provided voluntary consent

Individuals who did not match the previously stated criteria were excluded from 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

Scale	**Range**	**Description**	**Interpretation**
4	4.1-5.0	Very Great Extent (VGE)	The extent of item/provision or condition is taken into consideration between 81% to 100% all the time
3	3.1-4.0	Great Extent (GE)	The extent of item/provision or condition is taken into consideration between 61% to 80% most of the time
2	2.1-3.0	Moderate Extent (ME)	The extent of item/provision or condition is taken neither moderate or limited between 41% to 60%
1	1.0-2.0	Very Little Extent (VLE)	The extent of items/provision or condition is 1% to 20% or totally mission or never taken into

Data Gathering Procedure

The researcher requested approval from the Dean of the College of Engineering, Technology and Architecture of the University of Visayas to carry out the study. After receiving support for the research proposal, the researchers drafted a permission letter to the school involved in the study, seeking authorization to conduct the investigation. Data collection was organized on a per respondents basis, with the help of assigned personnel, to facilitate progress monitoring.

After data collection, the next steps involved organizing, tabulating, and performing statistical analysis. To ensure the accuracy and reliability of the quantitative data, the researchers collaborated with a skilled statistician. Tables and graphs were created and presented to address the sub-problems identified in the study.

Data Analysis

The study utilized statistical methods such as simple frequency and percentage analyses to outline the profiles of students and alumni of Northwest Samar State University (NwSSU). The profiles of student respondents were assessed based on enrolment data from the past three years, number of graduates over the previous three years and the school's licensure examination passing rates during the same period, and the A Likert scale was used to evaluate the Mechanical Engineering education program at Northwest Samar State University (NwSSU) from 5-1 with matching ranges and descriptions.

Ethical Considerations

The researcher in this study placed a strong emphasis on adhering to ethical standards, particularly concerning data collection procedures. The researcher is committed to maintaining social responsibility, objectivity, and non-discrimination, and safeguarding the welfare of children throughout the questionnaire distribution process. Before participating, respondents were given informed consent forms in the presence of the researcher, which allowed any questions or concerns to be addressed immediately. To protect participants' privacy, names, and other identifying information were deliberately excluded from the questionnaires. The researcher ensured that all data collection instruments and the gathered data were handled with the utmost care to maintain respondent confidentiality.

Once data analysis was completed, the questionnaires were systematically disposed of to further ensure confidentiality. Each participant received an informed consent form clearly stating their voluntary agreement to participate in the study, highlighting their autonomy in the decision. To maintain fairness, the researchers provided consistent and unbiased responses while avoiding personal biases or affiliations. They also took steps to educate participants about ethical principles and their positive impact on both employees and the environment. After obtaining the necessary consent, the researchers transparently communicated the study’s objectives, the reasons behind the research, and their own identities to each respondent. The researcher discussed the potential benefits of the research and emphasized the critical role of each participant. It was also made clear that respondents had the right to refuse participation at any time and to declare any conflicts of interest related to the study.

RESULTS AND DISCUSSION

Table 1. ***Students Profile in terms of Enrolment for the Last Three Years***

Northwest Samar State (NwSSU)	f	%
AY 2017-2018	367	22.67
AY 2018-2019	247	41.17
AY 2019-2020	217	36.16
Total	600	100

Table 1 shows the admission and retention of students for mechanical engineering students at Northwest Samar State University (NwSSU). In the academic year 2017-2018, there were 367 enrolled students in the mechanical engineering program, representing 22.67% of the total student body. The enrolment decreased further in the 2019-2020 school year, to 217 students, which accounted for 36.16% of the total student population. This means that, despite a notable decline in enrolment over the last three years, the mechanical engineering program has retained a relatively stable proportion of the overall student body. This stability indicates that the program remains a significant aspect of the university's academic offerings and is still in high demand among students. The consistent percentage also suggests that the university's attempts to retain and recruit students for this program were partially successful, potentially mitigating the substantial decline in enrolment. Nonetheless, the reduction in absolute numbers may be concerning highlighting the need for further investigation to determine the mechanisms driving this trend. Understanding the reasons behind this trend is crucial for strategic planning at the university. Identifying and addressing the factors contributing to the decline could help in attracting more students and improving the program's overall appeal. As highlighted by (Geisinger and Raman, 2013; Bravo, 2023), the completion of engineering degrees is closely linked to two primary factors: the admission rate and the retention rate of students as they progress through their studies. Therefore, a thorough examination of these factors can provide valuable insights for improving both student recruitment and retention in the engineering program.

Table 2. ***Students Profile in terms of Graduates for the Last Three Years***

Northwest Samar State (NwSSU)	f	%
AY 2017-2018	9	17.30
AY 2018-2019	13	25
AY 2019-2020	30	57.7
Total	52	100

Table 2 provides an overview of the number of mechanical engineering students who graduated from Northwest Samar State University (NwSSU) throughout the previous three academic years. In the 2017-2018 school year, there were 9 graduates, representing 17.30% of the total. Furthermore, in the 2019-2020 school year, the number of graduates had significantly risen to 30, comprising 57.7% of the total. This brings the cumulative total to 52 BSME graduates over the last three years. These figures indicate a growing trend in the number of Mechanical Engineering graduates. The data indicates that there has been a significant increase in the number of Mechanical Engineering graduates at Northwest Samar State University (NwSSU) over the past three academic years. This increase in the number of graduates implies that the Northwest Samar State University (NwSSU), particularly those responsible for the Mechanical Engineering program, has implemented effective strategies to enhance student retention and support from the first year through to graduation. The consistent rise in graduates reflects the success of these efforts in meeting the academic and developmental needs of the students. The growth in graduation rates reflects the success of these efforts in meeting students' academic and developmental needs, showcasing the effectiveness of the Mechanical Engineering program in fostering student success and progression. Student outcomes, including as retention, attrition, and graduation rates, are one way to assess the overall effectiveness of higher education institutions (Nieuwoudt and Pedler, 2021).

Table 3. ***Students Profile in terms of Passing Percentage in the Licensure Examinations for the Last Three Years***

Northwest Samar State University		
	National	School
	Passing %	Passing%
AY 2018		
AUG	60.8	27.27
FEB	47.05	0
AY 2019		
AUG	70.61	0
FEB	50.49	37.5
AY 2020		
AUG	38.4	50
FEB	5	0

Table 3 shows of the passing percentage of the licensure examinations of mechanical engineering students at Northwest Samar State University (NwSSU). Based on the licensure exam results for the past 3 years there is a significant increase. In 2018, NwSSU's passing rates were significantly lower than the national averages, with a striking 0% in February. The situation improved slightly in 2019, wherein the month of February showed a modest 37.5%. In addition in 2020, NwSSU performed better in August with a 50% passing rate, surpassing the national average of 38.4%, but reverted to a 0% passing rate in February, while the national average remained at 5%. Overall, Northwest Samar State University's performance demonstrates considerable variability, with several instances of lower-than-national average rates and some periods of improvement. This implies that while there are some signs of development, the university's licensure exam results are inconsistent, implying that there may be underlying difficulties that hinder performance stability. One of an institution's essential success criteria is the quality of its graduates, which is frequently judged by their

performance on board exams (Ballado-Tan, 2015).

CONCLUSION

The exploration of the study is focus on the three factors that presents a accurate perspective data of the Mechanical Engineering program from Northwest Samar State University (NwSSU) progress over the years. Despite a significant drop in student enrolment from 367 in the 2017-2018 academic year to 217 in 2019-2020, the program has maintained a constant share of the university's total student body. This stability suggest a continued interest and relative success in maintaining students, despite declining enrolment. The graduation statistics show a strong trend, with the number of graduates rising dramatically from 9 students in 2017-2018 to 30 students in 2019-2020. This increase in graduation rates suggests that the university's initiatives for supporting and retaining students until graduation have been successful. The increased graduation rates demonstrate well on the program's ability to meet students' academic and developmental needs. Although the licensure exam results show an uneven picture. While passing rates have improved, particularly in August 2020, when the school outperformed the national average, overall performance is inconsistent with multiple periods of underachievement. This unpredictability shows that there may be underlying issues affecting exam performance, emphasizing the need for additional research and focused interventions to stabilize and improve licensure outcomes. Overall, while NwSSU's Mechanical Engineering program has seen some progress in terms of student retention and graduation rates, resolving the disparities in licensure exam results is important. A detailed examination of the factors impacting these trends can provide useful insights for improving the program's appeal and effectiveness, resulting in better educational results and higher-quality graduates.

RECOMMENDATION

Based on the findings of the study, the following recommendations were given.

1. The school should have an intensive and proper marketing in the nearby high schools in barangays and municipalities about the mechanical engineering program of Northwest Samar State University (NwSSU). The information and dissemination about the mechanical engineering program is essential.
2. Revisit the program curriculum of Northwest Samar State University (NwSSU) and include industry representatives in the deliberation to enhance the instructors' teaching strategies.
3. The school should improve the adequate laboratory equipment and facilities to improve the employability of graduates.
4. The administration should allocate a budget for faculty development and research

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IMPACT OF SENIOR HIGH-SCHOOL STRANDS ON FIRST-YEAR ENGINEERING STUDENTS PERFORMANCE: A PROPOSED ACTION PLAN

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University of the Visayas – Main Campus

ABSTRACT

The study explores on the impact of several senior school (SHS) academic strands on the academic performance of first year students at Caraga State University in the Philippines. The K-12 curriculum established by Republic Act 10533 sought to improve students' readiness for higher education by broadening fundamental education and providing specialized courses. This study investigates whether the academic background of engineering students—specifically, the strands of Science, Technology, Engineering, and Mathematics (STEM), Accountancy, Business, and Management (ABM), and Humanities and Social Sciences (HUMSS)—influences their performance. The study used a descriptive-correlational design to assess data from 120 students enrolled in the university's engineering programs. The study discovered that students with STEM backgrounds did better in their first year than their non-STEM counterparts. Non-STEM students used bridging programs to improve their readiness, but they still failed more frequently in difficult subjects such as Calculus and Physics. The study employed statistical methods to evaluate performance variables such as GPA and failure rates between STEM and non-STEM students and discovered that while both groups exhibited growth over time, STEM students exhibited more consistent academic performance. The findings of the study emphasize the need of aligning SHS tracks with postsecondary education requirements, and they suggest that specialized support systems and curriculum changes could improve the academic success of students from diverse educational backgrounds. Based on these findings, the study suggests an action plan to improve academic assistance, with the goal of better integrating students into engineering programs and meeting the student body's various needs.

KEYWORD: *K-12 curriculum, Engineering program, Academic strands, Bridging Program*

INTRODUCTION

The transition from senior high school to higher education marks a pivotal moment in a student's academic journey, often serving as a critical determinant of future success. The implementation of the K to 12 curriculum in the Philippines, under Republic Act 10533, known as the "Enhanced Basic Education Act of 2013," was designed to enhance the preparedness of learners for tertiary education, (Basic education act of 2013). This reform introduced a comprehensive curriculum aimed at producing graduates who meet the rigorous standards of higher education, both domestically and internationally. A significant feature of this curriculum is the addition of two years of senior high school, offering students the opportunity to specialize in areas that align with their aptitudes, interests, and cognitive abilities. Senior High School (SHS) in the K to 12 program is divided into four tracks: Academic, Technical-Vocational-Livelihood, Sports, and Arts and Design. The Academic Track, which includes strands such as Science, Technology,

Engineering, and Mathematics (STEM), Accountancy, Business, and Management (ABM), Humanities and Social Sciences (HUMSS), and the General Academic Strand (GAS), is particularly geared towards preparing students for higher education. According to (Magno and Piosang, 2016), these specialized tracks are designed to help students select a path that best suits their individual talents and interests, thus supporting their academic and professional growth. Studies have shown that many senior high school graduates choose to pursue tertiary education as a means to further develop the skills acquired during their specialized track.

The Department of Education (DepEd) advocates for SHS graduates to align their chosen track with their intended career paths, thereby enhancing their readiness for the complexities of higher education. On the contrary, the Commission on Higher Education (CHED) Memorandum Order No. 105, series of 2017, mandates that Higher Education Institutions (HEIs) admit all Grade 12 completers, regardless of the senior high school track or strand, provided they meet the institution's admission criteria. This directive has led to the admission of students from a wide array of academic backgrounds into various tertiary programs, raising concerns about how these varied backgrounds might influence academic performance, particularly in demanding fields like engineering.

At Caraga State University, a government-controlled university in the CARAGA Region of the Philippines, which offers engineering programs such as BS Electronics Engineering (BSEcE), BS Geodetic Engineering (BSGE), BS Agriculture and Biosystems Engineering (BSABE), and BS Mining Engineering (BSEM). One of the challenges the university faces is addressing the diverse academic backgrounds of its students, who come from different senior high school strands. The academic performance of first-year engineering students is closely monitored as it serves as an indicator of their potential success in their chosen fields. Department of Education (DepEd) advises SHS graduates to align their tracks when planning career paths, (Santos et al., 2019).

This study is significant because it can help in designing specific support systems and teaching strategies that cater to the different educational backgrounds of new students. Understanding these factors will provide insights into student preparedness and assist in creating a proposed action plan aimed at improving academic performance and support within the engineering program. The findings will offer valuable guidance to the school in enhancing curricula and support structures to better address the needs of students from various educational backgrounds, thereby creating a more effective and inclusive learning environment.

This study investigates to analyse the impact of different senior high school strands—specifically Science, Technology, Engineering, and Mathematics (STEM), Accountancy, Business, and Management (ABM), and Humanities and Social Sciences (HUMSS), on the academic performance of first-year engineering students at Caraga State University. The study aims to determine if there are any significant relationships between students' chosen strands and their success in engineering courses, considering factors such as GPA, participation in bridging programs, and distribution of failing grades in common subjects. By identifying these relationships, the study seeks to provide significant insights into how prior educational backgrounds influence college success, which could help design better educational assistance and advising practices for the students.

STATEMENT OF THE PROBLEM

This study aims to analyze how the different senior high school strands affect the academic performance of first-year engineering students at Caraga State University. Specifically, it seeks to answer the following questions:

1. What is the level of academic performance of students enrolled in the engineering programs in terms of :
a. current engineering program
b. senior high school stand of the students
c. bridging or enhancement programs taken
d. common failing subjects of the students

2. What is the academic performance of the respondents, as indicated by their GPA in the first and second semesters of the academic year. 2018-2019?

3. What is the significant relationship between the respondents' senior high school academic strands and their academic performance in their first year of engineering studies?

4. Generate an action plan that can help enhance the academic performance of the of first-year engineering students at Caraga State University.

METHODS

Design

This quantitative study utilized a descriptive-correlational design, collecting data through a survey administered via Google Forms. The descriptive-correlational approach was selected to examine the relationship between students' chosen academic strands and their academic performance, with a focus on comparing outcomes between STEM and non-STEM strands. A simple random sampling method was applied, encompassing over 50% of the total respondent population.

Respondent Groups and Criteria

The study involved randomly selected third-year engineering students from Caraga State University – Butuan City. The participants were chosen according to the following criteria:

Inclusion Criteria:

1. Enrollment as a bonafide student at Caraga State University – Butuan City.
2. Legal age.
3. Must currently enrolled in one of four distinct engineering programs.
4. Willingness to participate.
5. Provision of voluntary consent.

Participants who did not meet these criteria were excluded from the study.

Scoring Procedure

This section explains the scoring procedures for the data analysis part of this study, focus on three primary variables: academic strand, bridging program and failure subjects taken by respondents. Values for these variables will be determined using a four-point scale.

Scale	**Range**	**Description**	**Interpretation**
4	4.1-5.0	Very Great Extent (VGE)	The extent of item/provision or condition is taken into consideration between 81% to 100% all the time
3	3.1-4.0	Great Extent (GE)	The extent of item/provision or condition is taken into consideration between 61% to 80% most of the time
2	2.1-3.0	Moderate Extent (ME)	The extent of item/provision or condition is taken neither moderate or limited between 41% to 60%
1	1.0-2.0	Very Little Extent (VLE)	The extent of items/provision or condition is 1% to 20% or totally mission or never taken into

Data Gathering Procedure

The researcher sought permission from the Dean of the University of Visayas' College of Engineering, Technology, and Architecture to conduct the study. After securing support for the research design, the researchers submitted a permission letter to the school involved in the study, requesting permission to conduct the study. Respondent collected data with the assistance of designated individuals to allow for progress monitoring. After data collection, the next steps were to arrange, tabulate, and conduct statistical analyses. To ensure the accuracy and trustworthiness of the quantitative data, the researchers collaborated with a skilled statistician. Tables and graphs were created and presented to address the issues raised in the study.

Data Analysis

The study employed statistical techniques such as simple frequency and percentage analyses to describe the profiles of the engineering students at Caraga State University. These profiles were evaluated based on students' personal details, the engineering program they are currently pursuing, their academic strand from senior high school, and their academic performance, which was measured by their GPA during their first year of tertiary education for the 2018-2019 academic year. This data informed the creation of a pre-assessment evaluation to analyze the relationship between academic strands and the academic performance of K-12 graduates who are now third-year engineering students at Caraga State University – Butuan City. Additionally, a Likert scale ranging from 5 to 1, with corresponding ranges and descriptions, was used to assess the third-year engineering students.

Ethical Considerations

The researcher in this study emphasized the need of adhering to ethical standards, in particular to data collection processes. Throughout the questionnaire distribution process, the researcher is committed to maintaining social responsibility, objectivity, and

non-discrimination, as well as protecting children's wellbeing. Prior participation, respondents were given informed consent forms in the presence of the researcher, allowing any questions or concerns to be addressed promptly. To safeguard participants' privacy, names and other identifying information were purposefully removed from the questionnaires. To protect respondent confidentiality, the researcher ensured that all data collection tools and obtained data were handled with utmost care.

When the data assessment was complete, the questionnaires were disposed of in a systematic manner to preserve confidentiality. Each participant was given an informed consent form that clearly stated their voluntary permission to participate in the study while emphasizing their autonomy in the decision. To ensure fairness, the researchers gave consistent and unbiased responses, avoiding personal biases or affiliations. They also worked to educate participants about ethical principles and how they benefit both employees and the environment. After receiving consent, researchers described the study's objectives, reasons for the research, and their identities to each respondent. The researcher explained the possible benefits of the study and underlined the importance of each volunteer. After getting the necessary consent, the researchers transparently communicated the study's objectives, the reasons for the research, and their personal names to each respondent. The researcher highlighted the possible benefits of the study and underlined the importance of each volunteer. Respondents were also informed that they had the right to withdraw participation at any moment and to disclose any conflicts of interest relating to the study.

RESULTS AND DISCUSSION

Table 1. ***Engineering Program of the Respondents***

Program	**Frequency**	**Percentage (%)**
BS in Agricultural and Biosystems Engineering	30	25
BS in Electronics Engineering	30	25
BS in Geodetic Engineering	30	25
BS in Mining Engineering	30	25
Total	**120**	**100**

Table 1 provides an overview of the survey participants, highlighting that 120 students currently enrolled at Caraga State University in Butuan City were surveyed. These students are spread across four distinct engineering programs: Bachelor of Science in Agricultural and Biosystems Engineering, Bachelor of Science in Electronics Engineering, Bachelor of Science in Geodetic Engineering, and Bachelor of Science in Mining Engineering. Each of these programs has an equal number of 30 respondents, indicating a balanced distribution among them. Additionally, the respondents are also distributed across four different academic strands, though specific details about these strands are not indicate in the table. This distribution represents a diverse set of academic backgrounds among the engineering students. As stated by Laguador et al.,(2016), tertiary education offers students the chance to further develop their skills in their chosen academic field after finishing senior high school.

Table 2. ***Academic Strand taken by the Respondents***

Senior High School Academic Strand (Categorization)	Frequency	Percentage (%)
STEM	60	50
NON STEM	60	50
Total	**120**	**100**

Table 2 illustrates the distribution of respondents based on their academic strands during their senior high school years. The strands are categorized into STEM (Science, Technology, Engineering, and Mathematics) and Non-STEM categories, which include HUMMS (Humanities and Social Sciences), GAS (General Academic Strand), and ABM (Accountancy, Business, and Management). The table demonstrates a significant portion of the students enrolling in engineering programs at the university come from the STEM strand, with 60 students, representing 50% of the sample, having a STEM background. The data indicates an even split, with half of the respondents coming from STEM fields and the other half from Non-STEM strands. The strands available in senior high school typically include academic tracks like STEM and Non-STEM strands are crucial since it strives to prepare students for specific disciplines and career paths. According to Malaguial, (2023), students often encounter this problem when making decisions, as they must take into account their interests, strengths, and long-term goals.

Table 3. ***Bridging Program during first year college***

Enhancement Program (Subjects)	Non STEM Students (%)	STEM Students (%)
Math A (Calculus Enhancement Program)	60 (100.0%)	0 (0.0%)
Physics B (Physics Enhancement Program for Engineers)	60 (100.0%)	0 (0.0%)

Table 3 demonstrates that students from various senior high school strands have participated in different bridging courses. Specifically, only graduates from Non-STEM strands have completed two standardized bridging courses: Math A (Calculus Enhancement Program) in the 1st semester and Physics B (Physics Enhancement Program for Engineers) in the 2nd semester. This data implies that the bridging courses are intended to enhance students' preparedness for engineering studies by providing additional support in Science and Mathematics. The bridging program is designed to supplement the first-year college curriculum with additional Mathematics courses. The purpose of the bridging is to help students from non-STEM backgrounds, who may not have taken relevant STEM subjects in senior high school, to catch up on essential engineering topics. The bridge program intervention aimed to help the students with their math skills and improve their chances of succeeding in college, (Cançado et al., 2018).

Table 4. ***Distributions on the common subject with failing grades among students***

Distributions on the common subject with failing grades 1st semester				
Subject	**STEM**	**Percentage (%)**	**Non STEM**	**Percentage (%)**

	(f)		(f)	
Calculus 1	3	5.00%	9	15.00%
Physics 1	0	0.00%	1	1.70%
GE 100	3	5.00%	2	3.30%
Distributions on the common subject with failing grades 2nd semester				
Subject	**STEM** (f)	**Percentage (%)**	**Non STEM** (f)	**Percentage (%)**
Calculus 2	14	23.30%	24	40.00%
Physics 2	11	18.30%	18	30.00%
Chemistry	2	3.30%	4	6.70%

The table 4 above shows that the distributions on the common subjects with failing grades among students in engineering at Caraga State University. The data shows that during the first semester of academic year 2018-2019. In the first semester, Non-STEM students had higher rates of failure than STEM students, although Physics 1 and GE 100 had very low failure rates for both categories. However, in the second semester, the tendency shifted significantly. Calculus 2 saw a significant increase in failure rates across STEM (23.30%) and non-STEM students (40.00%), indicating increasing difficulty or insufficient basic knowledge. Physics 2 had greater failure rates than Physics 1, but not as high as Calculus 2. Additionally, the Chemistry that has been introduced in the second semester had a reasonably low failure rate, but non-STEM students performed worse than STEM students. The table implies that the data highlights a clear increase in failing grades in advanced courses in the 2nd semester, with Non-STEM students experiencing more challenges compared to their STEM counterparts. The pattern emphasizes the need for better preparation and assistance for non-STEM students as they progress through their education in the engineering program. The better integration of the K-12 strand with college-level courses has resulted in various benefits, including improved student success, financial advantages, and more institutional accountability, (DeMaria, 2015).

Table 5. ***Significant difference on the common subjects with failing grades among engineering students***

Chi-square test on the distributions of common failing subjects during 1st semester				
	Observe Value		**Expected Value**	
Subject	**STEM (f)**	**Non STEM (f)**	**STEM (f)**	**Non STEM (f)**
Calculus 1	3	9	4	8
Physics 1	0	1	0.3	0.6
GE 100	3	2	1.7	0.5
Chi-square test on the distributions of common failing subjects during 2nd semester				
	Observed Value		**Expected Value**	
Subject	**STEM (f)**	**Non STEM (f)**	**STEM (f)**	**Non STEM (f)**
Calculus 2	14	24	14.1	23.9
Physics 2	11	18	10.7	18.3
Chemistry	2	4	2.2	3.8

The table 5 above shows that the significant difference on the common subjects with failing grades among STEM and non-STEM students at Caraga State University. It demonstrates that the observed values are often near to expected values, indicating that the distribution of failures in these subjects is basically as predicted. In the 1st semester, all the subjects showed that failure rates were near the expected figures, with some slight deviations. Notably, GE 100 had higher failure rates for STEM students than expected, suggesting it was particularly challenging. Moreover in the 2nd semester, subjects like Calculus 2, Physics 2, and Chemistry had failure rates that closely matched the expectations, indicating that the difficulty levels and student performance were consistent with predictions. The data implies that both STEM and non-STEM students faced challenges in these courses, but the failure distributions were consistent with expected patterns. Wewe, (2020) define learning problems as an event in which an individual fails to accomplish learning objectives due to constraints encountered during the learning process.

Table 6. ***Grade Point Average of the students***

Data Summary on 1st semester GPA			
	Mean	Variance	Standard Deviation
STEM Students	1.79	0.113	0.3362
Non-STEM Students	1.94	0.1315	0.3626
Data Summary on 2nd semester GPA			
	Mean	Variance	Standard Deviation
STEM Students	2.25	0.271	0.5206
Non-STEM Students	2.48	0.2642	0.514

Based on the table 6 above the STEM students had a mean GPA of 1.79 with a

standard deviation of 0.3362 in the first semester, showing that their academic performance was fairly steady and on the lower end of the spectrum when compared to their non-STEM colleagues. Non-STEM students, on the other hand, had a higher average GPA of 1.94 and a slightly bigger standard deviation of 0.3626, indicating a significantly wider variety of academic achievements. On the other hand the second semester, both groups had improved: STEM students had a mean GPA of 2.25, but their performance became more variable, with a standard deviation of 0.5206. Non-STEM students also improved to a mean GPA of 2.48, but with less variability, as indicated by a standard deviation of 0.514. This data implies that while both groups showed academic over time, STEM students' academic performance developed more consistently, with less significant variations from the mean. The findings suggest that while both groups progressed academically, STEM students experienced more pronounced variations in performance, which could be attributed to the growing complexity of their education or other variables influencing their academic stability. The Grade Point Average (GPA) is a measure of a student's overall learning outcomes, (Hidayat et al., 2021).

CONCLUSION

In conclusion, the analysis of engineering students at Caraga State University provides significant information on the impact of their academic backgrounds on academic performance. The diversity of their senior high school backgrounds for both STEM and non-STEM, — and the balanced representation across the four engineering programs underscore the diverse educational foundations from which students begin their studies in the program. This diversity highlights the significance of understanding how varied educational backgrounds affect student outcomes. The need for bridging programs for non-STEM students highlights the difficulties they experience when transitioning to the engineering curriculum, particularly in areas like as mathematics and physics. Despite these preparation methods, non-STEM students continue to fail at a higher rate than STEM students, particularly in more advanced courses. Based on the result of the study, confirming that the disparities in performance are consistent with the expectations based on students' prior educational experiences. While STEM students generally perform better and exhibit less variability in their grades, non-STEM students show greater fluctuation in their academic outcomes. Both groups demonstrate some improvement by the second semester, yet STEM students maintain a more consistent academic trajectory.
These findings suggest that while bridging programs provide crucial support, additional strategies may be needed to address the specific challenges faced by non-STEM students in order to enhance their success in advanced engineering coursework.

RECOMMENDATION

1. The school should develop a more comprehensive advising system to assist students in selecting courses that align with their preparedness and academic background. The instructors should work closely with students to monitor their development and provide early interventions if academic performance declines.

2. The school ought to regularly examine and adjust the curriculum to ensure that it meets incoming students' different academic backgrounds. The schools should incorporate review modules on foundational concepts into core engineering courses to help mitigate the reported discrepancies.

3. The school should improve bridging programs for engineering students at Caraga State University. Given the significant performance disparity between STEM and non-STEM students, the bridging programs (Math A and Physics B) should be expanded to include additional subjects or more topics or more intensive instruction. This could include fundamental classes in chemistry and advanced calculus to better prepare non-STEM students for the challenges of engineering courses.

4. Provide faculty members with training sessions on strategies for teaching that accommodate to a varied student foundation, especially those from non- STEM backgrounds. Faculty should be equipped with tools and approaches to enable students who may require further assistance in understanding complex subjects.

5. The school should set up a feedback mechanism for students to report on the effectiveness of bridging programs and support services. Conduct regular assessments to monitor the efficacy of bridging programs and academic assistance initiatives. Use this data to help the school continuously improve the resources available.

6. The school should provide faculty members with training sessions on teaching methodologies that cater to a varied student base, especially those from non- STEM backgrounds. Faculty should be equipped with tools and approaches to enable students who may require further assistance in understanding complex subjects.

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FACTORS AFFECTING LABOR PRODUCTIVITY IN SELECTED CONSTRUCTION PROJECTS IN DAVAO DEL SUR: PROBLEMS AND INTERVENTIONS

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ABSTRACT

The construction industry is crucial for economic development and the improvement of community living standards, particularly in rapidly growing regions like Davao del Sur. Identifying specific factors is vital to anticipate unnecessary financial losses and delays. Despite strategic measures, failures in construction projects are sometimes inescapable. This study investigates the factors affecting labor productivity in construction projects within this area, focusing on variables such as labor characteristics, management practices, project specifics, resource allocation, and environmental conditions. Employing a quantitative research design with a descriptive-correlational approach, the study surveyed 46 construction workers to analyze how these factors influence productivity and project outcomes. Data were tabulated and statistically analyzed using simple percentages, weighted means, and the Pearson r formula. Key findings indicate that while labor characteristics, management, and project specifics moderately affect productivity, significant relationships were found between labor experience and job designation. This research highlights the importance of understanding labor productivity dynamics and offers actionable recommendations for stakeholders to enhance efficiency and support sustainable growth in the construction sector. By addressing identified challenges and improving labor productivity, the study aims to provide valuable insights for project managers, contractors, and policymakers in Davao del Sur.

KEYWORD: *labor productivity, labor management, construction project, construction operation, management in construction*

INTRODUCTION

The construction industry plays a pivotal role in shaping our built environment, fueling economic development, and enhancing community living standards. According to Toan et al.,(2020), the construction industry plays a crucial role in the national economy of countries worldwide and significantly contributing to their gross domestic product. Its scope encompasses a wide array of activities, from erecting residential and commercial structures to developing critical infrastructure such as roads and bridges. Construction projects are one of the high priorities in attaining a country's national objectives, (Chigara and Moyo, 2014). As a fundamental pillar of societal advancement, the construction industry operates within a framework of considerable complexity and scale, with each project presenting its unique set of challenges and opportunities. Success in this sector hinges on meticulous coordination across multiple dimensions, including design, material procurement, labor management, and adherence to regulatory standards. Effective project management, rigorous safety protocols, and clear communication among stakeholders are essential for navigating this intricate landscape.

In Davao del Sur, a region experiencing rapid growth and development, the construction sector is expanding, bringing with it an increase in the complexity of

challenges faced by the labor force. Key factors influencing labor productivity in this context include labor characteristics, management practices, project specifics, resource allocation, and environmental conditions. Several factors influence construction labor productivity, including people, management, equipment and tools, materials, technology, and environment, (Alaghbari et al., 2019). Despite the critical importance of these factors, there is a noticeable gap in comprehensive research addressing how these elements interact and impact labor efficiency within this region. Labor productivity is a decisive factor in the success of construction projects, directly influencing timelines, costs, and the quality of outcomes. According to Fedulova et al., (2019), labor productivity is defined as the amount of time it takes a worker to create a specific amount of product or service in order to make a living. Understanding the elements influencing worker productivity is critical for Davao del Sur's building processes and effective project completion

.

This study aims to address the specific challenges encountered in the construction industry within Davao del Sur and to develop practical strategies for enhancing labor productivity. By conducting an in-depth analysis of the relevant factors and issues, this research seeks to provide a thorough understanding of the variables affecting labor productivity in selected construction projects in the region. The study will offer actionable recommendations designed to improve the efficiency and effectiveness of construction endeavors. The insights generated will be valuable to industry stakeholders, including project managers, contractors, and policymakers, facilitating informed decision-making and fostering sustainable growth within the construction sector of Davao del Sur.

STATEMENT OF THE PROBLEM

The study aims to identify and assess factors affecting labor productivity in specific construction projects in Davao del Sur. It specifically seeks to answer the following questions:

1. What is the profile of the respondents in terms of:
    a. age;
    b. highest educational attainment;
    c. types of construction projects;
    d. number of years in the construction project and;
    e. job designation\

2. What extent do these factors affect the labor productivity of construction projects in terms of;
    a. characteristic labor factor;
    b. management factor;
    c. project characteristic factor;
    d. resource management factor and
    e. environmental factor

3. What is the significance of the relationship between the identified respondent profiles and the factors influencing labor productivity in construction projects?

4. Based on the study's findings, make an planned intervention will be formulated to improve the labor productivity of construction projects.

Null Hypothesis

H0:There is no significant relationship between the identified profile of the respondent and the factors in the labor productivity of construction.

METHODS

Design

This study employed a quantitative research design with a descriptive-correlational approach to investigate the relationship between various independent variables and their impact on labor productivity in construction projects. The primary aim was to describe and analyze how specific variables influence labor productivity and to identify any significant correlations between the respondents' profiles and the factors affecting project performance. A probability sampling technique method was applied in the study.

Respondent Groups and Criteria

The study included 46 construction workers randomly selected from a construction company in Davao del Sur. Participants were chosen based on the following criteria:

Inclusion Criteria:

1. Bonafide employee of any selected construction company within Davao del Sur
2. Legal age.
3. Willingness to participate.
4. Provision of voluntary consent.

Participants who did not meet these criteria were excluded from the study.

Scoring Procedure

This section explains the scoring procedures for the data analysis part of this study, focus on primary variables: characteristic labor factor, management factor, project characteristic factor, resource management factor and environmental factor. Values for these variables will be determined using a Likert Scale.

Scale	**Range**	**Description**	**Interpretation**
4	7.6-10.0	Affects Very Positively	The extent of item/provision or condition is taken into consideration between 81% to 100% all the time
3	5.1-7.5	Affects Moderately Positive	The extent of item/provision or condition is taken into consideration between 61% to 80% most of the time
2	2.6-5.0	Affects Moderately Negative	The extent of item/provision or condition is taken neither moderate or limited between 41% to 60%
1	1.0-2.5	Affects Very Negatively	The extent of items/provision or condition is 1% to 20% or totally mission or never taken into consideration

Data Gathering Procedure

The researcher sought permission from the Dean of the University of Visayas' College of Engineering, Technology, and Architecture to conduct the study. After securing support for the research design, the researchers submitted a permission letter to the school involved in the study, requesting permission to conduct the study. Respondent collected data with the assistance of designated individuals to allow for progress monitoring. After data collection, the next steps were to arrange, tabulate, and conduct statistical analyses. To ensure the accuracy and trustworthiness of the quantitative data, the researchers collaborated with a skilled statistician. Tables and graphs were created and presented to address the issues raised in the study.

Data Analysis

The study employed statistical techniques such as simple frequency and percentage analyses to describe the profiles of the engineering students at Caraga State University. These profiles were evaluated based on students' personal details, the engineering program they are currently pursuing, their academic strand from senior high school, and their academic performance, which was measured by their GPA during their first year of tertiary education for the 2018-2019 academic year. This data informed the creation of a pre-assessment evaluation to analyze the relationship between academic strands and the academic performance of K-12 graduates who are now third-year engineering students at Caraga State University – Butuan City. Additionally, a Likert scale ranging from 5 to 1, with corresponding ranges and descriptions, was used to assess the third-year engineering students.

Ethical Considerations

The researcher in this study emphasized the need of adhering to ethical standards, in particular to data collection processes. Throughout the questionnaire distribution process, the researcher is committed to maintaining social responsibility, objectivity, and non-discrimination, as well as protecting children's wellbeing. Prior participation, respondents were given informed consent forms in the presence of the researcher, allowing any questions or concerns to be addressed promptly. To safeguard participants' privacy, names and other identifying information were purposefully removed from the questionnaires. To protect respondent confidentiality, the researcher ensured that all data collection tools and obtained data were handled with utmost care.

When the data assessment was complete, the questionnaires were disposed of in a systematic manner to preserve confidentiality. Each participant was given an informed consent form that clearly stated their voluntary permission to participate in the study while emphasizing their autonomy in the decision. To ensure fairness, the researchers gave consistent and unbiased responses, avoiding personal biases or affiliations. They also worked to educate participants about ethical principles and how they benefit both employees and the environment. After receiving consent, researchers described the study's objectives, reasons for the research, and their identities to each respondent. The researcher explained the possible benefits of the study and underlined the importance of each volunteer. After getting the necessary consent, the researchers transparently communicated the study's objectives, the reasons for the research, and their personal names to each respondent. The researcher highlighted the possible benefits of the study and underlined the importance of each volunteer. Respondents were also informed that they had the right to withdraw participation at any moment and to disclose any conflicts

of interest relating to the study.

RESULTS AND DISCUSSION

Table 1: ***Profile of the respondents***

	Profile	No. Of distribution	Percent
AGE	18-25	0	0
	26-35	12	26.09
	36-45	27	58.7
	45 & above	7	15.22
	Total	**46**	**100**

The table 1 above provides a thorough glimpse of 46 people working in the construction industry. Majority of the respondents aged 36-45 compromising 58.7% highlighting a significant concentration in this group. While respondents aged 18- 25 do not have any participants This distribution shows a largely middle-aged group, with a conspicuous absence of younger participation and a relatively minor representation of elderly adults. The table implies that the construction industry workforce is largely middle-aged, with a notable lack of younger workers and insignificant representation of elderly individuals. This distribution indicates a potential gap in attracting younger talent and maintaining older personnel, highlighting a prospective area for industry attention and improvement. Yanita et al.,(2023) indicate that an employee's age can have an impact on their work because physical capacities gradually deteriorate with age.

Table 2. ***Educational Attainment***

	Profile	No. Of distribution	Percent
Educational Attainment	High School	10	21.74
	College Level	1	2.17
	College Graduate	21	45.65
	Post Graduate	8	17.39
	Vocational Course	0	0
	Total	**46**	**100**

The table 2 shows an overview of the educational attainment of 46 participants. A considerable majority of the respondents with 45.65%, has graduated from college, while 17.39% hold postgraduate degrees. The table also reveals that none of the members of this group had taken any vocational courses. This indicates a highly educated group with a strong emphasis on academic qualifications. The table suggest that the group's educational background is predominantly focused on traditional academic paths rather than technical or vocational training. Higher educated workers can increase productivity and increase the production potential curve outward, (Abdelgany and Saleh , 2022).

Table 3. ***Types of Construction Project***

	Profile	No. Of distribution	Percent
Types of	vertical	33	71.74

Construction Project	horizontal	2	4.35
	both	11	23.91
	Total	**46**	**100**

The data presented in table 3 illustrates the distribution of construction projects based on their type. Thirty-three projects or a significant 71.74% of the 46 total—are classified as vertical construction. This suggests that inside the dataset, vertical structures are strongly preferred or prioritized. There are 11 projects (23.91%) that combine horizontal and vertical construction, indicating a significant proportion of projects that include components of both types. Conversely, only 2 projects, or 4.35% of the total, are categorized as horizontal construction, indicating a relatively low frequency of this kind in the sample. The dataset above implies that vertical construction projects are the most common type, indicating a distinct inclination or need for projects involving upwardly extending structures. The very modest percentage of horizontal construction projects—which usually involve infrastructure like roads or bridges—indicates that these kinds of projects are less frequent in this particular setting. The existence of mixed-use projects suggests a level of adaptability or intricacy in the kinds of building being done, demonstrating a balance between projects that are exclusively vertical and those that necessitate the integration of both vertical and horizontal elements. All things considered, this distribution points to a preference for vertical structures, with blended or mixed construction types playing a substantial but lesser part. Al-Rubaye and Mahjoob, (2020) stated that among the critical elements that have been identified to be vital to labor productivity are the following: the complexity of design, the degree of order differentiation during execution, the clarity of technical requirements, and the coordination across design disciplines.

Table 4. ***No. of yrs. working In Construction Project***

	Profile	No. Of distribution	Percent
No. of yrs. working In Construction Project	1 year & below	6	13.04
	1-3 years	16	34.78
	3-5 years	11	23.91
	5-10 years	11	23.91
	10 years & above	2	4.35
	Total	**46**	**100**

The data above presents the distribution of 46 respondents based on their years of experience in construction projects. A significant portion, 34.78%, has between 1 to 3 years of experience, making it the largest group. This is followed by those with 3 to 5 years and 5 to 10 years of experience, each comprising 23.91% of the total. Only 4.35% have over 10 years of experience. This suggests a workforce primarily composed of early-career professionals, which may impact project execution, innovation, and mentorship opportunities. The low percentage of experienced workers raises concerns about knowledge retention and leadership development, potentially affecting the industry's adaptability and growth. This demographic distribution may influence the industry's adaptability and long-term growth. Mahamid et al., (2014) evaluated that the primary factors influencing labor productivity are lack of labor skills, poor stakeholder communication, late payments, and unfavourable working conditions.

Table 5. ***Construction Job Classification***

	Profile	No. Of distribution	Percent
Construction Job Classification	Project Manager	4	8.69
	Owner	17	36.96
	Project Civil Engineer	1	2.17
	Asst. Project Civil Engr.	4	8.7
	Contractor	1	2.17
	Electrician	2	4.35
	Administrative Clerk	2	4.35
	Laborer	15	32.61
	Total	**46**	**100**

Table 5 outlines the distribution of job classifications among 46 respondents in the construction sector. The largest group consists of owners, with 17 individuals (36.96%), followed by laborers, who make up 15 individuals (32.61%). While the least are the project civil engineers and contractors each have 1 individual (2.17%). This distribution indicates a workforce predominantly comprised of owners and laborers, with fewer professionals in management and specialized roles, which may influence decision-making and project execution in the industry. The table implies several key points about the distribution of job classifications in the construction workforce. The significant presence of owners and labourers suggests a focus on execution and hands-on work, while the limited number of project managers and specialized roles may indicate a gap in leadership and strategic oversight. This could hinder effective decision-making and difficult to projects coordination. Less experienced professionals are also more common, which raises questions about the general level of competence in the workforce and may have an effect on creativity, mentorship, and problem-solving skills. In any industry, performance is essential for implementing strategies into action that ensure competitiveness and sustainability ,(Muthuveloo et al., 2017).

Table 6. ***Factors affecting labor productivity of construction project***

Factors	**Mean**	**Standard Deviation**	**Extent of affect**
Labor Characteristic Factor	5.72	0.83	affects moderately positive
Management Factor	6.11	0.62	affects moderately positive
Project Characteristic Factor	5.64	0.72	affects moderately positive
Resource Management Factor	6.03	0.7	affects moderately positive

Environmental Factor	5.57	0.73	affects moderately positive
Overall	**5.81**	**0.56**	**affects moderately positive**

The table above presents five key factors affecting a project, all showing a moderately positive impact. The management factor has the highest mean score of 6.11 and the lowest standard deviation of 0.62, indicating it is viewed as particularly important with strong consensus. Resource management follows closely with a mean of 6.03, while the environmental factor, with a mean of 5.57, is perceived positively but with slightly more variability in responses. In addition, the overall mean score of 5.81 suggests a generally favorable perception of all factors, highlighting their significance in project outcomes. The data in the table above implies that all five key factors impacting a project are viewed positively, suggesting that they contribute beneficially to project outcomes. It suggests a general consensus on the importance of these factors in achieving successful project results. The workforce, management, tools and equipment, materials, technology, environment, and technology all have an impact on the reduction in construction worker productivity, (Toan et al., 2020).

Table 6**: *Significant relationship between the identified profile of the respondent and the factors in labor productivity of construction project.***

Identified Profile	**Factors in Labor Productivity of Construction Project**		
	Sig. Value	P-value	Interpretation
Age	.200	.192	There is no significant relationship.
Educational Attainment	.171	.205	There is no significant relationship
Types of Construction Projects	.378	-.133	There is no significant relationship
Number of Years in the Construction Project	**.026**	-.328	There is a significant relationship.
Job designation	**.000**	-.585	There is a significant relationship.

Significant margin of error (.05)

The table shows analysis of factors affecting labor productivity in construction projects. It demonstrates that age, educational attainment, and types of construction projects do not have significant relationships with productivity, as indicated by their p-values exceeding the 0.05 threshold. In contrast, both the number of years spent in the project and job designation show significant relationships, with p-values below 0.05. This suggests that having more experience in a project positively influences productivity, while the role or position of workers also plays a crucial role in determining productivity levels. The experience and job designation are key factors in enhancing labor productivity within the construction sector. El-Gohary and Aziz, (2014) identify several factors influencing labor productivity in the construction industry, including workforce experience, incentive programs, material accessibility, management effectiveness, supervision competence, construction technology, compensation methods, site congestion, project scheduling, workflow, constructability, and clarity of instructions.

CONCLUSION AND RECOMMENDATION

Summary of Findings

The findings from the study provide a comprehensive overview of the demographics, educational background, project types, experience levels, job classifications, and factors influencing labor productivity in the construction workforce

1. Demographics: The majority of the 46 respondents are aged 36-45 (58.7%), with no participants from the 18-25 age group. This highlights a significant gap in younger talent entering the industry, which could have implications for innovation and future workforce sustainability. The limited representation of older workers (15.22%) further underscores the need for strategies to attract and retain both younger and more experienced individuals.

2. Educational Background: A substantial portion of respondents (45.65%) are college graduates, with 17.39% holding postgraduate degrees. However, the complete absence of individuals with vocational training indicates a reliance on traditional academic routes rather than technical education. This may limit the development of practical skills essential for construction tasks, potentially impacting productivity and efficiency on job sites.

3. Types of Construction Projects: The data indicates a strong preference for vertical construction, comprising 71.74% of projects. This preference suggests a focus on high-rise buildings or similar structures, while only 4.35% of projects are horizontal, which typically involve infrastructure like roads or bridges. The presence of mixed projects (23.91%) indicates some adaptability but reinforces the notion that vertical projects dominate the landscape.

4. Experience Levels: The workforce is predominantly early-career, with 34.78% having only 1-3 years of experience. This suggests a potential shortage of seasoned professionals, raising concerns about mentorship opportunities and knowledge transfer. The low percentage (4.35%) of respondents with over 10 years of experience may hinder the industry's adaptability and long-term growth, as experienced workers are crucial for leadership and strategic direction.

5. Job Classifications: The construction workforce is heavily composed of owners (36.96%) and laborers (32.61%), with fewer professionals in management or specialized roles. This distribution points to a strong emphasis on hands-on execution rather than strategic oversight, which could impair effective project management and decision-making processes. The limited number of project managers and specialized roles may also affect the overall quality of project execution and innovation.

6. Factors Affecting Labor Productivity: The study identified five key factors impacting productivity, all showing a moderately positive influence. The management factor scored highest (mean of 6.11), indicating that effective management practices are crucial for enhancing productivity. Other factors, such as resource management and environmental conditions, also contribute positively to project outcomes, suggesting a consensus on their importance in achieving successful results.

7. Statistical Relationships: The analysis revealed no significant relationships between age, educational attainment, or types of construction projects with labor productivity.

However, the number of years in the construction field and job designation were significantly related to productivity. This suggests that experience plays a crucial role in enhancing productivity, as more seasoned workers likely bring better skills and knowledge to their roles, while job designation can influence the level of responsibility and decision-making authority.

Conclusion

The findings of the study highlight important traits and difficulties among the middle-aged, highly educated but inexperienced workers that make up the construction industry. The absence of younger workers highlights a significant gap that could affect future innovation and sustainability in the industry. The construction industry faces several challenges that could impact its future effectiveness and adaptability. The lack of younger workers suggests a potential risk for innovation and sustainability, indicating a need for strategies to attract new talent. On the other hand, the strong focus on vertical construction projects suggests a clear market preference, which may restrict the variety of skills and knowledge needed for broader infrastructure development. The focus on vertical projects may limit skill diversity, pointing to a need for broader training and development in various construction types. Additionally, the distribution of job roles suggests that improving management and leadership within the workforce is essential for better project execution. The results of the study highlights the importance of proactive measures to strengthen the workforce and ensure the professional development to strengthen the workforce's skill set. To ensure a resilient and adaptable workforce that can respond to the changing demands of the construction sector, it is vital to address the lack of younger talent and promote vocational training. By adopting targeted strategies to attract and retain a diverse talent pool and enhance leadership skills, the industry can better prepare for future growth and innovation.

Recommendation

Based on the findings, the following recommendations can be made to enhance the construction workforce and address identified challenges:

1. Attract Younger Talent: Implement targeted recruitment initiatives to appeal to younger individuals, such as internships, apprenticeships, and partnerships with educational institutions. Highlight the potential for career growth and innovation within the industry to attract new entrants.

2. Promote Vocational Training: Develop and promote vocational training programs that focus on practical skills essential for various construction roles. Collaborate with trade schools and community colleges to create curriculum that aligns with industry needs.

3. Enhance Mentorship Opportunities: Establish formal mentorship programs that pair experienced workers with younger or less experienced employees. This will facilitate knowledge transfer, skill development, and leadership growth, fostering a more competent workforce.

4. Diversify Project Types: Encourage a broader range of construction projects beyond vertical construction to develop a more versatile skill set among workers. This could involve investing in infrastructure and horizontal projects, providing workers with

diverse experiences.

5. Strengthen Management Training: Offer management and leadership training programs for current employees to develop effective project management skills. This can enhance decision-making and coordination, ultimately improving project outcomes.

6. Foster a Culture of Continuous Learning: Create an organizational culture that values ongoing education and skill development. Encourage employees to pursue additional certifications and training to keep pace with industry advancements.

7. Conduct Regular Workforce Assessments: Periodically evaluate the workforce's skills and demographics to identify gaps and areas for improvement. Use this data to inform hiring practices and training programs.

THE BEHAVIOR OF ENGINEERS IN DETERMINING FIRST JOB TENURE

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ABSTRACT

Engineering is a vital profession globally, contributing significantly to innovation and economic growth. This study examines the behaviors of engineers during their initial employment period, focusing on how these behaviors influence career trajectories. It identifies key factors such as engineering degree, age, and gender, and their correlation with adaptability, communication, and job satisfaction. Using a quantitative, descriptive-correlational approach, data were collected from 100 engineers across nine disciplines through structured surveys employing a Likert scale. The findings reveal a strong predominance of Electronics Engineering among participants and highlight retention challenges, particularly in the early years of employment. Analysis indicates that while male engineers dominate the initial hiring phase, female engineers show better retention in specific tenure brackets. The research underscores the importance of fostering supportive work environments to enhance job satisfaction and retention rates, ultimately contributing to a more stable and diverse engineering workforce. Recommendations for organizations include implementing effective support systems and mentorship programs

to cultivate a thriving professional landscape in engineering.

KEYWORD: *Engineers, First Job Tenure, Job Factors, Work Behavior*

INTRODUCTION

For many decades, engineering has emerged as a vital and highly esteemed profession on a global scale. According to Wijesinghe and Jayawardane, (2024), engineering is a prominent field on a global scale. Its significance lies not only in its technical contributions to society but also in its role in driving innovation and economic growth. Engineers are essential in addressing complex challenges, from infrastructure development to technological advancements, making the field both dynamic and impactful. As the world continues to evolve, the demand for skilled engineers remains strong, highlighting the profession's promise for future generations and its critical role in shaping a sustainable and advanced society.

The engineering profession demands continuous learning and strong problem-solving skills. Engineers who focus on professional development not only enhance their expertise but also build valuable networks that contribute to job stability. Aligning personal values with workplace culture further strengthen an engineer's dedication to their initial role. Hosseini, (2014) perceives culture as embodying an organization's identity and acting as its personality in interactions among people. The behaviors exhibited by engineers during their first job tenure are pivotal in shaping their long-term career success. The initial job tenure is crucial in shaping an engineer’s career trajectory, presenting unique challenges and opportunities that influence professional identity. Key factors, including the respondents' engineering degrees, age-related tenure, and gender disparities, play critical roles in this context. Investigating these behaviors reveals trends that affect not only individual careers but the broader engineering field as well.

Ultimately, fostering a supportive environment that encourages positive behaviors can benefit both engineers and employers, leading to improved retention rates and a more engaged workforce. Alas and Mousa, (2016), emphasize that organizational culture is crucial in influencing an organization's success or failure. This research highlights the importance of understanding these dynamics to create a thriving professional landscape in engineering.

This study examines the behaviors of engineers during their first employment period and their impact on job tenure. By exploring these behaviors, we aim to identify trends that affect individual careers and the broader engineering field. The findings will emphasize the importance of adaptability, effective communication, and mentorship, highlighting the need for supportive work environments that benefit both engineers and employers. Ultimately, this research seeks to foster a thriving professional landscape in engineering.

STATEMENT OF THE PROBLEM

The study aims to examine the factors influencing engineers' behaviors during their initial employment period and how these factors affect their career trajectories. It specifically seeks to answer the following questions:

1. What is the profile of the respondents in terms of:
a. types of engineering degree
b. age;
c. gender;

2. What is the significance of the relationship between the identified respondent profiles and the behaviors that impact career trajectories in the engineering field?

3. Based on the study's findings, what recommendations can be made to enhance the support systems for new engineers in their workplaces?

Null Hypothesis

H0:There is no significant relationship between the profile characteristics of engineers and their behaviors during the initial employment period, nor do these behaviors influence their career trajectories in the engineering field.

METHODS

Design

This study employed a quantitative research design with a descriptive-correlational approach to investigate the relationship between factors influencing engineers' behaviors during their initial employment period and their impact on career trajectories. The primary aim was to describe and analyze how specific independent variables—such as age, type of engineering degree, and gender—affect behaviors like adaptability, communication, and job satisfaction. A stratified random sampling technique was applied to ensure representation across various engineering disciplines and demographics. This design will facilitate the identification of significant correlations between the respondents' profiles and the behaviors that influence their professional success.

Respondent Groups and Criteria

The study included 100 engineers who were randomly selected from nine different engineering disciplines across the country. These participants were chosen from various organizations and were either currently employed or had previously worked in their first job. Selection criteria for participants included the following:

Inclusion Criteria:

1. Bonafide engineers graduated from nine different engineering degrees in the country
2. Legal age.
3. Willingness to participate.
4. Provision of voluntary consent.

Participants who did not meet these criteria were excluded from the study.

Scoring Procedure

This section explains the scoring procedures for the data analysis part of this study, focus on primary variables: age, type of engineering degree, and gender. Values for these variables will be determined using a Likert Scale.

Scale	**Range**	**Description**	**Interpretation**
4	7.6-10.0	Affects Very Positively	The extent of item/provision or condition is taken into consideration between 81% to 100% all the time
3	5.1-7.5	Affects Moderately Positive	The extent of item/provision or condition is taken into consideration between 61% to 80% most of the time
2	2.6-5.0	Affects Moderately Negative	The extent of item/provision or condition is taken neither moderate or limited between 41% to 60%
1	1.0-2.5	Affects Very Negatively	The extent of items/provision or condition is 1% to 20% or totally mission or never taken into consideration

Data Gathering Procedure

The researcher obtained permission from the Dean of the University of Visayas' College of Engineering, Technology, and Architecture to carry out the study. Following this approval, a formal request was submitted to the participating school for permission to proceed. Data was collected with help from designated individuals to monitor progress. After collection, the data was organized, tabulated, and analyzed statistically. To enhance the accuracy and reliability of the quantitative data, the researchers worked with a qualified statistician, creating tables and graphs to address the study's issues.

Data Analysis

The study utilized statistical techniques, including simple frequency and percentage analyses, to characterize the profiles of newly employed engineers. These profiles were examined based on personal demographics, such as age and gender, as well as the type of engineering degree held and initial job satisfaction levels. The data were collected through a structured survey that included a Likert scale ranging from 1 to 10 to assess behaviors like adaptability and communication. This analysis aimed to explore the correlations between these factors and their impact on early career trajectories, thereby informing strategies to enhance professional success for engineers during their initial employment phase.

Ethical Considerations

The researcher in this study highlighted the importance of following ethical standards, especially in data collection. During the questionnaire distribution, the researcher prioritized social responsibility, objectivity, non-discrimination, and the protection of children's wellbeing. Respondents received informed consent forms in the researcher’s presence, allowing them to ask questions. To ensure privacy, names and identifying details were removed from the questionnaires, and all data was handled with care. After data assessment, questionnaires were disposed of systematically to maintain

confidentiality. Each participant was given a clear informed consent form affirming their voluntary participation and autonomy. The researchers aimed for consistency and neutrality in their responses, educating participants about ethical principles beneficial to both employees and the environment. They transparently communicated the study's objectives, benefits, and their identities, emphasizing the importance of each volunteer while assuring respondents they could withdraw at any time and disclose any conflicts of interest.

RESULTS AND DISCUSSION

Table 1. ***Engineering Degree of the Respondents***

Degree	**Frequency**	**Percentage**
BS in Agricultural Engineering	6	6.0
BS in Chemical Engineering	2	2.0
BS in Civil Engineering	5	5.0
BS in Computer Engineering	6	6.0
BS in Electrical Engineering	2	2.0
BS in Electronics Engineering	66	66.0
BS in Industrial Engineering	8	8.0
BS in Mechanical Engineering	3	3.0
BS in Mining Engineering	2	2.0
Total	**100**	**100.0**

The table above presents data on the degrees held by participants in a study, indicating both the frequency and percentage of each degree type. This distribution highlights a strong emphasis on Electronics Engineering within the surveyed group. Of the 100 respondents, the majority possess a Bachelor of Science in Electronics Engineering, representing 66% of the sample, or 66 individuals. In contrast, a smaller proportion holds degrees in Electrical, Chemical, and Mining Engineering, each comprising only 2% of the total population. This data implies that Electronics Engineering is the predominant field of study among the participants, which may reflect current job market demands, educational trends, or specific interests within the group. The low representation of other engineering disciplines suggests that they may be less popular, or it could indicate that the survey specifically targeted individuals in fields related to electronics. The concentration on electronics engineering may also point to potential areas for future research, industry development, or educational focus, underscoring the need for resources and support tailored to this discipline. According to Chavez et al., (2016), electronics engineering is one of the most significant and most rapidly expanding areas within the engineering sector.

Table 2. ***Tenure of Engineering Graduates based on Age***

Tenure	**20-21 (f)**	**22-23 (f)**	**24-25 (f)**	**26-27 (f)**	**Total**
0-6 months	8	13	3	2	26
>6months – 1year	2	10	4	0	16
>1year – 2 years	5	9	4	2	20

>2years - 3years	3	10	2	0	15
>3 years – 4 years	3	4	4	0	11
>4 years – 5 years	1	3	0	0	4
>5 years	4	4	0	0	8
Total	26	53	17	4	100

The table above displays data on employee tenure across four time periods (20-21, 22-23, 24-25, and 26-27), detailing the frequency of employees in various tenure categories. In total, there are 100 employees represented. The most significant group is those with 0-6 months of tenure which is the young workforce, totaling 26 individuals. Tenure tends to decline in the longer categories, with only 4 employees having 4 to 5 years of experience. The data reveals fluctuations in employee retention and tenure, indicating that while there is a strong influx of new hires, longer tenures are less common, potentially highlighting issues related to employee retention or turnover. The data suggests a broader trend of workforce mobility within the country, where employees frequently seek new opportunities, emphasizing the importance of understanding and addressing the factors influencing turnover. According to Trevelyan, (2019), the transition from education to professional practice can be challenging for many early career engineers. The expectations and established work habits frequently clash with the realities of engineering environments, potentially contributing to higher turnover rates. Addressing these challenges is crucial for organizations that aim to foster an environment conducive to long-term commitment and employee satisfaction, ultimately improving retention and stability within the workforce.

Table 3. ***Expected: Contingency Table Engineering Graduates' Tenure Based on Age***

Tenure	**20-21 (f)**	**22-23 (f)**	**24-25 (f)**	**26-27 (f)**
0-6 months	6.76	13.8	4.42	1.04
>6months – 1year	4.16	8.48	2.72	0.640
>1year – 2 years	5.20	10.6	3.40	0.800
>2years - 3years	3.90	7.95	2.55	0.600
>3 years – 4 years	2.86	5.83	1.87	0.440
>4 years – 5 years	1.04	2.12	0.680	0.160
>5 years	2.08	4.24	1.36	0.320

The table above displays employee tenure across four time periods (20-21, 22-23, 24-25, and 26-27), highlighting the frequency of employees in different tenure categories. Notably, the highest number of employees with 0-6 months of tenure appears in the 22-23

period (13.8), suggesting a significant influx of new hires during that time. In contrast, there is a general decline in numbers as tenure increases, with very few employees staying beyond 4 to 5 years, particularly in the 26-27 period where the figures drop dramatically with only 0.16 . This trend points to potential retention challenges, as fewer employees are remaining with the organization long-term. The data above indicates successful recruitment but raises concerns about retention and high turnover rate among employees. The low numbers in longer tenure categories indicates that it reflect employee dissatisfaction or a mismatch between expectations and workplace realities. Consequently, the findings underscore the urgent need to implement effective retention strategies aimed at engaging employees, particularly in the early stages of their careers to foster long-term commitment and create a more stable workforce. The first challenge faced by early career engineers is demonstrating their ability to blend in with the company's culture and meet performance standards, (Ajit, and D. P.B., 2013).

Table 4. ***Tenure of Engineering Graduates based on Gender***

Tenure	**Female Engineers (f)**	**%**	**Male Engineers (f)**	**%**
0-6 months	7	14.0	19	38.0
>6months – 1year	9	18.0	7	14.0
>1year – 2 years	10	20.0	10	20.0
>2years - 3years	13	26.0	2	4.0
>3 years – 4 years	6	12.0	5	10.0
>4 years – 5 years	1	2.0	3	6.0
>5 years	4	8.0	4	8.0

The table provides insights into the tenure of female and male engineers, showing both the frequency and percentage of employees in various tenure categories. Among those with 0-6 months of tenure, a greater percentage of male engineers (38.0%) is observed compared to female engineers (14.0%), indicating that more men are entering the field or organization at this stage. However, in the 2-3 years tenure category, female engineers represent 26.0%, while only 4.0% of male engineers are found in this range. This data suggests a shift in hiring or retention trends. Furthermore, there is a notable drop for both genders in the 4-5 years category, with few employees remaining beyond five years. This suggests that while initial hiring may be effective, both female and male engineers but face difficulties remaining in their positions over time. This due to the possibly of workplace dynamics that impact job satisfaction and career longevity. According to Yousaf et al., (2014), in most cases, organizations fail to provide sufficient support, cooperation, and guidance for female professionals because most superiors do not view them as equals to their male colleagues. This trend highlights potential retention challenges, the need for organizations to focus on strategies to foster a more stable and diverse workforce in the engineering field.

Table 5. ***Chi-square test on the Tenure of Engineering Graduates based on Gender***

	Observed Value: Contingency Table			**Expected Value: Contingency Table**	
Tenure	**Female Engineers (f)**	**Male Engineers (f)**	**Sum**	**Female Engineers (f)**	**Male Engineers (f)**
0-6 months	7	19	26	13	13

>6months – 1year	9	7	16	8	8
>1year – 2 years	10	10	20	10	10
>2years - 3years	13	2	15	7.5	7.5
>3 years – 4 years	6	5	11	5.5	5.5
>4 years – 5 years	1	3	4	2	2
>5 years	4	4	8	4	4
Total	**50**	**50**	**100**		

The table 5 above compares observed and expected values for the tenure of female and male engineers across various categories. In the 0-6 months category, the observed count shows 7 female and 19 male engineers, totaling 26, which is significantly higher than the expected value of 13 for each gender, indicating a stronger male presence among new hires. In the >6 months to 1 year category, female engineers have a higher observed count (9) compared to males (7), suggesting improved retention for women during this period. However, in the >2 years category, the observed value for female engineers (13) far exceeds the expected value (7.5), while the male count is much lower than expected, indicating a potential gender disparity in longer-term employment. The lower numbers in the >4 years categories highlight challenges in retaining employees from both genders, as both observed counts fall below their expected values. Overall, these findings imply that while initial hiring may favor male engineers, female engineers may experience better retention in the early years. As stated by Nasir et al., (2019), female employees are more likely to experience turnover compared to their male counterparts. However, the declining numbers in longer tenure categories point to a need for organizations to develop effective retention strategies to ensure a balanced and stable workforce.

Table 6. ***Significance of Length of Stay and Level of Influence Determining the Tenure of Engineering Graduates***.

Tenure	**Location**	**Income**	**Nature of Work**	**Job Security**	**Work Intensity**	**Management**	**Work Environment**	**End of Contract**	**Σ**
0-6m	10	17	17	17	14	15	14	8	112
>6m – 1yr	6	10	9	9	3	11	6	4	58
>1yr – 2 yrs	5	7	7	8	8	11	9	5	60
>2yrs - 3yrs	3	10	6	6	8	10	6	2	51

>3yrs–4yrs	4	6	7	8	4	6	8	3	46
>4yrs–5yrs	2	2	1	1	1	2	1	1	11
>5yrs	0	1	4	3	3	3	2	1	17
Σ	30	53	51	52	41	58	46	24	355
Chi-square									16.746
Degrees of Freedom									42
p									0.9998

The table summarizes various factors influencing job tenure, including location, income, nature of work, job security, work intensity, management, work environment, and end of contract, across different tenure categories. The data shows that employees with 0-6 months of tenure report the highest cumulative scores across these factors (112), indicating that new hires may prioritize various aspects of their job, such as management and work environment. As tenure increases, scores generally decline, particularly for those with over 4 years, suggesting that long-term employees may experience diminishing satisfaction or face challenges related to job security and work intensity. The Chi-square statistic (16.74) and the p-value (0.9998) imply that there is no statistically significant difference in perceptions of these factors across different tenure categories, meaning that tenure may not strongly influence how employees view these aspects of their jobs. This suggests that while new hires may have higher expectations regarding their work conditions, long-term employees could be facing increasing dissatisfaction or challenges that are not adequately addressed. Securing the right talent is essential for organizations, as attracting top applicants plays a vital role in establishing a competitive edge, (Yu, 2014). Organizations should consider strategies to enhance job satisfaction and address the specific concerns of long-term employees to improve retention and overall workplace morale.

CONCLUSION

In conclusion, the data presented underscores significant trends in the engineering workforce, particularly highlighting the dominance of Electronics Engineering among graduates and a concerning pattern of high turnover rates. The findings reveal that while organizations effectively attract new talent, particularly male engineers, they face challenges in retaining employees, especially as tenure increases. The analysis indicates that female engineers, despite being underrepresented initially, may exhibit better retention in the early years, suggesting potential gender dynamics at play. Moreover, the factors influencing job satisfaction and tenure, such as management support and work environment, become increasingly critical as employees progress in their careers. To foster a more stable and diverse workforce, organizations must prioritize effective retention strategies and address the unique challenges faced by both male and female engineers, ultimately enhancing workplace morale and commitment.

RECOMMENDATION

To effectively enhance retention and foster a more diverse engineering workforce, organizations should adopt a multi-faceted approach. First, improving management support is crucial; training leaders to recognize and address the specific needs of both male and female engineers can create a more inclusive atmosphere. This can involve regular check-ins, open-door policies, and responsiveness to employee concerns.

Additionally, fostering an inclusive work environment should be a priority. Implementing diversity training and promoting awareness of unconscious biases can help cultivate a culture where all employees feel valued and empowered. Creating employee resource groups can also provide networking and support opportunities for underrepresented groups, enhancing their sense of belonging.

Regular assessments of job satisfaction are essential for understanding employee needs. Organizations should conduct anonymous surveys to gather insights on workplace dynamics, career aspirations, and areas for improvement. Using this data to adapt policies can demonstrate a commitment to employee well-being.

Mentorship programs can play a vital role in career development, pairing less experienced engineers with seasoned professionals. This not only helps new employees navigate their careers but also fosters knowledge sharing and community within the organization.

Lastly, offering opportunities for continuous learning, such as workshops, certifications, and conferences, can engage employees and encourage professional growth. By investing in these initiatives, organizations can create a supportive environment that not only attracts top talent but also retains them, ultimately leading to greater stability and success in the engineering sector.

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IMPLEMENTATION OF SOLID WASTE MANAGEMENT IN THE MUNICIPALITY OF PALOMPON, LEYTE: PROPOSED ACTION PLAN FOR IMPROVEMENT

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ABSTRACT

This study examines the impact of gender, age, educational attainment, marital status, and awareness of legislation on solid waste management practices in Palompon, Leyte. Among 200 respondents, the gender distribution was 56.5% female and 43.5% male, influencing resource allocation and community engagement. Notably, 29.2% of respondents were over 50, suggesting that older adults may shape waste management initiatives. Additionally, 41.5% had completed college, indicating high educational attainment and awareness of sustainable practices.

Using a descriptive-survey method and statistical tools like frequency and percentage analyses, the research assessed residents' perceptions, the status of relevant legislation, and the effectiveness of the current waste management program. Participants were randomly selected based on criteria ensuring they were bona fide residents of Palompon, of legal age, and able to provide informed consent.
Marital status analysis revealed that 45.5% of respondents were married, which may enhance community program participation. Awareness of Republic Act 9003 was high at 83.5%, reflecting effective outreach, but only 35% reported proper waste disposal practices, highlighting gaps in implementation.

Overall, there is strong consensus on the importance of waste segregation and local government responsibilities; however, many view household waste management as primarily a parental duty. While local programs received positive feedback, improvements are needed in hazardous waste handling and collection frequency. This study underscores the need for targeted educational initiatives to foster individual responsibility and enhance community engagement in sustainable waste management, emphasizing the role of demographic insights in developing effective strategies.
Keywords: *evaluation, mechanical engineering program, admission and retention, licensure passing percentage*

INTRODUCTION

Effective solid waste management is a pressing concern for communities worldwide, particularly in rapidly developing areas like Palompon, Leyte. As urbanization and population growth intensify, the challenges associated with waste disposal and management become increasingly complex. In Palompon, improper waste management not only poses environmental hazards but also threatens public health and overall quality of life. The municipality is politically subdivided into 50 barangays, with 10 Poblacion barangays covering approximately 1 square kilometer each, while the remaining 40 barangays are distributed along the coastline and in rural mountainous areas. Palompon spans a land area of 126.07 square kilometers (48.68 square miles) and had a recorded population of 60,612 in 2018, with an estimated growth rate of 1.03% per year (LGU Palompon, 2015).

To address the challenges of solid waste management, the Philippines has implemented measures such as the Republic Act 9003, known as the Ecological Solid Waste Management Act. According to Gequinto (2017), the Republic Act 9003 is a comprehensive law in the Philippines that outlines solid waste management strategies, policies, and programs to protect the environment and public health from the harmful effects of waste. This legislation aims to establish a comprehensive and environmentally sound waste management framework that protects both public health and the environment. It requires the provision of support to the National Solid Waste Management Commission, which oversees the implementation of waste management plans. Additionally, the Act outlines policies to achieve the objectives of the National Ecology Center, which focuses on raising awareness, providing consultation, and offering training to local government units on ecological waste management practices.

Solid waste encompasses unwanted and discarded materials produced from daily human activities (Mishra et al., 2014). Addressing the issue of solid waste in Palompon and similar communities requires a multifaceted approach that includes education, community engagement, and robust policy enforcement to foster sustainable waste management practices. Hence, by focusing on effective solid waste management, Palompon can improve its environmental sustainability, protect public health, and elevate the quality of life for its residents. Solid waste management encompasses the collection, transportation, disposal, and treatment of waste materials, aiming to mitigate negative impacts on health and the environment while promoting economic development and enhancing quality of life. Recognizing appropriate waste disposal techniques has become essential in today's unclean world (Marello and Helwege 2017).This initiative is expected to contribute significantly to the country’s economic development by formalizing waste collection and recycling, creating job opportunities, reducing reliance on imported oil, and increasing power generation.

This study aims to investigate the current challenges and practices of solid waste management in Palompon, exploring potential strategies for improvement and sustainability. By examining these aspects, we hope to contribute valuable insights that can guide local policies and initiatives, ultimately fostering a healthier and more sustainable environment for the community.

STATEMENT OF THE PROBLEM

This study aims to explore the implementation of solid waste management practices in the Municipality of Palompon, Leyte, particularly in relation to the provisions of Republic Act 9003. The study seeks to address the following specific questions:

1. What is the profile of the respondents concerning the following characteristics:
   a. Gender
   b. Age
   c. Highest educational attainment
   d. Marital status

2. What is the level of awareness among respondents in terms of :
   a. RA 9003
   b. Awareness and practice of solid waste management programs
   c. Attitude towards solid waste management
   d. Status of solid waste management program

e. Level of effectiveness on the laws and programs of the municipality in accordance to the solid waste management program
f. Implementing body of MENRO office according to the status of solid waste management program

3. Based on the findings, what action plan for improvement can be proposed to enhance solid waste management practices in the municipality.

METHODS

Design

This study employs a descriptive-survey method with a quantitative approach to assess the solid waste management practices within the Municipality of Palompon, Leyte. This method is particularly useful to gather and analyze numerical data to gain insights into the awareness, perceptions, and practices related to solid waste management among residents.

Respondent Groups and Criteria

The respondents for this study were randomly selected from 200 locals of Palompon, Leyte, specifically those living in the town proper, along with ten (10) Local Government Unit employees working at the Municipal Environment and Natural Resources Office (MENRO).

The basis for the selection of the study was based on the Inclusion-Exclusion Criteria set:

The following are the inclusion parameters considered in this research:

1. bonafide resident of Palompon Leyte
2. must be of legal age
3. willing to participate.
4. provided voluntary consent

Individuals who did not match the previously stated criteria were excluded from 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

Scale	**Range**	**Description**	**Interpretation**
4	4.1-5.0	Very Great Extent (VGE)	The extent of item/provision or condition is taken into consideration between 81% to 100% all the time

3	3.1-4.0	Great Extent (GE)	The extent of item/provision or condition is taken into consideration between 61% to 80% most of the time
2	2.1-3.0	Moderate Extent (ME)	The extent of item/provision or condition is taken neither moderate or limited between 41% to 60%
1	1.0-2.0	Very Little Extent (VLE)	The extent of items/provision or condition is 1% to 20% or totally mission or never taken into

Data Gathering Procedure

The researcher obtained approval from the Dean of the College of Engineering, Technology, and Architecture at the University of Visayas to carry out the study. After receiving endorsement for the research proposal, a permission letter was prepared for the relevant school to request authorization for the investigation. Data collection was structured on an individual respondent basis, with support from designated staff to facilitate effective monitoring of progress.

After gathering the data, the researchers organized, tabulated, and performed statistical analyses. To ensure the quantitative data's accuracy and reliability, they worked alongside an experienced statistician. They created tables and graphs to effectively address the sub-problems identified in the study.

Data Analysis

The study employed statistical methods, including simple frequency and percentage analyses, to outline the profiles of residents in Palompon, Leyte. The assessment of respondent profiles was based on several key demographic factors: the effectiveness of the current solid waste management program, residents' attitudes toward solid waste management practices, the overall status of the solid waste management program, and the effectiveness of laws and programs related to solid waste management.

Ethical Considerations

The researcher in this study prioritized ethical standards, particularly in the data collection process. Committed to social responsibility, objectivity, and non-discrimination, the researcher ensured the welfare of children during the distribution of questionnaires. Respondents were presented with informed consent forms in the researcher’s presence, allowing for immediate clarification of any questions or concerns. To protect participants' privacy, all names and identifying information were intentionally excluded from the questionnaires. The researcher handled all data collection instruments and the gathered data with utmost care to maintain confidentiality.

After completing the data analysis, the questionnaires were systematically disposed of to further ensure confidentiality. Each participant received an informed consent form that clearly outlined their voluntary agreement to take part in the study, reinforcing their

autonomy in the decision-making process. To ensure fairness, the researchers provided consistent and unbiased responses, actively avoiding personal biases or affiliations. They also took steps to educate participants about ethical principles and their positive effects on both employees and the environment. After securing the necessary consent, the researchers communicated the study's objectives, the rationale behind the research, and their identities to each respondent. They discussed the potential benefits of the research and highlighted the important role of each participant, making it clear that respondents had the right to withdraw at any time and to declare any conflicts of interest related to the study.

RESULTS AND DISCUSSION

Table 1. ***Frequency and Percentage Distribution of the Respondents According to Gender***

BARANGAY	GENDER		TOTAL
	MALE	FEMALE	
MAZAWALO	11	9	20
IPIL III	9	11	20
IPIL II	11	9	20
IPIL I	9	11	20
CENTRAL III	9	11	20
CENTRAL II	7	13	20
CENTRAL I	7	13	20
SAN JUAN	11	9	20
GUIWAN II	9	11	20
GUIWAN I	4	16	20
TOTAL	87	113	200
PERCENTAGE (%)	43.5	56.5	100

The table above presents gender distribution data across various barangays, showing a total of 200 individuals with 87 males (43.5%) and 113 females (56.5%). Each barangay has a consistent total of 20 individuals, but the gender counts vary, with some like Mazawalo showing a near-even split of 11 males and 9 females, while others, such as Guiwan I, exhibit a significant imbalance with 4 males and 16 females. This overall gender imbalance, favoring females by approximately 13%, highlights demographic trends that could influence local governance, resource allocation, and community services tailored to specific gender needs. The data implies a gender imbalance in the surveyed barangays, with more females than males. According to Sarbassov et al., 2019, stated that females tended to be more engaged in waste separation compared to males.

Table 2***. Frequency and Percentage Distribution of the Respondents According to Their Age.***

AGE GROUP	FREQUENCY	PERCENTAGE (%)
19 YRS OLD & BELOW	24	12.5
20 – 29	41	21.4
30 – 39	29	15.1
40 – 49	42	21.8
50 YRS OLD & ABOVE	56	29.2
TOTAL	192	100

The data above outlines the age distribution of a population with a total of 192 individuals, categorized into different age groups. The largest group is those aged 50 years and above, comprising 56 individuals, or 29.2% of the total. While the 30 to 39 group includes 29 individuals with a percentage of 15.1%. This distribution highlights the considerable presence of older adults, especially those aged 50 and above, which could influence solid waste management strategies, as their engagement and practices may shape community recycling efforts and waste separation initiatives. Most developing countries shows that many older generations are inclined to sort their waste, as they tend to have a greater awareness of environmental impacts and a stronger appreciation for the planet, Debrah et al., (2021).

MARITAL STATUS	FREQUENCY	PERCENTAGE
SINGLE	83	41.5

Table 3. ***Frequency and Percentage Distribution of the Respondents According to Their Highest Educational Attainment***

EDUCATIONAL ATTAINMENT	FREQUENCY	PERCENTAGE
Elementary Level	12	6
Elementary Graduate	8	4
High School Level	15	7.5
High School Graduate	17	8.5
College Level	83	41.5
College Graduate	65	32.5
Total	200	100

The table above details the educational attainment of a population of 200 individuals, revealing a diverse range of education levels. The largest segment consists of individuals with a college-level education, totaling 83, or 41.5% of the population, while only 6 individuals, or 4%, have attained an elementary education. This distribution indicates a generally high level of educational attainment, with most individuals reaching at least high school and many advancing to college. Such a focus on higher education can significantly impact solid waste management within the community, as a more educated population is likely to be better informed about sustainable practices, leading to improved waste separation, recycling efforts, and overall environmental stewardship. As per stated by Bautista (2019), the world is encountering serious environmental challenges, and educational systems must cultivate environmentally literate individuals who are not only concerned about the environment but also possess the knowledge necessary to act responsibly regarding environmental issues

Table 4. ***Frequency and Percentage Distribution of the Respondents According to Their Marital Status***

MARRIED	91	45.5
SEPARATED	12	6
WIDOWED	14	7
TOTAL	200	100

The data above on marital status reveals the distribution of a population of 200 individuals, with the majority being married, comprising 91 individuals, or 45.5% of the total population. In contrast, the separated and widowed categories are smaller, consisting of 12 individuals (6%) and 14 individuals (7%) of the total population, respectively. This distribution implies that a substantial portion of the population is likely to have familial and social responsibilities, which can influence community dynamics, support systems, and engagement in social programs. The predominance of married individuals suggests a potential for stable household structures, which may positively impact community participation in initiatives such as solid waste management. Additionally, understanding these marital dynamics can inform local services and resources tailored to the needs of different marital statuses, promoting more effective community planning and support mechanisms. According to Jauculan (2023), married individuals are more actively engaged in solid waste disposal and effectively implement their barangay's waste management, showing greater responsibility and concern for their households.

Table 5. ***Frequency and Percentage Distribution of the Respondents According to the Awareness to RA 9003***

BARANGAY	RESPONSE		TOTAL
	YES	NO	
MAZAWALO	15	5	20
IPIL III	16	4	20
IPIL II	17	3	20
IPIL I	16	4	20
CENTRAL III	19	1	20
CENTRAL II	18	2	20
CENTRAL I	18	2	20
SAN JUAN	16	4	20
GUIWAN II	16	4	20
GUIWAN I	16	4	20
TOTAL	167	33	200
PERCENTAGE (%)	83.5	33.5	100

The table presents responses from a population of 200 individuals across various barangays regarding a specific question, with a clear majority answering "Yes." Out of the total responses, 167 individuals (83.5%) affirmed the statement, while only 33 individuals (16.5%) responded "No." Each barangay shows a strong inclination toward the affirmative response, with Central III recording the highest proportion of "Yes" answers at 95%. This high level of agreement suggests a general consensus among the respondents on the issue at hand, which could indicate widespread awareness or support for the topic being addressed. The implications of these findings may point to the effectiveness of community outreach or education initiatives, as well as a collective willingness to engage in practices related to the subject, potentially enhancing community involvement and participation in related programs or policies. According to Cawayan et al., (2021), the information education campaign can be highly beneficial, as raising awareness about solid waste management can significantly

influence people's perceptions of garbage.

Table 6. ***Frequency and Percentage Distribution of the Respondents According to the Awareness and Practice of Solid Waste Management Programs***

NO.	QUESTIONS	YES		NO		TOTAL	MEAN
		FREQ	%	FREQ	%		
1	Attended awareness programs conducted by the local authority/school regarding household waste management.	139	69.8	60	30.2	199	1.30
2	Understand the principle of waste characterization.	163	81.9	36	18.1	199	1.18
3	Understand the principle of solid waste minimization.	153	76.5	47	23.5	200	1.24
4	Aware of the solid waste management program in my municipality.	163	81.9	36	18,1	199	1.18
5	Believe that municipal administrators have an important role to play in the implementation of solid waste management at the municipality.	187	93.5	13	6.5	200	1.07
6	Familiar with the segregation of waste.	197	98.5	3	1.5	200	1.02
7	Believe waste segregation is important in the municipality.	197	99	2	1	199	1.01
8	Aware of the effective mechanisms for municipal waste management.	154	78.2	43	21.8	197	1.22
9	Aware of the effects of improper waste management.	197	99	2	1	199	1.01
10	Aware of the penalties for the violation of solid waste management.	130	65	70	35	200	1.35
11	Willing to learn about environmental issues and concerns.	195	97,5	5	2.5	200	1.03
12	Committed to minimizing waste.	184	92.5	14	7.5	199	1.08
13	Segregate solid waste in household wastes.	160	80	40	20	200	1.20
14	Do not throw my solid waste outside my household.	70	35	130	65	200	1.65
15	Observe garbage on the roadside.	113	57.4	84	42.6	197	1.43
						Mean	1.198

Legend 1.0 - 1.50 = Yes, 1.51 – 2.0 = No.

The data above presents responses to a series of questions related to awareness and

attitudes toward solid waste management among a population of 200 individuals. A significant majority reported having attended awareness programs with 69.8% of the total population. Nearly all respondents (98.5%) are familiar with waste segregation, and a striking 99% believe it is important for the municipality. Despite this awareness, only 35% admitted to not throwing waste outside their households, indicating a gap between knowledge and practice. The high mean score of 1.198 suggests a general positivity towards solid waste management initiatives, yet the data implies a need for further education and enforcement of proper waste disposal practices to translate awareness into responsible behavior. These insights can inform local authorities about areas needing improvement, particularly in encouraging proper waste disposal habits and enhancing the effectiveness of existing programs. The involvement of community members in solid waste management programs is influenced by the actions of their leaders or officials, San Juan (2019).

Table 7. ***Frequency and Percentage Distribution of the Respondents According to the Attitude towards Solid Waste Management***

NO.	QUESTIONS	YES		NO		TOTAL	MEAN
		FREQ	%	FREQ	%		
1	Improper waste disposal is a threat to environment.	183	93.8	12	6.2	195	1.06
2	Waste segregation is beneficial to the municipality.	189	96.4	7	3.6	196	1.04
3	Household waste management is the sole responsibility of my parents.	65	33.2	131	66.8	196	1.67
4	Municipal waste management program should be spearheaded by the municipal administration	187	94.4	11	5.6	198	1.06
5	Solid waste collection and disposal is the sole responsibility of the local authorities.	132	66.3	67	33.7	199	1.34
6	Responsible for the generation of municipal solid waste.	186	93	14	7	200	1.07
7	Have a role to minimize the municipal waste.	190	95	10	5	200	1.05
						Mean	1.184

Legend 1.0 - 1.50 = Yes, 1.51 – 2.0 = No.

The data presents responses from individuals regarding their perceptions and responsibilities related to waste management. A significant majority recognize improper waste disposal as a serious environmental threat (93.8%) and believe that waste segregation benefits the municipality (96.4%). However, there's a notable divide regarding household waste responsibilities, as only 33.2% view it as solely their parents' duty. In contrast, despite the strong awareness of environmental threats, most respondents (66.8%) think it is the sole responsibility of the parents to manage the household. Only 5% believe they have a role in minimizing municipal waste. The overall mean score of 1.184 indicates a strong consensus on the importance of both individual and collective efforts in effective waste management. The implications of these findings are significant for community education and engagement strategies. While there is a clear understanding of the importance of proper waste disposal and the role of municipal programs, initiatives aimed at fostering individual responsibility within

households could enhance overall waste management practices. Local authorities might consider targeted educational campaigns to emphasize the role of all community members, including children and young adults, in waste management. Additionally, addressing the belief that waste management is solely a parental responsibility could empower individuals to take initiative in their own households, leading to more effective and sustainable waste practices within the community. The way households perceive, understand, and approach solid waste—along with their awareness and attitudes—plays a crucial role in effective solid waste management , (Manun'Ebo and Ndombe, 2020), Rousta et al., 2020).

Table 8. ***Frequency and Percentage Distribution of the Respondents According to the Status of Solid Waste Management Program***

NO.	QUESTIONS	YES		NO		TOTAL	MEAN
		FREQ	%	FREQ	%		
1	Waste materials are collected according to the schedule in school or home.	176	88.4	23	11.6	199	1.12
2	Waste materials are collected during weekends and even during holidays.	143	72.2	55	27.8	198	1.28
3	Solid wastes are collected once a week only.	52	26.1	147	73.9	199	1.74
4	Students, home, or establishments are informed on the days when garbage is to be collected.	171	86.4	27	13.6	198	1.14
5	Solid waste designated area or material recovery facility is used in the school management system or community.	183	92.4	15	7.6	198	1.08
6	No garbages are left uncollected in designated areas.	139	69.8	60	30.2	199	1.30
7	Waste materials are collected in designated areas.	177	88.9	22	11.1	199	1.11
8	Medical wastes from school or houses are placed in appropriate containers located throughout the medical department facility at the time of generation (if applicable).	135	69.9	58	30.1	193	1.30
9	Wastes are collected by the maintenance staff.	177	89.4	20	10.1	198	1.21
10	Infectious waste, chemical waste, toxic substances are collected together, regardless of whether or not they are contaminated (if applicable).	115	59.3	79	40,7	194	1.41
11	Grease trap, kitchen waste, are collected by authorized staff in strong, leak-proof containers that are clearly labelled.	99	50.38	98	49.7	197	1.50
12	Waste is collected according to	175	87.9	24	12.1	199	1.12

	classification such as biodegradable, non-biodegradable, and recyclable.						
						Mean	1.276

Legend: *1.0 - 1.50 = Yes, 1.51 – 2.0 = No*

The table above presents important insights from respondents regarding waste collection practices in schools and homes, indicating a generally positive perception. A significant majority (88.4%) confirm that waste materials are collected according to schedule, with 86.4% noting that they are informed about collection days. However, challenges remain; while 72.2% report that waste is collected on weekends and holidays, a notable 73.9% believe solid waste is collected only once a week, suggesting potential gaps in service frequency. The high percentage (92.4%) of respondents indicating the use of designated waste areas reflects an organized approach to waste management, although nearly 30% acknowledge that some garbage remains uncollected. The overall mean score of 1.276 suggests general satisfaction with waste management practices, but the implications of these findings indicate a need for improved collection frequency. While respondents generally trust existing systems, the belief that solid waste is collected only weekly points to a need for increased collection to enhance satisfaction and effectiveness. The uncollected garbage highlights inefficiencies that could lead to environmental and health issues, necessitating a reassessment of collection schedules. Additionally, concerns about the improper handling of medical and hazardous waste underscore the importance of stricter safety protocols and training for waste management personnel. Continued education on proper waste segregation is essential for fostering community participation and promoting sustainable practices. Urban authorities should focus not only on investing in solid waste management infrastructure but also on engaging the community by raising awareness about the importance of a clean environment ,(Muiruri et al., 2020).

Table 9**. *Frequency and Percentage Distribution of the Respondents According on the Level of Effectiveness on the Laws and Programs of the Municipality in Accordance to the Solid Waste Management Program***

NO.	DESCRIPTION	MEAN	INTERPRETATION
1	Concerned resident ensures that generated solid wastes are properly segregated in three containers for biodegradable, non-biodegradable and recyclable.	3.74	Highly Implemented
2	Resident choose proper containers such as cars, sacks, garbage bag, etc that facilitates sanitary, efficient handling, storage collection, transports or disposal.	3.72	Highly Implemented

Legend: 1.0 - 1.80 = Not Implemented, 1.81 – 2.60 = Poorly Implemented, 2.61 – 3.40 = Moderately Implemented, 3.41 – 4.20 = Highly Implemented, 4.21 – 5.0 = Very Highly Implemented

The data presents insights into residents' practices regarding solid waste management, with both indicators demonstrating a strong commitment to proper waste handling. The first indicator reveals that residents are highly diligent in segregating solid waste into three designated containers—biodegradable, non-biodegradable, and recyclable—achieving a mean score of 3.74, which indicates this practice is highly implemented. Similarly, the second indicator shows that residents effectively choose appropriate containers, such as cars, sacks, and garbage bags, to facilitate sanitary and efficient handling, storage, transport, or disposal of waste, with a mean score of 3.72. Together, these findings reflect a proactive approach to waste management within the community, highlighting the importance of proper segregation and the use of suitable containers in promoting effective waste disposal practices. The high mean scores for both indicators imply that residents are actively engaged in responsible solid waste management practices, demonstrating a strong commitment to environmental sustainability. A community that is well-informed and proactive is essential for fostering a culture of sustainability and enhancing overall waste management efforts. This level of engagement can lead to positive environmental outcomes and may encourage further initiatives aimed at improving waste management practices. The effective segregation of waste can significantly reduce landfill waste and promote recycling efforts. To reduce the adverse effects of waste disposal and enhance waste recovery rates, it is essential to adopt proper waste segregation practices at the household level (Meng et al., 2018).

*Table 10.**Frequency and Percentage Distribution of the Implementing Body of MENRO Office According to the Status of Solid Waste Management Program***

NO.	QUESTIONS	YES		NO		TOTAL	MEAN
		FREQ	%	FREQ	%		
1	Waste materials are collected according to the schedule in school or home.	3	100	0	0	3	1
2	Waste materials are collected during weekends and even during holidays.	3	100	0	0	3	1
3	Solid wastes are collected once a week only.	1	33	2	67	3	1.6667
4	Students, home, or establishments are informed on the days when garbage is to be collected.	3	100	0	0	3	1
5	Solid waste designated area or material recovery facility is used in the school management system or community.	3	100	0	0	3	1
6	No garbages are left uncollected in designated areas.	2	67	1	33	3	1
7	Waste materials are collected in designated areas.	3	100	0	0	3	1.3333
8	Medical wastes from school or houses are placed in	3	100	0	0	3	1

	appropriate containers located throughout the medical department facility at the time of generation (if applicable).						
9	Wastes are collected by the maintenance staff.	2	67	1	33	3	1
10	Infectious waste, chemical waste, toxic substances are collected together, regardless of whether or not they are contaminated (if applicable).	3	100	0	0	3	1.3333
11	Grease trap, kitchen waste, are collected by authorized staff in strong, leak-proof containers that are clearly labeled.	3	100	0	0	3	1
12	Waste is collected according to classification such as biodegradable, non-biodegradable, and recyclable.	3	100	0	0	3	1
						Mean	1.028

Legend : *1.0 - 1.50 = Yes, 1.51 – 2.0 = No.*

The table above provided a data assessing waste management practices at a school or home, with questions focusing on the collection and handling of waste materials. The responses reveal that waste collection occurs consistently according to a schedule, with a notable percentage indicating that solid waste is only collected weekly. Additionally, all respondents affirmed that communication regarding collection days is effective, and specific areas for waste disposal are utilized. However, some concerns arise about the collection of medical and hazardous wastes, as well as the proper segregation of various types of waste. The overall mean score suggests a generally positive view of waste management practices, though there are areas where improvement could enhance efficiency and safety. The data implies that while waste management practices are largely effective and organized, there are gaps, particularly in the frequency of solid waste collection and the handling of hazardous materials. This suggests a need for improvement in collection schedules and training on waste segregation, particularly for medical and toxic wastes, to enhance safety and efficiency. An efficient waste management system is typically managed by local authorities, which face limitations in planning capacity, resource availability, operational oversight, and contract management, (Chisholm, et al.,2021).

CONCLUSION

In conclusion, the analysis of the study reveals a predominantly female population (56.5%) with a significant representation of older adults (29.2%) and a well-educated demographic, factors that can enhance community engagement in solid waste management. While awareness of waste management programs is high (83.5%), there is a notable gap between knowledge and actual disposal practices, as evidenced by 35% of respondents acknowledging improper waste disposal. Additionally, despite a generally positive perception of waste management efforts, challenges remain regarding the frequency of waste collection and the handling of hazardous materials.

To improve solid waste management outcomes, targeted educational campaigns are essential to empower individuals, promote responsible waste disposal practices, and address

misconceptions about household responsibilities. By fostering a culture of sustainability through community engagement and improving operational practices, the effectiveness of waste management initiatives can be significantly enhanced.

RECOMMENDATIONS

1. Targeted Educational Campaigns: Develop and implement community-wide educational initiatives that focus on the importance of individual responsibility in solid waste management. These campaigns should aim to engage all age groups, particularly children and young adults, to foster a culture of environmental stewardship.

2. Enhanced Collection Services: Assess and improve the frequency of waste collection services. Consider additional pickups during weekends and holidays to address community concerns and ensure that waste is managed effectively.

3. Community Workshops: Organize workshops on proper waste segregation and disposal practices, encouraging hands-on participation. Collaborate with local schools, community organizations, and barangay leaders to maximize outreach.

4. Incentivize Participation: Introduce incentive programs for households that demonstrate consistent compliance with waste segregation and responsible disposal practices. This could include recognition programs or small rewards.

5. Strengthen Local Governance: Empower local authorities to enforce solid waste management regulations more effectively. Ensure they have the necessary resources and training to implement and monitor waste management programs.

6. Regular Assessments: Conduct periodic assessments of community awareness and waste management practices to identify areas needing improvement. Use feedback to adjust programs and ensure they remain relevant and effective.

7. Collaboration with NGOs: Partner with non-governmental organizations focused on environmental sustainability to enhance community programs and provide additional resources for education and engagement.

By implementing these recommendations, local authorities can strengthen community participation in solid waste management, leading to more sustainable practices and improved environmental outcomes.

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