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Developing a Capability Enhancement Program to Improve Vessel Safety Inspection Among Philippine Coast Guard Personnel

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Abstract
Aim: The research titled *Developing a Capability Enhancement Program to Improve Vessel Safety Inspection Among Philippine Coast Guard Personnel* focused on the performance deficiencies that JNCO and SNCO and CO of the Philippine Coast Guard (PCG) experience during vessel safety inspections.
Methodology: The research employed a mixed-methods approach with concurrent triangulation to gather data through structured surveys and reviews of PCG policies and inspection protocols and training programs.
Results: The study showed that the current training programs fail to match the duties of personnel according to their ranks because they lack functional differentiation and simulation-based instruction and post-training assessments. These gaps in operations became apparent through maritime disasters such as the MB Kim Nirvana-B (2015), MV Mercraft 2 (2022), and M/B Aya Express (2023) where safety inspections failed to detect critical issues. PCG personnel at all ranks experienced difficulties because they lacked proper tools and insufficient procedural knowledge and unclear role execution and this situation worsened because of insufficient progressive training.
Conclusion: A proposed Capability Enhancement Program (CEP) based on Human Capital Theory aimed to resolve these deficiencies. The CEP establishes training modules that match different ranks and includes real-world applications and performance evaluation tools to enhance inspection effectiveness while decreasing preventable maritime incidents and improving institutional maritime safety governance.

Keywords: *Philippine Coast Guard, Capability Enhancement Program, Vessel Safety Inspection, Personnel*

INTRODUCTION

The Philippines' maritime sector plays a critical role in the nation's socio-economic development, but persistent safety concerns such as aging vessels, human error, and ineffective enforcement mechanisms threaten this progress (Zafra, 2021; Wiweko et al., 2015). Despite contributing USD 11.9 billion annually to the national economy (Zafra, 2021), the maritime sector continues to suffer from high incident rates, with over 300 cases between 2022 and 2023 (MARINA, 2022). Investigations into disasters such as the M/Bca Kim Nirvana B (2015), MV Mercraft 2 (2022), and M/Bca Aya Express (2023) revealed significant inspection failures—ranging from incomplete passenger manifests to undetected structural alterations and untrained crews (Glang, 2015; Meraña, 2022; Antonil, 2023). Although the Philippine Coast Guard (PCG) and Maritime Industry Authority (MARINA) are responsible for ensuring vessel safety under Republic Act No. 9993, systemic gaps in training and inspection enforcement persist (MC 05-12 MDSD, 2012; MC 07-12 PDI, 2013).

Research highlights the inadequacy of current inspection procedures and underscores the need for an institutionalized training framework. Studies by Ong (2021), Knapp and Heij (2020), and Goerlandt (2015) all point to discrepancies between documented compliance and actual onboard safety standards due to limited institutional

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capacity and insufficient inspector competency. Effective training programs, such as those described by Rodriguez and Walters (2017), Ahmad et al. (2014), and Buck (2016), emphasize role-based progression, soft skills development, and simulation-based learning, which are largely missing in PCG's current structure. Global models from the U.S. Coast Guard and EMSA illustrate how competency-based, technology-enabled training and structured career pathways can lead to improved inspection outcomes (Frittelli, 2019; Lazakis et al., 2016). To address this enforcement-performance gap, the proposed capability enhancement program aims to establish a progressive training curriculum aligned with job-specific responsibilities and policy mandates, ensuring safer and more reliable maritime operations in the Philippines.

Maritime accidents in the Philippines such as the M/Bca Kim Nirvana B (2015), MV Mercraft 2 (2022), and M/Bca Aya Express (2023) highlight the serious consequences of inadequate training among Philippine Coast Guard (PCG) personnel. Official investigations revealed that safety inspections were compromised due to overlooked issues, limited technical knowledge, and the absence of proper tools. These failures stem from systemic problems including insufficient personnel, weak risk profiling systems, and poor feedback mechanisms. Studies by Golden and Weisbrod (2016), Baig et al. (2024), and Puisa et al. (2018) affirm that resource-deficient inspection systems are highly vulnerable to operational breakdowns and disasters. In contrast, global models such as the U.S. Navy's Training with Industry (TWI) program (Flynn & Souksavatdy, 2017) and EMSA's Common Core Curriculum (Sendi, 2015; Lazakis et al., 2016) recommend simulation-based and continuous competency training as effective remedies for these deficiencies. Buck (2016) also emphasizes that long-term inspector development depends on knowledge management systems and well-structured personnel pipelines.

Despite the availability of these international best practices, the PCG has not yet fully adopted them. The existing training model lacks specialization by rank and omits critical features such as digital integration, risk-based planning, and performance feedback mechanisms. To address this, the study employs Human Capital Theory (Becker, 1993) as its theoretical foundation, asserting that strategic investments in training and education enhance individual and institutional productivity. The PCG's Capability Enhancement Program (CEP) aligns with this theory by proposing role-specific training to improve inspection outcomes under the SOLAS and MARPOL conventions and internal PCG protocols. This approach is operationalized through an Input-Process-Output (IPO) framework that evaluates training gaps and challenges across personnel ranks—Junior Non-Commissioned Officers (JNCO), Senior Non-Commissioned Officers (SNCO), and Commissioned Officers (CO). Ultimately, the CEP aims to deliver structured, rank-specific instruction that enhances PCG's ability to enforce maritime safety regulations effectively and consistently.

Objectives

This research aimed to develop a capability enhancement program to improve vessel safety inspections among Philippine Coast Guard personnel capabilities for maritime safety functions especially vessel safety inspections.

The research focused on answering the following questions.

1. What are the duties and responsibilities of PCG Officer and Non- Officers relative to Vessel Safety Inspections?
    a. Junior Non-Commissioned officers (Apprentice Seaman to Seaman 1st Class)
    b. Senior Non-Commissioned officers (Petty officer 3rd Class to Chief Petty officer)
    c. Commissioned officers
2. What are the existing training programs being undertaken by the Officers and Non- Officers?
3. What gaps identified in the duties and responsibilities on maritime safety functions and the existing training programs?
4. What are the challenges encountered by PCG Officers and Non- Officers in performing their duties and responsibilities?
5. Based on the findings, what ladderized capability enhancement program can be recommended to assist the Philippine Coast Guard personnel in performing maritime safety functions?

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METHODS

Research Design

This study utilized a mixed-methods research design using concurrent triangulation to develop a Capability Enhancement Program (CEP) for Philippine Coast Guard (PCG) personnel performing vessel safety inspections. Quantitative data were gathered through a structured survey, while qualitative data were obtained via document review of official PCG policies and training materials. Key variables examined included personnel duties and responsibilities, training attended, identified gaps, and operational challenges.

The primary research instruments used were a structured survey administered through Google Forms for quantitative data collection and a document review for qualitative analysis.

Population and Sampling

The study involved 314 respondents from the Philippine Coast Guard (PCG), specifically Commissioned Officers (CO) and Non-Commissioned Officers (NCO) assigned to Coast Guard Districts Central Visayas (Region VII) and Eastern Visayas (Region VIII). These personnel perform critical vessel inspections and enforce vessel safety and emergency readiness protocols across operational units comprising 15 stations and 119 substations. Out of a total population of 488 personnel—24 COs, 240 Senior NCOs (SNCOs), and 224 Junior NCOs (JNCOs)—the sample included all 24 COs through total enumeration due to their limited number, while 148 SNCOs and 142 JNCOs were selected through random sampling based on a 95% confidence level and a 5% margin of error using the Raosoft calculator.

Instruments

The primary research instrument used in the study was an online survey questionnaire distributed via Google Forms to different respondent groups within the Philippine Coast Guard (PCG). The questionnaire was structured into three sections: Part I collected demographic and professional background data; Part II consisted of 25 Likert-scale items assessing operational and procedural challenges in vessel safety inspections (VSI); and Part III gathered qualitative insights through open-ended questions about recommended training modules, maritime safety priorities in Philippine waters, and practical skill gaps. This multi-part design ensured a comprehensive understanding of both quantitative trends and qualitative insights into training needs and inspection practices.

To ensure the instrument's validity and reliability, it underwent expert evaluation by a PMMA faculty member and a professional statistician who recommended structural and content revisions across all sections. A pilot test involving ten eligible but non-sample PCG personnel assessed the reliability of Part II using Cronbach's Alpha, which yielded excellent internal consistency across all groups: 0.976 for Commissioned Officers, 0.944 for Senior Non-Commissioned Officers, and 0.980 for Junior Non-Commissioned Officers. Part III's open-ended questions were validated through expert review for clarity and relevance. These results confirmed the instrument's suitability for accurately measuring the operational challenges PCG personnel face during vessel safety inspections.

Data Gathering Procedures

The study gathered data using a structured online questionnaire survey. The researcher obtained official approval from the Coast Guard District Commander before collecting data. The study's purpose, scope, and procedures were explained to participants, and station and sub-station commanders were informed of the approval through their Operations Officers before personnel gave their informed consent.

The participants received a written informed consent form which confirmed their voluntary participation while ensuring confidentiality and explaining their rights in detail. The document included a clear statement that participants maintained the freedom to exit the study at any time without facing adverse effects. The study included participants who fulfilled the inclusion criteria and received informed consent authorization from their commanders.

The survey was distributed via Google Forms, with Operations Officers managing the process. The link and consent form were sent to qualified participants through email, Facebook Messenger, and Viber. After the survey period, the researcher manually checked all responses to ensure the data were accurate, complete, and consistent.

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Data Analysis

This study utilized a mixed-methods concurrent triangulation approach to examine the operational challenges faced by Philippine Coast Guard (PCG) personnel during vessel safety inspections. The quantitative component involved an online survey administered via Google Forms to Junior Non-Commissioned Officers (JNCO), Senior Non-Commissioned Officers (SNCO), and Commissioned Officers (CO). The instrument included three parts: demographic profiling (Part I), 25 Likert-scale items assessing inspection challenges (Part II), and open-ended qualitative questions (Part III). Descriptive statistics summarized demographic data, while challenge-based responses were rated using a 4-point Likert scale. Weighted Means (WM) and Verbal Interpretations (VI) helped identify the level of agreement and frequency of challenges across ranks, providing a clear picture of inspection-related issues.

The qualitative component incorporated analysis of both PCG internal policy documents and responses to open-ended survey questions. Content analysis was conducted on key official documents such as Memorandum Circulars 06-12 and 07-12, and SOP No. 04-13, along with course materials for training programs like the VSEI Apprentice Inspectors Course and Emergency Readiness Evaluator's Course. These materials were examined to assess the alignment between prescribed training and real-world practices. Thematic coding of open-ended responses revealed consistent concerns about training insufficiencies, procedural bottlenecks, and contextual maritime safety issues unique to Philippine waters. This combined data served as the foundation for developing a tailored Capability Enhancement Program (CEP) that aligns with the specific needs and responsibilities of each personnel rank.

Ethical Considerations

The researcher ensured full ethical compliance by securing informed consent from all participants via an online form that clearly explained the study's purpose, procedures, potential risks, and the voluntary nature of participation. Participant anonymity and privacy were strictly protected through the design of the online survey, which excluded personal identifiers and used secure methods for data collection. Only the researcher and the PMMA Graduate School statistician had access to the confidential data, which was analyzed in aggregate form. Academic integrity was upheld by paraphrasing sources, adhering to APA 7th edition citation standards, and verifying originality through Turnitin plagiarism detection to meet institutional ethical guidelines.

RESULTS and DISCUSSION

Profile of the Respondents

This study involved 314 Philippine Coast Guard (PCG) personnel, comprising 142 Junior Non-Commissioned Officers (JNCO), 148 Senior Non-Commissioned Officers (SNCO), and 24 Commissioned Officers (CO). Demographic variables included sex, rank, position, educational background, career specialization, training, shipboard experience, eligibility, years of service, and vessel safety inspection (VSI) experience. Among JNCOs, most were male (96%), with the majority holding the rank of Apprentice Seaman, Seaman 1st Class, or Seaman 2nd Class. While 63% had bachelor's degrees, a notable 62% lacked career specialization, and 46% had not attended any relevant training. Most had no sea duty (94%), no professional eligibility (91%), and limited VSI experience, with 59% having none at all.

For SNCOs, all 148 respondents were male, and Petty Officer 3rd Class was the most common rank. They showed greater role responsibility, with Sub-Station Commander being the predominant position (32%). A majority (65%) had bachelor's degrees, and career specialization was more prevalent compared to JNCOs, with Maritime Safety Administration (30%) and Marine Environmental Protection (24%) being the most common. Training participation was high, with 94% having undergone Vessel Safety Enforcement Inspection training. However, 91% still lacked eligibility certification, and 73% had no sea duty. Notably, SNCOs demonstrated significantly greater VSI experience, with 48% having 6–10 years in the role, indicating their key operational involvement in inspection duties.

Commissioned Officers included 20 males (83%) and 4 females (17%), a notably higher female representation compared to non-commissioned ranks. Most held the rank of Ensign and served as Station or Deputy Station Commanders. All officers had completed bachelor's degrees, and Maritime Safety Administration was the most common specialization (54%). While 58% received training in vessel safety enforcement, 33% had no related training at all. The majority (96%) lacked shipboard experience but stood out with higher professional eligibility

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levels, with 75% holding PRC board licenses. Most had 1–5 years of service in the PCG and showed limited VSI experience, with only half having any background in vessel safety inspections. These patterns across ranks reflect a varying distribution of operational readiness, professional qualifications, and inspection exposure that influence the effectiveness of PCG vessel safety oversight.

Duties and Responsibilities of PCG officers and Non-officers Relative to Vessel Safety Inspections

The Philippine Coast Guard (PCG) employs a structured, rank-based approach to vessel safety inspections, assigning specific duties to Junior Non-Commissioned Officers (JNCO), Senior Non-Commissioned Officers (SNCO), and Commissioned Officers (CO). JNCOs, from Apprentice Seaman to Seaman First Class, primarily assist with operational tasks such as verifying safety equipment, supporting emergency drills, checking ship documents, and briefing passengers. Their responsibilities are guided by various policy documents, including the Vessel Safety Enforcement Inspection (VSEI) Guidelines, Pre-Departure Inspection (PDI) Procedures, Emergency Readiness Evaluation (ERE) Guidelines, and protocols on detecting unauthorized persons on board (Ravira & Piniella, 2016).

SNCOs act as supervisors to JNCOs and ensure procedural compliance with inspection protocols. They lead equipment checks, evaluate manning compliance, and supervise emergency drills. Additionally, they are responsible for checking passenger manifests, verifying loadline compliance, and securing cargo, while documenting findings in the Inspection Record Book. COs hold ultimate accountability, directing inspection operations and making enforcement decisions, including issuing the Enforcement Inspection Apprehension Report (EIAR) and overseeing vessel movements during adverse weather as per SOP No. 04-13. They coordinate with agencies like MARINA and PPA, and supervise the entire inspection lifecycle to ensure full regulatory compliance and maritime safety (Teperi et al., 2019; Ravira & Piniella, 2016).

Existing Training Programs Being Undertaken by the different groups of respondents

This study reviews the training programs provided by the Philippine Coast Guard (PCG) to personnel performing vessel safety inspections. It evaluates the Programs of Instruction (POIs), Course Frameworks (CFs), and Training Course Syllabi (TCS) for three core courses: the VSEI Apprentice Inspectors Course (229 hours), the 15-Day Vessel Safety Enforcement Inspector's Course (120 hours), and the Emergency Readiness Evaluators Course (112 hours) (Philippine Coast Guard, n.d.). These trainings are tailored to Junior Non-Commissioned Officers (JNCO), Senior Non-Commissioned Officers (SNCO), and Commissioned Officers (CO), respectively, aligning with their rank-specific responsibilities. Training content includes essential maritime safety topics from national policies such as the VSEI Guidelines (MC No. 06-12), Pre-Departure Inspection Procedures (MC No. 07-12), and Emergency Readiness Evaluation Guidelines (MC No. 08-12), as well as international standards like SOLAS, MARPOL, and the STCW Code.

JNCOs receive foundational instruction on inspecting lifesaving and firefighting equipment, following safety checklists, and participating in onboard emergency drills. The 15-day training for SNCOs expands upon this by preparing them to lead inspection teams, validate documents, and recommend enforcement actions, reinforcing their supervisory role. For Commissioned Officers, the Emergency Readiness Evaluators Course focuses on evaluating shipboard emergency preparedness and inter-agency coordination, equipping them with the skills to oversee high-level safety enforcement. These structured training pathways reflect the PCG's efforts to align personnel capabilities with inspection duties, although the comparison between training objectives and field performance may still reveal gaps in practice and policy application (Philippine Coast Guard, n.d.).

Gaps Identified in the Duties and Responsibilities on Vessel Safety Inspections and the Existing Training Program

This study identified significant gaps between the actual duties of Philippine Coast Guard (PCG) personnel in vessel safety inspections and the training they receive, highlighting misalignments across ranks—Junior Non-Commissioned Officers (JNCO), Senior Non-Commissioned Officers (SNCO), and Commissioned Officers (CO). While JNCOs are tasked with operational support such as equipment checks, deficiency tagging, and assisting in emergency drills, their training lacks rank-specific focus and fails to develop crucial soft skills like teamwork, communication, and

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documentation essential for their field roles. Similarly, SNCOs, who have supervisory and leadership responsibilities during inspections, do not receive adequate training in team coordination, mentoring, or enforcement decision-making, resulting in challenges when executing their duties confidently and authoritatively.

For Commissioned Officers, although their training covers adjudication and enforcement procedures, it remains heavily procedural and lacks realistic field scenarios that would enhance command decision-making and inter-agency coordination skills necessary for high-pressure operational contexts. A major issue is that all ranks receive largely identical training content despite their distinct roles, which contributes to skill deficiencies, especially in team management for SNCOs and strategic enforcement for COs. Furthermore, the existing training framework lacks mechanisms to assess post-training performance or incorporate participant feedback, leading to missed opportunities for program improvement and a persistent mismatch between training and the practical demands of vessel safety inspections (Philippine Coast Guard, n.d.).

Challenges Encountered by PCG officers and Non-officers in Performing Their Duties and Responsibilities

This study identified the top challenges faced by Philippine Coast Guard (PCG) personnel during vessel safety inspections, differentiated by rank: Junior Non-Commissioned Officers (JNCO), Senior Non-Commissioned Officers (SNCO), and Commissioned Officers (CO). JNCOs primarily struggle with technical knowledge gaps, operational constraints, and practical issues such as understanding their inspection roles (WM = 3.30), managing time pressures, and lack of proper inspection tools (Puisa et al., 2021). They also face difficulties in emergency preparedness, documentation of violations, and effective communication with vessel crews (Philippine Coast Guard, 2012b; 2012d; Hauseng, 2020; Teperi et al., 2019). Refresher training deficiencies further exacerbate these operational challenges (Golden & Weisbrod, 2016).

SNCOs, who carry supervisory and technical leadership duties, report more complex technical challenges, including verifying compliance with load line and stability regulations (WM = 3.38) and managing multiple teams under time constraints (Puisa et al., 2021; Philippine Coast Guard, 2012b). Their challenges extend to standardizing deficiency reporting, overseeing complex equipment inspections, and inter-agency coordination (Knapp & Heij, 2020; Ravira & Piniella, 2016). Leadership and resource management difficulties, such as ensuring proper tools and preparing teams for Pre-Departure Inspections, also persist (Baig et al., 2024; Sardar, 2023). Like JNCOs, they encounter challenges in emergency readiness and crew training verification (Philippine Coast Guard, 2012d).

At the commissioned officer level, challenges reflect strategic oversight responsibilities, focusing on ensuring inspection quality and consistency across regions and technical supervision of complex vessel systems (WM = 3.48) (Puisa et al., 2021; Knapp & Heij, 2020). Officers face difficulties with advanced training deficiencies, crisis leadership during simulated emergencies, and managing comprehensive compliance under operational constraints (Golden & Weisbrod, 2016; Sardar, 2023). Resource allocation, role clarity, and leadership effectiveness during high-pressure inspections remain concerns (Knapp & Heij, 2020; Philippine Coast Guard, n.d.-c). Across ranks, verifying crew training adequacy for emergencies is a persistent challenge (Philippine Coast Guard, 2012d; Puisa et al., 2018). These findings underscore the need for a ladderized training program addressing technical, procedural, leadership, and emergency response competencies tailored to rank-specific needs to enhance PCG's vessel safety inspection capability.

Ladderized Capability Enhancement Program to Improve the Vessel Safety Inspections among Philippine Coast Guard personnel

The Ladderized Capability Enhancement Program (CEP) is a structured training initiative designed to improve the vessel safety inspection competencies of Philippine Coast Guard (PCG) personnel, specifically targeting Junior Non-Commissioned Officers (JNCO), Senior Non-Commissioned Officers (SNCO), and Commissioned Officers (CO). By aligning training content with the actual operational duties and challenges faced in the field, the program delivers rank-specific, progressive instruction to equip personnel with the necessary knowledge and skills to conduct Pre-Departure Inspections (PDI), Vessel Safety Enforcement Inspections (VSEI), and Emergency Readiness Evaluations (ERE). Grounded in Human Capital Theory, the CEP emphasizes practical, role-based learning and

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regulatory adherence, promoting accountability, career development, and improved maritime safety aligned with international standards like SOLAS, MARPOL, and STCW.

The Basic Course for JNCOs, a key component of the program, spans 160 hours over 20 days and aims to prepare apprentice seamen through lectures, workshops, practical drills, and onboard immersion. It addresses identified gaps such as limited prior experience, poor documentation skills, and weak hazard recognition by focusing on foundational maritime safety knowledge, shipboard familiarization, inspection procedures, emergency drills, communication, risk assessment, and environmental protection. Survey data revealed that a majority of JNCOs had little or no prior vessel inspection experience or relevant training, underscoring the need for this comprehensive program. Through immersive field exercises and structured communication training, the course seeks to boost operational readiness, accuracy in reporting, and confidence among JNCOs, ensuring they can effectively support vessel inspections and contribute to maritime safety enforcement.

Conclusion

The study concludes that while the Philippine Coast Guard (PCG) has clearly defined vessel inspection duties according to rank, its current training programs fall short in adequately preparing personnel for their specific roles. The uniform training lacks rank-specific content, practical simulations, and post-training assessments, leading to gaps in essential skills such as documentation, leadership, legal enforcement, and operational decision-making. These deficiencies have tangible consequences, as evidenced by major maritime accidents linked to inadequate inspections and enforcement. The proposed ladderized Capability Enhancement Program (CEP) offers a strategic, rank-aligned training framework designed to bridge these gaps, enhance operational competence, and improve maritime safety outcomes by incorporating policy-based instruction, hands-on exercises, and continuous evaluation.

Recommendations

To address the identified gaps, the PCG should institutionalize the ladderized Capability Enhancement Program with role-specific modules that align with official mandates and operational realities. The curriculum must cover technical, legal, and strategic competencies currently missing, including risk-based inspections, emergency readiness, and inter-agency coordination. Mandatory refresher courses and standardized post-training assessments should be established to sustain proficiency and compliance. Additionally, inspectors must be equipped with uniform inspection tools and digital aids to ensure consistency in fieldwork. The CEP should be embedded into PCG policy and training doctrine for long-term sustainability and alignment with international maritime standards. Finally, ongoing research is recommended to evaluate the program's effectiveness and explore its application in related maritime safety domains, supporting continuous improvement and adaptation to evolving challenges.

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