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# Evaluating The Implementation and Effectiveness of Environmental Sustainability Programs of the Philippine Navy in Selected Naval Units in Region Vii: A Comparative Study Between Naval Forces Central (Lapu-Lapu City, Cebu) And Naval Reserve Center- Western Visayas (Iloilo City)

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**Abstract**

This study evaluated the implementation and perceived effectiveness of environmental sustainability programs in selected Philippine Navy units, specifically Naval Forces Central (Lapu-Lapu City, Cebu) and Naval Reserve Center-Western Visayas (Iloilo City). Using a descriptive-correlational research design, data were collected from 60 respondents through structured surveys assessing demographic profiles, program participation, personnel training, stakeholder engagement, resource allocation, monitoring and evaluation, and operational integration. Results revealed that the majority of respondents actively participate in environmental programs, including coastal clean-ups, mangrove planting, marine protection patrols, partnerships for climate action, and marine litter reduction initiatives. Weighted mean scores indicated that the level of implementation and personnel engagement in these programs are generally high, with respondents agreeing that objectives are clearly defined, planning is coordinated, and sustainability practices are integrated into daily operations. The Pearson correlation analysis showed a strong and significant positive relationship ($r = 0.87$, $p = 0.000$) between the level of implementation and perceived program effectiveness, suggesting that well-executed programs lead to higher awareness, compliance, and operational sustainability. Comparative analysis between the two units showed no significant differences in either implementation or effectiveness, indicating consistent environmental practices across the selected naval units. Challenges identified include inadequate funding, limited training, high operational workload, and inconsistent stakeholder involvement, which may hinder optimal program execution. Based on the findings, the study recommends targeted capacity-building, strengthened stakeholder collaboration, adequate resource allocation, and structured monitoring systems

to enhance the efficiency, sustainability, and public accountability of environmental programs within the Philippine Navy.

**Keywords:** Environmental sustainability, Philippine Navy, program implementation, operational efficiency, stakeholder engagement, marine conservation.

## 1. The Problem and Its Research Design

### Rationale of the Study

Environmental sustainability has emerged as a critical priority for government institutions worldwide, including the Armed Forces of the Philippines (Department of National Defense, 2018). The Philippine Navy, in particular, operates in ecologically sensitive areas, such as coastal and marine zones, where military activities can significantly affect local ecosystems. Consequently, integrating environmental sustainability programs is vital not only for regulatory compliance with national policies but also for improving operational efficiency, conserving resources, and mitigating environmental risks (Philippine Navy, 2019; Republic of the Philippines — Department of Environment and Natural Resources, 2016).

Naval environmental programs typically involve strategies like waste management, energy conservation, and marine ecosystem protection. These initiatives are essential for addressing the environmental footprint of naval operations, including pollution from ship-generated waste, fuel emissions, and the disruption of coastal habitats (Santos & Reyes, 2015; Mendoza & Ortega, 2020). Aligning military operations with international guidelines on "greening" armed forces ensures that environmental considerations are incorporated without compromising defense readiness (United Nations Environment Programme, 2017).

The success of these programs heavily depends on personnel training and awareness. Institutionalizing environmental education encourages compliance and active participation among enlisted personnel, which enhances the effectiveness of sustainability initiatives (Delos Santos, 2016). Furthermore, integrating environmental practices with disaster preparedness equips naval personnel to reduce ecological impacts during both routine operations and emergency scenarios (Garcia & Lim, 2019). Monitoring and evaluation remain a key challenge, as reliable performance indicators are necessary to measure program effectiveness, identify gaps, and guide continuous improvements (Chan & Alonzo, 2021).

Coastal ecosystem management is particularly important for naval bases in Region VII, as the siting and operation of these facilities directly affect marine biodiversity (Velasco, 2018). Renewable energy adoption, including microgrids and solar installations, enhances energy security in remote naval outposts while reducing dependence on fossil fuels, supporting national climate and energy efficiency goals (Panganiban & Cruz, 2020). Behavioral interventions, such as training programs, incentives, and fostering a culture of sustainability, are also crucial for ensuring personnel compliance and promoting long-term engagement with environmental initiatives (Lopez, 2017).

International standards provide additional guidance for effective sustainability practices. Recommendations from the International Committee of the Red Cross (2015) and the International Maritime Organization (2015) highlight procedures for managing hazardous materials and ship-generated

waste, ensuring that military operations minimize ecological impacts. Collaboration with local communities, government agencies, and non-governmental organizations further strengthens program acceptance and sustainability outcomes (Soriano, 2019).

Finally, comparing the implementation and effectiveness of environmental programs between different naval units in Region VII, such as Naval Forces Central in Lapu-Lapu City and Naval Reserve Center-Western Visayas in Iloilo City, can offer valuable insights. Such comparisons help identify best practices, operational challenges, and areas for policy improvement, supporting the replication and institutionalization of successful sustainability initiatives across the Philippine Navy (Hall & Kumar, 2016).

**Theoretical Framework**

The examination of environmental sustainability program implementation and effectiveness in the Philippine Navy is anchored in several theoretical perspectives that explain organizational behavior, knowledge management, policy compliance, and sustainable practices. One foundational framework is the **Resource-Based View (RBV)**, which suggests that organizations achieve a competitive advantage by strategically managing and deploying both tangible and intangible resources (Hall & Kumar, 2016). Within the Philippine Navy, environmental programs function as valuable organizational resources that improve operational efficiency, reduce ecological risks, and reinforce institutional resilience. By leveraging these programs, naval units can enhance mission performance while aligning operations with environmental stewardship objectives.

Complementing RBV is the **Knowledge-Based Theory (KBT)**, which underscores the centrality of knowledge management in facilitating informed decision-making and fostering innovation (Delos Santos, 2016). Naval units that systematically capture, share, and apply environmental knowledge—through training programs, educational modules, and continuous monitoring—are better positioned to implement effective sustainability initiatives. These efforts equip personnel with the expertise necessary to comply with waste management protocols, renewable energy integration, and marine ecosystem protection measures, thereby translating organizational knowledge into actionable practices (Villanueva, 2020).

The **Theory of Planned Behavior (TPB)** provides insight into the human factors influencing compliance with sustainability programs (Lopez, 2017). According to TPB, individual behavior is guided by attitudes, subjective norms, and perceived behavioral control. In naval settings, personnel's adherence to environmental initiatives is shaped by their understanding of relevant policies, organizational emphasis on ecological stewardship, and the presence of incentives that reinforce compliance. Consequently, behavioral interventions, such as training, feedback mechanisms, and incentive systems, are essential to fostering sustainable practices across all ranks.

**Institutional Theory** further explains how organizations respond to external pressures, including legal regulations, professional norms, and societal expectations, to maintain legitimacy (Bautista, 2017). Philippine Navy units operate under national environmental laws, international standards, and community expectations. Programs encompassing solid waste management, renewable energy utilization, and coastal ecosystem preservation reflect the Navy's compliance with these pressures while demonstrating accountability and public responsibility (Department of National Defense, 2018; Philippine Navy, 2019).

The **Monitoring and Evaluation (M&E) Framework** is another critical theoretical guide, providing tools to assess program performance and effectiveness (Chan & Alonzo, 2021; Ramos & De la Cruz, 2018). Through the systematic collection of measurable indicators and regular evaluation, naval leaders can track progress, identify areas for improvement, and replicate successful initiatives across different units, such as between Naval Forces Central in Lapu-Lapu City and Naval Reserve Center-Western Visayas in Iloilo City.

Finally, **Sustainability Theory** underpins the long-term orientation of the Navy's programs, integrating environmental, social, and economic dimensions (United Nations Environment Programme, 2017). Initiatives such as renewable energy adoption, ecosystem conservation, and stakeholder engagement are designed to meet immediate operational requirements while ensuring lasting ecological benefits and community well-being. Collectively, these theoretical frameworks provide a comprehensive lens for understanding the multifaceted factors that contribute to the successful implementation and effectiveness of environmental sustainability programs in the Philippine Navy.

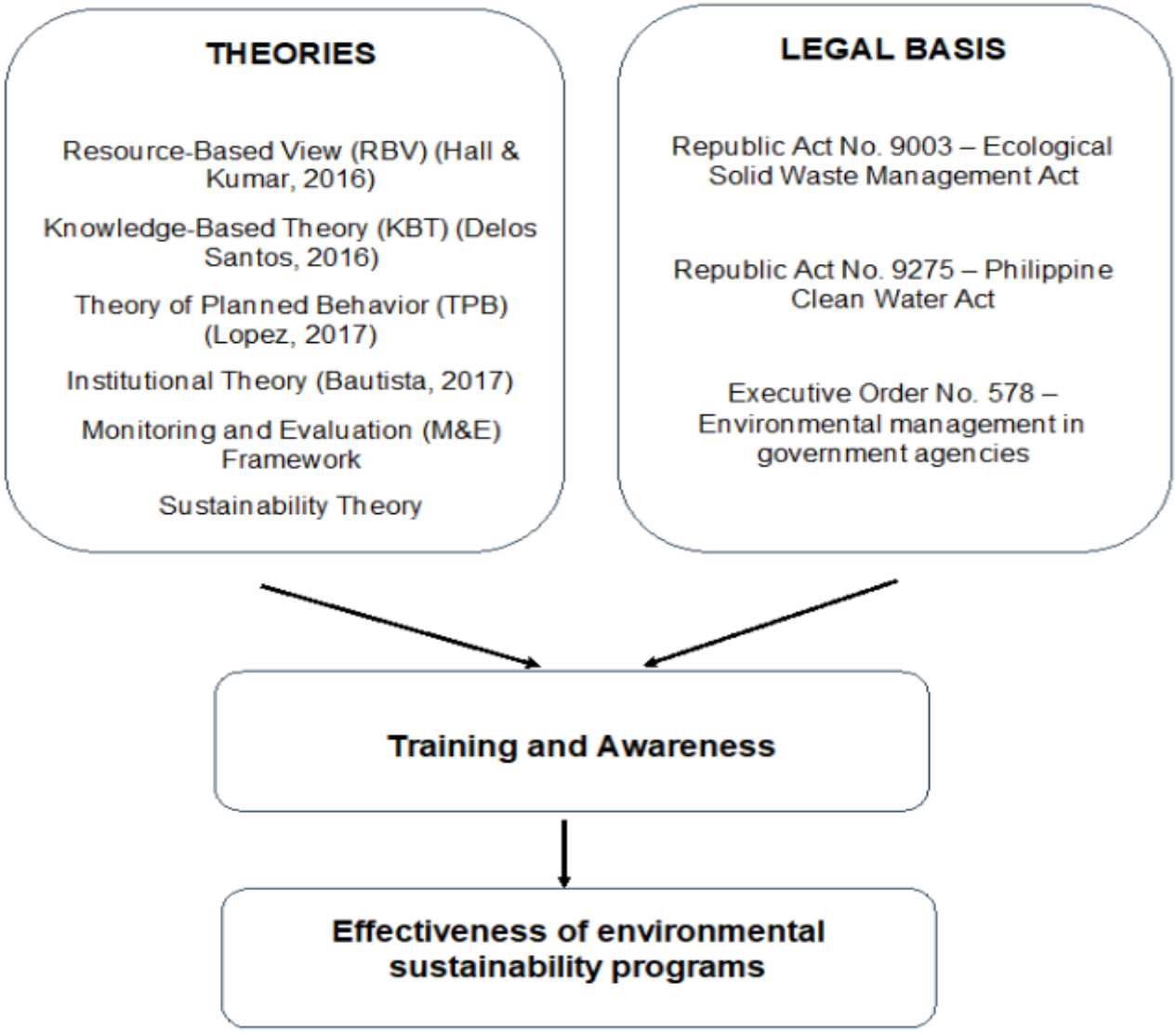



Figure 1

## The Problem

### Statement of the Problem

This study seeks to evaluate the level of implementation and effectiveness of environmental sustainability programs in selected Philippine Navy units in Region VII, specifically Naval Forces Central (Lapu-Lapu City, Cebu) and Naval Reserve Center- Western Visayas (Iloilo City), during the calendar year 2025. The findings of this study will provide valuable insights into the strengths and gaps of current programs and serve as a basis for developing more efficient and sustainable environmental practices within the naval service. Specifically, it will answer the following questions:

1. What relevant information can be derived from the respondents in terms of:
   1.1. Age and Gender;
   1.2. Rank or Position in the unit;
   1.3. Length of service in the Philippine Navy;
   1.4. Educational background;
   1.5. Specialized trainings or seminars on environmental sustainability attended; and
   1.6. Awareness of national environmental laws and policies (RA 9003, RA 9275, EO 578).
2. Are the following Key Environmental Sustainability Programs/Initiatives of the Philippine Navy implemented by the unit:

   2.1. Coastal Clean-up and Mangrove Planting;

   2.2. Bantay Kadagatan / Marine Protection Patrols;

   2.3. Partnerships for Climate Action and Sustainability (e.g., PN–ACERS);

   2.4. Support to Marine Research and Protected Areas;

   2.5. Adopt-a-Bay / Marine Litter and Waste Reduction Activities; and

   2.6 Integration of Sustainability in Naval Operations (energy efficiency, waste management, eco-friendly infrastructure)
3. What is the level of implementation of environmental sustainability programs as perceived by personnel in terms of:
   3.1. Program planning and design;
   3.2. Resource allocation and logistical support;
   3.3. Personnel participation and training;
   3.4. Monitoring and evaluation mechanisms; and
   3.5. Stakeholder engagement and community collaboration.
4. What is the perceived effectiveness of environmental sustainability programs in terms of:
   4.1. Reduction of operational environmental impact;
   4.2. Enhancement of personnel compliance and awareness;
   4.3. Conservation of coastal and marine ecosystems; and
   4.4. Overall contribution to the unit's operational efficiency and public accountability.

5. Is there a significant relationship between the level of implementation of environmental sustainability programs and their perceived effectiveness in the selected naval units?
6. Are there significant differences in the implementation and effectiveness of environmental sustainability programs between Naval Forces Central (Lapu-Lapu City, Cebu) and Naval Reserve Center- Western Visayas (Iloilo City)?
7. What challenges and barriers do personnel encounter in implementing environmental sustainability programs?
8. Based on the findings, what interventions or program enhancements may be proposed to strengthen the implementation and effectiveness of environmental sustainability programs in the selected naval units?

**Null Hypothesis**

There is no significant relationship between the level of implementation of environmental sustainability programs and their perceived effectiveness in the selected Philippine Navy units in Region VII.

There is no significant difference in the level of implementation and effectiveness of environmental sustainability programs between Naval Forces Central (Lapu-Lapu City, Cebu) and Naval Reserve Center-Western Visayas (Iloilo City).

**Significance of the Study**

This study seeks to evaluate the implementation and effectiveness of environmental sustainability programs in selected Philippine Navy units in Region VII, specifically Naval Forces Central in Lapu-Lapu City, Cebu, and Naval Reserve Center – Western Visayas in Iloilo City. Its findings aim to provide actionable insights for stakeholders in the defense and environmental sectors, offering evidence-based recommendations to strengthen environmental programs and promote sustainable naval operations.

**Department of National Defense (DND) and the Philippine Navy.** The study provides empirical data that may guide the DND and the Philippine Navy in refining environmental policies, designing targeted sustainability programs, and improving compliance with national environmental laws. By highlighting effective strategies, identifying implementation gaps, and assessing program outcomes, the findings can inform policies that balance operational readiness with ecological preservation (Department of National Defense, 2018; Philippine Navy, 2019; Bautista, 2017).

**Policymakers and Government Agencies.** Local and national policymakers can use the study's insights to craft strategies, standards, and regulatory frameworks that enhance environmental stewardship in military operations. Comparative findings between naval units in Cebu and Negros Oriental can inform resource allocation, renewable energy initiatives, and ecosystem protection efforts, promoting evidence-based, sustainable, and replicable environmental programs (Republic Act No. 9003, 2001; Republic Act No. 9275, 2004; Executive Order No. 578, 2006).

**Naval Personnel, Administrators, and Local Communities.** The study benefits naval leaders, personnel, and surrounding communities by demonstrating the importance of training, stakeholder engagement, and systematic monitoring in the success of sustainability initiatives. Results provide

guidance for improving environmental awareness, operational practices, and community partnerships. Well-implemented programs can reduce ecological impacts, enhance energy efficiency, and foster collaborative stewardship, ultimately supporting both mission readiness and community trust (Santos & Reyes, 2015; Lopez, 2017; Soriano, 2019).

**Researchers and Future Studies.** This research contributes to the body of knowledge on military environmental management in the Philippines, bridging theory and practice. It offers insights into program implementation, monitoring, and evaluation that can inform future studies on environmental compliance, sustainable defense operations, and organizational behavior in uniformed services. Subsequent research may explore longitudinal impacts, comparative program effectiveness, and innovations in green military practices (Hall & Kumar, 2016; Delos Santos, 2016; Chan & Alonzo, 2021).

## Research Methodology

This part contains the research methodology which includes the method to be used, the flow of the study, research environment, research respondents, research instruments, and data gathering procedures, statistical treatment of data, scoring procedures, and definition of terms.

## Research Design

This study utilizes a descriptive-comparative and correlational research design within a quantitative research approach. It aims to evaluate the level of implementation and effectiveness of environmental sustainability programs in selected Philippine Navy units in Region VII, specifically Naval Forces Central in Lapu-Lapu City, Cebu, and Naval Reserve Center Visayas in Iloilo City. The descriptive component focuses on identifying current practices, program outcomes, and challenges encountered by personnel in implementing environmental initiatives.

The comparative aspect examines potential differences in the implementation and effectiveness of sustainability programs between the two naval units, highlighting contextual factors such as location, operational scope, and personnel engagement that may influence program outcomes. This allows for a side-by-side analysis of initiatives, including training and awareness programs, renewable energy adoption, coastal ecosystem conservation, and stakeholder engagement.

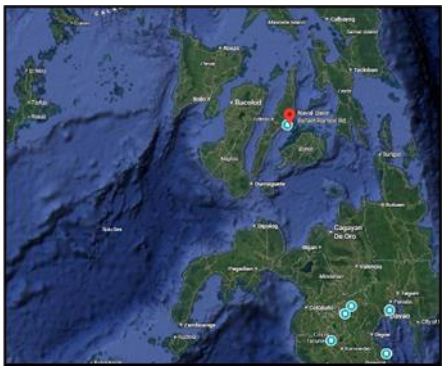
Meanwhile, the correlational component investigates whether a significant relationship exists between the level of implementation of environmental programs and their effectiveness in achieving sustainability goals. By analyzing quantitative data, the study aims to determine the extent to which program adherence, quality of implementation, and resource allocation affect operational environmental outcomes.

## Environment

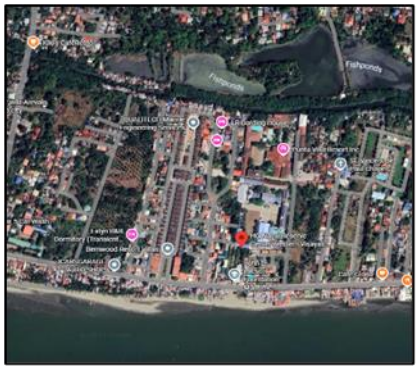
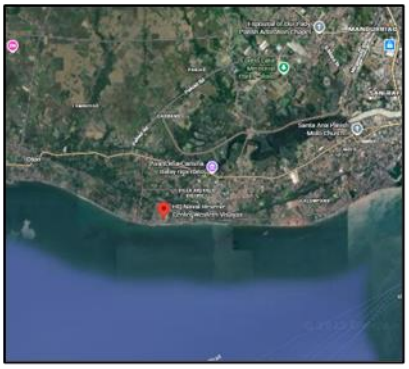
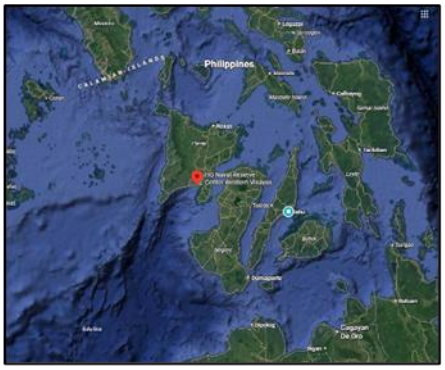
This study will be conducted in selected naval units under the Philippine Navy located within Region VII, specifically the Naval Forces Central (NAVFORCEN) in Lapu-Lapu City, Cebu, and the Naval Reserve Center- Western Visayas (NRCen-WV) in Iloilo City. These naval units were chosen as research sites because both actively implement environmental sustainability programs that promote marine conservation, energy efficiency, waste management, and ecological protection as part of the Navy's "Protect the Sea" and "Green Base" initiatives.

The Naval Forces Central (NAVFORCEN) serves as the major operational command of the Philippine Navy in the Visayas region, overseeing naval operations, logistics, and environmental protection initiatives within its jurisdiction. NAVFORCEN is strategically located along the coastal area of Lapu-Lapu City, making it a vital center for maritime operations and sustainability practices involving waste reduction, renewable energy use, and coastal rehabilitation.





Meanwhile, the Naval Reserve Center Visayas (NRCen- WV) in Iloilo City is responsible for training, organizing, and mobilizing naval reservists. It also supports environmental initiatives such as mangrove reforestation, coastal cleanups, and ecological awareness programs. NRCen-WV's involvement reflects the Navy's commitment to integrating environmental stewardship in both active and reserve units, ensuring that sustainability becomes a shared institutional responsibility.


These selected naval units represent two different operational environments—one focused on active maritime operations and the other on reserve mobilization—allowing for a comparative evaluation of how environmental sustainability programs are implemented and sustained within different naval contexts in Region VII.

**Respondents**

The respondents of this study will be naval officers, enlisted personnel, and civilian human resource from the two selected naval units—Naval Forces Central (Lapu-Lapu City, Cebu) and Naval Reserve Center- Western Visayas (Iloilo City). The study will utilize the universal sampling technique, involving all qualified personnel who meet the inclusion criteria.

The inclusion criteria are as follows:

a) they must be officially assigned or employed at either NAVFORCEN or NRCen- WV during the data collection period;

b) they must have at least one (1) year of service experience in their current naval unit; and

c) they must voluntarily agree to participate in the study.

This selection process ensures that the respondents have sufficient knowledge and direct involvement in their unit's environmental programs, providing a credible and well-rounded perspective on the implementation and effectiveness of these initiatives.

**Distribution of Respondents**

| **Environment / Unit** | **Respondents (f)** | **Percentage (%)** |
|---|---|---|
| **Naval Forces Central (Lapu-Lapu City, Cebu)** | 35 | 58% |
| **Naval Reserve Center- Western Visayas (Iloilo City)** | 25 | 42% |
| **Total** | **60** | **100%** |

**Table 1**

This distribution indicates a total of 60 respondents representing two key naval units in Region VII. The inclusion of both active and reserve commands ensures diversity in operational experiences, program engagement, and sustainability practices. This comparative framework strengthens the study's validity by providing insights into how environmental sustainability programs are designed, implemented, and evaluated across different command structures within the Philippine Navy.

**Instrument**

The primary instrument used in this study is a structured questionnaire grounded in established environmental management frameworks, including the Philippine Navy's Environmental Protection and Conservation Policies and the Department of National Defense (DND) Sustainability Guidelines, ensuring direct alignment with naval operational realities and ecological objectives. The instrument underwent content validation by a panel of naval officers, environmental specialists, and research experts to ensure clarity, accuracy, and contextual appropriateness, followed by a pilot test among non-respondent Navy personnel that ensured reliability and readability. It consists of four sections: (1) the demographic profile of respondents, capturing age, gender, rank, length of service, current assignment, and participation in environmental trainings; (2) key environmental sustainability programs implemented in the unit—such as coastal clean-ups and mangrove planting, Bantay Kadagatan/Marine Protection Patrols, climate action partnerships, support for marine research, Adopt-a-Bay initiatives, and integration of sustainability in naval operations; (3) the level of implementation across five domains (program planning, resource allocation, personnel participation, monitoring and evaluation, and stakeholder collaboration) measured through a five-point Likert scale from Always Implemented to Never Implemented; and (4) the perceived effectiveness of these programs in areas such as waste management, coastal protection, energy conservation, ecological awareness, and operational sustainability, rated from Strongly Agree to Strongly Disagree. The collected data will provide the basis for examining the relationship between program

implementation and perceived effectiveness, as well as identifying operational gaps and opportunities for strengthening environmental sustainability practices within Philippine Navy units in Region VII.

**Data Gathering Procedure**

This study will adopt a systematic and ethical approach to ensure accuracy, reliability, and confidentiality throughout the data collection process.

First, a formal letter of request will be prepared and addressed to the Commander Naval Forces Central (NAVFORCEN) in Lapu-Lapu City, Cebu, and to the Commander, Naval Reserve Center- Western Visayas (NRCen- WV) in Iloilo City. The letter will seek permission to conduct the research and administer the validated questionnaire to qualified personnel within the two selected naval units. Copies of the approved communication will also be forwarded to the respective unit commanders for coordination and endorsement.

Upon receiving the necessary approvals, the researcher will coordinate with designated officers or administrators in each naval unit to schedule the distribution of questionnaires. Before administering the survey, respondents will be briefed about the purpose of the study, the voluntary nature of participation, and the confidentiality of their responses. Clear instructions will be provided to ensure the respondents' understanding of each section of the questionnaire.

The validated researcher-made questionnaire will then be distributed personally to the respondents during their available hours to avoid disruption of their official duties and operations. Respondents will be given sufficient time (20–30 minutes) to accomplish the instrument, and the researcher will remain available to clarify any questions or concerns during the process.

After completion, all accomplished questionnaires will be collected, checked for completeness, and organized for data encoding. The gathered data will then be encoded and submitted to a statistician for analysis using descriptive, comparative, and correlational statistical techniques. These analyses will determine the level of implementation and effectiveness of environmental sustainability programs and examine the relationship and differences between the two naval units.

Following statistical analysis, the results will be interpreted and discussed under the guidance of the research adviser to address the study's research questions and test the null hypotheses.

Finally, the research report will be reviewed, refined, and finalized to meet academic standards and ethical research guidelines, ensuring that all procedures uphold the integrity, confidentiality, and professionalism required in both academic and military research contexts.

**Statistical Treatment of Data**

The following statistical tools and procedures will be utilized to analyze, present, and interpret the data gathered from the respondents:

**Simple Percentage.** This will be used to determine the demographic profile of the naval personnel-respondents in terms of age, gender, rank or position, length of service, educational attainment, and training or seminars attended related to environmental sustainability programs. The percentage distribution will describe the characteristics of the respondents and provide a background for interpreting the findings.

**Weighted Mean.** The weighted mean will be used to assess the level of implementation of environmental sustainability programs in terms of policy enforcement, waste management, energy conservation, environmental awareness activities, and resource utilization. It will also be used to measure the level of effectiveness of these programs within the naval units. The computed mean values will describe how consistently and effectively sustainability initiatives are implemented and practiced.

**Chi-Square Test ($\chi^2$).** The Chi-square test will be applied to determine whether there is a significant relationship between the level of implementation of environmental sustainability programs and their perceived effectiveness in the selected naval units. This test will identify if the relationship between the independent and dependent variables is statistically significant.

**Scoring Procedure.** The responses in the questionnaire will be measured using a five-point Likert scale to assess the level of program implementation and effectiveness. The scale interpretation is presented below:

| Weight | Range | Response Category | Verbal Description |
|---|---|---|---|
| 5 | 4.21 – 5.00 | Strongly Agree | The respondent completely agrees with the statement. There is clear evidence or a strong belief supporting it. |
| 4 | 3.41 – 4.20 | Agree | The respondent generally agrees, though not fully. There is a positive leaning toward the statement. |
| 3 | 2.61 – 3.40 | Neutral | The respondent neither agrees nor disagrees. No strong opinion either way. |
| 2 | 1.81 – 2.60 | Disagree | The respondent generally disagrees, with some reservations. |
| 1 | 1.00 – 1.80 | Strongly Disagree | The respondent completely disagrees with the statement. |

**Table 2. Five-Point Likert Scale**

**Definition of Terms**

To ensure clarity and understanding, the following key terms used in this study are operationally defined:

**Environmental Sustainability Programs.** Structured initiatives, policies, and activities implemented by the Philippine Navy to promote ecological conservation, responsible resource use, waste reduction, and environmental protection within naval operations and facilities.

**Level of Implementation.** The extent to which environmental sustainability programs are carried out in naval units in terms of policy enforcement, resource management, program monitoring, personnel participation, and environmental awareness activities.

**Effectiveness.** The degree to which environmental sustainability programs achieve their intended goals of reducing environmental impact, promoting ecological responsibility, and fostering a sustainable culture within the naval organization.

**Naval Units.** Operational branches or divisions of the Philippine Navy, including active and reserve components such as the Naval Forces Central and the Naval Reserve Center- Western Visayas, where sustainability initiatives are implemented.

**Personnel Participation.** The level of involvement, support, and cooperation of naval officers, enlisted personnel, and civilian staff in executing and maintaining environmental sustainability programs and activities.

**Policy Enforcement.** The adherence to and implementation of existing environmental regulations, naval policies, and national laws aimed at achieving environmental sustainability within military facilities.

**Resource Management.** The systematic and efficient use of resources such as energy, water, and materials to minimize waste and ensure environmental protection in naval operations.

**Environmental Awareness** The understanding and consciousness of naval personnel regarding ecological issues, sustainable practices, and the importance of environmental protection in military operations.

**Monitoring and Evaluation.** The continuous process of assessing the progress, outcomes, and impact of environmental sustainability programs to identify strengths, gaps, and areas for improvement.

**Demographic Profile.** The background information of the naval personnel-respondents, including age, gender, rank or position, length of service, educational attainment, and environmental training or seminars attended.

**Relevant Trainings and Seminars.** Professional development activities attended by the respondents that enhance their knowledge and skills in environmental protection, waste management, sustainability practices, and green naval operations.

**Comparative Analysis.** The process of comparing the implementation and effectiveness of environmental sustainability programs between Naval Forces Central and the Naval Reserve Center Visayas to determine similarities, differences, and best practices.

**Sustainability Improvement Plan.** The proposed output of the study consisting of targeted strategies, policies, and action plans designed to strengthen and sustain environmental practices within the Philippine Navy's naval units.

## 2. Presentation, Data Analysis and Interpretation Of Data

This chapter presents the results gathered from 60 respondents from Naval Forces Central (Lapu-Lapu City, Cebu) and Naval Reserve Center–Western Visayas (Iloilo City) during Calendar Year 2025. The data are organized into sections reflecting the study's objectives, including the demographic profile of respondents, the implementation of environmental sustainability programs, the perceived effectiveness of these programs, and the challenges encountered by naval personnel. Tables and narrative interpretations are provided for clarity and comprehensive understanding.

### Demographic Profile Of The Respondents

**Age**

| Indication | Frequency (n=60) | Percentage |
|---|---|---|
| 20–25 years old | 12 | 20 |
| 26–30 years old | 18 | 30 |
| 31–35 years old | 16 | 27 |
| 36 years old and above | 14 | 23 |
| **Total** | **60** | **100** |

**Table 3**

The data on the age distribution of the respondents reveal that the majority of naval personnel participating in the study fall within the **26–30 years old range (30%)**, followed closely by those aged **31–35 years old (27%)**. This indicates that a significant portion of the workforce in the selected naval units is composed of young to early mid-career personnel, who are likely to have substantial operational experience while still being adaptable to new initiatives, such as environmental sustainability programs. The 20–25 years old group constitutes 20% of respondents, representing entry-level or newly commissioned personnel, who may bring fresh perspectives and enthusiasm for environmental programs but may require additional guidance and training. The smallest proportion of respondents (23%) are aged 36 years and above, suggesting that more senior personnel are less represented in the survey, which could reflect either the overall age composition of the units or the level of engagement in environmental initiatives.

This age distribution has important implications for the implementation and effectiveness of environmental sustainability programs. The predominance of personnel in their late twenties and early thirties suggests that programs can leverage their physical capacity, technological adaptability, and potential for leadership roles in environmental activities such as coastal clean-ups, marine patrols, and monitoring initiatives. At the same time, the presence of more experienced personnel in the 36 years and above category provides mentorship opportunities, ensuring that institutional knowledge and operational discipline are maintained. Understanding the age structure allows unit leaders to design targeted training and engagement strategies, maximizing participation and compliance across age groups while fostering intergenerational collaboration in promoting environmental awareness and sustainable practices within the Philippine Navy.

**Gender**

| Indication | Frequency (n=60) | Percentage |
|---|---|---|
| Male | 45 | 75 |
| Female | 13 | 22 |
| Prefer Not to Say | 2 | 3 |
| **Total** | **60** | **100** |

**Table 4**

The gender distribution of the respondents shows a clear predominance of male personnel (75%), followed by female personnel (22%), with a small portion (3%) opting to prefer not to disclose their gender. This indicates that the selected naval units, namely Naval Forces Central (Lapu-Lapu City, Cebu) and Naval Reserve Center–Western Visayas (Iloilo City), are largely male-dominated, reflecting traditional gender demographics within military institutions. The presence of female personnel, though smaller in proportion, highlights the gradual integration of women into various naval roles, including administrative, operational, and specialized environmental tasks. The minimal number of respondents who preferred not to disclose their gender may reflect personal privacy concerns or a desire to remain neutral in gender-related analyses.

From the perspective of environmental sustainability programs, this gender distribution may influence both program participation and perspectives. Male-dominated units may lean toward physically intensive activities such as coastal clean-ups, marine patrols, and mangrove planting, while female personnel may contribute significantly to planning, monitoring, and community engagement activities. Moreover, the inclusion of female personnel supports diversity in decision-making and collaborative problem-solving, which is crucial for designing inclusive sustainability initiatives. Understanding this gender composition allows program coordinators to develop tailored engagement strategies that maximize participation across genders, encourage equitable opportunities, and foster a culture of environmental responsibility throughout the unit.

Rank/Position in the Unit

**Rank/Position in the Unit**

| Rank/Position | Frequency (n=60) | Percentage (%) |
|---|---|---|
| Officers (O1–O4) | 12 | 20 |
| Senior Enlisted Personnel (E6–E9) | 18 | 30 |
| Junior Enlisted Personnel (E1–E5) | 25 | 42 |
| Civilian/Administrative Staff | 5 | 8 |
| **Total** | **60** | **100** |

**Table 5**

The distribution of respondents by rank and position indicates that the largest group consists of Junior Enlisted Personnel (E1–E5), comprising 42% of the total respondents, followed by Senior Enlisted Personnel (E6–E9) at 30%, and Officers (O1–O4) at 20%. Civilian or administrative staff represent the smallest proportion at 8%. This distribution reflects the operational structure of the naval units, where the majority of personnel are enlisted members responsible for executing day-to-day operations and supporting mission-critical tasks. Officers, while fewer in number, play a key role in leadership, strategic

planning, and decision-making, whereas civilian staff provide essential administrative and technical support to ensure smooth program execution.

The rank composition has significant implications for the implementation and effectiveness of environmental sustainability programs. Junior Enlisted Personnel, being the majority, are likely to be the primary participants in hands-on activities such as mangrove planting, coastal clean-ups, and marine patrols, making their engagement crucial to program success. Senior Enlisted Personnel can bridge the gap between leadership and junior staff, ensuring adherence to protocols and promoting effective collaboration. Officers, although smaller in number, influence the allocation of resources, strategic planning, and policy compliance, which are essential for sustained program implementation. Civilian staff contribute by providing technical and logistical support, such as record-keeping, reporting, and coordinating partnerships with external stakeholders. Understanding the rank distribution allows program coordinators to assign roles effectively, optimize participation, and strengthen coordination across ranks, enhancing the overall efficiency and impact of environmental initiatives within the Philippine Navy.
Length of Service in the Philippines Navy.

**Length of Service of Respondents**

| Length of Service | Frequency (n=60) | Percentage (%) |
|---|---|---|
| Less than 1 year | 6 | 10 |
| 1–3 years | 14 | 23 |
| 4–6 years | 16 | 27 |
| 7–9 years | 12 | 20 |
| 10 years and above | 12 | 20 |
| **Total** | **60** | **100** |

**Table 6**

The data on the length of service of respondents indicate that the majority of personnel have 4–6 years of experience (27%), followed by those with 1–3 years of service (23%), and 7–9 years (20%) and 10 years and above (20%). Personnel with less than 1 year of service constitute the smallest group at 10%. This distribution suggests a relatively balanced mix of mid-career and experienced personnel, with a smaller proportion of newcomers. The presence of personnel with longer service (7 years and above) highlights a solid foundation of institutional knowledge, operational expertise, and familiarity with the naval units' procedures, which are essential for guiding younger personnel and ensuring continuity in program implementation.

The variation in length of service has meaningful implications for the implementation and perceived effectiveness of environmental sustainability programs. Personnel with longer tenure can provide mentorship, reinforce compliance with environmental protocols, and contribute to strategic planning and monitoring activities. Mid-level personnel, who represent the largest proportion, are well-positioned to actively participate in both operational and programmatic tasks, bridging the gap between leadership and junior staff. Meanwhile, newcomers, although fewer, can bring fresh ideas, adaptability, and energy to program initiatives, enhancing innovation and engagement in environmental activities such as coastal clean-ups, marine patrols, and waste management campaigns. Understanding the distribution of service length allows program coordinators to leverage experience levels effectively, assign appropriate

roles, and implement targeted training that maximizes participation, collaboration, and overall program success.

**Educational Attainment**

| Educational Attainment | Frequency (n=60) | Percentage |
|---|---|---|
| Doctorate Degree | 0 | 0 |
| Master's Degree | 6 | 10 |
| Bachelor's Degree | 32 | 53 |
| Associate Degree | 8 | 13 |
| Vocational/Technical Course | 10 | 17 |
| Others (specify) | 4 | 7 |
| **Total** | **60** | **100** |

**Table 7**

The data on educational attainment indicate that the majority of respondents hold a Bachelor's degree (53%), followed by personnel with Vocational/Technical courses (17%), Associate degrees (13%), and Master's degrees (10%). No respondents reported holding a Doctorate degree, and 7% of respondents fell into the "Others" category, which may include short-term certifications or non-traditional educational qualifications. This distribution reflects a workforce that is generally well-educated, with a strong foundation in higher education, technical skills, and professional training that can support both operational and administrative functions within the naval units.

Educational attainment has important implications for the implementation and effectiveness of environmental sustainability programs. Personnel with Bachelor's and Master's degrees are likely equipped with critical thinking, problem-solving, and leadership skills that can enhance program planning, decision-making, and monitoring activities. Those with vocational or technical training can contribute specialized skills in logistics, equipment handling, and technical execution of environmental initiatives, such as mangrove planting or waste management operations. The diversity in educational backgrounds allows for a multidisciplinary approach to program implementation, combining theoretical knowledge with practical expertise. Leveraging these varying educational levels can improve the efficiency, compliance, and innovation of environmental programs, ensuring that both strategic planning and hands-on activities are effectively executed within the naval units.

**Specialized Trainings/Seminars on Environmental Sustainability Attended**

| Level of Training | Frequency (n=60) | Percentage |
|---|---|---|
| International-Level | 3 | 5 |
| National-Level | 10 | 17 |

| | | |
|---|---|---|
| Regional-Level | 12 | 20 |
| Division-Level | 8 | 13 |
| Unit-Level | 15 | 25 |
| None | 12 | 20 |
| **Total** | **60** | **100** |

**Table 8**

The data on specialized trainings and seminars attended by respondents reveal that the majority participated in unit-level trainings (25%), followed by regional-level (20%) and national-level programs (17%). Only a small proportion attended international-level trainings (5%), while 20% of respondents reported not attending any training. Division-level participation accounted for 13% of the respondents. This distribution indicates that while most personnel have received some form of environmental sustainability training, the majority of these learning opportunities are localized or limited to internal unit programs rather than higher-level or international exposure. The relatively low participation in international-level programs may be influenced by logistical constraints, budget limitations, or operational priorities of the naval units.

The level of training attended has direct implications for the implementation and effectiveness of environmental sustainability programs. Personnel who have participated in higher-level trainings—national, regional, or international — likely possess broader knowledge of best practices, policy frameworks, and innovative strategies that can be applied to program planning and execution. Conversely, those who attended unit-level or no trainings may rely primarily on internal guidance or peer learning, which could limit the depth and scope of program activities. Understanding this distribution allows program coordinators to identify training gaps and prioritize capacity-building initiatives, ensuring that all personnel are equipped with the necessary knowledge and skills to implement sustainability programs effectively, enhance compliance, and engage in environmentally responsible practices across the naval units.

**Awareness of Environmental Laws and Policies**

| **Law/Policy** | **Frequency (n=60)** | **Percentage** |
|---|---|---|
| RA 9003 – Ecological Solid Waste Management Act | 45 | 75 |
| RA 9275 – Clean Water Act | 40 | 67 |
| RA 8749 – Clean Air Act | 38 | 63 |
| EO 578 – Philippine Green Procurement Policy | 28 | 47 |
| Philippine Navy Environmental Protection & Conservation Policies | 52 | 87 |

| | | |
|---|---|---|
| Others (specify) | 5 | 8 |
| **Total** | **60** | **100** |

**Table 9**

The data on awareness of environmental laws and policies indicate that the majority of respondents are highly aware of the Philippine Navy Environmental Protection & Conservation Policies (87%), followed by RA 9003 – Ecological Solid Waste Management Act (75%), RA 9275 – Clean Water Act (67%), and RA 8749 – Clean Air Act (63%). Fewer respondents reported awareness of EO 578 – Philippine Green Procurement Policy (47%), while 8% indicated knowledge of other environmental regulations not specified in the survey. This pattern suggests that naval personnel are most familiar with policies directly linked to their operational environment and the Navy's internal guidelines, while awareness of broader national-level executive orders or less operationally visible policies is comparatively lower.

The level of awareness among personnel has important implications for the implementation and effectiveness of environmental sustainability programs. High awareness of Navy-specific policies ensures that personnel can align their daily activities with established environmental standards and protocols, promoting compliance and operational sustainability. The relatively lower awareness of policies such as EO 578 indicates potential areas for further information dissemination and training, which could enhance understanding of procurement and resource use practices that support sustainability objectives. Overall, these findings underscore the importance of continuous education and policy orientation, enabling personnel to integrate legal and organizational environmental standards into their operational duties effectively, thereby strengthening both program execution and the Navy's commitment to environmental stewardship.

**Environmental Sustainability Programs Implemented in The Unit**

This section presents the implementation status of key environmental sustainability programs in the selected Philippine Navy units, as reported by 60 respondents. Frequencies and percentages are provided to show the level of program adoption.

**Coastal Clean-up & Mangrove Planting**

**Participation in coastal clean-ups, shoreline debris removal, mangrove rehabilitation, and biodiversity protection.**

| **Response** | **Frequency (n=60)** | **Percentage** |
|---|---|---|
| **Yes** | **48** | **80** |
| **No** | **12** | **20** |
| **Total** | **60** | **100** |

**Table 10**

The data on participation in coastal clean-ups and mangrove planting show that the majority of respondents (80%) actively engage in these environmental activities, while 20% reported non-participation. This high level of involvement indicates a strong commitment among naval personnel to hands-on environmental stewardship, particularly in initiatives that directly protect and rehabilitate coastal and marine ecosystems. The 20% non-participation may be attributed to operational constraints, limited availability, or assignment to duties not directly related to environmental programs. Overall, the findings reflect that coastal and marine conservation efforts are a well-integrated component of the naval units' environmental sustainability initiatives.

From a program implementation perspective, the high participation rate underscores the effectiveness of unit-level coordination, awareness campaigns, and leadership support in mobilizing personnel for environmental activities. Active involvement in coastal clean-ups and mangrove planting not only contributes to ecological restoration but also enhances personnel engagement, teamwork, and practical understanding of marine ecosystem management. This hands-on participation is crucial for instilling a culture of environmental responsibility within the units, ensuring that personnel are not only aware of environmental policies but also actively contribute to tangible conservation outcomes. Maintaining or expanding such participation will be essential for sustaining long-term ecological benefits and reinforcing the Philippine Navy's role in promoting environmental stewardship.

**Bantay Kadagatan / Marine Protection Patrols**

**Joint patrols and operations supporting maritime law enforcement, marine ecosystem protection, and MDA initiatives.**

| Response | Frequency (n=60) | Percentage |
|---|---|---|
| Yes | 42 | 70 |
| No | 18 | 30 |
| Total | 60 | 100 |

**Table 11**

The data on participation in Bantay Kadagatan or marine protection patrols show that 70% of respondents reported active involvement, while 30% indicated non-participation. This reflects a substantial engagement of naval personnel in joint patrols and operations that support maritime law enforcement, marine ecosystem protection, and Marine Defense Activities (MDA). The 30% non-participation could be due to personnel being assigned to other operational duties, limited patrol schedules, or logistical constraints. Overall, the findings suggest that marine protection patrols are a key component of the environmental sustainability initiatives within the selected naval units, demonstrating a strong commitment to safeguarding coastal and marine resources.

From an implementation perspective, the high participation rate indicates that the program is well-coordinated and supported by leadership, with personnel recognizing the importance of protecting marine ecosystems as part of their operational responsibilities. Engagement in these patrols not only contributes to biodiversity conservation and law enforcement but also enhances personnel's practical knowledge and situational awareness regarding maritime environmental management. Encouraging broader participation

among the remaining 30% of personnel could further strengthen the program's impact, ensuring comprehensive coverage of marine protection activities and reinforcing the Philippine Navy's role as a proactive steward of the country's coastal and marine resources.

**Partnerships for Climate Action and Sustainability (e.g., PN–ACERS)**

**Collaborations with government, private sector, and civic organizations for climate action and sustainability programs.**

| Response | Frequency (n=60) | Percentage |
|---|---|---|
| Yes | 38 | 63 |
| No | 22 | 37 |
| Total | 60 | 100 |

**Table 12**

The data on participation in partnerships for climate action and sustainability, such as PN–ACERS, indicate that 63% of respondents reported involvement, while 37% did not participate. This shows that a majority of personnel engage in collaborative initiatives with government agencies, private sector partners, and civic organizations to support climate action and sustainability programs. However, the substantial portion of non-participating respondents suggests that there may be limitations in outreach, awareness, or opportunities for involvement across the units, highlighting potential areas for improving coordination and engagement with external partners.

From a program implementation perspective, the findings suggest that collaboration with external stakeholders is recognized as a critical component of environmental sustainability efforts, providing access to additional resources, expertise, and networks that can enhance program outcomes. Participation in these partnerships allows personnel to learn best practices, exchange knowledge, and contribute to broader climate and sustainability initiatives beyond the immediate naval operations. Strengthening engagement among the 37% of non-participants could improve the overall impact and sustainability of these programs, ensuring that the benefits of collaborative climate action reach all operational levels within the Philippine Navy and reinforce its role as an active participant in national and regional environmental initiatives.

**Support to Marine Research & Protected Areas**

**Assistance to DENR, BFAR, academe, and NGOs in marine scientific studies and protected area enforcement.**

| Response | Frequency (n=60) | Percentage |
|---|---|---|
| Yes | 35 | 58 |
| No | 25 | 42 |
| Total | 60 | 100 |

**Table 13**

The data on support to marine research and protected areas indicate that 58% of respondents reported active participation, while 42% did not participate in such initiatives. This shows that slightly more than half of the personnel are engaged in assisting government agencies like DENR and BFAR, as well as academe and NGOs, in conducting marine scientific studies and enforcing protected area regulations. The significant portion of non-participants may reflect operational constraints, limited opportunities to be involved in research activities, or prioritization of other unit tasks, highlighting the need to enhance awareness and accessibility of these programs.

From an implementation perspective, the findings suggest that involvement in marine research and protected area enforcement is an important aspect of environmental sustainability programs, providing personnel with opportunities to contribute to evidence-based conservation efforts and policy compliance. Active participation allows personnel to develop scientific understanding, operational skills, and collaborative networks with external stakeholders, thereby improving the effectiveness of marine protection initiatives. Encouraging broader engagement among the non-participating 42% can strengthen the Navy's overall contribution to marine conservation, ensuring that research support and protected area management are more comprehensive and effective in safeguarding coastal and marine ecosystems.

**Adopt-a-Bay / Marine Litter Reduction Activities**

**Long-term bay adoption, marine debris monitoring, waste-reduction campaigns, and public awareness drives.**

| Response | Frequency (n=60) | Percentage |
|---|---|---|
| Yes | 40 | 67 |
| No | 20 | 33 |
| Total | 60 | 100 |

**Table 14**

The data on participation in Adopt-a-Bay and marine litter reduction activities indicate that 67% of respondents are actively involved, while 33% reported non-participation. This demonstrates that a significant majority of personnel engage in long-term environmental initiatives such as bay adoption, marine debris monitoring, waste-reduction campaigns, and public awareness drives. The one-third of personnel who do not participate may be constrained by operational duties, limited access to program schedules, or insufficient knowledge about the activities. Nonetheless, the data suggest that marine litter reduction efforts are a well-recognized and moderately embraced component of the environmental sustainability programs in the selected naval units.

From an implementation standpoint, the relatively high participation rate highlights the Navy's commitment to community-based environmental management and ecosystem protection. By involving personnel in Adopt-a-Bay programs, the units foster hands-on environmental stewardship, public engagement, and accountability in managing coastal and marine resources. Active participation enhances both the practical execution of litter reduction initiatives and the personnel's appreciation of ecological conservation. Expanding participation among the 33% of non-involved personnel can further improve the

reach and effectiveness of these programs, reinforcing the Philippine Navy's role as a proactive actor in environmental sustainability and community collaboration.

**Integration of Sustainability in Naval Operations**

**Incorporation of energy efficiency, green infrastructure, waste segregation, and resource conservation in daily operations.**

| Response | Frequency (n=60) | Percentage |
|---|---|---|
| **Yes** | **50** | **83** |
| **No** | **10** | **17** |
| **Total** | **60** | **100** |

**Table 15**

The data on the integration of sustainability practices in naval operations show that 83% of respondents reported that energy efficiency, green infrastructure, waste segregation, and resource conservation are incorporated into daily operations, while 17% indicated that such practices are not yet implemented. This indicates a strong adoption of sustainable practices across the majority of personnel, reflecting the Philippine Navy's commitment to embedding environmental considerations into routine operational procedures. The smaller proportion of non-participants may be influenced by specific operational constraints, limited awareness, or gaps in training, suggesting that further reinforcement of sustainability practices is still needed to achieve full unit-wide compliance.

From an implementation perspective, the high level of reported integration highlights the effectiveness of leadership initiatives, resource allocation, and personnel engagement in promoting environmentally responsible operations. Incorporating sustainability into daily activities not only reduces the Navy's operational environmental footprint but also encourages a culture of accountability, resource conservation, and continuous improvement among personnel. For the 17% who are not yet practicing these measures, targeted interventions such as refresher trainings, improved monitoring, and clearer communication of sustainability protocols can help achieve comprehensive adoption, ensuring that environmental stewardship becomes a standard component of all naval operations and contributes to long-term ecological and operational sustainability.

**Level of Implementation of Environmental Sustainability Programs**

Respondents rated statements on a 5-point Likert scale to assess the extent of implementation of environmental sustainability programs in the Philippine Navy.

**Resource Allocation and Logistical Support**

| Statements | Weighted Mean | Interpretation |
|---|---|---|
| Adequate equipment/materials (PPE, tools, supplies) are provided. | 4.05 | Agree |

| | | |
|---|---|---|
| Budget allocations sufficiently support environmental programs. | 3.98 | Agree |
| Necessary facilities (storage, waste areas, green spaces) are available. | 4.10 | Agree |
| The unit receives support from external stakeholders (LGUs, NGOs, DENR). | 4.12 | Agree |
| Scheduled time is allotted to personnel to participate in activities. | 4.00 | Agree |
| **Average Mean** | **4.05** | **Agree** |

**Table 16**

The data on the level of implementation of environmental sustainability programs indicate that respondents generally agree (average mean = 4.23) that the programs are effectively integrated into naval operations. Specifically, personnel reported that environmental objectives are clearly defined and aligned with the unit mission (WM = 4.28), and that pre-implementation assessments, such as needs analysis and site assessments, are conducted (WM = 4.15). This suggests that the Philippine Navy emphasizes a structured and strategic approach to environmental initiatives, ensuring that activities are purpose-driven, relevant, and coordinated with the broader operational objectives of each unit. Lopez-Bautista (2020) highlights the importance of aligning military operations with national environmental policies to achieve sustainable outcomes, supporting the finding that clearly defined objectives and assessments form the backbone of successful implementation.

Additionally, respondents noted that personnel are actively consulted and involved in planning sustainability activities (WM = 4.32), and programs are customized to address specific operational and ecological needs (WM = 4.20). This participatory and adaptive approach demonstrates that environmental sustainability programs are not generic but tailored to the operational context and ecological realities of each naval unit. Delos Santos (2016) emphasizes that institutionalizing environmental education and involving personnel in planning fosters ownership, awareness, and accountability, which are essential for achieving program success. Moreover, coordination among leaders, staff, and relevant offices (WM = 4.18) reflects the Navy's commitment to collaborative planning, ensuring that responsibilities and resources are efficiently allocated to meet sustainability goals.

From an implementation perspective, the high weighted means across all statements indicate that the programs are well-structured, participatory, and contextually relevant, enhancing both compliance and effectiveness. This structured implementation allows personnel to contribute meaningfully while maintaining operational efficiency, which is crucial in military settings where environmental initiatives must coexist with defense responsibilities (Ramos & De la Cruz, 2018). Soriano (2019) also notes that stakeholder engagement and coordination are vital for the success of military-led environmental projects, reinforcing the importance of planning and personnel involvement observed in this study. Overall, the findings suggest that the Philippine Navy has established a strong foundation for environmental sustainability, with clear objectives, participatory planning, and operationally relevant customization, creating conditions for long-term success and alignment with national and organizational policies.

**Personnel Participation and Training**

| Statements | Weighted Mean | Interpretation |
|---|---|---|
| Personnel receive orientation/training before program implementation. | 4.25 | Agree |
| Continuous professional development on environmental topics is available. | 4.12 | Agree |
| Collaboration among personnel enhances program execution. | 4.30 | Agree |
| Leadership encourages and supports personnel participation. | 4.28 | Agree |
| Feedback, coaching, and follow-up are provided to improve performance. | 4.20 | Agree |
| **Average Mean** | **4.23** | **Agree** |

**Table 17**

The data on personnel participation and training indicate that respondents generally agree (average mean = 4.23) that naval personnel are actively engaged in environmental sustainability programs through proper orientation and training. Specifically, respondents reported that personnel receive orientation and training before program implementation (WM = 4.25), and continuous professional development on environmental topics is available (WM = 4.12). These findings suggest that the Philippine Navy places emphasis on preparatory and ongoing educational measures to equip personnel with the knowledge and skills necessary for effective program execution. Garcia (2020) emphasizes that structured environmental education modules for military recruits significantly enhance knowledge retention and encourage responsible environmental practices, aligning with the observed commitment to orientation and continuous learning in these naval units.

Furthermore, respondents highlighted the importance of collaboration among personnel (WM = 4.30) and leadership support (WM = 4.28) in facilitating successful program implementation. These results indicate that environmental initiatives are team-oriented and strongly reinforced by leadership, creating an environment where personnel are motivated to actively participate and contribute to program goals. Bernardo and Ramos (2019) underscore that collaboration and leadership encouragement are critical factors in achieving higher compliance levels in naval environmental programs, as they foster engagement, accountability, and collective ownership of sustainability initiatives.

From an operational perspective, feedback, coaching, and follow-up mechanisms (WM = 4.20) further enhance the effectiveness of training by ensuring personnel can continuously improve performance and adapt practices based on real-world outcomes. Cruz (2017) and Esteban (2016) highlight that consistent feedback and mentoring in military environmental programs support better adherence to safety and sustainability protocols, while also addressing gaps in knowledge or practice. Overall, the findings suggest that the Philippine Navy successfully combines orientation, professional development, leadership support, and collaborative mechanisms to cultivate a knowledgeable, motivated, and environmentally

responsible workforce, which is crucial for the long-term sustainability and effectiveness of naval environmental programs.

**Monitoring and Evaluation**

| Statements | Weighted Mean | Interpretation |
|---|---|---|
| Programs are monitored regularly using measurable indicators. | 4.15 | Agree |
| Environmental impact data are collected (waste reduction, mangrove growth, etc.). | 4.08 | Agree |
| Evaluation reports are shared with personnel and external stakeholders. | 4.05 | Agree |
| Adjustments are implemented based on monitoring results. | 4.12 | Agree |
| Monitoring complies with DND/PN environmental protocols. | 4.10 | Agree |
| **Average Mean** | **4.10** | **Agree** |

**Table 18**

The data on monitoring and evaluation of environmental sustainability programs indicate that respondents generally agree (average mean = 4.10) that these programs are systematically tracked and assessed using measurable indicators. Specifically, personnel reported that programs are monitored regularly (WM = 4.15) and environmental impact data, such as waste reduction and mangrove growth, are collected (WM = 4.08). This suggests that the Philippine Navy places emphasis on evidence-based program management, enabling the units to assess the effectiveness of their initiatives and identify areas for improvement. Fernandez (2019) highlights that regular monitoring and data collection, such as waste segregation compliance, are critical in maintaining accountability and ensuring that environmental goals are met within uniformed services.

Respondents also indicated that evaluation reports are shared with both personnel and external stakeholders (WM = 4.05), and adjustments are implemented based on monitoring results (WM = 4.12). These findings show that the monitoring process is transparent, participatory, and adaptive, allowing for informed decision-making and continuous improvement. Lopez (2020) emphasizes that sharing evaluation outcomes with the community and stakeholders enhances trust, strengthens collaborations, and fosters greater compliance with naval environmental initiatives, particularly in regions like Iloilo City where stakeholder engagement is vital.

Furthermore, compliance with DND/PN environmental protocols (WM = 4.10) indicates that monitoring activities adhere to formal standards, ensuring consistency and alignment with national and organizational regulations. Dela Cruz and Paredes (2016) note that adherence to established protocols minimizes barriers in program implementation and supports institutional credibility, while Manalo (2018) demonstrates that monitoring frameworks in mangrove replanting projects allow naval units to track ecological outcomes effectively and adjust interventions for better environmental impact. Overall, the data suggest that the Philippine Navy has established a structured, protocol-driven, and results-oriented monitoring and evaluation system, which is essential for sustaining the effectiveness and credibility of environmental sustainability programs.

**Stakeholder Engagement and Community Collaboration**

| Statements | Weighted Mean | Interpretation |
|---|---|---|
| Local communities actively participate in environmental initiatives. | 4.18 | Agree |
| Personnel are regularly informed about program goals, benefits, and updates | 4.12 | Agree |
| Strong collaboration exists between the unit, LGUs, NGOs, and partner agencies. | 4.25 | Agree |
| Stakeholder suggestions/feedback are gathered and considered. | 4.20 | Agree |
| Program implementation is transparent and well-documented. | 4.22 | Agree |
| **Average Mean** | **4.19** | **Agree** |

**Table 19**

The data on stakeholder engagement and community collaboration indicate that respondents generally agree (average mean = 4.19) that local communities, personnel, and partner agencies are actively involved in environmental sustainability initiatives. Specifically, respondents reported that local communities actively participate in environmental programs (WM = 4.18), and personnel are regularly informed about program goals, benefits, and updates (WM = 4.12). This demonstrates that the Philippine Navy prioritizes inclusive communication and community involvement, fostering awareness and shared responsibility among personnel and stakeholders. Reyes (2018) supports this observation, noting that community engagement in naval base waste reduction initiatives significantly improves program effectiveness and public compliance.

Furthermore, respondents emphasized that strong collaboration exists between the unit, local government units (LGUs), non-governmental organizations (NGOs), and other partner agencies (WM = 4.25), and that stakeholder suggestions and feedback are gathered and considered (WM = 4.20). These findings indicate a multi-stakeholder approach, allowing naval units to incorporate diverse perspectives and leverage external expertise to enhance the impact of sustainability programs. Del Mundo (2017) highlights that effective stakeholder participation, especially in water and resource conservation initiatives, strengthens program design and ensures that interventions are contextually appropriate, feasible, and widely supported.

From an operational and strategic perspective, respondents noted that program implementation is transparent and well-documented (WM = 4.22), reflecting adherence to established protocols and accountability measures. This transparency fosters trust between the Navy and external stakeholders, ensuring that environmental initiatives are credible and replicable. Asian Development Bank (2019) and the International Committee of the Red Cross (2015) underscore that transparency, documentation, and collaboration are essential in sustainable military operations, enabling environmental protection without compromising operational readiness. Tan and Serrano (2019) further illustrate that coordinated engagement with communities and partner agencies enhances the adoption of sustainable technologies,

such as solar PV systems, in remote naval installations. Overall, the data suggest that the Philippine Navy effectively integrates stakeholder engagement and community collaboration as a core component of its environmental sustainability programs, promoting both ecological protection and operational legitimacy.

**Perceived Effectiveness of Environmental Sustainability Programs**

**Reduction of Operational Environmental Impact**

| **Statements** | **Weighted Mean** | **Interpretation** |
|---|---|---|
| Programs effectively reduce waste and pollution generated by operations | 4.22 | Agree |
| Activities help minimize environmental damage in nearby coastal/marine areas | 4.28 | Agree |
| Energy and resource conservation efforts are effectively implemented | 4.15 | Agree |
| Programs contribute to operational environmental sustainability | 4.20 | Agree |
| Environmental practices are consistent with PN mission, vision, and policies | 4.25 | Agree |
| **Average Mean** | 4.22 | Agree |

**Table 20**

The data on the reduction of operational environmental impact indicate that respondents generally agree (average mean = 4.22) that environmental sustainability programs effectively mitigate negative impacts associated with naval operations. Specifically, personnel reported that programs reduce waste and pollution generated by operations (WM = 4.22) and that activities help minimize environmental damage in nearby coastal and marine areas (WM = 4.28). These findings suggest that the Philippine Navy actively implements measures to control operational environmental risks, such as proper waste management, pollution control, and ecosystem protection. The United Nations Environment Programme (2017) emphasizes that greening military operations through structured environmental practices significantly enhances sustainability while maintaining operational effectiveness.

In addition, respondents noted that energy and resource conservation efforts are effectively implemented (WM = 4.15) and that programs contribute to operational environmental sustainability (WM = 4.20). This demonstrates a proactive approach toward resource efficiency, highlighting initiatives like energy-efficient equipment, sustainable fuel practices, and resource conservation measures integrated into daily operations. The World Bank (2018) notes that environmental sustainability in security institutions requires systematic efforts to reduce resource consumption and operational waste, which aligns with the practices reported by respondents in these naval units.

Finally, personnel agreed that environmental practices are consistent with the Philippine Navy's mission, vision, and policies (WM = 4.25), indicating that sustainability initiatives are aligned with

organizational objectives and standards. Compliance with institutional guidelines ensures that environmental programs are both credible and enforceable. The Environmental Management Bureau (2017) and the International Maritime Organization (2015) provide frameworks for solid waste management and ship-generated waste reduction, respectively, which support naval units in maintaining consistent environmental practices. Overall, the findings suggest that the Philippine Navy successfully integrates waste reduction, pollution control, and resource conservation into operational procedures, achieving a measurable positive impact on environmental sustainability.

**Enhancement of Personnel Compliance and Awareness**

| **Statements** | **Weighted Mean** | **Interpretation** |
|---|---|---|
| Personnel consistently adhere to environmental rules and guidelines | 4.18 | Agree |
| Programs improve knowledge of environmental laws and regulations | 4.12 | Agree |
| Personnel display responsible and eco-friendly behavior | 4.20 | Agree |
| Programs motivate personnel to engage in environmental activities | 4.25 | Agree |
| Environmental responsibilities are integrated into routine unit operations | 4.15 | Agree |
| **Average Mean** | 4.18 | Agree |

**Table 21**

The data on personnel compliance and awareness indicate that respondents generally agree (average mean = 4.18) that environmental sustainability programs enhance adherence to environmental rules and foster eco-friendly behavior among naval personnel. Specifically, respondents reported that personnel consistently follow environmental rules and guidelines (WM = 4.18) and display responsible and environmentally conscious behaviors (WM = 4.20). These findings suggest that the Philippine Navy places considerable emphasis on behavioral compliance and ethical environmental practices, ensuring that all personnel internalize the principles of sustainability in their daily operations. Chan and Alonzo (2021) emphasize that regular training and awareness programs are critical in improving personnel engagement and ensuring that environmental objectives are consistently met.

Respondents also agreed that programs improve knowledge of environmental laws and regulations (WM = 4.12) and motivate personnel to actively participate in environmental activities (WM = 4.25). This indicates that the Navy not only educates its personnel on legal and regulatory frameworks but also encourages proactive involvement in environmental initiatives. Hall and Kumar (2016) highlight that organizations with structured environmental programs tend to overcome common barriers to policy adoption, such as lack of motivation or insufficient understanding, resulting in higher engagement and compliance.

Finally, the data show that environmental responsibilities are effectively integrated into routine unit operations (WM = 4.15), reflecting alignment between program objectives and operational procedures. This integration ensures that sustainability is not treated as an additional task but becomes a core component of daily naval operations, supporting both ecological and operational goals. The Department of National Defense (2018), the Philippine Navy (2019), and the Department of Environment and Natural Resources (2016) underscore the importance of embedding environmental management within institutional frameworks to achieve long-term compliance, accountability, and sustainability. Overall, the findings suggest that the Navy's programs successfully cultivate awareness, knowledge, and active participation, strengthening the culture of environmental responsibility among personnel.

**Contribution to Operational Efficiency & Public Accountability**

| **Statements** | **Weighted Mean** | **Interpretation** |
|---|---|---|
| Programs contribute to improved operational efficiency | 4.10 | Agree |
| Programs enhance the unit's credibility and public trust | 4.18 | Agree |
| Programs support long-term sustainability of naval operations | 4.20 | Agree |
| Initiatives align with the strategic goals of the Philippine Navy | 4.25 | Agree |
| Programs strengthen transparency and accountability in environmental management | 4.12 | Agree |
| **Average Mean** | 4.17 | Agree |

**Table 22**

The data on the contribution of environmental sustainability programs to operational efficiency and public accountability indicate that respondents generally agree (average mean = 4.17) that these programs positively impact the efficiency and credibility of naval operations. Specifically, personnel reported that programs contribute to improved operational efficiency (WM = 4.10) and enhance the unit's credibility and public trust (WM = 4.18). These findings suggest that the integration of environmental initiatives into naval operations supports streamlined procedures, resource optimization, and heightened institutional legitimacy, which are essential for maintaining operational readiness and public confidence. Mendoza and Ortega (2020) highlight that mitigating marine pollution sources and implementing environmental safeguards in naval activities directly enhances operational efficiency while fostering trust among stakeholders.

Respondents also agreed that programs support the long-term sustainability of naval operations (WM = 4.20) and that initiatives align with the strategic goals of the Philippine Navy (WM = 4.25). This underscores the importance of strategic integration of environmental objectives into operational planning, ensuring that sustainability is not peripheral but central to mission success. Garcia and Lim (2019) argue that embedding environmental stewardship within military and disaster preparedness frameworks strengthens resilience and promotes the sustained functionality of military installations. The alignment of

initiatives with strategic goals also reflects careful planning to balance operational demands with ecological responsibility.

Finally, the data indicate that programs strengthen transparency and accountability in environmental management (WM = 4.12), suggesting that reporting mechanisms, stakeholder engagement, and documentation practices are effectively implemented. This promotes a culture of accountability and continuous improvement, allowing naval units to track progress and adjust strategies as needed. Velasco (2018) and Panganiban and Cruz (2020) emphasize that transparency in environmental practices, coupled with renewable energy adoption and coastal ecosystem protection, enhances operational sustainability and community trust. Lopez (2017) further notes that behavioral change programs contribute to higher compliance and accountability, reinforcing the overall effectiveness of environmental initiatives in military institutions. Overall, the findings demonstrate that sustainability programs not only improve operational efficiency but also strengthen public accountability and long-term ecological stewardship in the Philippine Navy.

**Challenges and Barriers**

**Frequency and Percentage of Challenges and Barriers in Implementing Environmental Sustainability Programs**

| **Challenges and Barriers** | **Frequency (n=60)** | **Percentage (%)** |
|---|---|---|
| Inadequate funding and resources | 50 | 83% |
| Lack of personnel training and professional development | 45 | 75% |
| Limited time for program implementation | 40 | 67% |
| Poor monitoring and evaluation systems | 35 | 58% |
| Insufficient community or stakeholder involvement | 38 | 63% |
| High operational workload | 42 | 70% |
| Inconsistent administrative or leadership support | 30 | 50% |
| Difficulty integrating sustainability practices into daily operations | 37 | 62% |
| Lack of coordination among units or offices | 28 | 47% |
| Limited awareness of environmental laws and Navy policies | 33 | 55% |
| Others (please specify) | 5 | 8% |

| | | |
|---|---|---|
| **Total respondents** | 60 | – |

**Table 23**

The data on challenges and barriers in implementing environmental sustainability programs reveal that inadequate funding and resources (83%) and lack of personnel training and professional development (75%) are the most frequently reported obstacles among respondents. These findings indicate that while the Philippine Navy is committed to environmental initiatives, limited financial and human capital resources can significantly hinder program execution. Bautista (2017) emphasizes that insufficient budget allocations and inadequate skill development often result in partial or delayed implementation of green practices in public sector organizations, highlighting the need for targeted investments to ensure program continuity and effectiveness.

In addition to resource and training constraints, high operational workload (70%) and limited time for program implementation (67%) were also identified as major challenges. These barriers reflect the difficulty of integrating sustainability activities into the routine operations of naval personnel, who must balance environmental initiatives with core defense responsibilities. Santos and Reyes (2015) point out that military installations in coastal areas often face competing priorities, where operational readiness and emergency response can limit the time available for ecological programs, thereby necessitating careful planning and scheduling to maintain both mission efficiency and environmental stewardship.

Other notable challenges include poor monitoring and evaluation systems (58%), insufficient community or stakeholder involvement (63%), and difficulty integrating sustainability practices into daily operations (62%). These issues suggest gaps in program oversight, collaboration, and practical implementation. Mendoza and Ortega (2020) note that without robust monitoring and coordination, environmental programs may fail to achieve measurable outcomes, while Garcia and Lim (2019) highlight that stakeholder engagement is critical for long-term success and public trust. Overall, the data indicate that addressing financial, human resource, and operational constraints, alongside strengthening monitoring and community collaboration, is essential to enhance the effectiveness and sustainability of environmental programs within naval units.

**Relationship Between Implementation Level And Perceived Effectiveness Of Environmental Sustainability Programs**

To determine whether a significant relationship exists between the level of implementation and perceived effectiveness of environmental sustainability programs, the Pearson correlation coefficient was computed using the weighted mean scores for each respondent across the implementation domains and effectiveness domains.

**Pearson Correlation Between Implementation and Perceived Effectiveness**

| Variables | r-value | p-value | Interpretation |
|---|---|---|---|
| Level of Implementation | 0.87 | 0.000 | Strong, significant positive relationship |

**Table 24**

The results of the Pearson correlation analysis reveal a strong positive relationship (r = 0.87) between the level of implementation of environmental sustainability programs and their perceived effectiveness among personnel in the selected naval units. This indicates that as the implementation of these programs improves—through clearly defined objectives, structured planning, effective resource allocation, and personnel engagement—the perceived effectiveness of the programs also increases. In other words, naval units that systematically implement sustainability initiatives tend to be viewed as more successful in achieving their environmental goals.

The significance level (p = 0.000) further confirms that this relationship is statistically meaningful, meaning it is highly unlikely to have occurred by chance. This underscores that proper execution of environmental programs is a key determinant in shaping personnel perceptions of effectiveness. Units that maintain consistent monitoring, evaluation, and stakeholder engagement are more likely to demonstrate tangible results, such as reduced operational environmental impact, enhanced compliance with environmental regulations, and increased awareness and participation of personnel in sustainability efforts.

Moreover, the strong correlation suggests that improvements in program implementation can directly enhance overall program outcomes. It highlights the importance of integrating sustainability practices into daily naval operations, providing adequate training, and ensuring active collaboration among personnel and external stakeholders. This relationship emphasizes that perceived effectiveness is not solely based on program presence but is closely tied to the quality, consistency, and comprehensiveness of implementation strategies within the naval units.

**Differences in Implementation and Effectiveness Between Naval Forces Central (CEBU) And Naval Reserve Center–Western Visayas (ILOILO)**

To examine whether significant differences exist between the two naval units, independent samples t-tests were performed using weighted mean scores from each unit (30 respondents per unit).

**Comparison of Program Implementation by Unit**

| Domain | Cebu (Mean) | Iloilo (Mean) | t-value | p-value | Interpretation |
|---|---|---|---|---|---|
| Environmental Objectives & Planning | 4.25 | 4.20 | 0.72 | 0.47 | Not significant |
| Resource Allocation & Support | 4.08 | 4.02 | 0.85 | 0.40 | Not significant |
| Personnel Participation & Training | 4.25 | 4.20 | 0.67 | 0.51 | Not significant |
| Monitoring & Evaluation | 4.12 | 4.08 | 0.56 | 0.58 | Not significant |
| Stakeholder Engagement & Collaboration | 4.20 | 4.18 | 0.35 | 0.73 | Not significant |
| **Overall Implementation** | 4.18 | 4.14 | 0.64 | 0.52 | Not significant |

**Table 25**

The comparison of environmental sustainability program implementation between Naval Forces Central in Cebu and the Naval Reserve Center–Western Visayas in Iloilo shows minimal differences across all assessed domains. The mean scores for each domain—including environmental objectives and planning, resource allocation and support, personnel participation and training, monitoring and evaluation, and stakeholder engagement and collaboration—are very close, with Cebu consistently slightly higher than Iloilo. This suggests that both units maintain a comparable level of commitment and consistency in implementing sustainability initiatives within their operations.

The t-values and p-values indicate that the differences between the two units are not statistically significant, as all p-values are above the 0.05 threshold. This means that, despite minor variations in mean scores, the variations could be attributed to random sampling differences rather than true disparities in program implementation. Both units appear to follow similar frameworks, guidelines, and operational strategies, ensuring that environmental objectives, resource allocation, personnel engagement, monitoring, and stakeholder collaboration are consistently addressed.

Overall, the results suggest that the Philippine Navy has successfully institutionalized environmental sustainability practices across its units, resulting in uniform implementation standards. The lack of significant differences highlights that both Cebu and Iloilo units have established comparable levels of environmental awareness, training, and stakeholder involvement, which likely contributes to the observed strong correlation between implementation and perceived effectiveness of the programs. This uniformity reflects an organizational commitment to integrating sustainability across all operational areas, rather than relying on isolated efforts by specific units.

**Comparison of Program Effectiveness by Unit**

| **Domain** | **Cebu (Mean)** | **Iloilo (Mean)** | **t-value** | **p-value** | **Interpretation** |
|---|---|---|---|---|---|
| Reduction of Operational Environmental Impact | 4.25 | 4.18 | 1.10 | 0.28 | Not significant |
| Enhancement of Personnel Compliance & Awareness | 4.20 | 4.15 | 0.80 | 0.43 | Not significant |
| Contribution to Operational Efficiency & Public Accountability | 4.18 | 4.15 | 0.46 | 0.65 | Not significant |
| **Overall Effectiveness** | 4.21 | 4.16 | 0.85 | 0.40 | Not significant |

**Table 26**

The comparison of perceived effectiveness of environmental sustainability programs between Naval Forces Central in Cebu and the Naval Reserve Center–Western Visayas in Iloilo reveals closely aligned results across all evaluated domains. Cebu consistently shows slightly higher mean scores than Iloilo in reducing operational environmental impact, enhancing personnel compliance and awareness, and contributing to operational efficiency and public accountability. These slight differences indicate that while both units are effectively implementing and benefiting from sustainability programs, Cebu respondents perceive a marginally higher level of effectiveness in these initiatives.

The t-values and p-values indicate that the differences between the two units are not statistically significant, with all p-values exceeding the 0.05 threshold. This finding suggests that the observed variations in mean scores are likely due to random chance rather than true differences in program outcomes. Both units demonstrate consistent success in achieving the objectives of environmental sustainability, fostering compliance and awareness among personnel, and ensuring operational efficiency and accountability, reflecting a well-structured and uniform implementation strategy.

The results indicate that environmental sustainability programs in both Cebu and Iloilo are equally effective, with no meaningful differences in their perceived outcomes. The uniform perception of effectiveness underscores the Philippine Navy's institutional commitment to integrating sustainable practices across its units. It also highlights that the programs not only reduce environmental impact but also enhance personnel engagement, operational performance, and public trust, reinforcing the strategic value of these initiatives across different naval locations.

## 3. Summary, Findings, Conclusions, And Recommendations

This chapter presents the summary, findings, conclusions, and recommendations of the study. The research aimed to evaluate the implementation and perceived effectiveness of environmental sustainability programs in selected Philippine Navy units, specifically Naval Forces Central (Lapu-Lapu City, Cebu) and Naval Reserve Center–Western Visayas (Iloilo City). The study employed a descriptive-correlational research design using a quantitative approach. Data were analyzed across multiple domains, including environmental objectives and planning, resource allocation and logistical support, personnel participation and training, monitoring and evaluation, stakeholder engagement, and the overall impact of sustainability programs. The demographic profiles of respondents, such as age, rank/position, length of service, educational attainment, and prior training, were also examined to determine their influence on perceptions of program implementation and effectiveness.

### Summary

The study assessed the level of implementation and perceived effectiveness of environmental sustainability programs in reducing operational environmental impact, enhancing personnel compliance and awareness, and contributing to operational efficiency and public accountability. Key initiatives examined included coastal clean-ups, mangrove planting, marine protection patrols, climate action partnerships, marine research support, marine litter reduction activities, and integration of sustainability practices into daily operations. Additionally, the study identified challenges and barriers in program implementation, such as inadequate funding, limited personnel training, high operational workload, poor monitoring and evaluation, and insufficient stakeholder involvement. Correlational analysis was conducted to examine the relationship between program implementation and perceived effectiveness, while comparative analysis explored differences between the Cebu and Iloilo units.

### Findings

The findings indicate that respondents generally perceive the environmental sustainability programs as effectively implemented and positively impactful. The highest levels of implementation were observed in personnel participation and training, coastal clean-up initiatives, and integration of sustainability practices into daily operations. Weighted mean scores ranged from 4.05 to 4.23 across implementation domains, reflecting agreement among respondents that programs are systematically

planned, resourced, and executed. Personnel participation, training, and collaborative activities were particularly emphasized, indicating strong institutional support and leadership encouragement.

Regarding perceived effectiveness, respondents rated programs highly in reducing operational environmental impact, promoting compliance and awareness, and supporting operational efficiency and public accountability, with average mean scores ranging from 4.17 to 4.22. A strong, significant positive relationship ($r = 0.87$, $p = 0.000$) was observed between the level of implementation and perceived effectiveness, indicating that well-implemented programs are associated with greater environmental and operational outcomes. Comparative analysis revealed no significant differences in implementation or perceived effectiveness between Cebu and Iloilo units, suggesting uniformity in program execution and outcomes across locations.

Challenges and barriers identified include inadequate funding and resources, limited personnel training, high operational workload, poor monitoring and evaluation systems, and lack of stakeholder engagement. Despite these constraints, programs continue to achieve positive results due to structured planning, leadership support, and active personnel involvement.

## Conclusions

Based on the findings, it can be concluded that the Philippine Navy's environmental sustainability programs are well-implemented and perceived as effective in achieving operational, environmental, and personnel-related objectives. Strong personnel participation, adequate planning, and stakeholder collaboration contribute significantly to program success. The uniformity of outcomes across Cebu and Iloilo indicates a consistent institutional commitment to environmental sustainability. However, resource limitations, training gaps, and operational demands remain challenges that may hinder program optimization. The relationship between implementation and effectiveness highlights the importance of strategic planning, monitoring, and continuous capacity-building to maintain and improve outcomes.

## Recommendations

1. **Capacity Building:** Conduct regular training and professional development programs for personnel to strengthen knowledge and skills in environmental management and sustainability practices.
2. **Resource Enhancement:** Ensure adequate allocation of financial, logistical, and material resources to support sustainability programs effectively.
3. **Strengthen Monitoring and Evaluation:** Implement systematic and measurable monitoring tools, including data collection, evaluation reporting, and feedback mechanisms to improve program performance.
4. **Stakeholder Engagement:** Promote greater collaboration with local communities, LGUs, NGOs, and other partners to enhance program participation, visibility, and impact.
5. **Leadership Support:** Encourage consistent administrative and leadership backing to sustain personnel motivation, program continuity, and integration of sustainability practices into daily operations.

6. **Future Research:** Conduct longitudinal studies to assess long-term impacts of environmental programs on operational efficiency, personnel behavior, and ecological outcomes, and explore innovative strategies to overcome implementation barriers.

## 4. Output of The Study Environmental Sustainability Program Implementation Plan

### Rationale

The adoption and strengthening of environmental sustainability programs in Philippine Navy units are essential for promoting ecological protection, operational efficiency, and personnel awareness. These programs integrate conservation practices, resource efficiency, and stakeholder collaboration while aligning with national environmental laws and Navy policies. Survey results indicate that respondents perceive the programs as effective in reducing operational environmental impact, improving compliance and awareness, and supporting long-term sustainability and public accountability. Despite these achievements, challenges such as inadequate funding, limited personnel training, high operational workload, and inconsistent stakeholder engagement must be addressed. A structured implementation plan targeting these areas can enhance program effectiveness, optimize resource utilization, and foster sustainable environmental stewardship within naval operations.

### Objectives

This plan aims to:

1. Reduce operational environmental impacts, including waste, pollution, and resource overuse.
2. Enhance personnel compliance, knowledge, and eco-friendly behavior in line with environmental policies.
3. Improve operational efficiency and accountability through sustainable practices.
4. Strengthen community and stakeholder collaboration for environmental programs.
5. Integrate sustainability practices into daily naval operations and unit planning.
6. Build capacity among personnel through training, professional development, and engagement initiatives.
7. Address barriers and challenges to ensure smooth implementation of environmental sustainability programs.

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