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Research Article

Optimizing Maritime Safety: A Case Study of Annual General Inspections in Coast Guard District North Western Luzon

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Abstract
This study aims to provide a comprehensive analysis of the implementation of Philippine Coast Guard's core functions within the Coast Guard District North Western Luzon. Using a mixed research method and explanatory-sequential research design, the research identified the differences of the core functions of the guidelines and procedures for the Philippine Coast Guard implementation among the inspectors of the Philippine Coast Guard in District North Western Luzon Stations. Findings revealed that there was a well-implemented level of implementation of the guidelines and procedures for the Philippine Coast Guard's core functions in terms of maritime safety, search and rescue, maritime security and law enforcement and marine environmental protection. Significant difference was found in terms of the regular safety inspections of life-saving equipment like lifeboats and life vests and maritime security and law enforcement in terms of well-maintained weapons and defense systems to support law enforcement activities and properly implemented the proper procedures for handling and detaining individuals involved in illegal activities. The challenges encountered by in terms of maritime safety and search and rescue includes lack of equipment and support, personnel shortage and communication problems. Challenges in terms of maritime security and law enforcement includes inter-agency coordination barriers, insufficient mod ern equipment and the need for training and drills while challenges in terms of marine environmental protection were lack of equipment for marine environmental response, gaps on environmental laws and weak marine protection partnership. Based on the results, the study suggested for a strengthened standard operating procedure that focuses on equipment modernization and maintenance, protocols on communication channels, interagency collaboration mechanisms and the provision of continuous drills and training for the PCG personnel.
Keywords: Annual General Inspection, Maritime Safety, Search and Rescue, Maritime Security and Law Enforcement, Marine Environmental Protection.

Introduction

The Philippine Coast Guard (PCG) main function is to protect and ensure the safety of the country against the entry of unauthorized foreign vessels into the Port State Control (PSC) of the country. In accordance to the Republic Act 9993 or the Act Establishing the Philippines Coast Guard as an Armed and Uniformed Service are mandated to enforce regulations following maritime international conventions and treaties approved by the government. This includes the assurance of MARSAF function to help prevent unnecessary loss of lives and properties at sea, to issue permits and supervises all marine salvage operations and to tow floating hazards such as illegal fish traps and vessels (coastguard.gov.ph). In the context of the Sustainable Development Goals (SDGs), the universal call to action to protect and ensure the planet's peace and maritime is emphasized under In SDG 14 (life below water) and SDG 16 (peace, justice, and strong institutions). These goals highlighted the importance of sustainable maritime practices through maritime safety, security and environmental protection (undp.org). According to Linner *et al.,* (2023), SDG 14 and SDG 16 needs to be understood to have an effective, transparent and successful ocean governance. The interactions of these two SDG's are crucial in establishing the peace in the ocean realm. This will be possible by improving governance and enhancing the maritime agencies operational capabilities which is also covered under the Philippine Development Plan (PDP). This key document shapes the country's policy direction specifically in maritime governance priorities of the Philippines which set clear strategic priorities focus on long-term sustainability and comprehensive governance (Ganadillo, 2023).

Moreover, this highlights the importance of ensuring maritime safety of PCG. This study aims to address research gaps on the evaluation of maritime safety focus on its various core functions, including search and rescue, law enforcement, environmental protection, and maritime security this research paper, titled "Optimizing Maritime Safety: A Case Study of Annual General Inspection in Coast Guard District North Western Luzon" seeks to evaluate the effectiveness of these core functions during the Annual General Inspections (AGI). By analyzing data from AGI, this study also aims to determine the challenges in ensuring maritime safety of PCG to propose a standard operating policy and procedure to improve the implementation and enforcement of maritime safety and overall operations of PCG District North Western Luzon. This study aims to provide a comprehensive analysis of the implementation of Philippine Coast Guard's core functions within the Coast Guard District North Western Luzon.

By evaluating these, the research seeks to identify strengths, areas for improvement, and best practices. The insights gained from this evaluation can inform strategies to enhance overall operational effectiveness and efficiency, ensuring that the coast guard can better fulfill its mission of safeguarding maritime safety, security, and environmental protection. This study also aligned to the Philippine College of Criminology (PCCR) in terms of their commitment in research studies for the good of the public and the country. By exploring the evaluation of PCG implementation of maritime safety, also values the PCCR core values such as passion, integrity and excellence in providing innovation and improvement fostering growth, productivity and service efficiency.

Literature Review

The international and local maritime is governed by International Maritime Organization (IMO) to ensure maritime safety practices worldwide. The European Maritime Safety Agency (EMSA) and the US Coast Guard emphasized the need for vessel inspections and technological advancements in compliance with the protocols and regulatory standards. The enactment of the Coast Guard Law of 2009 also known as Republic Act No. 9993 and its Implementing Rules and Regulations, the Philippine Coast Guard has been vested with the necessary authority and responsibility to perform preventive measures in ensuring the safety of merchant vessels. PCG plays a pivotal role in enforcing maritime laws, conducting rescue operations, and ensuring environmental protection. The PCG's responsibilities include implementing national and international maritime safety regulations, which cover vessel inspections, crew certifications, pollution prevention measures, and search and rescue operations. The effectiveness of the PCG in these areas is critical to minimizing accidents and casualties at sea.

This study aims to determine if vessels comply with safety standards, identify potential hazards, and enforce corrective actions. This process not only safeguards human lives but also protects the marine environment from pollution. A pertinent example is the oil spill in Oriental Mindoro when MT Princess Empress sank in early 2023, the MT Princess Empress, an oil tanker, sank off the coast of Oriental Mindoro, Philippines, causing a significant oil spill that damaged marine ecosystems and impacted local communities reliant on fishing and tourism. This incident revealed gaps in maritime safety regulations and enforcement and highlighted the need for improved emergency response mechanisms. Recommendations include strengthening vessel inspection protocols, enhancing crew training on safety procedures and emergency response, improving oil spill response plans and readiness, enforcing strict maritime regulations, and investing in technology for real-time monitoring and early hazard detection.

The PDP 2023-2028 is a plan for deep economic and social transformation to reinvigorate job creation and accelerate poverty reduction by steering the economy back on a high-growth path. This growth must be inclusive, building an environment that provides equal opportunities to all Filipinos, and equipping them with skills to participate fully in an innovative and globally competitive economy. Enabling environment focus on the expand and upgrade infrastructure which consider the inaccessible and unsafe transport facilities under roads, waterways and others. Enabling economic transformation builds on sustainable, resilient, integrated, and modern infrastructure systems as a solid foundation. Anchored on the long-term vision, the government will steer the nation toward a future where movement of people and goods is safely and efficiently facilitated by adequate and accessible transportation. Filipinos are empowered through cost-effective and reliable flow and exchange of information and are able to partake opportunities in the digital economy. Families have access to safe and adequate water and sanitation services; to reliable, clean, and affordable fuel and electricity; and to quality education, health, solid waste management, and other social infrastructure facilities. Communities and industries are served by green infrastructures that are not only adaptive and resilient against shocks and natural disturbances, but also contribute toward a low-carbon future. Another is the ensuring peace and security and enhance administration of justice. A secure and

peaceful community where guns are silenced, food and basic services are sufficient, and community life has normalized and shown signs of progress-this reality is now within the reach of geographically isolated and conflict-affected communities. In pursuing economic transformation, the manifestation of peace and security is a necessary condition in allowing the implementation of development activities that could bring in more and better opportunities for the people. This is attainable if conflict-vulnerable areas are protected and developed, the quality of life is safeguarded from criminality, and communities are safe from natural hazards and other security threats. Likewise, an efficient administration of justice is critical in ensuring sustained economic progress. A stable and accountable justice system, whether traditional or alternative, must inspire trust and confidence among stakeholders through integrity, fairness, and accessibility.

The Philippine Development Plan (PDP) 2023–2028 puts forward the premise that a whole-of government approach with cross-cutting strategies is required in ensuring peace and security. It asserts that economic justice is a pillar of a strong and vibrant economy and requires a sector-based approach anchored on strong coordination among justice sector institutions, agencies, and actors to drive public engagement and trust in the justice system. And also, the practice of good governance and improve bureaucratic efficiency by achieving a prosperous, inclusive, and resilient society through economic transformation requires the practice of open, efficient, and accountable governance. In this desired future, citizens, civil society organizations, and the private sector are able to access clear and capable platforms that effectively receive and respond to their agenda at all levels of government. Citizen participation is inclusive, fair, and empowering, allowing Filipinos to transact conveniently with the government through digital technologies and maximizing the benefits of an integrated and productive bureaucracy. Furthermore, public servants are agile, resilient, and accountable; and citizens trust that they will consistently perform at the highest levels of inclusion, productivity, and integrity. This chapter presents the challenges facing good governance and bureaucratic efficiency as well as the outcomes to be pursued to address these challenges during the plan period. These outcomes are: (a) participatory governance deepened; (b) public accountability and integrity bolstered; (c) government functions, systems, and mechanisms rationalized and strengthened; and (d) competent, motivated, agile, and resilient public servants supported (pdp.depdev.gov.ph).

Coast Guard Inspector General and Internal Affairs Service play a pivotal role in ensuring operational integrity by conducting proactive inspections and audits of all PCG personnel, units, facilities, and properties. These assessments are formalized through Annual General Inspections (AGIs), which rigorously evaluate compliance with laws, regulations, policies, and service standards within Philippine Coast Guard especially that it is entrusted with critical responsibilities including maritime safety, maritime search and rescue, maritime law enforcement and security, and marine environmental protection. This study aims to provide a comprehensive analysis of the implementation of Philippine Coast Guard's core functions within the Coast Guard District North Western Luzon.

The Philippine Coast Guard (PCG) critical function to safeguard the nation’s safety that is free from illegal activities and marine pollution also faces challenges and issues including political and jurisdictional, qualified personnel shortage and major problem on port congestion which affects the Philippine economy. Gap on the effective maritime policy were emphasized on the cited literatures wherein significant challenges remain despite the government effort to address the maritime challenges and issues. Torrecampo also emphasized the Blue Economy Act which was proposed to address these issues through sustainable maritime practices. The solid foundation of international regulations for maritime safety were highlighted but the implementation in the Philippines still needs to address these challenges to ensure maritime safety and efficiency.

Maritime safety is vital for protecting lives, vessels, and the marine environment, with the Philippine Coast Guard playing a crucial role through vessel inspections, maritime law enforcement, search and rescue operations, and environmental protection. Studies highlight the positive impact of the PCG's regular inspections and law enforcement in reducing accidents and improving safety standards. However, challenges such as limited resources and outdated equipment persist, as noted by the National Maritime Polytechnic report, which recommends increased government support and enhanced training programs. Further studies emphasize the need for continuous improvement in maritime safety practices. Some studies point out the necessity for stricter enforcement of safety management systems among Philippine-flagged vessels, while the University of the Philippines Marine Science Institute underscores the importance of well-trained personnel in preventing and responding to marine pollution incidents. Moreover, research highlights improvements in SAR operations due to better training and coordination, while suggesting that adopting international standards and advanced inspection systems can further enhance PCG's effectiveness.

Overall, these studies indicate that while the PCG has made substantial strides in improving maritime safety through its core functions, ongoing efforts in training, technology upgrades, and international cooperation are essential for optimizing maritime safety in the Philippines. This case study aims to assess the implementation of these core functions during the Annual General Inspection to identify areas for further enhancement and ensure the PCG's continued effectiveness in safeguarding maritime safety.

Theoretical Framework

The study was anchored with the Systemic Theoretical Process Analysis (STPA) model by Professor Nancy Leveson (2002). This model was used for hazard analysis and accident prevention based on the identification of causal scenarios. This model is the most appropriate in this study because it provides a comprehensive framework in understanding level of implementation of the guidelines and procedures for the Philippine Coast Guard's core functions in terms of Maritime safety, search and rescue, maritime security and law enforcement and marine environmental protection within the Coast Guard District North Western Luzon to proposed standard operating policy and procedure for PCG. This model was used by Wróbel, Montewka and Kujala (2018) in their study on the development of safety assessment for autonomous merchant vessels which highlighted the use of the system-theoretic model suitable for safety analysis for autonomous vessels. Aps *et al.,* (2017) also used this model in maritime traffic safety management in the Gulf of Finland (Baltic Sea) wherein STPA identified hazards and potentially unsafe ships in accordance to IMO which was efficient in ship level situational update.

Conceptual Framework

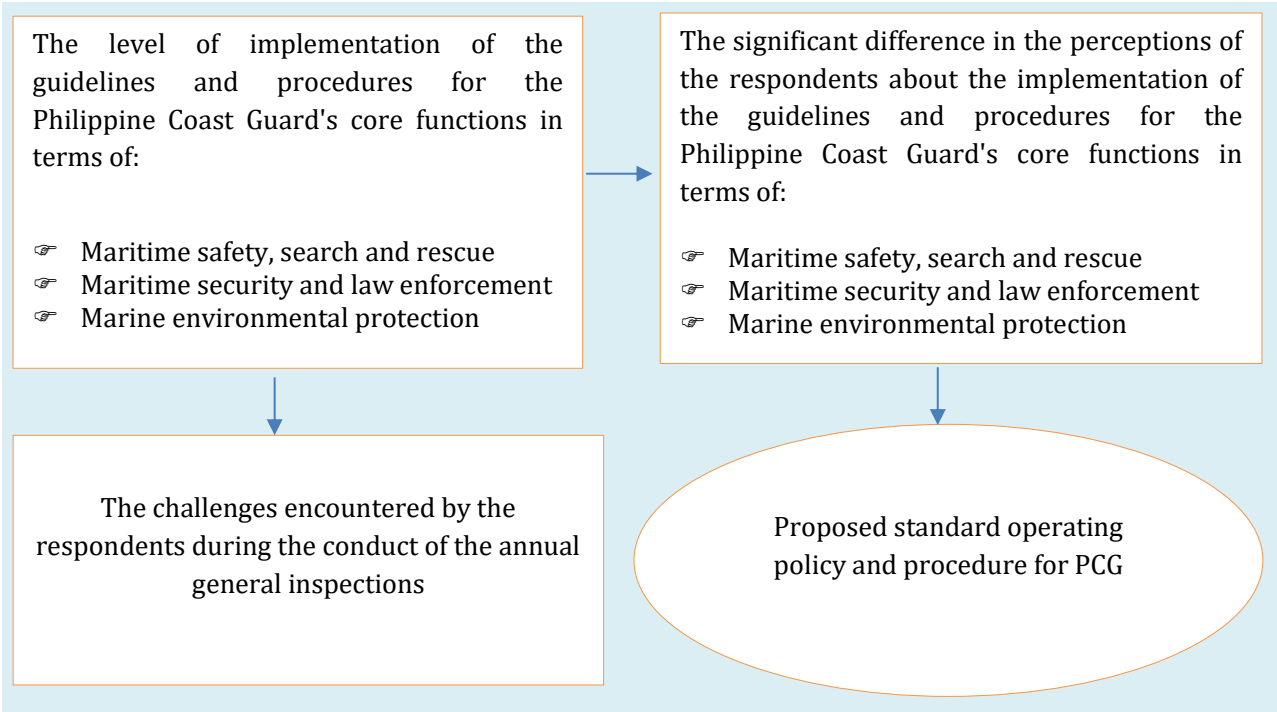

Figure 1. The conceptual paradigm of the study.

Above is the conceptual framework that guides the data collection and analysis and helps formulate targeted recommendations of the study illustrating the Philippine Coast Guard's core functions and the relationship of independent and dependent variables.

The first box presented the independent variables of the study which was the level of implementation of the guidelines and procedures for the Philippine Coast Guard's core functions in terms of maritime safety, search and rescue, maritime security, law enforcement and marine environmental protection. The second box presented the dependent variable which was the challenges encountered during the annual general inspections. The study assessed how the level of implementation of the guidelines and procedures for the Philippine Coast Guard's core functions in terms of maritime safety, search and rescue, maritime security, law enforcement and marine environmental protection differs in each PCG stations and how this implementation contributed the challenges encountered during the annual general inspections. This framework illustrates how the Philippine Coast Guard's operations are implemented and challenged in the

conduct of the annual general inspections. The level of implementation on the maritime core functions was the basis for the proposed standard operating policy and procedure for PCG.

Significance of the Study

The following will benefit from the findings of the study:

- Philippine Coast Guard (PCG): The findings will help identify areas for improvement in their core functions, such as vessel inspections, maritime law enforcement, search and rescue (SAR) operations, and environmental protection. This can lead to more effective policies and strategies to enhance overall maritime safety.
- Government Agencies: Government bodies responsible for maritime safety and resource allocation will benefit from the study's recommendations on increasing support for the PCG, upgrading inspection technologies, and enhancing training programs. This will ensure that the PCG is well-equipped and trained to perform its duties.
- Maritime Industry: Shipping companies, vessel operators, and maritime workers will benefit from improved safety standards and practices. The study's emphasis on strict enforcement of safety management systems (SMS) and the adoption of advanced inspection systems can reduce accidents and enhance operational efficiency.
- Maritime Training Institutions: Institutions like the National Maritime Polytechnic (NMP) will gain insights into the specific training needs of PCG personnel, enabling them to tailor their programs to address gaps and enhance the competencies of maritime professionals.
- Local Communities: Coastal communities that depend on the maritime industry will benefit from safer maritime operations and better environmental protection measures. The study's focus on preventing and responding to marine pollution incidents will help safeguard the marine environment and local livelihoods.

Statement of the Problem

The objectives of this study were to assessed the level of implementation of the Philippine Coast Guard's core functions in terms of maritime safety, search and rescue, maritime security, law enforcement and marine environmental protection and the challenges encountered during the annual general inspections to proposed a standard operating policy and procedure to enhance the delivery of service of the Philippine Coast Guard District North Western Luzon.

To do this, the following are the aim of the study:

1. Assess the level of implementation of the guidelines and procedures for the Philippine Coast Guard's core functions in terms of:

1.1. Maritime safety, search and rescue;
1.2. Maritime security and law enforcement; and
1.3. Marine environmental protection.

2. Analyze the significant difference in the perceptions of the respondents among the above-mentioned variables when grouped according to the different coast guard stations.

3. Identify the challenges encountered by the respondents during the conduct of the annual general inspection?

4. Proposed a standard operating policy and procedure based on the findings of the study.

Methodology

This chapter presents the research method, design, population and locale of the study, scope and limitation, data gathering tools, data gathering procedure, treatment of data, ethical considerations and dissemination of findings.

Research Design

The study used a mixed method or the qualitative and quantitative research method using an explanatory-sequential research design in analyzing the annual general inspections within the Coast Guard District North Western Luzon. Explanatory-sequential research design was also used to identify the differences of the core

functions of the guidelines and procedures for the Philippine Coast Guard implementation using quantitative data collection and qualitative analysis to substantiate the results of the gathered data. This design was suited to the study because it involves analyzing the quantitative and qualitative data of the annual general inspections core functions in terms of maritime safety, search and rescue, maritime security and law enforcement and marine environmental protection and their challenges encountered within the Coast Guard District North Western Luzon.

Research Method

A mixed-method approach is a research methodology that has its own philosophical assumptions and methods of inquiry and includes philosophical assumptions to provide directions for the collection and analysis of data from multiple sources in a single study interweaving qualitative and quantitative data for an in-depth understanding (Dawadi *et al.,* 2021). This method is appropriate in the study because it quantified the level of the implementation of the guidelines and procedures for the Philippine Coast Guard's core functions and to analyze the challenges encountered during the annual general inspection and substantiate with qualitative data to provide sufficient and in-depth understanding of the findings.

Population of the Study

There were 159 total population of the study which includes the Philippine Coast Guard personnel of the four (4) coast guard stations. The sample size of the study was computed using 95% confidence level and 5% margin of error. The total number of sample size in this study was 113 inspectors of Philippine Coast Guard in District North Western Luzon Stations for the quantitative data and there were 15 participants for the qualitative data. There was one group of respondents for quantitative and qualitative sample size. The main group was 113 inspectors for quantitative study with a subset group of 15 supervisors and commanders for qualitative data.

The inclusion criteria are those official and active personnel of Philippine Coast Guard assigned to the four (4) coast guard stations in District North Western Luzon namely Ilocos Norte, Ilocos Sur, La Union and Pangasinan Coast Guard Stations. The inclusion also includes those personnel who were at least one year designation as inspectors and or directly involved in the implementation of the PCG core functions in terms of maritime safety, search and rescue, maritime security and law enforcement and marine environmental protection. For the qualitative data, there were 15 supervisors and commanders who were willing and voluntarily participated in the interview. The exclusion criteria of the respondents include those PCG personnel with less than one year designation, personnel on leave or in training, those who were not directly involved in field inspections or the implementation of core PCG functions and those who refused to give consent or declined their participation in the study.

Data Gathering Tools

To obtain the data needed to determine the level of implementation of maritime safety on the annual general inspections in Coast Guard District North Western Luzon, the researcher used a semi-structured survey questionnaire and interview guide questions as the instruments which adapted by the researcher in the AGI Checklist for DCS for Maritime Safety Services, CG8, and AGI Checklist for DCS for Marine Environmental Protection, CG-9. This adapted instrument has been developed by the researcher with modifications aligned to the research objectives and quantitative research method of the study. The survey questionnaire consists of two parts survey questionnaires wherein the first part of the survey questionnaire focuses on the core function of the Philippine Coast Guard's guidelines and procedures in terms of maritime safety, search and rescue, maritime security and law enforcement, and marine environmental protection. The second part of the survey identified the specific challenges encountered by the PCG personnel during their annual general inspections in the Coast Guard District North Western Luzon.

The interview guide questions were composed of questions that were also focus on the core function of the Philippine Coast Guard's guidelines and procedures in terms of maritime safety, search and rescue, maritime security and law enforcement, and marine environmental protection. Questions were also included that related to the specific challenges encountered by the PCG personnel during their annual general inspections in the Coast Guard District North Western Luzon. The research instrument was validated by a panel of expert in maritime safety inspection administrators and a statistician to ensure that it aligns with the study's purpose and that the survey is reliable and valid so that it accurately measures the study's variables. The study conducted a reliability testing and gathered data were analyzed using Cronbach alpha of 0.05 among 20 respondents on the same characteristics of the respondents from different PCG District and revealed a reliability test of ≥ 0.7 which indicate an acceptable to excellent internal inconsistency of survey questions.

Data Gathering Procedure

The researcher followed certain procedures in gathering the data of this study. The researcher primarily handed in a letter of permission to conduct the study to the commander of the PCG stations in the Coast Guard District North Western Luzon. The researcher was personally explained and administered the survey and interview to the identified respondents and participants of the study. The analysis of the data gathered were processed immediately using statistical and thematic analysis. A statistician was assisted the researcher in a more accurate interpretation and analysis.

Treatment of Data

The data gathered were analyzed through the statistical and thematic analysis and findings were presented in tabular and through the themes based from the results of the gathered data. Median was used to describe the variables in the study to determine the level of implementation on the core function of the Philippine Coast Guard's guidelines and procedures in terms of maritime safety, search and rescue, maritime security and law enforcement, and marine environmental protection and the specific challenges encountered by the PCG personnel during their annual general inspections in the Coast Guard District North Western Luzon.

Frequency, percentage and rank were used to present the quantitative data of the challenges encountered by the PCG personnel during their annual general inspections. Kruskal–Wallis test was used to determine the significant difference on the core function of the Philippine Coast Guard's guidelines and procedures in terms of maritime safety, search and rescue, maritime security and law enforcement, and marine environmental protection when grouped according to their stations. Thematic analysis was used to analyzing qualitative data from the interview conducted. Thematic analysis is a highly popular technique which usually comprises thick descriptive data (Naeem *et al.,* 2023). The study applied the Braun and Clarke's thematic analysis which composed of six-phase: familiarization with data; generating initial codes; searching for themes; reviewing themes; defining and naming themes and writing the report (Ashmed *et al.,* 2025).

Ethical Considerations

The researcher adhered to ethical principles throughout the research study to ensure anonymity and respondents confidentiality. Informed consent discussed to the respondents before the survey. The purpose of the study also explained to the respondents to ensure their voluntary participation. The respondents have the right to withdraw from the study at any time without consequences.

Dissemination of the Research Outcome

The researcher followed the proper procedure in disseminating the results of the study to ensure that ethical considerations were also followed and to ensure the findings will be significant among its beneficiaries. After the final defense and incorporations of necessary adjustments, the researcher will submit the research paper for publication review in academic journals a and ask permission to the PCG Commander to present the proposed standard operating policy and procedure for PCG.

Results and Discussion

This chapter presents the results and discussion as well as the analysis and interpretation of the data gathered.

Table 1 presents the level of implementation of the guidelines and procedures for the Philippine Coast Guard's core functions in terms of maritime safety, search and rescue which revealed a median of 4.00 which interpreted as "Well Implemented" across indicators. This supports Pangandaman (2022) that Philippine Coast Guard is excellent in ensuring safe and clean sea in adherence to its protocols and its continued commitment to deliver reliable and effective maritime services for the Philippines. This implies that though the PCG has established and maintained well the compliance with its guidelines and procedures for the core functions in terms of maritime safety, search and rescue across all indicators. These results align with the International Maritime standards which indicate that safety, prevention, and proper training should be part of regular inspection and maintenance (IMO, 2023). The need to maintain communication protocols and safety equipment checks were essential for search and rescue readiness. This support Reyes (2020), Mendoza (2019) and Monje (2013) that enforcement of maritime laws enhanced response times and effectiveness of SAR coordination. In addition, De la Cruz (2018) emphasized that consistent updates were necessary for sustained well-implemented status of SAR operations. Communication protocols and advanced technologies were important in SAR such as satellite systems, drones (Santos, 2018). This implies that the well-implemented maritime safety and search and rescue (SAR) core functions reflects the agency confidence and high compliance aligned with the standards to ensure sustainable marine safety and effective

institutional governance. These findings suggest that the PCG should maintain regular policy updates and inter-agency coordination to address gaps in terms of maritime safety and search and rescue (SAR) core functions.

Table 1. The level of implementation of the guidelines and procedures for the Philippine Coast Guard's core functions in terms of maritime safety, search and rescue.

Maritime safety, search and rescue (SAR) core functions	**Ilocos Sur station**	**Ilocos Norte station**	**Pangasinan station**	**La Union station**	**Overall Mdn**	**Interpretation**
	Mdn	**Mdn**	**Mdn**	**Mdn**		
1) Life-saving equipment like lifeboats and life vest are regularly undergo safety inspections.	4.00	4.00	4.00	4.00	4.00	Well implemented
2) The search and rescue operations strictly follow the set PCG guidelines and protocols.	4.00	4.00	4.00	4.00	4.00	Well implemented
3) The PCG performed scheduled emergency preparedness drills as per the standard procedure.	4.00	4.00	4.00	4.00	4.00	Well implemented
4) The trained personnel are sufficient for emergency response and search and rescue operations.	4.00	4.00	4.00	4.00	4.00	Well implemented
5) Strict compliance on SAR communication protocols were followed during operations.	4.00	4.00	4.00	4.00	4.00	Well implemented
6) The search and rescue equipment are well-maintained and 100% functional.	4.00	4.00	4.00	4.00	4.00	Well implemented
7) Effective coordination among the search and rescue teams are evident.	4.00	4.00	4.00	4.00	4.00	Well implemented
8) The implementation of passenger safety measures for passenger vessels are strictly monitored.	4.00	4.00	4.00	4.00	4.00	Well implemented
9) All PCG vessels adhere to safety guidelines including capacity and load distribution.	4.00	4.00	4.00	4.00	4.00	Well implemented
10) There is a regular review and update on the safety management system for SAR.	4.00	4.00	4.00	4.00	4.00	Well implemented
Median	**4.00**	**4.00**	**4.00**	**4.00**	**4.00**	**Well implemented**

As gleaned in Table 2, the level of implementation of the guidelines and procedures for the Philippine Coast Guard's core functions in terms of maritime security and law enforcement with median of 4.00 which was interpreted as "Well Implemented". This implies that, while PCG found to have a well implemented core functions in terms of maritime security and law enforcement across indicators. This study was in adherence of operational protocols aligned with the mandates of Republic Act No. 9993 which maintain the maritime safety and security. This underscores the PCG Strategic Plan 2020–2028 which emphasized enforcement readiness and inter-agency coordination in improving the operational performance aligned in the Philippine Development Plan's (PDP). This was aligned with Ganadillo (2023), and Linner *et al.,* (2023) on the integration of security and law enforcement and strengthening maritime rule. This implies that the well-implemented core functions in terms of maritime security and law enforcement demonstrated the PCG commitment in upholding security and enforcement operations.

Although the PCG found to have a well implemented core functions in terms of maritime security and law enforcement across indicators, NMP Report (2019) highlighted the problems on outdated equipment and lack of training in the PCG. This also in contrast with De la Cruz (2018) on uneven implementation and the need for strengthened intervention and the under-reporting of maritime accidents and inspection reports that overstate PCG performance (Psarros *et al.,* 2010). Furthermore, while the findings of this study affirm a well implemented core functions in maritime security and law enforcement, the cited literature and studies revealed challenges which consider the need for comparative analysis of both quantitative and qualitative

data to be able to identify the strong and weak points on the implementation of maritime security and law enforcement. This is to ensure that the implementation practices sustained and ensure long-term effectiveness.

Table 2. The level of implementation of the guidelines and procedures for the Philippine Coast Guard's core functions in terms of maritime security and law enforcement.

Maritime security and law enforcement	**Ilocos Sur station**	**Ilocos Norte station**	**Pangasinan station**	**La Union station**	**Overall Mdn**	**Interpretation**
	Mdn	**Mdn**	**Mdn**	**Mdn**		
1) The PCG is compliant to vessel inspections with the maritime security guidelines.	4.00	4.00	4.00	4.00	4.00	Well implemented
2) There is effective enforcement on the security measures against illegal activities.	4.00	4.00	4.00	4.00	4.00	Well implemented
3) There is an effective vessel traffic management system (VTMS) to ensure maritime security.	4.00	4.00	4.00	4.00	4.00	Well implemented
4) There is a quick response for violators of maritime law during inspection.	4.00	4.00	4.00	4.00	4.00	Well implemented
5) The standard law enforcement procedures are strictly followed by the coastal patrol.	4.00	4.00	4.00	4.00	4.00	Well implemented
6) There is a consistent implementation of port security measures.	4.00	4.00	4.00	4.00	4.00	Well implemented
7) The inspection for boarding of vessels is conducted in accordance with maritime law enforcement protocols.	4.00	4.00	4.00	4.00	4.00	Well implemented
8) There is proper coordination on maritime security operations between the PCG and other law enforcement agencies.	4.00	4.00	4.00	4.00	4.00	Well implemented
9) There are well maintained weapons and defense systems to support law enforcement activities.	4.00	4.00	4.00	4.00	4.00	Well implemented
10) The PCG properly implemented the proper procedures for handling and detaining individuals involved in illegal activities.	4.00	4.00	4.00	4.00	4.00	Well implemented
Median	**4.00**	**4.00**	**4.00**	**4.00**	**4.00**	**Well implemented**

Presented in Table 3 the level of implementation of the guidelines and procedures for the Philippine Coast Guard's core functions in terms of marine environmental protection with median 4.00 which was interpreted as “Well Implemented”. This means that the PCG personnel agreed that the guidelines and procedures for the Philippine Coast Guard's core functions in terms of marine environmental protection was well implemented across indicators. This aligned to the effort conducted by the PCG in partnership with Department of Environment and Natural Resources (DENR) by enforcing environmental laws in Manila Bay. This implies that though the PCG core functions in terms of marine environmental protection across indicators were well implemented.

These findings affirmed that the agency preparedness strengthens its marine environmental protection commitment. This aligned with the International Maritime Organization (IMO) that prevention and control measures reflect the implementation of standards and policies. Moreover, this supports the study of Santos (2021) and Reyes (2020) that the PCG inspections enhanced pollution control and maximize law enforcement outcomes and the its positive impact in ensuring protocol compliance. The environmental protection training enables PCG staff to be more capable on building public trust and strong community partnerships collaboration (Torrecampo, 2024). These findings implies that the PCG competence on implementing well-implemented environmental protection corresponds to their reinforcement of strategic

inter-agency collaboration and sustainable marine ecosystem conservation and governance. This served as the framework of the PCG in integrating practices on marine environmental protection.

Table 3. The level of implementation of the guidelines and procedures for the Philippine Coast Guard's core functions in terms of marine environmental protection.

Marine environmental protection	**Ilocos Sur station**	**Ilocos Norte station**	**Pangasinan station**	**La Union station**	**Overall Mdn**	**Interpretation**
	Mdn	**Mdn**	**Mdn**	**Mdn**		
1) Response measures for oil spill are fully implemented.	4.00	4.00	4.00	4.00	4.00	Well implemented
2) All inspected vessels followed protocols for waste disposal and pollution control.	4.00	4.00	4.00	4.00	4.00	Well implemented
3) There is an active enforcement on marine pollution prevention guidelines in daily operations.	4.00	4.00	4.00	4.00	4.00	Well implemented
4) There is regular monitoring to detect signs of pollution in the marine environment.	4.00	4.00	4.00	4.00	4.00	Well implemented
5) The PCG complies with marine environmental protection laws by vessels.	4.00	4.00	4.00	4.00	4.00	Well implemented
6) Marine environmental protection training is regularly conducted to the crew and staff.	4.00	4.00	4.00	4.00	4.00	Well implemented
7) There is a quick respond to marine pollution incidents such as oil spills and hazardous waste.	4.00	4.00	4.00	4.00	4.00	Well implemented
8) There is a sufficient equipment for marine environmental protection that are 100% functional during inspections.	4.00	4.00	4.00	4.00	4.00	Well implemented
9) There is a strong collaboration to protect marine ecosystems among the with local communities.	4.00	4.00	4.00	4.00	4.00	Well implemented
10) The PCG promote marine conservation and protection on biodiversity through different strategies.	4.00	4.00	4.00	4.00	4.00	Well implemented
Median	**4.00**	**4.00**	**4.00**	**4.00**	**4.00**	**Well implemented**

Table 4 shows the overall level of implementation of the Philippine Coast Guard's core functions perceived by the 113 PCG personnel which revealed a median of 4.00 which was interpreted as "Well Implemented". The core functions in terms of maritime safety, search and rescue, maritime security and law enforcement and marine environment protection were well implemented indicating that PCG North Western Luzon personnel were highly effective in implementing the guidelines and procedures on PCG core functions. This finding was in accordance to the study of Abanilla (2024) which evaluated the Philippine Coast Guard (PCG) pivotal role in enforcing maritime criminal laws and safeguarding maritime security, safety, and environmental protection through effective law enforcement. Wu *et al.,* (2019) and Kim and Cha (2020) highlighted the importance of inspections in improving operations and assurance of safety management. Reyes (2020) and Santos (2021) also concluded that SAR and law enforcement inspections prevent accidents.

However, the findings of the study were in contrast to the study of Jensen *et al.,* (2015) where gaps in the implementation still persist suggesting that perceived the implementation effectiveness cannot be measured merely by uniform compliance. The under-reporting of maritime accidents highlighted by Psarros *et al.,* (2010) mask operational weaknesses and the limited resources, outdated equipment and weak enforcement of safety management systems emphasized by the NMP Report (2019) and De la Cruz (2018) hinder the effectiveness of safety protocols implementation. Taken together, these findings indicate that while the PCG personnel in North Western Luzon was revealed to be well implemented, corroborating studies emphasize

that effectiveness of implementation requires sustained training, investment in modern equipment, strict compliance on maritime safety standards. These implies that well systematic implementation of the PCG stations of North Western Luzon District reflect its operational excellence across all core functions that may serve as a benchmark and best-practice.

Table 4. Summary of statistics for Philippine Coast Guard's core functions.

Philippine Coast Guard's core functions	**n**	**Median**	**Interpretation**
Maritime safety, search and rescue	113	4.00	Well implemented
Maritime security and law enforcement	113	4.00	Well implemented
Marine environmental protection	113	4.00	Well implemented
Median	-	**4.00**	**Well implemented**

As gleaned in Table 5, the difference in the perceptions of the respondents among the Philippine Coast Guard's core functions in terms of maritime safety, search and rescue. The findings revealed that among the ten indicators, the respondents perceived statistically significant different in terms of the statement, *"Life-saving equipment like lifeboats and life vests are regularly undergoing safety inspections"* with a p-value of 0.004 lower than 0.05 level of significance. This difference implies that coast guard stations differed in their actual implementation of safety inspections. This aligns with the importance given by the International Maritime Organization (IMO) and the Safety of Life at Sea (SOLAS) Convention, which emphasize the critical role of equipment readiness in ensuring passenger and crew safety.

Moreover, other indicators revealed a p-values greater than 0.05 which means there were no significant differences in the respondents' perceptions in PCG core functions in terms of maritime safety, search and rescue. This implies that PCG personnel relatively perceived uniform implementation on maritime safety, search and rescue particularly on the strictly compliance of PCG guidelines and protocols, scheduled emergency preparedness drills, sufficient personnel for emergency response and search and rescue operations, strict compliance on SAR communication protocols, well-maintained and functional SAR equipment, effective coordination, strict monitoring on passenger safety measures, adherence to safety guidelines and regular review and update on the safety management system for SAR.

Overall, the Philippine Coast Guard has consistently practice effective maritime safety and SAR protocols. However, the significant difference in terms of the inspection of life-saving equipment underscores the need for consistency and standardized safety inspection protocols and enforcement across all stations which suggest for a development of standard operating policy and procedure in inspections.

Table 5. The difference in the perceptions of the respondents in terms of maritime safety, search and rescue.

Philippine Coast Guard's core functions maritime safety, search and rescue	**Test statistic**	**p-value**
1) Life-saving equipment like lifeboats and life vest are regularly undergo safety inspections.	13.249*	0.004
2) The search and rescue operations strictly follow the set PCG guidelines and protocols.	4.795 ns	0.187
3) The PCG performed scheduled emergency preparedness drills as per the standard procedure.	7.748 ns	0.052
4) The trained personnel are sufficient for emergency response and search and rescue operations.	3.459 ns	0.326
5) Strict compliance on SAR communication protocols were followed during operations.	1.708 ns	0.635
6) The search and rescue equipment are well-maintained and 100% functional.	3.667 ns	0.300
7) Effective coordination among the search and rescue teams are evident.	1.947 ns	0.583
8) The implementation of passenger safety measures for passenger vessels are strictly monitored.	7.411 ns	0.060
9) All PCG vessels adhere to safety guidelines including capacity and load distribution.	2.586 ns	0.460
10) There is a regular review and update on the safety management system for SAR.	7.013 ns	0.071

Table 6. The post hoc test analysis for maritime safety, search and rescue.

Indicator	Coast guard stations	Mean	Decision	Test statistic	Asymp. Sig.
Life-saving equipment like lifeboats and life vest are regularly undergo safety inspections.	Ilocos Norte	3.87 [b]	Well implemented	13.249*	0.004
	Ilocos Sur	3.47[acd]	Well implemented		
	La Union	3.78[b]	Well implemented		
	Pangasinan	3.92[b]	Well implemented		

Table 6 present the post hoc test analysis for maritime safety, search and rescue which revealed that Coast Guard Ilocos Sur Station had relatively lower ratings in terms on the implementation of safety inspections of life-saving equipment compared to Coast Guard Stations in Ilocos Norte, La Union and Pangasinan. This indicates that although all coast guard stations perceived that they have a well implemented inspections for maritime safety, search and rescue, Ilocos Sur perceive the implementation less favorably which suggest that PCG personnel may have encountered challenges in the conduct of safety inspections compared to Coast Guard Stations in Ilocos Norte, La Union and Pangasinan which reflect differences in resources, supervision or operational practices.

The findings aligned with Reyes (2020) and Santos (2021) which emphasized that consistent PCG inspections lead to effective maritime safety operations. The lower implementation reflects the possible operational gaps and challenges in resources. Overall, the cornerstone of well-implemented inspections of maritime safety relies to its operational efficiency and consistency. The results that showed relatively lower implementation on Coast Guard Ilocos Sur Station underscore the need for strengthened and uniform standard operating policy and procedure that focus on regularly safety inspections particularly on life-saving equipment like lifeboats and life vest to enhance the implementation of maritime safety inspections across all coast guard stations.

Table 7. The difference in the perceptions of the respondents in terms of maritime security and law enforcement.

Philippine Coast Guard's core functions maritime security and law enforcement	Test statistic	p-value
1) The PCG is compliant to vessel inspections with the maritime security guidelines.	4.211 ns	0.240
2) There is effective enforcement on the security measures against illegal activities.	7.578 ns	0.056
3) There is an effective vessel traffic management system (VTMS) to ensure maritime security.	7.253 ns	0.064
4) There is a quick response for violators of maritime law during inspection.	1.000 ns	0.801
5) The standard law enforcement procedures are strictly followed by the coastal patrol.	5.291 ns	0.152
6) There is a consistent implementation of port security measures.	5.197 ns	0.158
7) The inspection for boarding of vessels is conducted in accordance with maritime law enforcement protocols.	3.857 ns	0.277
8) There is proper coordination on maritime security operations between the PCG and other law enforcement agencies.	1.720 ns	0.632
9) There are well maintained weapons and defense systems to support law enforcement activities.	9.047*	0.029
10) The PCG properly implemented the proper procedures for handling and detaining individuals involved in illegal activities.	10.752*	0.013

As gleaned in Table 7, the difference in the perceptions of the respondents among the Philippine Coast Guard's core functions in terms of maritime security and law enforcement. The findings revealed that among the ten indicators, the respondents perceived statistically significant different in terms of the statement, *"There are well maintained weapons and defense systems to support law enforcement activities"* and *"The PCG properly implemented the proper procedures for handling and detaining individuals involved in illegal activities*" with a p-value of 0.029 and 0.013 respectively lower than 0.05 level of significance. This difference implies that coast guard stations differed in their actual implementation of maintaining systems and handling and detaining individuals involved in illegal activities. The result also showed no significant

different on the implementation of maritime security and law enforcement particularly on PCG compliance to vessel inspections, effective enforcement on the security measures, and vessel traffic management system (VTMS), quick response for violators, strict adherence to standard law enforcement procedures, consistent implementation of port security measures, inspection in accordance with maritime law enforcement protocols and proper coordination on maritime security operations between the PCG and other law enforcement agencies. Moreover, this supports Knapp and Franses (2009) and Psarros *et al.,* (2010) that organizational and legal challenges still remain even with proper enforcement of international maritime conventions. This supports Buck (2016); Celik (2009) and Mba (2025) the need for improved systems and technological advancements the need for equipment upgrades and PCG personnel training (Reyes, 2020 and Mendoza, 2019). These significant differences found reflect inequalities in resources, operational readiness and lack of training among PCG units.

Table 8. The post hoc test analysis for maritime security and law enforcement.

Indicator	Coast guard stations	Mean	Decision	Test statistic	p-value
There are well maintained weapons and defense systems to support law enforcement activities.	Ilocos Norte	3.87 [b]	Well implemented	13.249*	0.004
	Ilocos Sur	3.47[acd]	Well implemented		
	La Union	3.78[b]	Well implemented		
	Pangasinan	3.92[b]	Well implemented		
The PCG properly implemented the proper procedures for handling and detaining individuals involved in illegal activities.	Ilocos Norte	3.87 [b]	Well implemented	13.249*	0.004
	Ilocos Sur	3.47[acd]	Well implemented		
	La Union	3.78[b]	Well implemented		
	Pangasinan	3.92[b]	Well implemented		

Table 8 present the post hoc test analysis for maritime security and law enforcement which revealed that Coast Guard Ilocos Sur Station had relatively lower ratings in terms well maintained weapons and defense systems to support law enforcement activities and properly implemented the proper procedures for handling and detaining individuals involved in illegal activities compared to Coast Guard Stations in Ilocos Norte, La Union and Pangasinan. This indicates that although all coast guard stations perceived that they have a well implemented inspections for maritime security and law enforcement, Ilocos Sur perceive the implementation less favorably which suggest that PCG Ilocos Sur personnel may have encountered challenges compared to PCG personnel from Ilocos Norte, La Union and Pangasinan which reflect differences in sustaining consistent enforcement capacity. These supports Reyes (2020) and Mendoza (2019) that PCG inspectors training, coordination and resources vary by station and that the NMP Report (2019) showed pressing concerns on outdated equipment and lack of resources which contribute to the struggle of stations. Standardized maritime enforcement is needed to overcome these disparities (Monje, 2013). Overall, consistent law enforcement capacity combined with sufficient resources, updated defense systems and training are essential to achieve an effective maritime security. The observed differences on maritime security and law enforcement particularly in Ilocos Sur underscore the need to address these encountered challenges to ensure that all coast guard stations maintain national mandates and global maritime security frameworks.

As gleaned in Table 9, the difference in the perceptions of the respondents among the Philippine Coast Guard's core functions in terms of marine environmental protection. The findings revealed that there is no significant difference on the respondent's perception showing all ten indicators achieved a p-value of higher than 0.05 level of significance which implies that acceptance of the null hypothesis indicating a consistent effort of the PCG across stations in promoting environmental protection and biodiversity conservation. This supports the study of Batalden and Sydnes (2014) which emphasized the alignment to international codes such as polar code in enhancing environmental protection like MARPOL and SOLAS to reduced maritime incidents (Knapp and Franses, 2009 and Psarros *et al.,* 2010). Necesario (2024) emphasized the alignment of PCG efforts and environmental conservation strategies to SDG 14 in ensuring sustainable use of marine

resources. This indicates that the PCG across stations has a consistent effort to safeguard biodiversity and marine ecosystems aligned to international and national regulations.

Table 9. The difference in the perceptions of the respondents in terms of marine environmental protection.

Philippine Coast Guard's core functions maritime security and law enforcement	**Test statistic**	**p-value**
1) Response measures for oil spill are fully implemented.	5.74ns	0.12
2) All inspected vessels followed protocols for waste disposal and pollution control.	3.44 ns	0.33
3) There is an active enforcement on marine pollution prevention guidelines in daily operations.	2.76 ns	0.43
4) There is regular monitoring to detect signs of pollution in the marine environment.	1.85 ns	0.60
5) The PCG complies with marine environmental protection laws by vessels.	1.14 ns	0.77
6) Marine environmental protection training is regularly conducted to the crew and staff.	5.97 ns	0.11
7) There is a quick respond to marine pollution incidents such as oil spills and hazardous waste.	1.02 ns	0.80
8) There is a sufficient equipment for marine environmental protection that are 100% functional during inspections.	3.47 ns	0.33
9) There is a strong collaboration to protect marine ecosystems among the with local communities.	2.38 ns	0.50
10) The PCG promote marine conservation and protection on biodiversity through different strategies.	6.65 ns	0.08

Table 10. The challenges encountered by the respondents during the conduct of the annual general inspection.

Challenges encountered during annual general inspections	***F***	**%**	**Rank**
Insufficiency on search and rescue equipment.	55	19.37	1
Challenges in communication during operations.	52	18.31	2
Other agencies do not cooperate during inspections.	50	17.61	3
Limited environmental conservation resources.	36	12.68	4
Unfunded training or drills for SAR personnel.	32	11.27	5
Existence/uncontrollable illegal activities.	26	9.15	6
Lacking efforts for pollution prevention.	17	5.99	7
Maritime law and security standards were not strictly followed.	16	5.63	8

Presented in Table 10 were the challenges encountered by the respondents during the conduct of the annual general inspection. The findings revealed that the majority of the PCG personnel experienced the most common challenges in terms of insufficiency on search and rescue (SAR) equipment (19.37%) followed by challenges in communication during operations (18.31%) and lack of cooperation from other agencies during inspections (17.61%). This aligns to the study of David (2025) that the coast guard experienced numerous challenges primary the issues of limited resources, minimal revolving capital to acquire modern equipment, lack of maintenance of vessels and infrastructure and limited training. Another major challenge was revealed in terms of the inter-agency coordination and collaboration during complex law enforcement, environmental protection and disaster response operations. The PCG personnel encountered communication barriers and the lack of standardized procedures.

Moreover, lesser but still notable challenges were revealed, including limited environmental conservation resources (12.68%) and unfunded training or drills for SAR personnel (11.27%). This supports the study of Tomi (2025) on the encountered significant challenges of the Philippine Coast Guard on the limited funding, inadequate facilities and insufficient training duration which hinder the effectiveness of maritime security. This suggests for enhancing training facilities, increasing budget allocation, and implementing standardized policies to strengthen PCG personnel's competencies and ensure their readiness on maritime safety, law enforcement, and environmental protection. Furthermore, the least challenges encountered by the PCG personnel were related to existence/uncontrollable illegal activities (9.15%), lacking efforts for pollution prevention (5.99%) and maritime law and security standards were not strictly followed (5.63%). This

indicate that though these challenges were encountered, only a small percentage of respondents perceived that these were major issues which means they were not persistent or still controllable. These findings aligned to the continuous efforts of PCG in collaboration with the PNP to seized illegal activities on board (PCG, 2024) and apprehend various cases of fuel pilferage within the Philippine Sea (Rita, 2024). Overall, the findings of the study present the need to strengthened standard operating procedure (SOP) to provide a structured guidelines for resource allocation, communication protocols and inter-agency collaboration to address the gaps on operational inefficiencies and to improve the overall effectiveness of PCG operations.

The Qualitative Analysis on the Challenges Encountered by the Respondents During the Conduct of the Annual General Inspection in Terms of Maritime Safety, Search and Rescue

The qualitative data revealed three major themes namely lack of equipment and support, personnel shortage and communication problems.

Table 11. Challenges encountered by the respondents during the conduct of the annual general inspection in terms of maritime safety, search and rescue.

Probing questions	Actual responses of the key informants (KIs)	Generated themes
What are the challenges you encountered in terms of maritime safety and search and rescue operations?	"We need updated equipment, because most of what we have is either insufficient and traditional which hampers our operational efficiency." [P6]	Lack of equipment and support
	"There were operations that some of us experience communication barriers because of lack of communication tools." [P10]	
	"We often borrowed equipment from one station to another mostly when there were sudden operations." [P2]	
What are the maritime safety and search and rescue problems you considered the most affecting the PCG operations? How these challenges should be addressed?	"In SAR, we are short-staffed, so sometimes we also have to multitask." [P5]	Personnel shortage
	"We are hopeful for the support of the higher authority to strengthen our team by providing additional personnel in the maritime safety, search and rescue in every station." [P8]	
	"Some of the inspectors were doing several tasks because of the lack of personnel which really affect our performance." [P11]	
What other maritime safety and search and rescue do you believe is a barrier in the efficiency of PCG operations?	"There were instances that the changes of SOP were given late or just on the day of the inspection or operation." [P4]	Communication problems
	"I have noticed some inefficiencies on the coordination, though minimal, it will also affect our performance." [P13]	
	"Sometimes there are delays in instructions, which causes a few problems." [P1]	

The qualitative data were collected through an interview among the fifteen (15) PCG personnel of the four (4) stations under the Coast Guard District North Western Luzon and revealed the following themes: (1) lack of equipment and support, (2) personnel shortage and (3) communication problems still a challenge. Most of the interviewed participants expressed their challenges concerning the Philippine Coast Guard's core functions in terms of maritime safety, search and rescue which revealed that there was a lack of available equipment which were needed during their inspections and actual deployments. This theme reflects the challenges of the Philippine Coast Guard's core functions in terms of maritime safety, search and rescue which emphasized the need for sufficient and updated equipment.

The participants also emphasized the need for additional personnel for maritime safety, search and rescue to maintain operation readiness. This showed workforce limitations which hinder flexibility of the personnel performance affect personnel operational efficiency. This aligned to the result of NMP Report (2019) and the findings of the study of David (2025) that PCG faced challenges on resources and lack of training. Although SAR operations were well implemented, gaps on manpower and resource were still experienced during AGIs (Santos, 2021 and Mendoza, 2019). The theme communication problem was also emerged in the maritime safety, search and rescue core functions implementation which includes poor communication and

coordination during inspections or operations. This indicates the gap in communication and coordination protocols which negatively affect the inspections and operations under the maritime safety, search and rescue core functions. These findings were consistent with the Monje (2013) and Torrecampo (2024) on the need for coordinated efforts among agencies to achieve effective maritime enforcement and environmental protection. This implies that though the quantitative data revealed a well implemented PCG's SAR guidelines, there still underlying operational challenges such as lack of sufficient equipment, limitations in manpower capacity and communication gaps that needs to be address through a standard operating policy and procedure that aligns to the SDG's specifically SDG 14 and SDG 16 to foster overall core function implementation and good maritime governance.

The Qualitative Analysis on the Challenges Encountered by the Respondents During the Conduct of the Annual General Inspection in Terms of Maritime Security and Law Enforcement

Table 12. Challenges encountered by the respondents during the conduct of the annual general inspection in terms of maritime security and law enforcement.

Probing questions	**Actual responses of the key informants (KIs)**	**Generated themes**
What are the challenges you encountered in terms of maritime security and law enforcement?	"In remote areas, we experienced several challenges in coordinating with our partner government agencies." [P2]	Inter-agency coordination barriers
	"We are often the ones responding to maritime incidents; communication in the field is difficult, so you really just have to wait." [P5]	
	"We need to build strong coordination not only on paper but most especially in times of operational support that would be very important." [P11]	
What are the most pressing issues you consider need immediate action? How should these be addressed?	"We need high-tech surveillance equipment for us to be able to keep up with our functions in maritime security and law enforcement mostly during vigilance in the coastline." [P6]	Insufficient modern equipment
	"Most of our equipment are depreciating and lack of maintenance like binoculars at communication gear, that is why we are really in the process of requesting those to be replaced immediately." [P9]	
	"We need modern patrol boats for our enforcement operations." [P8]	
	"Continuous training in law enforcement is necessary, especially for newcomers, so they can get used to simulation drills." [P1]	
What support do you think is needed to improve the maritime security and law enforcement?	"With our multi admin tasks, sometimes limit us to conduct drills because of time constraint." [P10]	Need for training and drills
	"Implementation is followed, yes, but we also need to maintain consistent level of training, all of us should be." [P15]	

The participants were asked about their experiences on the implementation of the guidelines and procedures for the Philippine Coast Guard's core functions in terms of maritime security and law enforcement through interviews and revealed themes on (1) inter-agency coordination barriers, (2) insufficient modern equipment and the (3) need for trainings and drills. Multiple participants shared their experiences in actual on-ground coordination during the maritime security and law enforcement implementation. This theme emphasized the operational readiness under maritime security and law enforcement implementation needs to have strong inter-agency cooperation to provide on time task and logistical support. This supports Monje (2013) on unified maritime enforcement in the Philippines and Santos (2018) on the proper preparation and coordination for typhoon operations. This also support Psarros *et al.,* (2010) which highlight the existing barriers on weak coordination mechanisms which lead to under-reporting of maritime accidents which indicate that there were persistent challenges on both global and local of law enforcement at sea.

Insufficient modern equipment also emerged as the most reported issues regarding maritime security and law enforcement implementation. This theme reflects the noticeable gap between equipment sufficiency and operational demands which need to be address for efficient maritime security and law enforcement implementation. This recurring issue were aligned to results of NMP Report (2019) on PCG challenges on resources. This mirrors the conclusions of Buck (2016) that U.S. Coast Guard inspections were hampered by lack of resources and information management suggesting for modernization and technological upgrades in maritime security operations. The participants also expressed their insights on the need for continuous trainings and drills to capacitate them to maintain their performance under the maritime security and law enforcement implementation (Mendoza, 2019, Ghajour, 2022). The thematic analysis revealed that though the PCG have well implemented maritime security and law enforcement protocols, operational-level barriers still remain gaps in terms of logistical issues, coordination challenges and need for training and drills which suggest for the formulation of a more adaptive standard operating policy and procedure for future implementation.

The Qualitative Analysis on the Challenges Encountered by the Respondents During the Conduct of the Annual General Inspection in Terms of Marine Environmental Protection

Table 13. Challenges encountered by the respondents during the conduct of the annual general inspection in terms of marine environmental protection.

Probing questions	Actual responses of the key informants (KIs)	Generated themes
What are the challenges you encountered in terms of marine environmental protection?	"We have equipment for marine environmental response but they are not enough for responding to large-scale incidents; sometimes we borrow equipment from other stations." [P3]	Lack of equipment for marine environmental response
	"We should have new oil spill booms. Those we have are old and should be replaced with ones capable of responding to expanded spill incidents." [P7]	
	"The capacity of the equipment is no longer adequate during real-life situations." [P9]	
What are the programs do you believe are lacking or needed to be strengthened in terms of marine environmental protection?	"Our personnel need to undergo training on environmental law updates; most of them were not present during the last orientation because of other tasks." [P2]	Gaps on environmental laws
	"There are new guidelines from the DENR and marine biodiversity protocols, not all personnel are updated on them." [P5]	
	"The training isn't the same for everyone, so everyone should be informed, especially about environmental laws." [P13]	
What other external aspect do you considered that need to be evaluated that affects marine environmental protection?	"Those locals in the coastal areas need to be aware of the efforts and programs under marine environmental protection." [P10]	Weak marine protection partnership
	"Marine protection is a big thing; this is not only a PCG commitment, this should be everybody's concern, especially our fishermen." [P11]	

The qualitative results showed a deeper understanding of the level of implementation of the guidelines and procedures for the Philippine Coast Guard's core functions in terms of marine environmental protection gathered from 15 PCG personnel. Their responses were analyzed thematically and found key themes which revealed (1) lack of equipment for marine environmental response, (2) gaps on environmental laws and (3) weak marine protection partnership.

The quantitative findings revealed 100% functional equipment but still pose challenges on the sufficiency of equipment for marine environmental response. This theme indicates that the PCG was dealing with problems on the lack of equipment for marine environmental response which led to the field-level challenges especially when dealing with unexpected or multiple incidents. The quantitative results showed well implemented training, participants noted the gaps on marine environmental laws that needs to be address. This emphasized the existing gaps on capacitating the PCG personnel focusing on marine

environmental laws updates and up-to date protocols. The qualitative results revealed weak marine protection partnership such as collaboration with local communities which often limit the implementation of the guidelines and procedures for the Philippine Coast Guard's core functions in terms of marine environmental protection. This suggests for additional effort to build a strong collaboration in promoting implementation and awareness on marine environmental protection.

Summary of Findings, Conclusions, and Recommendations

Summary of Findings

The findings revealed that the level of implementation of the guidelines and procedures for the Philippine Coast Guard's core functions in terms of maritime safety, search and rescue, maritime security and law enforcement and marine environmental protection were well-implemented across indicators.

Moreover, significant difference was found in the perceptions of the respondents among the abovementioned variables maritime safety, search and rescue in terms of the regular safety inspections of life-saving equipment like lifeboats and life vests and maritime security and law enforcement in terms of well-maintained weapons and defense systems to support law enforcement activities and properly implemented the proper procedures for handling and detaining individuals involved in illegal activities wherein Coast Guard Ilocos Sur station were relatively lower in ratings compared to Coast Guard Stations in Ilocos Norte, La Union and Pangasinan.

Furthermore, the challenges encountered by the respondents during the conduct of the Annual general inspection on maritime safety and search and rescue (SAR) includes lack of equipment and support, personnel shortage and communication problems. Challenges in terms of maritime security and law enforcement includes inter-agency coordination barriers, insufficient modern equipment and the need for training and drills while challenges in terms of marine environmental protection were lack of equipment for marine environmental response, gaps on environmental laws and weak marine protection partnership.

Based on the results, standard operating policy and procedure was proposed based on the findings of the study to address the experience challenges on the level of implementation of the guidelines and procedures for the Philippine Coast Guard's core functions in terms of maritime safety, search and rescue, maritime security and law enforcement and marine environmental protection.

Conclusion

The study concludes that the PCG's core functions in terms of maritime safety and search and rescue, maritime security and law enforcement, and marine environmental protection were generally well implemented indicating a committed and responsible Philippine Coast Guard personnel in the Coast Guard District North Western Luzon.

However, persistent challenges remained on the sufficiency of its equipment, effective communication and strong inter-agency collaboration which need to be addressed to ensure the efficiency and success of PCG operational functions.

Lastly, based on the results of the study, a need for strengthened standard operating procedure should be proposed that focuses on equipment modernization and maintenance, protocols on communication channels, inter-agency collaboration mechanisms and the provision of continuous drills and training for the PCG personnel.

Recommendations

Based on the findings and conclusions of the study, the research recommends the following to address the gaps identified and to maintain a well implemented Philippine Coast Guard's core functions:

1) Coast Guard District North Western Luzon should allocate budget for equipment maintenance and procurement of upgraded and modernized equipment for maritime safety and search and rescue, maritime security and law enforcement, and marine environmental protection.
2) The Coast Guard District North Western Luzon should strengthen its inter-agency collaboration and communication protocols through formal inter-agency agreements and regular conduct of inter-agency planning and evaluation meetings.
3) The Coast Guard District North Western Luzon should review the adoption of the proposed standard operations procedure for implementation will addresses current challenges encountered and will foster

best practices in the PCG.

4) The Coast Guard District North Western Luzon personnel should conduct regular drills and training that focus on maritime safety and search and rescue, maritime security and law enforcement, and marine environmental protection.
5) Further research is recommended to assess the effectiveness and impact of the proposed standard operating procedure on the operations and the schedule drills of the PCG personnel.

Declarations

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