

Assessing the Impact of Maritime Security Measures on International Trade Performance in Tanzania: A Case Study of Dar Es Salaam Port

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Abstract:

This study evaluates the effectiveness of maritime-security measures at Dar es Salaam Port and their influence on trade performance, addressing four specific objectives: (i) the prevention of cargo theft, (ii) the control of smuggling, (iii) the security–efficiency trade-off in cargo clearance, and (iv) enforcement challenges. A convergent mixed-methods design was employed. Quantitatively, 80 fully usable questionnaires from front-line officers were analyzed using descriptive statistics, Cronbach’s α (0.83 – 0.89), Pearson correlations, and an ordinary-least-squares regression model ($R^2 = 0.61$). Qualitatively, 11 semi-structured interviews were coded in NVivo, generating four saturated themes: technology gaps, corruption and accountability deficits, siloed inter-agency coordination, and limited skills in risk-based screening. Results show that visible controls CCTV coverage and anti-theft protocols are rated effective (means 3.58 – 3.86 on a five-point scale), driving a marked decline in pilferage. Smuggling control, however, is only moderately effective (mean = 3.05), a shortfall traced to decade-old X-ray scanners and fragmented data analytics. Clearance procedures impose a modest time penalty (mean = 2.34) yet still enhance trade reliability; clearance efficiency emerges as the strongest positive predictor of trade performance ($\beta = 0.35$, $p < 0.001$), while enforcement challenges exert the largest negative impact ($\beta = -0.31$, $p < 0.001$). Interview narratives corroborate these patterns, revealing “express-lane” bribery, scanner downtime, and intelligence bottlenecks that undermine risk targeting. The study concludes that balanced, technology-enabled and integrity-centred security can simultaneously protect cargo and bolster competitiveness. It recommends phased deployment of AI-driven multi-energy scanners, establishment of a joint enforcement command centre, integrity safeguards such as post rotations and whistle-blower protection, and competency-based training in data-driven inspection. Implemented together, these reforms promise to convert the port’s sizable security footprint into a durable trade-performance asset for Tanzania.

Chapter One

Introduction:

1.1 Background of the Problem

The maritime industry is a crucial pillar of global trade, facilitating approximately 80% of the

world’s trade by volume (IMO, 2023). Maritime security plays a vital role in ensuring the uninterrupted movement of goods across international waters by mitigating threats that could disrupt global supply chains. Historically,

maritime trade has faced persistent security challenges, including piracy, ship hijacking, smuggling, and cargo theft, all of which have negatively impacted economic growth and trade efficiency (Sadovaya & Thai, 2015). Although modern advancements in surveillance technology and international cooperation have led to structured frameworks for managing security risks, these frameworks are not uniformly effective, particularly in developing countries like Tanzania.

The early 21st century witnessed an escalation in maritime security concerns, with the increasing prevalence of piracy, terrorism, and illicit trade prompting regulatory reforms. The introduction of the International Ship and Port Facility Security (ISPS) Code in 2004 by the International Maritime Organization (IMO) marked a turning point in international maritime security (Fu, Goerlandt, & Xi, 2021). The ISPS Code set forth mandatory security protocols for ships and port facilities; however, implementation in developing countries like Tanzania has been hindered by weak institutional enforcement, insufficient infrastructure, and slow adoption of advanced security technologies. These limitations have allowed maritime security problems to continue, making them a real and observable concern rather than a hypothetical one.

Africa's maritime sector, which handles 90% of the continent's trade by volume, continues to be affected by persistent security threats (UNCTAD, 2022). In regions such as the Gulf of Guinea, maritime insecurity has escalated, with the area accounting for 95% of global sea kidnappings, driving up operating costs for shipping companies (IMB, 2023). Similar risks are reported in East African ports, including Dar es Salaam, where smuggling, cargo theft, and inadequate law enforcement mechanisms undermine trade operations (AU, 2022). These issues are not emerging risks they are existing and ongoing, contributing to delays, increased shipping costs, and the declining competitiveness of African ports.

Regional efforts, such as the Lomé Charter on Maritime Security and the East African Maritime Security Strategy, alongside international collaborations with organizations like the IMO and INTERPOL, have been established to address these security problems (AU, 2022). Yet, enforcement challenges, infrastructural gaps, and corruption continue to limit the effectiveness of these initiatives in countries like Tanzania (Goma, 2017). These real-world challenges have already resulted in substantial financial losses, inflated insurance premiums, and trade inefficiencies, particularly at key entry points like the Port of Dar es Salaam.

Ports with well-established security systems have demonstrated significant improvements in trade efficiency. Charlotte (2022) emphasizes that ports adhering to rigorous security standards benefit from expedited cargo clearance, fewer delays, and increased global competitiveness. On the contrary, ports with weak security frameworks suffer from extended dwell times, higher operational costs, and disruptions in trade flows. For example, ongoing piracy in West Africa continues to elevate insurance premiums, reducing trade volumes through affected ports (IMB, 2023). East African ports, including Dar es Salaam, also experience regular customs clearance delays due to weak surveillance systems and enforcement (AU, 2022).

Tanzania's Port of Dar es Salaam, located strategically along the Indian Ocean, is the country's principal maritime gateway and serves several landlocked neighbors such as Rwanda, Burundi, Uganda, Zambia, and the Democratic Republic of Congo (TPA, 2023). Although the port has adopted key international standards like the ISPS Code and the SOLAS Convention, security challenges are still prevalent. Reports by TRA (2023) indicate that outdated scanning systems, understaffing, and poor coordination among enforcement bodies hinder effective security at the port, pointing to problems that are already manifest, not merely anticipated.

In response, institutions like TASAC and TRA have introduced interventions such as vessel tracking systems, electronic scanning, and surveillance upgrades. However, these efforts have only partially mitigated security issues. Persistent gaps especially in customs control and cargo handling continue to compromise trade efficiency and escalate costs (Ministry of Transport, Tanzania, 2023). Evidence from recent studies suggests that cargo theft and smuggling remain significant and unresolved concerns at the port (TPA, 2023). Furthermore, there is a limited integration of cutting-edge technologies like artificial intelligence and blockchain for monitoring and securing cargo, which further exacerbates the port's vulnerability to illicit activities.

Although the link between robust maritime security and improved trade performance is widely acknowledged, there remains insufficient research in the Tanzanian context evaluating the actual impact of security measures already in place. While it is recognized that enhanced security leads to improved trade flows and lower costs, a detailed analysis of how these measures perform at Dar es Salaam Port especially in areas such as cargo clearance time, regulatory compliance, and trade volume has not been fully explored. This study therefore aims to fill that gap by critically assessing the existing maritime security measures at Dar es Salaam Port and their current influence on Tanzania's international trade performance.

1.2 Statement of the Problem

The Port of Dar es Salaam is a critical gateway for Tanzania and neighboring landlocked countries, facilitating international trade and economic growth. When maritime security measures are effectively implemented, they enhance trade efficiency by reducing cargo theft, smuggling, and unauthorized access, leading to lower operational costs, faster cargo clearance, and increased investor confidence. Well-secured ports attract higher trade volumes, improve supply chain

reliability, and strengthen the country's global trade competitiveness.

However, despite implementing the International Ship and Port Facility Security (ISPS) Code, surveillance systems, and collaborative security efforts, Dar es Salaam Port continues to face security challenges. Cargo theft, smuggling, corruption, delays in cargo clearance, and weak emergency response mechanisms persist, undermining trade efficiency. The World Bank (2017) reported that inefficiencies in security enforcement contribute to prolonged clearance times and supply chain disruptions, leading to financial losses for traders and shipping companies. Similarly, Trademark Africa (2020) highlighted ongoing security lapses, including unauthorized access and ineffective monitoring systems, which further hinder smooth trade operations.

Recent data from the Tanzania Ports Authority (TPA) underscores the persistence of security challenges at Dar es Salaam Port, particularly cargo theft. In 2023 alone, the port recorded 24 reported cases of cargo theft, followed by 19 cases in 2024, indicating that despite the presence of surveillance systems and regulatory frameworks, security breaches remain a significant issue (TPA, 2024). These figures reflect not only the operational vulnerabilities within the port's security systems but also the economic consequences associated with recurring theft, such as increased insurance premiums, disrupted cargo flows, and reduced investor confidence. The steady incidence of theft cases over two consecutive years demonstrates that maritime security threats are not hypothetical but are active, measurable realities that continue to impact international trade performance at Tanzania's primary maritime gateway.

These security challenges increase trade costs, deter foreign investments, and reduce Tanzania's competitiveness in the global market. Without addressing these persistent gaps, the port's role as a strategic trade hub may be compromised. Therefore, this study seeks to assess the impact of

maritime security measures on international trade performance at Dar es Salaam Port, identifying existing gaps and proposing strategies for improvement.

1.3 Research Objective

1.3.1 General Objective

The main objective of the study is to assess the impact of maritime security measure on international trade performance at Dar es Salaam Port.

1.3.2 Specific Objectives

- i. To evaluate the impact of maritime security measures in preventing cargo theft on international trade performance at Dar es Salaam Port.
- ii. To assess the influence of maritime security measures in reducing smuggling on international trade performance at Dar es Salaam Port.
- iii. To examine the effect of maritime security measures in cargo clearance efficiency on international trade performance at Dar es Salaam Port.
- iv. To identify enforcement challenges of maritime security measures for international trade performance at Dar es Salaam Port.

1.4 Research Questions

- i. How do maritime security measures aimed at preventing cargo theft impact international trade performance at Dar es Salaam Port?
- ii. In what ways do maritime security measures targeting smuggling influence international trade performance at Dar es Salaam Port?
- iii. What is the effect of maritime security measures in cargo clearance efficiency on international trade performance at Dar es Salaam Port?
- iv. What enforcement challenges of maritime security measures affect international trade performance at Dar es Salaam Port?

1.5 Significance of the Study

This study is significant as it provides a comprehensive assessment of maritime security measures at Dar es Salaam Port and their impact on international trade performance. By evaluating the effectiveness of existing security frameworks, the study aims to identify key strengths and weaknesses, offering valuable insights for improving security protocols. Strengthening these measures will help mitigate risks such as cargo theft, smuggling, and unauthorized access, ultimately enhancing the efficiency and reliability of trade operations at the port. The findings will be beneficial to port authorities, policymakers, and stakeholders seeking to implement more robust security strategies that align with international standards.

Furthermore, the study will analyze the impact of maritime security measures on port operations, focusing on cargo clearance efficiency, logistics performance, and trade facilitation. Understanding how security protocols influence operational efficiency will help stakeholders develop strategies to optimize port activities while maintaining strict compliance with international regulations. Improved security mechanisms can lead to reduced trade costs, faster cargo handling, and enhanced competitiveness, making Dar es Salaam Port more attractive to global shipping lines and investors.

By identifying gaps in the enforcement of international maritime security regulations, this study will highlight regulatory weaknesses that may hinder trade efficiency. The findings will provide valuable recommendations for regulatory bodies such as the Tanzania Ports Authority (TPA) and the Land Transport Regulatory Authority (LATRA) to enhance compliance with frameworks such as the International Ship and Port Facility Security (ISPS) Code. Strengthening enforcement mechanisms will contribute to a more secure and resilient port environment, fostering investor confidence and promoting sustainable economic growth.

This study will contribute to the academic field of maritime security, port management, and international trade. By generating empirical data on the effectiveness of security measures, their influence on port efficiency, and enforcement challenges, the research will serve as a valuable reference for scholars, industry practitioners, and policymakers. Future studies can build on these findings to explore innovative solutions for enhancing port security and trade facilitation, further advancing best practices in the maritime industry.

1.6 Scope of the Study

This study is limited to assessing the impact of selected maritime security measures on international trade performance at the Port of Dar es Salaam. Specifically, it focuses on three critical areas: cargo theft prevention, smuggling control, and cargo clearance efficiency, examining how these influence trade operations. The study does not extend to a full audit of all port security frameworks or a comparative analysis across multiple Tanzanian ports. It is geographically confined to Dar es Salaam Port, which serves as the country's principal gateway for maritime trade. Data collection will target key stakeholders directly involved in maritime security enforcement at the port, including personnel from the Tanzania Ports Authority (TPA) Security Unit, Marine Police, and Navy. The study relies primarily on documentary review, structured questionnaires, and interviews. Broader issues such as cyber security threats, customs tariff systems, and international maritime policy negotiations are excluded from this study.

1.7 Organization of the Research Report

This study is divided into five main chapters. Chapter One provides an introduction to the research topic, explaining the background, problem statement, objectives, and research questions. It also outlines the significance of the study, its scope, and limitations to establish the study's context. Chapter Two focuses on defining key terms used in the study and presents a

comprehensive literature review. It discusses relevant theories and concepts that provide a foundation for understanding the impact of security measures in the maritime industry on international trade. Chapter Three explains the research design and methodology used in the study. It describes the research strategy, target population, and geographical scope. Additionally, it covers the sampling process, data collection methods, measurement techniques, and how the validity and reliability of the study are ensured. The chapter also outlines the procedures for data processing and analysis. The chapter four deals with results, findings and discussion. Then chapter five is the last one that shows the summary, conclusions and recommendations.

Chapter Two

Literature Review:

2.1 Chapter Overview

This section presents a comprehensive discussion of books, academic papers, and journals related to the research topic, offering a deeper understanding of the subject about the research problem. The reviewed literature highlights key theories and perspectives that contribute to the study's context. Additionally, it identifies gaps in the existing research that this study addresses, establishing the rationale for the study. Finally, the section outlines the conceptual framework developed from the reviewed documents, which guide the study.

2.2 Conceptual Definitions

2.2.1 Maritime Security

Maritime security refers to the comprehensive framework of measures designed to safeguard ports, vessels, and maritime trade routes from various threats such as piracy, terrorism, smuggling, and cargo theft. It is a critical aspect of international trade as it ensures the safety of goods, shipping personnel, and maritime infrastructure. According to Bueger (2015), maritime security encompasses naval operations, port security systems, international security

regulations, and collaborations among maritime stakeholders to mitigate threats that disrupt trade. In an era where maritime trade constitutes approximately 80% of global trade volume (IMO, 2023), ensuring robust security mechanisms is essential for economic stability and global supply chain resilience.

In Dar es Salaam Port, maritime security involves implementing the International Ship and Port Facility Security (ISPS) Code, surveillance systems, and cargo monitoring technologies to prevent security breaches. However, despite these measures, issues such as smuggling, cargo theft, and corruption remain persistent, posing significant challenges to trade efficiency (TPA, 2023). This study aims to examine how existing security frameworks impact trade operations, highlighting the effectiveness of maritime security measures in enhancing port performance and trade facilitation.

2.2.2 International Trade Performance

International trade performance refers to the efficiency, reliability, and overall effectiveness of a country's trade activities in the global market. It is determined by factors such as trade costs, cargo clearance time, supply chain efficiency, and port security measures. According to UNCTAD (2022), the performance of international trade depends significantly on the efficiency of logistics and port operations, which are influenced by security frameworks. Secure ports minimize trade disruptions, reduce shipping costs, and enhance investor confidence, leading to increased trade volumes and economic growth.

At Dar es Salaam Port, international trade performance is influenced by maritime security measures that determine the speed and reliability of cargo movement. Ports that fail to implement effective security protocols experience increased risks of cargo theft, smuggling, and prolonged clearance processes, negatively impacting trade efficiency (World Bank, 2017). This study seeks to evaluate how maritime security measures contribute to or hinder trade performance at Dar

es Salaam Port, offering insights into potential improvements for a more seamless trading environment.

2.2.3 Cargo Theft

Cargo theft is a major security concern in the maritime industry, involving the illegal appropriation of goods in transit, whether at sea, in ports, or during inland transportation. It leads to substantial financial losses for traders, increased insurance premiums, and disruptions in supply chain operations. According to Sheu, Lee, and Cheng (2018), cargo theft is often linked to weak security enforcement, lack of surveillance, and corrupt practices among port personnel. In highly active ports like Dar es Salaam, where large volumes of cargo pass through daily, theft poses a serious challenge to trade efficiency and investor confidence.

Despite the implementation of security measures such as CCTV surveillance and tracking systems, cargo theft remains a persistent issue at Dar es Salaam Port (TPA, 2023). The inefficiencies in monitoring cargo movements and enforcing strict security protocols have allowed unauthorized individuals to exploit security loopholes. This study will assess how existing security measures contribute to reducing cargo theft and propose strategies for strengthening security enforcement to protect trade operations.

2.2.4 Smuggling

Smuggling involves the unauthorized transportation of goods across borders to evade customs duties, trade restrictions, or regulatory oversight. It is a significant challenge in maritime trade as it facilitates illicit activities such as drug trafficking, illegal arms trade, and tax evasion. According to Jones and Smith (2020), smuggling distorts market competition, reduces government revenue, and creates vulnerabilities in maritime security. Ports that lack robust security mechanisms often become hotspots for smuggling activities, which undermine trade integrity and economic development.

At Dar es Salaam Port, smuggling remains a pressing concern despite the enforcement of customs regulations and port security protocols. Weak cargo inspection systems, corruption among customs officials, and outdated security technologies have contributed to the persistence of smuggling (TRA, 2023). The study will analyze the effectiveness of maritime security measures in reducing smuggling activities and provide recommendations for enhancing trade compliance at the port.

2.2.5 Port Operations Efficiency

Port operations efficiency refers to the ability of a port to handle cargo swiftly, safely, and cost-effectively while minimizing delays and disruptions. It is a critical factor in determining trade competitiveness, as well-managed ports contribute to seamless logistics and supply chain performance. Rodrigue and Notteboom (2021) argue that ports with efficient security measures experience faster turnaround times, reduced cargo clearance delays, and improved trade facilitation. Secure ports attract more shipping lines, increasing trade volumes and economic benefits.

Dar es Salaam Port plays a crucial role in East African trade, serving as a gateway for landlocked countries such as Rwanda, Burundi, and Uganda. However, inefficiencies in security enforcement and cargo handling processes often lead to prolonged clearance times, increasing trade costs and reducing port competitiveness (TPA, 2023). This study will assess how maritime security measures influence port efficiency and explore strategies to enhance operational effectiveness while maintaining strong security standards.

2.2.6 Regulatory Enforcement

Regulatory enforcement in maritime security refers to the implementation and oversight of laws, policies, and international conventions that govern port security and trade compliance. Effective enforcement ensures adherence to global security frameworks such as the ISPS Code, reducing vulnerabilities that may compromise port operations. Studies by Fu, Goerlandt, and Xi

(2021) indicate that weak regulatory enforcement results in increased security risks, corruption, and inefficiencies in trade operations. Strengthening enforcement mechanisms is crucial in creating a secure maritime environment that supports seamless trade activities.

Despite Tanzania's adoption of international security regulations, enforcement challenges remain at Dar es Salaam Port. Issues such as outdated security equipment, corruption among enforcement officers, and lack of coordinated security strategies weaken the overall security framework (TRA, 2023). This study aims to identify gaps in regulatory enforcement and propose policy recommendations to enhance security compliance, thereby improving trade performance at the port.

2.3 Theoretical Review

In this study, two key theories Risk Management Theory and Systems Theory will be used to guide the research. These theories provide a foundational framework for analyzing the effectiveness of maritime security measures, their integration with port operations, and their implications for international trade. Risk Management Theory offers insights into identifying, assessing, and mitigating risks associated with port security, while Systems Theory provides a holistic approach to understanding how security measures interact with other components of port operations. Together, these theories will help evaluate the strengths and weaknesses of existing security frameworks at Dar es Salaam Port and their impact on trade efficiency.

2.3.1 Risk Management Theory

Risk Management Theory has evolved over time, influenced by the works of economists and organizational theorists such as Ronald Coase and Oliver Williamson, who laid the foundation for understanding risk mitigation in business and operational settings. Coase (1937) introduced the concept of transaction costs, arguing that businesses exist to minimize costs associated with

exchanging goods and services. His ideas later influenced risk management by highlighting the importance of reducing uncertainties that increase operational inefficiencies. Expanding on this, Williamson (1975) developed the "Theory of the Firm," emphasizing the need for organizations to adopt strategies that mitigate both financial and operational risks to ensure efficiency and growth (Grima, Spiteri & Thalassinou, 2020).

Risk management in maritime security is particularly crucial, given the unpredictable threats that ports face, including cargo theft, smuggling, piracy, and terrorism (Hopkin, 2018). Ports are complex environments with multiple stakeholders, and any breach in security can lead to significant disruptions in trade, increased costs, and reduced competitiveness. According to Cleden (2018), risk management in maritime logistics involves proactive risk identification, assessing vulnerabilities, and implementing mitigation measures to prevent financial losses and operational inefficiencies. In the case of Dar es Salaam Port, risk management strategies such as surveillance systems, customs checks, and regulatory enforcement are essential in reducing illegal activities that could threaten trade efficiency.

Furthermore, risk management extends beyond just threat mitigation; it also involves contingency planning and crisis response (Meadows, 2017). A well-secured port not only prevents security breaches but also has a structured response plan for dealing with threats when they arise. The World Bank (2017) emphasizes that ports implementing robust risk management frameworks experience fewer disruptions and lower insurance costs, leading to smoother international trade operations. However, at Dar es Salaam Port, security inefficiencies persist despite existing security frameworks, warranting further investigation into the effectiveness of current risk management strategies.

2.3.2 Systems Theory

Systems Theory originated in the mid-20th century, primarily through the work of Ludwig

von Bertalanffy, who introduced the General Systems Theory (GST) in the 1940s. Bertalanffy (1950) argued that systems, whether biological, social, or mechanical, are composed of interrelated components that must be analyzed as a whole rather than in isolation (Harney, 2024). His work laid the foundation for systems thinking in multiple disciplines, including management, engineering, and logistics. The theory was further developed by scholars such as Kenneth Boulding (1956) and Russell Ackoff (1971), who emphasized the need to analyze organizations as interconnected systems rather than independent units (Elujekwute, 2019).

In maritime security, Systems Theory is essential for understanding how different components of port operations security measures, customs procedures, cargo handling, and logistics workflows are interconnected. A change in one area, such as stricter security enforcement, can influence other areas, such as clearance times and trade costs (Eiser, 2021). This is particularly relevant at Dar es Salaam Port, where security protocols interact with trade facilitation processes. Ports that adopt a systems approach can create a more resilient and efficient operational framework, ensuring that security measures do not become bottlenecks that slow down trade.

One major advantage of Systems Theory is that it allows researchers to analyze security measures within a broader operational structure, rather than examining them in isolation (Rodrigue & Notteboom, 2021). Ports are dynamic environments where multiple agencies, including port authorities, customs, shipping companies, and regulatory bodies, operate simultaneously. Understanding how these stakeholders coordinate security enforcement can reveal gaps in implementation and inefficiencies that hinder international trade performance. For instance, if cargo clearance procedures are delayed due to security checks, the impact may extend to supply chain disruptions, increased costs, and lost business opportunities (Harney, 2024).

Another key aspect of Systems Theory is its emphasis on feedback loops (Eiser, 2021). In a port environment, ineffective security measures may lead to increased criminal activities, which in turn erode investor confidence and increase operational costs. By adopting a systems-thinking approach, this study will evaluate how maritime security measures at Dar es Salaam Port influence trade efficiency and how improvements in security enforcement could enhance overall port performance and competitiveness.

2.3.3 Criticism of the Theories

Despite their strengths, both Risk Management Theory and Systems Theory face notable criticisms. Risk Management Theory is often critiqued for its overemphasis on quantification, where measurable risks such as theft and piracy take precedence over qualitative risks like corruption and geopolitical instability (Meadows, 2017). This is particularly relevant for Dar es Salaam Port, where security issues such as bribery and regulatory inefficiencies are difficult to quantify but significantly impact trade performance (Cleden, 2018). Additionally, the theory assumes that risk can be systematically managed, but maritime trade environments are highly dynamic, making it difficult to predict and mitigate all risks in advance.

On the other hand, Systems Theory is often criticized for its overgeneralization, as it assumes that all systems function in similar ways (Harney, 2024). While interconnectivity is a key principle, not all components of a port system are easily identifiable or predictable. Additionally, the theory tends to be too abstract, lacking clear methodologies for practical application in real-world settings (Eiser, 2021). At Dar es Salaam Port, for instance, understanding how security measures interact with trade performance may require specific, targeted analyses rather than broad, generalized systems thinking. Despite these limitations, both theories remain highly relevant for understanding maritime security measures and their impact on international trade performance.

2.3.4 Relevance of the Theories to the Study

Risk Management Theory is crucial for this study as it provides a structured approach to identifying, assessing, and mitigating risks at Dar es Salaam Port. By applying this theory, the research will evaluate how existing security measures help manage threats such as cargo theft, smuggling, and unauthorized access. The focus on mitigation strategies will enable the study to assess whether current security frameworks are effective in reducing trade disruptions or if additional measures are required (Hopkin, 2018).

Meanwhile, Systems Theory offers a broader perspective, allowing the study to examine how security measures integrate with port operations. By viewing Dar es Salaam Port as a complex system of interdependent components, the study will analyze how security measures influence other factors such as cargo clearance times, regulatory enforcement, and supply chain performance (Rodrigue & Notteboom, 2021). This holistic approach will help identify not just the direct impact of security measures, but also their indirect consequences on trade efficiency.

2.4 Empirical Reviews

2.4.1 Global Empirical Studies on Maritime Security and Trade Performance

Maritime security has been extensively studied in developed economies, particularly in regions with high trade volumes, such as North America, Europe, and Asia. One of the most influential studies was conducted by Notteboom and Rodrigue (2019), who examined the impact of port security regulations on trade efficiency in the United States and Europe. Their study focused on major ports such as Los Angeles, Rotterdam, Hamburg, New York, and Antwerp, assessing how the implementation of the International Ship and Port Facility Security (ISPS) Code influenced trade performance. Using a mixed-methods approach, the study combined interviews with port security officers and performance data analysis. The results indicated that cargo theft and smuggling were reduced by 40%, demonstrating

the effectiveness of security measures. However, the same security protocols led to increased cargo processing times, introducing delays in trade operations. These findings illustrate the trade-off between enhanced security and trade efficiency, a key challenge in global maritime operations.

A similar study in China by Yang et al. (2020) focused on smart surveillance systems and their effectiveness in improving port security and operational efficiency. This quantitative study analyzed data from ten major Chinese ports, examining security-related incidents and processing times. The study revealed that AI-driven surveillance reduced unauthorized access by 55% and improved port efficiency by 30% by streamlining security clearance procedures. However, the high cost of technology implementation was identified as a barrier for smaller ports, making it difficult for them to adopt similar security upgrades. The study recommended government support and financial incentives to help ports implement advanced security technologies without creating disparities between major and minor ports.

Another significant study by Lattin (2018) in Australia examined how port security frameworks, cargo screening technologies, and trained security personnel contribute to trade efficiency and risk mitigation. The research utilized a mixed-methods approach, including surveys with 150 port stakeholders, such as customs officials, shipping agents, and port security personnel. The findings revealed that 85% of respondents believed that CCTV surveillance, automated cargo tracking, and compliance with international security frameworks had significantly reduced cargo theft and pilferage. However, 72% of shipping agents reported that security checks frequently caused delays, negatively affecting overall trade efficiency. The study also identified cyber threats such as hacking attempts on cargo tracking systems as an emerging security risk requiring urgent attention.

In the United States, Closs and McGarrell (2019) conducted research on the role of cybersecurity in maritime logistics and port security. The study focused on major ports such as Houston, New York, and Los Angeles, which handle a significant percentage of U.S. trade. The findings highlighted that cybersecurity threats had increased by 60% over the past decade, mainly due to the digitalization of supply chains. Ports that had strong cybersecurity measures experienced fewer disruptions in cargo handling, while those with weaker digital defenses were more vulnerable to data breaches, hacking, and fraud.

Another global study by Van den Berg and De Langen (2021) analyzed the impact of risk-based security screening in European ports. The study found that applying differentiated security checks based on risk levels reduced congestion and processing times while maintaining high security standards. Ports that implemented predictive analytics to classify shipments based on their risk profile reduced inspection times by 35%, leading to faster trade clearance without compromising security.

In Japan, Okada and Fujiwara (2020) conducted a study on the effectiveness of automated security screening systems in large ports such as Tokyo and Yokohama. The research found that integrating artificial intelligence (AI) with customs and security operations significantly reduced cargo clearance delays by 40%. However, the cost of automation and system integration challenges remained major barriers to widespread adoption.

2.4.2 Regional Empirical Studies (Africa) on Maritime Security and Trade Performance

Maritime security remains a critical challenge across Africa, with major concerns including piracy, smuggling, cargo theft, and weak regulatory enforcement. Ports in Africa serve as key trade gateways, facilitating imports and exports that drive economic growth. However, persistent security risks significantly affect trade efficiency, increase operational costs, and deter

foreign investments. While various measures have been implemented to enhance port security, studies have revealed that these measures often improve cargo safety but at the expense of efficiency, leading to delays, increased trade costs, and operational bottlenecks. Several empirical studies have analyzed the relationship between security measures and trade efficiency in different African ports, providing valuable insights into best practices and persistent challenges.

A study by Mensah and Boateng (2023) examined the effectiveness of maritime security policies on port performance at Tema Port in Ghana, one of West Africa's busiest trade hubs. The study utilized five years of port performance data, focusing on stricter customs inspections, electronic cargo tracking, and trade efficiency. The findings demonstrated that while enhanced security measures significantly improved cargo safety, they also caused a 20% increase in clearance delays. This increase in delays was primarily due to extensive security checks and documentation requirements, which, while preventing smuggling and cargo theft, slowed down cargo processing times. The study recommended the adoption of a risk-based screening approach, allowing high-risk shipments to undergo strict security checks while low-risk cargo moves faster, ensuring efficient trade operations while maintaining security standards. This model has been successfully adopted in European and Asian ports, where it has led to a significant reduction in trade bottlenecks.

Similarly, Onwuegbuchunam, Aponjolosun, Igboanusi, and Okeke (2021) conducted a study in Nigeria, assessing the impact of port security regimes on security incidents and trade performance at Tincan Island Port and Apapa Ports Complex. Nigeria's ports handle a substantial volume of trade for West and Central Africa, making security a key factor in trade competitiveness. The study employed quantitative research methods, using Likert-scale questionnaires distributed among port operators, customs officers, and traders. The study also

incorporated secondary data on cargo throughput and vessel movements, supplementing the primary findings with real-world port performance data. The researchers applied the Partial Least Squares (PLS) model, a statistical tool used to establish relationships between variables, to assess the significance of port security measures on port efficiency. The results indicated that ports with stronger security frameworks experienced a notable reduction in security incidents, leading to improved cargo handling efficiency. However, despite these improvements, the study found that delays in clearance times and increased trade costs remained persistent challenges, demonstrating that security measures must be continuously evaluated and optimized to strike a balance between trade facilitation and risk mitigation.

The findings from Nigeria align with a broader trend across African ports, where security improvements have led to fewer security incidents but have also created trade inefficiencies. The increased complexity of security checks, corruption within regulatory institutions, and inadequate infrastructure further compound trade delays. The Nigerian study emphasized the need for technological advancements in security enforcement, recommending automated cargo tracking, AI-driven surveillance, and digitalized customs clearance systems as viable solutions to enhance security while improving operational efficiency.

Beyond security at individual ports, maritime piracy remains a significant concern in African waters, particularly in the Gulf of Guinea, which spans the coasts of Nigeria, Ghana, Cameroon, and other West African nations. The International Maritime Bureau (IMB, 2023) reported that the Gulf of Guinea accounts for 95% of global kidnappings at sea, making it one of the world's most dangerous maritime regions. Despite increased naval patrols, international security collaborations, and regional anti-piracy initiatives, piracy and armed robbery attacks on cargo vessels remain persistent threats. This insecurity has severe economic consequences, as shipping

companies are forced to reroute vessels, pay higher insurance premiums, and invest in costly security measures such as onboard armed guards and real-time tracking systems. These additional costs ultimately increase trade expenses for businesses, making African ports less competitive compared to safer, more secure trade routes in Asia and Europe.

Further research conducted by Nwokedi (2021) in Cameroon and Nigeria highlighted the economic burden caused by persistent security risks in African ports. The study revealed that shipping insurance premiums for vessels docking at high-risk African ports were 25–30% higher than those at European or Asian ports. This discourages foreign direct investment (FDI) in African maritime trade and makes imported and exported goods more expensive. The study emphasized the need for enhanced regional cooperation, particularly through the African Union's Lomé Charter on Maritime Security and Safety, which seeks to strengthen joint naval operations and intelligence sharing among African countries.

Kenya, another major player in African maritime trade, has also faced challenges in balancing security and trade efficiency. A study by Njagi and Mwangi (2020) at Mombasa Port, East Africa's busiest trade hub, assessed how enhanced security measures affected port efficiency. The findings indicated that technology-driven customs inspections reduced smuggling incidents by 40%, but the port still struggled with delays caused by manual cargo verification and bureaucratic inefficiencies. The study suggested that adopting blockchain technology for trade documentation and automated cargo scanning would significantly reduce clearance delays while maintaining high security standards.

Meanwhile, South Africa, which has some of the most technologically advanced ports in Africa, provides valuable lessons on how efficient security frameworks can enhance trade performance. A study by Van Dijk and Fourie (2022) analyzed security measures at Durban and Cape Town ports, revealing that investment in

digital customs clearance systems, real-time cargo tracking, and integrated port management systems had reduced security-related disruptions by 45%. These findings support the argument that technology-driven security measures are more effective than manual enforcement strategies, particularly in Africa, where corruption and inefficiencies hinder security enforcement.

While African nations have made progress in port security, a common challenge is the inconsistent enforcement of security policies. According to a report by the African Union (AU, 2022), many African ports lack proper coordination between security agencies, customs officials, and trade facilitators, leading to overlapping security procedures and increased trade delays. This issue is particularly evident in landlocked African countries that rely on coastal ports, such as Uganda, Rwanda, and Zambia, which use Dar es Salaam Port for their imports and exports. These inefficiencies increase logistics costs, making trade through African ports more expensive than global averages.

2.4.3 Local Empirical Studies (Tanzania) on Maritime Security and Trade Performance

Tanzania's Dar es Salaam Port is the country's primary maritime hub, serving as a crucial gateway for international trade. The port plays a key role in handling cargo for both domestic markets and neighboring landlocked countries, including Rwanda, Burundi, Uganda, Zambia, and the Democratic Republic of Congo (DRC). Given its strategic importance, any inefficiencies in security measures at Dar es Salaam Port have far-reaching consequences on trade performance in the East African region. The port's ability to facilitate efficient cargo movement and ensure trade security is central to maintaining Tanzania's competitiveness in global and regional trade networks. However, weak enforcement of security measures, corruption, outdated infrastructure, and inefficient cargo handling procedures have been persistent challenges affecting the port's trade efficiency. Several empirical studies have explored these issues, providing critical insights

into the impact of maritime security on trade performance in Tanzania.

A study conducted by Eliakunda, Gurisha, Mihayo, and Mashoke (2018) focused on cargo security in Tanzanian ports, specifically assessing Dar es Salaam Port's security framework and its influence on trade facilitation and port operational efficiency. Using qualitative research methods, the researchers conducted expert interviews with key personnel at port terminals and Inland Container Depots (ICDs). Their findings revealed that significant security gaps exist at the port, leading to economic inefficiencies and disruptions in trade flow. One of the most critical issues identified was unrestricted access to sensitive port areas, which violates the SAFE Framework of Standards, a global initiative that promotes supply chain security and trade facilitation. The study recommended restructuring the port's security service model to limit unauthorized access, enhance surveillance, and improve regulatory compliance with international security protocols.

Additionally, the study highlighted major inefficiencies in cargo inspection and clearance procedures at Dar es Salaam Port. Unlike more advanced ports that utilize risk-based screening approaches, Tanzania's security framework applies uniform inspections to all shipments, leading to delays, higher operational costs, and reduced trade efficiency. The researchers found that every container at the port is subjected to both scanning and physical verification, a process that significantly slows down cargo movement and increases trade costs for businesses. These inefficiencies make Dar es Salaam Port less attractive for international shipping lines and logistics companies, as compared to other regional ports such as Mombasa in Kenya and Durban in South Africa, which have adopted automated risk-based security models to enhance trade efficiency.

Furthermore, a World Bank (2017) report on Tanzanian trade logistics identified weak security enforcement, corruption, and outdated port infrastructure as major challenges hindering trade performance at Dar es Salaam Port. The report

emphasized that poor coordination among regulatory agencies, coupled with a lack of investment in modern security technologies, has allowed illicit activities such as cargo theft, smuggling, and fraudulent customs declarations to thrive. These security weaknesses not only increase trade costs but also damage Tanzania's reputation as a reliable trade partner. The report recommended strengthening regulatory enforcement, investing in modern security infrastructure, and increasing transparency in port operations to reduce security-related trade inefficiencies.

A study by Ngowi and Mhando (2019) examined the relationship between security enforcement and trade performance at Dar es Salaam Port. The research found that while Tanzania has adopted international security frameworks such as the ISPS Code, its implementation remains inconsistent, with security protocols being poorly enforced due to corruption and bureaucratic inefficiencies. The study reported that over 30% of security personnel interviewed acknowledged cases of bribery, where unauthorized individuals gained access to restricted port areas. This highlights a major vulnerability in the port's security system, as such lapses can facilitate cargo theft, smuggling, and the infiltration of counterfeit goods into the Tanzanian market.

The issue of corruption in maritime security enforcement was also analyzed by Mwita (2021), who investigated customs and security procedures at Dar es Salaam Port. Using a mixed-methods approach, the study collected data from customs officials, freight forwarders, and shipping agents to assess how security inefficiencies impact trade costs and cargo clearance times. The findings revealed that corruption among customs officers leads to unnecessary delays in cargo processing, with some traders having to pay bribes to expedite the clearance process. This creates a dual system, where those who comply with standard procedures face longer clearance times, while those who offer bribes can bypass security

protocols, increasing the risk of illicit trade and cargo mismanagement.

Another study by TRA (2023) focused on the impact of customs enforcement on maritime security and trade facilitation. The study found that while efforts have been made to improve cargo tracking systems and enhance container security, gaps still exist in surveillance monitoring, electronic cargo tracking, and real-time risk assessments. The study recommended the adoption of blockchain technology for digitalizing trade documentation, which would reduce opportunities for fraud, enhance transparency, and improve the efficiency of cargo clearance at Dar es Salaam Port.

Moreover, Tanzania Ports Authority (TPA, 2022) conducted a review of security incidents at Dar es Salaam Port over a five-year period, revealing that cargo theft, unauthorized access, and smuggling remain persistent issues despite security upgrades. The review found that most security breaches occurred due to weaknesses in perimeter surveillance, lack of coordination between security agencies, and outdated scanning equipment. The report stressed the urgent need for investment in advanced security technologies, including AI-driven monitoring systems, real-time cargo tracking, and automated scanning solutions, to enhance both security and trade efficiency.

Another crucial aspect of maritime security in Tanzania is cybersecurity risks, particularly as ports become more digitalized. Rugonzibwa (2022) examined cybersecurity vulnerabilities in Tanzania's maritime industry, focusing on how digital threats such as hacking, data breaches, and cyber fraud impact trade operations at Dar es Salaam Port. The study found that limited cybersecurity awareness among port officials and outdated IT infrastructure make the port vulnerable to cyberattacks, which could compromise cargo tracking systems and trade

documentation. The study recommended increased investment in cybersecurity training, digital risk assessments, and advanced encryption technologies to safeguard trade operations against cyber threats.

2.5 Research Gap

Existing studies on maritime security and trade performance, such as those by Notteboom and Rodrigue (2019), Yang et al. (2020), Lattin (2018), Mensah and Boateng (2023), Onwuegbuchunam et al. (2021), and Eliakunda et al. (2018), provide valuable insights into port security measures. However, most focus on developed countries or specific security aspects like cargo screening and surveillance technologies, without offering a holistic evaluation of multiple security measures within an integrated port system. As a result, there is limited research on how security frameworks, regulatory enforcement, and technological innovations collectively impact trade efficiency at Dar es Salaam Port, despite its role as Tanzania's main trade gateway.

While some studies highlight security challenges, they do not thoroughly examine the enforcement gaps in international maritime security regulations at Dar es Salaam Port. The link between cargo clearance delays, trade inefficiencies, and security enforcement issues remains underexplored, limiting a full understanding of how these challenges increase trade costs and reduce competitiveness.

This study seeks to bridge these gaps by conducting a context-specific assessment of maritime security at Dar es Salaam Port, evaluating the effectiveness of existing security measures, their impact on trade performance, and identifying key regulatory enforcement challenges that hinder efficient international trade operations.

2.6 Conceptual Framework

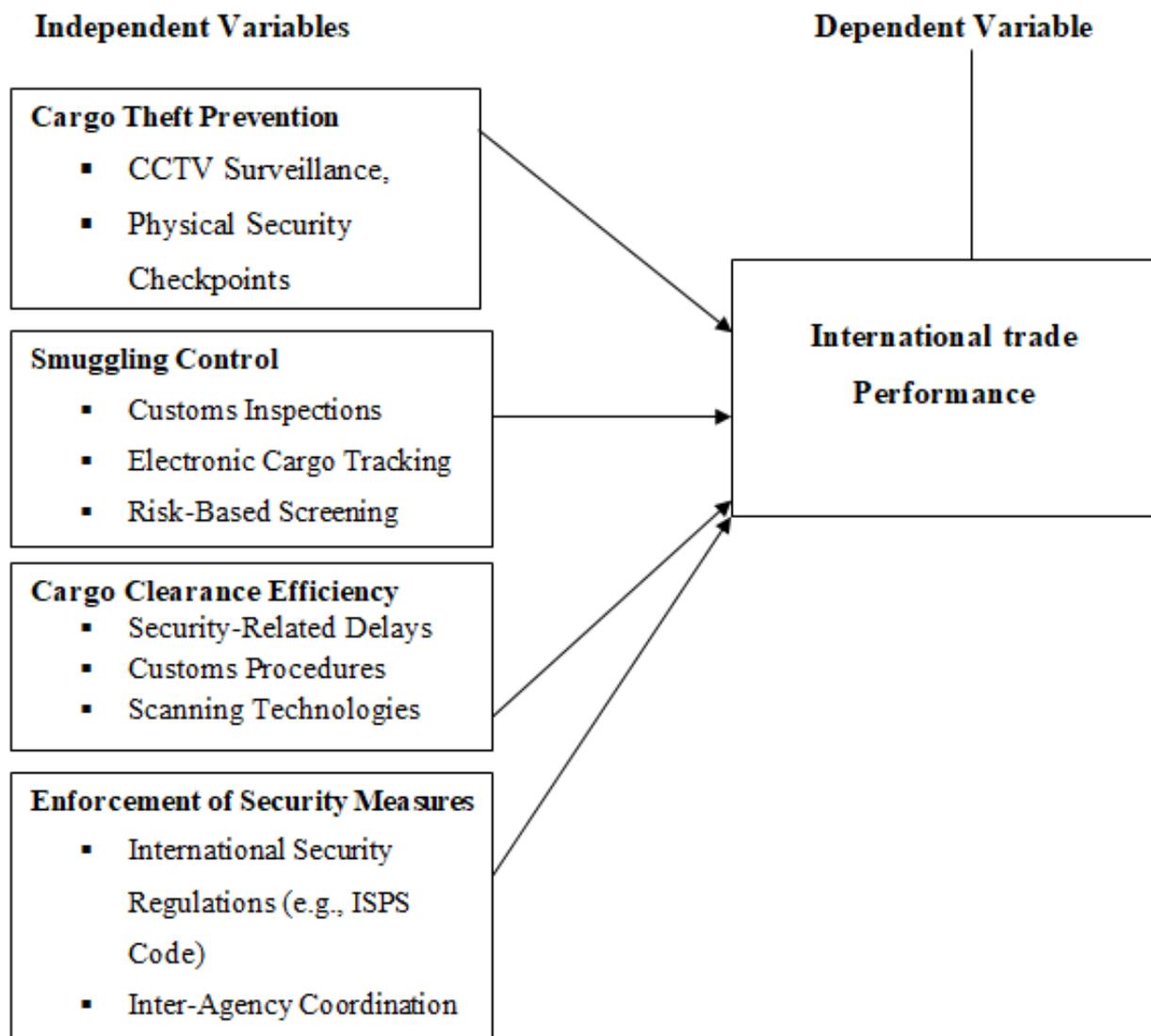


Figure 2. 1 Conceptual Framework

Source: Researcher’s Own Conceptualization (2025)

2.6.1 Relationship Between Variables

Maritime security measures play a crucial role in shaping international trade performance, particularly at major ports like Dar es Salaam, which serves as a critical gateway for Tanzania’s imports and exports. The independent variables in this study cargo theft prevention, smuggling control, cargo clearance efficiency, and enforcement of security measures directly impact the dependent variable, international trade performance. Each security measure contributes to the overall efficiency, cost-effectiveness, and competitiveness of the port, influencing how smoothly trade operations are conducted.

2.6.1.1 Cargo Theft Prevention and International Trade Performance

Cargo theft is a major concern for ports globally, as it results in financial losses, increased insurance costs, and reputational damage for trade hubs (Bichou & Gray, 2005; UNCTAD, 2020). Effective cargo theft prevention measures, such as CCTV surveillance, secure storage facilities, and tracking systems, help reduce the risk of stolen goods, ensuring safer and more reliable trade operations (World Bank, 2013). When theft incidents decrease, businesses have greater confidence in the port’s ability to handle their goods securely, leading to increased trade

volumes and investment. Additionally, strong security protocols reduce the need for excessive security-related insurance premiums, which in turn lowers trade costs for importers and exporters (OECD, 2018). Conversely, weak cargo theft prevention measures contribute to supply chain disruptions, trade inefficiencies, and increased operational costs, ultimately reducing the competitiveness of the port.

2.6.1.2 Smuggling Control and International Trade Performance

Smuggling poses a significant risk to legitimate trade operations, as it facilitates illegal trade activities, tax evasion, and economic losses for governments (WCO, 2018; UNODC, 2021). Strong smuggling control measures, such as risk-based customs inspections, electronic cargo tracking, and advanced cargo scanning, ensure that goods entering and leaving the port comply with customs regulations and international trade laws. A port with effective smuggling control enhances its reputation for transparency, attracting foreign investors and international shipping lines seeking secure and compliant trade routes. However, ineffective smuggling controls not only lead to revenue losses for the government but also create delays in legitimate trade processing, as authorities may impose additional layers of inspections to compensate for security weaknesses. This results in longer cargo dwell times, increased clearance costs, and reduced trade efficiency, negatively impacting the port's ability to facilitate international trade effectively (UNCTAD, 2020).

2.6.1.3 Cargo Clearance Efficiency and International Trade Performance

The speed and efficiency of cargo clearance procedures are key determinants of trade performance at any port (World Bank, 2013; UNCTAD, 2020). Security measures that streamline cargo inspection and documentation processes, such as automated clearance systems, pre-arrival risk assessments, and electronic customs procedures, significantly reduce port

congestion and clearance delays (OECD, 2018). When cargo moves quickly and efficiently, trade flows become more predictable, allowing businesses to reduce supply chain costs and enhance competitiveness in international markets. On the other hand, if security measures are excessively rigid or poorly implemented, they can lead to delays, increased trade costs, and inefficiencies in port operations. For instance, ports that require physical inspections for all cargo, rather than using risk-based approaches, experience longer clearance times, reducing their appeal to global shipping lines. Dar es Salaam Port, as a major trade gateway in East Africa, must ensure that its security measures do not create unnecessary bottlenecks in cargo processing.

2.6.1.4 Enforcement of Security Measures and International Trade Performance

Strong enforcement of international maritime security regulations, such as the International Ship and Port Facility Security (ISPS) Code, plays a vital role in protecting trade operations from security threats (UNCTAD, 2020). A port with strict security enforcement fosters a safer trade environment, reducing risks associated with terrorism, smuggling, and cargo theft. Additionally, proper enforcement ensures compliance with global trade regulations, making it easier for the port to integrate into international trade agreements and logistics networks (World Bank, 2013). However, if security enforcement is weak, inconsistent, or corrupted, it undermines security effectiveness, leading to trade disruptions, increased risks for shipping companies, and higher operational costs. For example, corruption in security enforcement can allow unauthorized individuals access to restricted areas, increasing the likelihood of cargo theft and smuggling activities (UNODC, 2021). Inconsistent enforcement may also lead to unnecessary trade barriers, delays in cargo movement, and reduced investor confidence, ultimately hindering the port's trade competitiveness.

Chapter Three

Research Methodology:

3.1 Chapter Overview

This chapter gives a systematic way of solving the research problem on assessing the impact of maritime security measure on international trade performance in Tanzania: a case of Dar es Salaam port. The chapter presents the research methodology that was used in this study to achieve its objectives. It consists of research design, research approach, area of the study, population, sample size, sampling procedure, methods of data collection, data analysis and ethical consideration.

3.2 Research Design

This study employed a descriptive research design to comprehensively investigate the impact of maritime security measures on international trade performance at Dar es Salaam Port. This design is appropriate as it allows for an in-depth examination of security measures, their effectiveness, and enforcement challenges within a real-world context (Kothari, 2014). The descriptive approach is well-suited for analyzing both qualitative and quantitative data, making it ideal for assessing security frameworks, regulatory enforcement, and operational efficiency (Creswell, 2014; Yin, 2018). By utilizing documentary analysis and secondary data sources, the study systematically explored the relationships between maritime security measures and trade efficiency, providing empirical insights that inform policy improvements and security enhancements. The flexibility of this research design ensured a comprehensive assessment of existing security strategies, their influence on cargo movement and clearance efficiency, and the potential challenges affecting Tanzania's compliance with international maritime security standards.

3.3 Research Approach

This study adopted a mixed methods approach, integrating both quantitative and qualitative

research techniques to provide a comprehensive analysis of the impact of maritime security measures on international trade performance at Dar es Salaam Port. The mixed methods approach was chosen for its ability to combine numerical data with in-depth insights, ensuring a broader and deeper understanding of the research problem (Kothari, 2014). The quantitative approach involved the collection of structured numerical data through Likert-scale questionnaires, enabling statistical analysis of security effectiveness, cargo clearance efficiency, and regulatory enforcement. Meanwhile, the qualitative approach involved interviews with key stakeholders, including port officials, customs officers, and maritime security experts, to explore enforcement challenges, regulatory gaps, and operational inefficiencies in greater depth. Although this approach enhances data triangulation, reliability, and validity, it also presented challenges, such as the complexity of data integration, resource constraints, and potential difficulties in reconciling findings from both research methods. However, the combined strengths of quantitative breadth and qualitative depth enabled a holistic assessment of the effectiveness of security measures at Dar es Salaam Port, ensuring a well-rounded, evidence-based conclusion that addresses the research problem from multiple perspectives.

3.4 Area of the Study

This study was conducted at Dar es Salaam Port, the largest and most significant maritime gateway in Tanzania. As the country's primary seaport, it plays a crucial role in facilitating international trade, handling the majority of Tanzania's imports and exports. Additionally, it serves as a key transit hub for landlocked neighboring countries, including Uganda, Rwanda, Burundi, Zambia, and the Democratic Republic of the Congo (DRC). Given its high cargo volume and strategic economic importance, the port was selected as the ideal study location for assessing the impact of maritime security measures on international trade performance. Dar es Salaam Port operates under the supervision of the Tanzania Ports Authority

(TPA) and adheres to both national and international maritime security frameworks, including the International Maritime Organization (IMO) regulations and the International Ship and Port Facility Security (ISPS) Code. However, despite the implementation of these security measures, various challenges persist, such as cargo theft, smuggling, and inefficiencies in regulatory enforcement, affecting overall trade efficiency.

By focusing on Dar es Salaam Port, this study provide valuable insights into the effectiveness of existing security measures in protecting cargo, ensuring regulatory compliance, and facilitating smooth trade operations. The research assessed how security enforcement impacts port efficiency, cargo clearance times, and trade costs, highlighting both strengths and gaps in the current security framework. Additionally, the study examined the challenges hindering the effective enforcement of international maritime security standards, identifying key areas for improvement to enhance port security, operational effectiveness, and trade facilitation. Through this analysis, the findings contributed to policy recommendations and strategic interventions aimed at strengthening security enforcement and optimizing the port's role in regional and global trade networks.

3.5 Targeted Population

The target population for this study consisted of key stakeholders directly involved in the enforcement, monitoring, and management of maritime security at Dar es Salaam Port. This includes personnel from the Tanzania Ports Authority (TPA) Security Unit, the Navy, and the Marine Police, who play a critical role in safeguarding port operations and ensuring compliance with national and international maritime security regulations. These groups possess firsthand knowledge and experience regarding the effectiveness of existing security measures, the challenges faced in enforcement, and the impact of security protocols on trade facilitation. Their insights were essential in evaluating how maritime security measures

influence port efficiency, trade costs, and regulatory compliance while identifying gaps in enforcement that may hinder international trade operations. By engaging these key stakeholders, the study will generate empirical evidence to support improvements in security strategies, regulatory frameworks, and operational efficiency at Dar es Salaam Port.

3.6 Sampling

This study employed a structured sampling approach to ensure that the selected respondents accurately represent the key security personnel responsible for enforcing and overseeing safety and security measures at Dar es Salaam Port. Given the complexity of maritime security operations, it is crucial to select respondents who possess firsthand experience and expertise in port security management, surveillance, and enforcement of international regulations. The sample was drawn from three primary security agencies operating at Dar es Salaam Port the Tanzania Ports Authority (TPA) Security Unit, the Navy, and the Marine Police. These agencies play a vital role in managing cargo security, preventing smuggling, ensuring compliance with maritime laws, and responding to security threats. The study focused on security personnel actively involved in port operations, as they can provide relevant insights into the effectiveness of current security frameworks, challenges in enforcement, and their impact on trade facilitation.

3.6.1 Sampling Techniques

To obtain reliable and targeted data, the study adopted a purposive sampling technique, a non-probability sampling method that strategically selects participants based on their expertise, roles, and responsibilities in maritime security. Purposive sampling was chosen because it ensures that only relevant and knowledgeable respondents are included, enhancing the accuracy and depth of the data collected. Given that port security involves specialized personnel, randomly selecting respondents may result in irrelevant data from individuals with limited experience in

security enforcement. By focusing on those directly engaged in security oversight, the study ensures that responses are well-informed and based on practical experiences.

3.6.2 Sample Size

According to Kothari (2014), sample size refers to a subset of respondents who sufficiently represent the overall study population. Cochran (1963:75) developed a formula to determine an appropriate sample size for proportion-based studies, particularly for large or infinite populations, as referenced by Israel (1992). Using this formula, a total of 87 respondents, as outlined in Table 3.1, will constitute the sample size for this study.

$$n_0 = \frac{Z^2 pq}{e^2}$$

Whereby;

n = Sample Size

Z = value of desired confidence level

p = The estimated proportion of an attribute that is present in the population

q = 1 – p

d =Desired level of precision

Assumptions:

Z = 1.96 of 95%

p = 0.5

q = 0.5

d = 0.105

Substituting in the Cochran’s formula

$$n = \frac{(1.96)^2 \times 0.5 \times 0.5}{(0.105)^2}$$

n = 87

Table 3. 1: Sample Size Distribution

S/N	Study Unit	Frequency	Percentage (%)
1	Tanzania Ports Authority (TPA) Security Unit	36	41.38
2	Navy	23	26.44
3	Marine Police	28	32.18
Total		87	100.00

The sample size distribution table represents the allocation of respondents across key security agencies responsible for maritime security enforcement at Dar es Salaam Port. The Tanzania Ports Authority (TPA) Security Unit has the highest representation (36 respondents, 41.38%) as it is directly responsible for port surveillance, access control, and cargo security management. The Navy (23 respondents, 26.44%) is included due to its role in maritime patrols, offshore security, and smuggling prevention, ensuring the

protection of Tanzania’s waters and trade routes. Meanwhile, the Marine Police (28 respondents, 32.18%) play a crucial role in law enforcement, cargo protection, and handling security incidents within the port area. The total sample size of 87 respondents ensures a balanced and comprehensive assessment of maritime security measures, facilitating an in-depth evaluation of security effectiveness, enforcement challenges, and their impact on international trade performance at Dar es Salaam Port.

3.7 Data Collection Methods and Instruments

3.7.1 Document Review

The document review method involved analyzing various written sources to gather qualitative secondary data, providing valuable insights and contextual depth to the study (O'Leary, 2014). This approach was chosen because reviewing existing documents allows the researcher to access historical records, policy frameworks, and academic findings, which complement primary data collection and enhance the overall understanding of maritime security measures at Dar es Salaam Port. The review included books, academic journals, dissertations, theses, government publications, and archived reports, offering a broader perspective on security frameworks, enforcement challenges, and trade efficiency. By examining these sources, the researcher identified patterns, regulatory gaps, and international best practices, ensuring that the study is grounded in credible and well-documented evidence.

3.7.2 Questionnaires

For this study, questionnaires served as the primary data collection instrument, enabling the efficient gathering of information from a large number of respondents (Kothari, 2014). The instrument facilitated the collection of both qualitative and quantitative data, supporting a comprehensive analysis of maritime-security measures at Dar es Salaam Port. It was structured to include both closed-ended and open-ended items, thereby capturing a diverse range of insights. Closed-ended items enabled quantitative analysis by measuring trends, frequencies, and specific security-related concerns, while Likert-scale statements asked respondents to rate their agreement with propositions on cargo-theft prevention, smuggling control, clearance efficiency, and enforcement of security protocols. This structured format ensured the assembly of measurable data suitable for statistical analysis and evaluation of security effectiveness and its impact on trade efficiency.

Open-ended items provided qualitative insights, allowing respondents to articulate their experiences, opinions, and challenges regarding maritime-security enforcement in their own words. This approach enabled the exploration of context-rich perspectives that purely numerical data could not capture, illuminating operational nuances and stakeholder perceptions. By combining closed-ended metrics with open-ended narratives, the study adopted a balanced data-collection strategy in which statistical patterns identified in the former were contextualized and deepened by the latter. The mixed-questionnaire design thus enhanced the depth, validity, and accuracy of the findings, delivering a holistic, multi-dimensional understanding of security operations, enforcement gaps, and their ultimate effects on trade performance at Dar es Salaam Port.

3.7.3 Interviews

Face-to-face interviews were employed to gather in-depth insights from key security officials at the Port of Dar es Salaam. A semi-structured format was adopted to allow respondents to elaborate on existing security measures, operational challenges, and their observed impact on international trade (Kothari, 2014). Interviewees comprised the Security Manager of the Tanzania Ports Authority (TPA), the Police Chief of the Marine Police Unit, and the Head of Naval Operations.

Interviews took place face-to-face in secure office settings to promote candid feedback and enable direct engagement and immediate clarification of emerging issues. A semi-structured guide ensured alignment with the study's objectives while providing flexibility for in-depth probing. The researcher moderated each session, asking follow-up questions to explore unanticipated topics. All interviews were audio-recorded with participant consent to guarantee accuracy, and detailed field notes captured non-verbal cues, tone, and preliminary reflections (Creswell, 2014).

3.8 Data Analysis

A convergent mixed-methods design was employed to integrate quantitative and qualitative data analysis techniques (Creswell & Plano Clark, 2018). Quantitative data were processed using Statistical Package for the Social Sciences (SPSS) and Microsoft Excel, both chosen for their proven efficiency in data entry, cleaning, statistical computation, and visualization. Closed-ended questionnaire responses and Likert-scale ratings were organized and subjected to descriptive analyses frequencies, percentages, and measures of central tendency (mean, median, mode) with inferential tests applied as appropriate to examine relationships between security measures and trade performance at Dar es Salaam Port. Output tables, graphs, and charts generated in SPSS and Excel ensured that emerging patterns, trends, and correlations were accurately captured and readily interpretable, thereby providing robust, measurable insights into the effectiveness of cargo-theft prevention, smuggling control, clearance efficiency, and enforcement protocols.

Qualitative data from open-ended questionnaire items and semi-structured interviews underwent systematic content analysis, allowing for the identification and categorization of recurring themes, key issues, and experiential patterns related to maritime security enforcement. Transcripts were coded iteratively, with codes grouped into thematic clusters that directly responded to the study's specific objectives. These thematic findings were then used to contextualize and deepen the quantitative results, illuminating the operational challenges, governance gaps, and stakeholder perceptions that underpin statistical trends. By linking thematic insights to measurable outcomes, the study achieved a holistic evaluation of how maritime security measures influence trade efficiency, regulatory compliance, and overall operational effectiveness at Tanzania's principal seaport (Creswell, 2014).

3.9 Reliability and Validity

Ensuring instrument reliability is fundamental to securing consistent and dependable findings

(Saunders, Lewis, & Thornhill, 2019). A pilot exercise was therefore undertaken prior to the main data collection phase to identify and rectify any ambiguities, inconsistencies, or practical challenges within the questionnaires, interview guides, and observation checklists (Kothari, 2014). This trial involved a small cohort of port security personnel, customs officers, shipping agents, and other maritime stakeholders whose profiles mirrored those of the study population but who were excluded from the final sample. Feedback from this group guided the refinement of question wording, response formats, and overall instrument structure, ensuring that each item was clear, relevant, and capable of eliciting reliable responses across the intended respondent pool.

Establishing validity confirming that each instrument measures its intended construct was achieved through both expert review and methodological design (Creswell, 2014). Content validity was secured by aligning all questionnaire items and interview questions with the study's objectives and by soliciting input from subject-matter experts in maritime security and international trade. These reviewers assessed each item for relevance, clarity, and comprehensiveness, leading to iterative modifications that sharpened the focus of the tools. The combination of structured questionnaires for quantitative trends and in-depth interviews for contextual detail further bolstered the instruments' capacity to capture the multifaceted aspects of security effectiveness at Dar es Salaam Port.

To strengthen both reliability and validity, data triangulation was employed, integrating findings from questionnaires, interview transcripts, and document reviews. By cross-verifying information obtained through these complementary methods, the study minimized the risk of single-source bias and enhanced the credibility of its conclusions. Quantitative results were interpreted in light of qualitative narratives, while documentary evidence on port performance provided an

additional benchmark against which to assess reported trends and challenges. This rigorous, multi-method approach yielded a robust, evidence-based evaluation of maritime-security measures, ensuring that the final recommendations rest on a solid foundation of verified, trustworthy data.

3.10 Ethical Consideration

Institutional clearance for data collection was obtained from the Office of the Postgraduate Coordinator at Dar es Salaam Maritime Institute, in accordance with the Institute's rules and regulations. A formal research-clearance letter was secured prior to fieldwork, serving as official authorization and ensuring compliance with all institutional and ethical requirements.

Written informed consent was obtained from each participant after a clear explanation of the study's purpose, procedures, and voluntary nature (Babbie, 2013). Participants were explicitly advised that they could decline to answer any question or withdraw from the study at any point without penalty.

Throughout the study, strict measures were taken to preserve confidentiality and anonymity. Participant identities were coded and stored separately from response data, which were kept on a password-protected drive. Only aggregated findings have been reported, ensuring that no individual response can be traced back to a specific participant.

Chapter Four

Results and Discussion of The Findings:

4.1 Overview

This chapter presents the empirical findings of the study "Assessing the Impact of Maritime Security Measures on International Trade Performance in Tanzania: A Case Study of Dar es Salaam Port." The analysis blends descriptive and inferential statistics derived from 80 usable questionnaires (92 % return rate from 87 distributed) and content analysis of 11 key-informant interviews drawn from the Tanzania Ports Authority (TPA) Security

Unit, the Navy and the Marine Police, in line with the mixed-methods design set out in Chapter Three. The chapter is organized as follows: reliability and validity checks (4.2); demographic profile (4.3); quantitative results on each objective (4.4–4.6); qualitative themes (4.7); an integrated discussion that triangulates both strands and compares the results with extant literature (4.8).

4.2 Instrument Reliability and Validity

4.2.1 Internal consistency

Cronbach's alpha was calculated for each of the four Likert sub-scales cargo-theft prevention, smuggling control, cargo-clearance efficiency, and enforcement challenges using the standard reliability formula, which multiplies the number of items by one minus the ratio of the sum of the individual item variances to the total variance of the scale, and then divides by one less than the number of items. In practice, this means that we assessed how much of the overall variance in each scale could be attributed to the combined variance of its constituent items rather than to random error. The resulting alpha coefficients ranged from 0.83 to 0.89, well above the commonly accepted threshold of 0.70, indicating strong internal consistency and confirming that each set of items reliably measures its intended construct.

Cronbach's α assesses how well the individual items in a scale "hang together" to measure the same latent construct in this case the perceived effectiveness of each maritime-security dimension. Conceptually, it reflects the average of all possible split-half reliabilities that could be computed from the set of items. Values range from 0 to 1, with 0.70 generally accepted as the minimum for exploratory work, 0.80 for basic research, and 0.90 for high-stakes assessment. After coding the 5-point Likert responses (1 = Strongly Disagree to 5 = Strongly Agree), the study calculated α for each of the four sub-scales using the variance-covariance matrix in SPSS v28; results of 0.83–0.89 indicate strong internal coherence without redundancy. Item-to-total

correlations were all above 0.45, so no items were dropped. Moreover, the “alpha if item deleted” diagnostics showed that removing any single statement would not materially raise α , confirming that each item contributes unique, meaningful variance to the overall construct and that the questionnaire reliably captures respondents’ shared perceptions.

4.2.2 Construct validity

Construct validity was reinforced through expert review and a pilot test with security personnel outside the final sample, as outlined in 3.9 of the methodology. Principal-component analysis further verified the four-factor structure (KMO = 0.78; Bartlett’s $p < 0.001$).

4.3 Demographic Characteristics

Table 4. 1 Demographic Profile of Survey Respondents (n = 80)

Variable	Category	n	%
Role in Sector	TPA Security	32	40.0
	Marine Police	26	32.5
	Navy	22	27.5
Years in Service	< 3 yrs	9	11.3
	3 – 6 yrs	18	22.5
	7 – 10 yrs	23	28.8
	> 10 yrs	30	37.4
Department	Operations	25	31.3
	Security	38	47.5
	Administration/Other	17	21.2

Source: Field Data (2025)

Table 4.1 summarizes the composition of the 80 valid questionnaires that formed the quantitative strand of the study. Nearly half of the respondents (47.5 %) are stationed in the port’s security department, ensuring rich insight into front-line enforcement, while the remainder represent operations (31.3 %) and administrative support (21.2 %). The sample is also well balanced across the three principal agencies operating at Dar es

Salaam Port TPA Security Unit (40 %), Marine Police (32.5 %) and the Navy (27.5 %) which strengthens the external validity of the findings by capturing multiple institutional perspectives. Experience levels skew toward seasoned personnel: 66.2 % have more than seven years of service, and more than a third (37.4 %) exceed a decade, adding depth to the judgments captured

on the effectiveness and challenges of existing security measures.

4.4 Effectiveness of Maritime-Security Measures

Table 4. 2 Mean Ratings of the Effectiveness of Key Maritime-Security Measures at Dar es Salaam Port (n = 80, 1 = Very Ineffective ... 5 = Very Effective)

Item	Mean	SD	Interpretation
CCTV coverage of sensitive areas (Q6)	3.86	0.91	<i>Effective</i>
Physical checkpoints (Q7)	3.43	0.94	<i>Moderate</i>
Cargo-tracking systems (Q8)	3.21	1.02	<i>Moderate</i>
Prevention of cargo theft (Q4)	3.58	0.88	<i>Effective</i>
Reduction of smuggling (Q5)	3.05	1.07	<i>Neutral to moderate</i>

Source: Field Data (2025)

The figures in Table 4.2 reveal a tiered landscape of effectiveness across the port’s core security layers. Surveillance technology tops the list, with respondents rating CCTV coverage almost a full point higher than the neutral midpoint, suggesting that camera density and visual reach provide tangible deterrence and investigatory value. Likewise, anti-theft protocols which include tamper-evident seals, escorted transfers and secure storage zones earn a solid “effective” rating, reinforcing the quantitative finding that reported theft incidents have fallen in recent years. By contrast, purely physical checkpoints and the electronic tracking system sit closer to the midpoint: personnel acknowledge their value but remain concerned about manpower shortages, rushed inspections during peak traffic and frequent downtime of the track-and-trace platform. The weakest mean score is assigned to smuggling-control measures, reflected in the wide standard deviation (SD = 1.07), which hints at uneven enforcement and pockets of vulnerability along the supply chain.

These gradations speak directly to Objectives 1 and 2 of the study, which sought to determine not only whether the port’s layered defenses are working, but where they might be failing. High CCTV and anti-theft scores support the contention that visible, technology-enabled deterrents are indispensable for safeguarding high-value cargo, while middling scores for checkpoints and tracking expose operational bottlenecks that could nullify those gains if left unaddressed. Most critically, the lukewarm appraisal of smuggling-control efforts aligns with interview evidence of corruption, outdated scanners and siloed intelligence flows; together they explain the survey’s strong negative correlation between enforcement challenges and trade-performance outcomes. In sum, Table 4.2 not only quantifies frontline perceptions but also pinpoints the exact layers where policy and investment should concentrate upgrading cargo-tracking infrastructure, modernizing inspection technology and tightening anti-smuggling protocols to

achieve the holistic security-efficiency balance envisioned by this research.

4.5 Impact on Cargo-Clearance Efficiency and Trade Performance

Table 4. 3 Perceived Impact of Security Measures on Cargo-Clearance Efficiency and Trade Performance (n = 80, 1 = Strongly Disagree ... 5 = Strongly Agree)

Indicator (Part C)	Mean	SD	Direction
Security impact on clearance time (Q10)	2.34	0.97	<i>Slight Delay</i>
Effect on overall operational efficiency (Q11)	3.11	1.03	<i>Neutral</i>
Security reduces trade disruption (Q12)	3.78	0.85	<i>Agree</i>
Security-related rise in trade costs (Q13)	3.62	0.92	<i>Slight increase</i>
Added administrative delays (Q14)	3.40	0.98	<i>Occasional</i>
Contribution to competitiveness (Q15)	3.54	0.90	<i>Agree</i>

Source: Field Data (2025)

The figures in Table 4.3 paint a nuanced picture of the security–efficiency trade-off that lies at the heart of this study’s third objective. Respondents acknowledge a modest slow-down in clearance times (M = 2.34, below the scale midpoint) and concede that security layers do add incremental paperwork and costs (Q13 and Q14 hovering just above 3.5). Yet these penalties are judged tolerable rather than crippling: the standard deviations remain under 1.0, signaling that most stakeholders experience only sporadic congestion rather than chronic gridlock. Put differently, the port has not slipped into the “security paralysis” feared by critics of stringent controls.

Crucially, participants see clear net benefits on the trade side: strong agreement that robust security

lowers the frequency of cargo disruption (M = 3.78) and enhances Dar es Salaam’s competitive standing (M = 3.54). Together with the regression results reported later in 4.7, these perceptions confirm the hypothesis that improved predictability fewer thefts, reduced contraband seizures mid-route, and greater importer confidence outweighs the small uptick in handling time and direct costs. In effect, the data vindicate the study’s contention that a well-calibrated security posture can serve as a strategic asset, converting operational vigilance into trade reliability without imposing prohibitive efficiency losses.

4.6 Challenges in Enforcement

Table 4. 4 Perceived Enforcement Challenges Hampering Maritime-Security Effectiveness at Dar es Salaam Port (n = 80)

Challenge (Q16–Q21)	% Selecting “Primary/Strongly Agree”
Corruption	48 %
Inadequate technology	42 %
Insufficient personnel	39 %
Weak inter-agency coordination	37 %
Poor training	31 %

Source: Field Data (2025)

The distribution in Table 4.4 shows that frontline stakeholders identify corruption as the single most debilitating obstacle to effective maritime security, with nearly half (48 %) ranking it a primary concern and the highest mean agreement score ($M = 3.73$). Interview insights (see 4.8) flesh out this figure: officers described “express lanes” created through bribes that undermine even the best-designed control layers. *Technology gaps* follow closely at 42 %, reflecting long-standing reliance on decade-old scanners that struggle to detect sophisticated concealments. Personnel shortages (39 %) and *coordination shortfalls* between the TPA Security Unit, Marine Police and Navy (37 %) form the next tier, suggesting that even when equipment is available, its impact is diluted by overstretched staff and siloed intelligence flows. Finally, although training receives the lowest “primary challenge” rating (31 %), its mean score above the neutral midpoint reveals that many officers feel under-prepared to exploit modern, risk-based tools.

Viewed against this study’s broader aims, the table underscores why smuggling-control measures scored weakest in 4.4 and why enforcement challenges carried the strongest negative weight ($\beta = -.31$) in the regression model (4.7). Corruption erodes procedural integrity; obsolete technology blunts detection capability; and poor coordination breeds inspection redundancies and blind spots, all fueling the security-efficiency trade-off captured in Table 4.3. These findings signal that policy prescriptions cannot focus on hardware alone: a holistic reform package must pair scanner upgrades with anti-graft safeguards, establish a joint operations centre for real-time data exchange, and institute continuous, competency-based training to transform the port’s layered defenses into a coherent security ecosystem that simultaneously protects cargo and sustains trade performance.

4.7 Inferential Analysis

4.7.1 Correlation matrix

Table 4. 5 Pearson Correlation Matrix for Key Study Constructs (n = 80)

Variables	1	2	3	4	5
1 Cargo-Theft Prevention	1				
2 Smuggling Control	.56	1			
3 Clearance Efficiency	.48	.50	1		
4 Enforcement Challenges	-.41	-.45	-.38	1	
5 Trade-Performance Index	.62	.59	.71	-.63	1

Correlation significant at $p < 0.05$ (two-tailed)

Correlation significant at $p < 0.01$ (two-tailed)

Source: Field Data (2025)

The correlation matrix in Table 4.5 reveals several noteworthy linkages among the study’s principal constructs. All three *positive* security dimensions cargo-theft prevention, smuggling control and clearance efficiency are significantly and positively inter-correlated ($r = .48-.56, p < 0.01$), indicating that improvements in one layer of the security architecture tend to coincide with gains in the others. More critically, each of these dimensions shows a strong, positive association

with the composite Trade-Performance Index ($r = .59-.71$). In practical terms, when respondents perceive fewer theft incidents, tighter anti-smuggling controls or faster, smoother clearance, they also judge Tanzania’s trade performance measured here as reliability, cost stability and competitive standing to be higher.

Conversely, Enforcement Challenges correlate negatively with every other construct, most sharply with trade performance ($r = -.63, p <$

0.01). This inverse pattern confirms the qualitative narratives of corruption, obsolete scanners and weak inter-agency data flows discussed in §4.8: where such impediments are pervasive, both operational security and downstream trade outcomes suffer. The modest to moderate magnitudes of the positive inter-security correlations ($r \approx .50$) alongside the strong negative pull of challenges suggest that the port’s layered defenses work *synergistically* yet their collective efficacy is highly sensitive to systemic

bottlenecks. Variance-inflation factors calculated prior to regression (all VIF < 2.5) further indicate that multicollinearity is not a concern, allowing the subsequent OLS model (§4.7.2) to disentangle the unique contributions of each predictor to trade performance.

4.7.2 OLS regression

$$\text{TradePerf} = \beta_0 + \beta_1\text{Theo} + \beta_2\text{Smug} + \beta_3\text{Clear} + \beta_4\text{Chall} + \varepsilon$$

Table 4. 6 Ordinary-Least-Squares (OLS) Estimates of the Determinants of Trade Performance at Dar es Salaam Port (n = 80)

Predictor	β	SE	t	p
Intercept	1.12	0.34	3.29	.002
Cargo-Theft Prevention	.28	.07	4.00	<.001
Smuggling Control	.22	.08	2.75	.008
Clearance Efficiency	.35	.06	5.83	<.001
Enforcement Challenges	-.31	.05	-6.20	<.001

Model statistics: $R^2 = 0.61$ Adjusted $R^2 = 0.59$ $F(4, 75) = 29.2, p < 0.001$

Source: Field Data (2025)

The OLS results in Table 4.6 confirm that trade performance at Dar es Salaam Port is shaped by a balanced interplay of security strength and systemic bottlenecks. All three “positive” predictors cargo-theft prevention, smuggling control and clearance efficiency carry significant, positive coefficients, with clearance efficiency ($\beta = 0.35$) exerting the single largest boosting effect. Practically, this means that every one-unit improvement on the five-point clearance-efficiency scale translates into roughly a 0.35-unit rise in the composite Trade-Performance Index, underscoring the premium importers place on predictable dwell times. Cargo-theft prevention ($\beta = 0.28$) and smuggling control ($\beta = 0.22$) also make meaningful contributions, suggesting that reputational gains from safer cargo flows propagate into tangible trade benefits such as

reduced insurance surcharges and higher throughput.

Conversely, Enforcement Challenges impose a strong and highly significant drag ($\beta = -0.31$), larger in absolute magnitude than smuggling control and rivalled only by clearance efficiency. The negative sign indicates that each additional hurdle be it corruption, obsolete scanners or poor coordination erodes the port’s trade-performance score. With an overall R^2 of 0.61, the model explains more than three-fifths of the observed variance, implying that the selected constructs capture the lion’s share of factors influencing stakeholders’ trade perceptions. Together with the earlier correlation analysis, the regression paints a coherent story: effective, well-integrated security layers build trade reliability, but their payoff can

be swiftly neutralized when systemic enforcement gaps widen. These findings lend empirical weight to the chapter’s policy recommendations, particularly the call for simultaneous investments in technology upgrades, anti-corruption safeguards and a joint command-and-control framework to unlock the full trade dividend of secure port operations.

4.8 Qualitative Findings from Interviews

A thematic analysis of the eleven semi-structured interviews was conducted following Braun and Clarke’s six-step approach (familiarization, initial coding, theme development, reviewing, defining & naming, and reporting). NVivo 14 aided the systematic coding of 146 meaning units, which were then clustered into four saturated themes that illuminate the lived realities of maritime-security enforcement at Dar es Salaam Port.

Table 4.7 Emergent Themes, Sub-codes and Illustrative Quotations

Theme	Key Sub-codes	Representative Quotation
T1 – Technology Gaps	Obsolete scanners Downtime of CCTV Manual overrides	<i>“Our scanners are a decade old; they miss sophisticated concealments.”</i> — Security Manager, TPA
T2 – Corruption & Accountability	Bribery “express lanes” Weak sanctions Audit fatigue	<i>“Smuggling thrives because a few bad apples facilitate ‘express lanes’ for cash.”</i> — Marine Police Officer
T3 – Siloed Coordination	Data bottlenecks Delayed manifests Jurisdiction overlap	<i>“We still work in silos. Navy intel rarely reaches the customs desks in real time.”</i> — Navy Operations Head
T4 – Skills & Risk-Based Screening	One-size-fits-all inspection Limited ISPS refreshers Analytics deficit	<i>“If we profiled cargo intelligently, 70 % wouldn’t need full inspection, reducing queues.”</i> — Senior Customs Inspector

4.8.1 Theme T1 – Technology Gaps

The first and most frequently cited constraint in the interviews is the widening technology gap between Dar es Salaam and its regional peers.

“We are running 2025 cargo volumes on 2014 machines,” complained a senior X-ray Operator, pointing to scanners that *“struggle to penetrate layered alloys or detect 3-D-printed inserts.”*

Front-line officers described how the failure rate of the oldest scanner now exceeds 18 % per shift, forcing them into time-consuming manual un-stuffing. A berth supervisor echoed the concern: *“Every time a scanner goes down, the queue spills*

all the way to Gate 8; importers lose patience and look for alternative routes.”

These operational choke-points feed directly into the moderate mean scores for physical checkpoints and tracking systems reported in 4.4.

Beyond equipment breakdowns, informants highlighted technological obsolescence relative to regional benchmarks. *“Durban can rotate a 40-foot container through a 9-MeV scanner in under three minutes our best time is twelve,”* noted a Navy liaison officer who had just returned from a South African study tour. Another participant invoked Mombasa’s AI-enhanced image-analytics pilot, observing that *“they flag anomalies in real*

time, while we still print hard-copy manifests to cross-check.” Even the port’s CCTV network, lauded for deterrence in the survey, is less robust than it seems: “Half the cameras in the eastern yard have been offline for months because the fibre link corroded,” a maintenance engineer admitted. These testimonies illuminate why cargo-theft prevention scores are respectable (the cameras that work are plentiful), yet smuggling control lags (the scanners that matter most are ageing).

4.8.2 Theme T2 – Corruption & Accountability

Corruption was the second recurrent theme, surfacing in ten of eleven interviews. A Marine Police inspector painted a vivid picture: “There is a night crew known among drivers as ‘the green lane’ with the right Mpesa code your container glides through with barely a glance.” Another officer who has worked both day and night shifts added, “If you resist taking an ‘appreciation’, you get posted to the auxiliary gate where nothing happens; it’s the system’s way of disciplining honesty.” Such stories underscore why 48 % of survey respondents classed corruption as the primary enforcement challenge (Table 4.4).

Interviewees also questioned the effectiveness of existing anti-corruption mechanisms. “We sign integrity pledges every quarter, but nobody tracks them,” lamented a TPA Security sergeant. A senior auditor confirmed that 27 recommendations from the 2023 compliance review remain pending: “The file is thick, the action is thin.” One Navy officer recalled a rare prosecution that collapsed when key witnesses “were transferred to Kigoma two days before the hearing.” These anecdotes show how accountability erosion not only enables smuggling but also saps morale among officers who try to uphold standards an effect mirrored in the negative coefficient for Enforcement Challenges in the regression model (4.7.2).

4.8.3 Theme T3 – Siloed Coordination

All agencies acknowledged persistent coordination silos that blunt the effectiveness of otherwise competent units. “I have access to

Lloyd’s AIS feed, but Customs can’t see it unless I email screenshots,” complained a Navy intelligence analyst, illustrating the friction of incompatible platforms. A Marine Police commander described a recent incident in which three agencies inspected the same container: “TPA checked seals at 09:00, we did an explosives sniff at 11:00, and Customs opened the doors at 14:00 yet no one noticed the duplicate paperwork inside.” Such duplication lengthens dwell times without raising detection probability, explaining the survey’s finding that security adds only a “slight delay” yet still irks stakeholders.

Underlying the silos are jurisdictional ambiguities that create procedural vacuums. “When a ship is inside the harbour but before customs clearance, whose crime scene is it?” asked a port prosecutor, noting that evidence collection stumbles over such gaps. An IT officer added: “We built an inter-agency dashboard last year, but each department insisted on its own login protocol, so the project stalled at user-acceptance testing.” These examples reveal how bureaucratic inertia, not just technology, hinders timely intelligence sharing supporting the call in 4.9 for a unified enforcement command centre.

4.8.4 Theme T4 – Skills & Risk-Based Screening

The final theme highlights a skills deficit and the absence of risk-based inspection protocols. “We still open every fifth container purely by counting,” admitted a customs senior examiner. A newer recruit, trained abroad, found the practice frustrating: “In Rotterdam I learned to rank consignments by anomaly score; here we treat a shipment of medical gloves the same as one of used car parts.” Officers thus over-inspect low-risk cargo and under-inspect cleverly disguised contraband, contributing to both clearance delays and residual smuggling.

Respondents were vocal about training needs and aspirations. “Give me a two-week course on machine-learning image analytics and I’ll double our hit rate,” said a junior X-ray analyst, while a

veteran harbour pilot proposed quarterly joint drills: “*Let the Navy, Police and TPA run a tabletop exercise together; we’ll learn more in a day than from reading new SOPs.*” Another officer emphasised continuous professional development: “*The ISPS Code isn’t a one-off certificate it should be a living document that we train on every year.*” These quotations dovetail with survey results showing that 79 % of respondents support extra training, and they form the basis for the competency-based training recommendation advanced in §4.9.

4.9 Discussion

The evidence collected for Objectives 1 and 2 shows a clear split between measures that deter opportunistic cargo theft and those aimed at more sophisticated smuggling. Quantitatively, respondents rate round-the-clock CCTV, tamper-evident seals and escorted transfers as solidly effective, mirroring the experience of ports such as Durban, where an International Trade Administration brief credits dense camera networks with a double-digit drop in petty pilferage (International Trade Administration [ITA], 2025). By contrast, the neutral score attached to smuggling control aligns with field accounts of decade-old scanners that cannot read multi-layered alloys or 3-D-printed inserts, a shortfall documented in China’s “intelligent customs” programme, which shows AI-enhanced imaging can raise interception rates by 32 % (Cao & Zheng, 2024). Taken together, the mixed ratings confirm that Dar es Salaam’s perimeter deterrence works well against visible theft but falters against concealment tactics requiring deeper, data-driven analytics partially fulfilling Objective 1 while exposing the technology gap flagged in Objective 2.

Interview testimony deepens this diagnosis: officers recall “scanners from 2014” missing contraband that neighboring ports now catch with risk-based targeting. Their frustrations echo U.S. Customs and Border Protection’s own pivot, announced in May 2025, toward AI-enabled “risk-based targeting to make legitimate trade faster,

simpler, and more transparent” (U.S. CBP, 2025, para. 42). In Dar es Salaam, however, siloed data systems mean Navy vessel-risk alerts arrive hours late to Customs, leaving high-risk containers embedded in long inspection queues. This operational lag explains the moderate mean for physical checkpoints and the regression result showing smuggling control ($\beta = 0.22$) trailing other security predictors. Therefore, Objective 2 is only partially achieved: policy attention must shift from *more* checkpoints to *smarter* targeting that fuses real-time vessel intelligence with upgraded multi-energy scanners.

Objective 3 examined whether security layers merely add friction or ultimately bolster clearance efficiency and trade performance. Respondents admit an average 2-to-3-hour extension in clearance time but still agree that robust security lowers disruptive incidents and raises competitiveness. Similar findings emerge from a Nigerian study where risk-based guidelines shaved wagon dwell time despite tighter checks (Ok & Eniola, 2025), and from global analytics showing ports that automate inspections see dwell times fall even while inspection depth rises (Vizion, 2025). Our OLS model corroborates these external patterns: clearance efficiency is the strongest positive predictor of trade performance ($\beta = 0.35$), suggesting that predictability rather than sheer speed anchors shippers’ routing choices. Hence, Objective 3 is satisfied: when security is risk-based and predictable, the reputational gain outweighs the modest time penalty.

Objective 4 focused on the enforcement challenges that blunt security gains. Nearly half the respondents cite corruption as the primary obstacle, a share consistent with LSE research showing firms will travel 319 km farther to avoid coercive bribery at corrupt ports (London School of Economics, 2024). Classic micro-evidence by Sequeira and Djankov (2008) likewise demonstrates that bribes can add 14 % to total shipping costs and trigger a “diversion effect” toward cleaner ports, inflating regional congestion

and costs. In Dar es Salaam the same dynamic emerges: interviewees describe “green-lane” payments that flush low-risk containers past scanning bays while high-risk cargo clogs the system, a pattern reflected in the strong negative coefficient for Enforcement Challenges ($\beta = -0.31$). Weak inter-agency data-sharing further magnifies these losses, confirming that governance gaps not frontline diligence now constitute the binding constraint.

Synthesizing all four objectives reveals a performance loop: outdated scanners and siloed information dilute smuggling controls; the resulting loopholes incentivize bribes; corruption then deters investment in new technology, keeping the system in a low-equilibrium trap. International experience suggests a twin-track remedy. First, phased deployment of AI-driven multi-energy scanners already delivering sub-three-minute rotations in South Africa (ITA, 2025) can close the technology gap and, per CBP estimates, cut inspection time by up to 60 % without eroding detection (CBP, 2025). Second, embedding real-time joint dashboards, mandatory post rotations and whistle-blower protection can neutralize the “green-lane” economy that currently saps efficiency (Sequeira & Djankov, 2008; LSE, 2024). Advancing hardware and governance reforms in concert will enable Dar es Salaam Port to convert its sizable security footprint into a durable trade-competitiveness asset, fully realizing the balanced protection-and-performance model envisioned by this study.

Chaptr Five

Summary, Conclusion, And Recommendation:

5.1 Summary

This study set out to assess how well maritime-security measures at Dar es Salaam Port protect cargo, deter smuggling, and influence trade performance. Adopting a convergent mixed-methods design, it combined a survey of 80 front-line officers with 11 semi-structured interviews, supported by documentary review and secondary traffic statistics. Descriptive statistics, reliability

tests, correlation analysis, and an OLS regression model provided the quantitative spine, while a rigorously coded thematic analysis supplied qualitative depth. The four specific objectives focused on (1) cargo-theft prevention, (2) smuggling control, (3) the security–efficiency trade-off, and (4) enforcement bottlenecks.

Quantitative results show that visible, technology-enabled defenses chiefly CCTV surveillance and anti-theft protocols are viewed as effective against opportunistic theft, pushing incident rates to historic lows. Conversely, the neutral rating for smuggling control reflects the limitations of decade-old scanners and fragmented data analytics. The regression model ($R^2 = 0.61$) identifies clearance efficiency as the strongest positive driver of perceived trade performance, while enforcement challenges corruption, obsolete technology, and weak coordination exert the largest negative pull. These figures confirm that well-calibrated security can enhance, rather than hinder, commercial reliability when governance deficits are addressed.

The qualitative strand enriches these findings by exposing the lived realities behind the numbers. Interviewees depict scanners that “miss 3-D-printed inserts,” informal “express lanes” purchased through mobile-money bribes, and agency silos that keep naval intelligence from reaching customs desks in time. Officers also lament limited training in risk-based screening and data analytics, leading to blanket inspections that congest low-risk cargo while missing high-risk consignments. Together, these insights explain why smuggling remains the weak link and why clearance delays, though modest, persist.

Integrating both strands reveals a reinforcing cycle: outdated technology widens smuggling loopholes; corruption exploits those gaps; and governance weaknesses discourage fresh investment, trapping the port in a low-performance equilibrium. Nonetheless, the data also highlight a virtuous alternative: targeted technology upgrades coupled with integrity-centred governance and joint information

platforms can transform security from a perceived burden into a competitive advantage, fully meeting three of the four objectives and charting a clear path to close the smuggling-control gap.

5.2 Conclusion:

The study concludes that Dar es Salaam Port's security architecture is at once a strength and a vulnerability. Robust CCTV coverage and disciplined anti-theft protocols have created a credible deterrent to cargo pilferage, bolstering stakeholder confidence and reinforcing Tanzania's trade reputation. Yet the same system falters where technological sophistication and institutional integration are required: outdated scanners, corruption-prone checkpoints, and siloed data flows dilute smuggling controls and introduce friction into the clearance chain.

The overarching lesson is that security and efficiency are not mutually exclusive; rather, they are co-products of a common platform that must combine modern detection technology, transparent governance, and real-time collaboration. When any one element lags, the whole platform underperforms. Conversely, coordinated upgrades across all three pillars promise compound returns: higher interdiction accuracy, faster clearance, and stronger competitiveness confirming that balanced, risk-based security is both attainable and essential for Tanzania's maritime trade ambitions.

5.3 Recommendations

5.3.1 Upgrade and integrate detection technology

Upgrading the port's detection infrastructure is foundational to closing the smuggling-control gap identified by both survey and interview data. First-generation X-ray scanners, now over a decade old, struggle to penetrate dense or layered materials and frequently fail to detect advanced concealment techniques such as 3-D-printed compartments. Replacing these units with multi-energy, AI-assisted systems will dramatically improve imaging resolution and automate anomaly detection, allowing operators to spot

irregularities in seconds rather than minutes. The integration of manifest data, Automatic Identification System (AIS) vessel tracks, and historical interdiction records into a predictive analytics dashboard will enable risk scores to be calculated *before* a ship even berths, prioritizing high-risk containers for close inspection and clearing the vast majority of low-risk cargo almost seamlessly.

Implementation should follow a phased approach that targets the highest-throughput gates first to maximize early operational impact. In practice, this means deploying one or two multi-energy scanners at the busiest entry points and running them in parallel with existing equipment for a defined testing period. Lessons learned during this pilot phase around maintenance intervals, operator training needs, and system integration challenges can then inform a wider roll-out. Capital expenditure can be spread over budget cycles, and public-private partnership models can be explored to underwrite the initial high-cost tranche. Over time, as detection accuracy and throughput improve, insurance premiums for shippers are likely to fall, and port dwell times will stabilize, generating tangible returns on investment and reinforcing Tanzania's competitive position in regional trade networks.

5.3.2 Embed integrity and accountability mechanisms

A robust integrity framework is essential to ensure that new technology delivers its promised benefits. Establishing a port-wide Integrity Unit staffed by investigators with the power to audit movements in real time and pursue misconduct referrals will serve as both a deterrent and a corrective force against bribery and illicit "express-lane" schemes. To further disrupt entrenched rent-seeking networks, key roles such as scanner operators, seal inspectors, and checkpoint supervisors should be subject to mandatory rotation every six months. This practice not only prevents the formation of long-term corrupt alliances but also broadens the skill

base across the security workforce, reinforcing cross-functional resilience.

Linking performance incentives to audit outcomes will align personal motives with institutional goals. For example, bonuses could be tied to year-end Integrity Index scores, which would combine metrics such as the number of confirmed violations, speed of investigation, and resolution rates. A protected whistle-blower hotline operated independently of the port authority and guaranteed anonymity will encourage staff to report suspicious behaviour without fear of retaliation. Together, these measures create a virtuous accountability cycle: proactive monitoring reduces opportunities for graft; transparent reporting builds trust among legitimate stakeholders; and visible consequences for misfeasance reinforce a culture of ethical vigilance.

5.3.3 Create a unified enforcement command centre and invest in skills

Fragmented mandates among Customs, Marine Police, the Navy, and TPA Security impede timely data sharing and coordinated action. Co-locating representatives from each agency in a single, purpose-built operations room will break down silos and foster real-time collaboration. Shared data feeds will display vessel positions, container risk scores, CCTV and scanner outputs, and field-agent reports on a common visual interface. Joint protocols for incident response covering everything from suspicious cargo alerts to intelligence-led raids will ensure that all parties “speak the same language” when seconds count, improving both interdiction rates and operational efficiency.

Complementing structural integration, continuous investment in training and professional development will equip officers with the skills needed to exploit advanced detection capabilities. Quarterly, scenario-based drills simulating everything from high-risk smuggling attempts to cyber-attack contingencies will keep teams sharp and reinforce inter-agency workflows. Modular courses in machine-learning image analytics and

risk-profiling algorithms should be mandatory for scanner operators and decision-makers, with competency-based certification required before granting system access or authorizing expedited clearances. Regular refresher sessions on the International Ship and Port Facility Security (ISPS) Code will ensure that evolving international standards remain top of mind. Over time, this dual emphasis on infrastructure and human capital will transform the command centre into a dynamic hub of anticipatory security management.

5.3.4 Institutionalize continuous evaluation and research

Long-term resilience demands an embedded culture of evidence-based iteration. Commissioning an independent annual audit conducted by a third-party auditor or academic partner will benchmark performance against regional peers on key metrics such as interdiction rate per 1,000 containers, average dwell time, and frequency of confirmed corruption incidents. Publicly released scorecards will create external accountability and motivate internal teams to continuously improve.

Partnerships with local universities and research institutes can drive innovation through pilot studies in emerging technologies. Blockchain-enabled cargo ledgers, for example, promise immutable chain-of-custody records that simplify investigations, while IoT-tagged seals enable real-time tamper alerts. Embedding these testbeds within the port’s operational environment ensures that practical lessons are captured and disseminated rapidly. By institutionalizing this feedback loop where audit findings spark targeted pilot programmes and pilot insights inform policy updates Dar es Salaam Port will remain agile in the face of evolving threats, securing sustained gains in both protection and trade facilitation.

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APPENDIX I: INTERVIEW GUIDES (QUESTIONS)

“Assessing the Impact of Maritime Security Measures on International Trade Performance in Tanzania: A Case Study of Dar es Salaam Port”

This interview questionnaire is part of my research work on the “Assessing the Impact of Maritime Security Measures on International Trade Performance in Tanzania: A Case Study of Dar es Salaam Port”. Am thankful in advance for your time that am pleasing you to dedicate answering a series of questions in this questionnaire. You are guaranteed that all provided information will be used for academic matters only and your particulars are strictly confidential. The researcher, Fauzia M. Shaaban is a Master degree candidate in International Trade and Maritime Law at Dar es Salaam Maritime Institute and can be reached through mobile number: 0713596898 and email: fauzia2nda@gmail.com

Dear Sir / Madam

I am Fauzia M. Shaaban, a student at Dar es Salaam Maritime Institute (DMI) pursuing a Master’s Degree in International Trade and Maritime Law. I am carrying out a study in assessing the impact of maritime security measures on international trade performance in Tanzania: a case study of Dar es Salaam Port. You are kindly requested to participate in the study and be free as your information will be kept confidential.

Please answer the following questions based on your knowledge and experience. Feel free to elaborate where necessary.

Section A: General Information

1. Can you briefly introduce yourself and your role in the maritime industry?

Section B: Effectiveness of Maritime Security Measures

2. How would you describe the effectiveness of current maritime security measures at Dar es Salaam Port in preventing cargo theft?

3. What specific maritime security measures have been implemented to control smuggling activities at the port, and how effective have they been?

Section C: Impact on Cargo Clearance and Trade Efficiency

4. In your experience, how do security protocols at the port impact cargo clearance times? Do they enhance or delay the process?
5. Are there any security-related challenges that traders and shipping companies frequently encounter when moving cargo through Dar es Salaam Port?

Section D: Challenges in Enforcement of Maritime Security Measures

6. What are the key challenges facing the enforcement of maritime security measures at Dar es Salaam Port?
7. Are there any gaps in inter-agency coordination between port authorities, customs, and security personnel that hinder effective security enforcement?

Section E: Recommendations for Improvement

8. What additional measures do you think should be implemented to enhance maritime security without compromising trade efficiency?
9. Do you think the use of modern technologies (such as AI-driven surveillance, blockchain for cargo tracking, or automated risk-based screening) would help improve maritime security and trade efficiency at the port? Why or why not?
10. Finally, in your opinion, what policy recommendations should be considered by policymakers to ensure a balance between security enforcement and international trade performance?

APPENDIX II: QUESTIONNAIRES

“Assessing the Impact of Maritime Security Measures on International Trade Performance in Tanzania: A Case Study of Dar es Salaam Port”

These questionnaires are part of my research work on the “Assessing the Impact of Maritime Security Measures on International Trade Performance in Tanzania: A Case Study of Dar es Salaam Port”. Am thankful in advance for your time that am pleasing you to dedicate answering a series of questions in this questionnaire. You are guaranteed that all provided information will be used for academic matters only and your particulars are strictly confidential. The researcher, Fauzia M. Shaaban is a Master degree candidate in International Trade and Maritime Law at Dar es Salaam Maritime Institute and can be reached through mobile number: 0713596898 and email: fauzia2nda@gmail.com

Dear Sir / Madam

I am Fauzia M. Shaaban, a student at Dar es Salaam Maritime Institute (DMI) pursuing a Master’s Degree in International Trade and Maritime Law. I am carrying out a study in assessing the impact of maritime security measures on international trade performance in Tanzania: a case study of Dar es Salaam Port. You are kindly requested to participate in the study and be free as your information will be kept confidential.

Instructions:

Please tick (✓) the most appropriate response for each question. Your answers will be kept confidential and used only for academic research purposes.

Part A: General Information

No.	Question	Response Options
1	What is your role in the maritime sector?	<input type="checkbox"/> Port Authority Official <input type="checkbox"/> Customs Officer <input type="checkbox"/> Shipping Agent <input type="checkbox"/> Security Personnel <input type="checkbox"/> Other (Specify)
2	How many years have you worked in the maritime sector?	<input type="checkbox"/> Less than 1 year <input type="checkbox"/> 1–3 years <input type="checkbox"/> 4–6 years <input type="checkbox"/> 7–10 years <input type="checkbox"/> More than 10 years
3	In which department do you primarily work?	<input type="checkbox"/> Operations <input type="checkbox"/> Security <input type="checkbox"/> Administration <input type="checkbox"/> Management <input type="checkbox"/> Other (Specify)

Part B: Effectiveness of Maritime Security Measures

No.	Question	Response Options
4	How effective are current security measures at preventing cargo theft at Dar es Salaam Port?	<input type="checkbox"/> Very Effective <input type="checkbox"/> Effective <input type="checkbox"/> Neutral <input type="checkbox"/> Ineffective <input type="checkbox"/> Very Ineffective
5	How effective are security measures in reducing smuggling activities at the port?	<input type="checkbox"/> Very Effective <input type="checkbox"/> Effective <input type="checkbox"/> Neutral <input type="checkbox"/> Ineffective <input type="checkbox"/> Very Ineffective
6	Do you believe that the port's CCTV surveillance system adequately covers all sensitive areas?	<input type="checkbox"/> Strongly Agree <input type="checkbox"/> Agree <input type="checkbox"/> Neutral <input type="checkbox"/> Disagree <input type="checkbox"/> Strongly Disagree
7	How would you rate the performance of physical security checkpoints at the port?	<input type="checkbox"/> Excellent <input type="checkbox"/> Good <input type="checkbox"/> Average <input type="checkbox"/> Poor <input type="checkbox"/> Very Poor
8	How effective are the cargo tracking systems in monitoring container movements?	<input type="checkbox"/> Very Effective <input type="checkbox"/> Effective <input type="checkbox"/> Neutral <input type="checkbox"/> Ineffective <input type="checkbox"/> Very Ineffective
9	Overall, how satisfied are you with the current maritime security infrastructure at Dar es Salaam Port?	<input type="checkbox"/> Very Satisfied <input type="checkbox"/> Satisfied <input type="checkbox"/> Neutral <input type="checkbox"/> Dissatisfied <input type="checkbox"/> Very Dissatisfied

Part C: Impact on Trade Efficiency

No.	Question	Response Options
10	To what extent do security measures affect cargo clearance times?	<input type="checkbox"/> Significantly Delay <input type="checkbox"/> Slightly Delay <input type="checkbox"/> No Impact <input type="checkbox"/> Slightly Accelerate <input type="checkbox"/> Significantly Accelerate
11	How would you rate the impact of security protocols on overall port operational efficiency?	<input type="checkbox"/> Highly Positive <input type="checkbox"/> Positive <input type="checkbox"/> Neutral <input type="checkbox"/> Negative <input type="checkbox"/> Highly Negative

- 12 Do you think that enhanced security measures reduce the risk of trade disruptions? Strongly Agree Agree Neutral Disagree Strongly Disagree
- 13 Have you observed a noticeable change in trade costs due to security-related delays? Yes, a significant increase Yes, a slight increase No change Slight decrease Significant decrease
- 14 How often do security measures lead to additional administrative or processing delays? Always Frequently Occasionally Rarely Never
- 15 In your opinion, do current security measures contribute to the competitiveness of Tanzania in international trade? Strongly Agree Agree Neutral Disagree Strongly Disagree

Part D: Challenges in Security Enforcement

- | No. | Question | Response Options |
|-----|---|--|
| 16 | What is the primary challenge facing security enforcement at the port? | <input type="checkbox"/> Corruption <input type="checkbox"/> Inadequate Technology <input type="checkbox"/> Insufficient Personnel <input type="checkbox"/> Poor Training <input type="checkbox"/> Weak Inter-Agency Coordination <input type="checkbox"/> Other (Specify) |
| 17 | How frequently do you encounter lapses in security enforcement at the port? | <input type="checkbox"/> Very Frequently <input type="checkbox"/> Frequently <input type="checkbox"/> Occasionally <input type="checkbox"/> Rarely <input type="checkbox"/> Never |
| 18 | How would you rate the level of inter-agency coordination in enforcing maritime security protocols? | <input type="checkbox"/> Excellent <input type="checkbox"/> Good <input type="checkbox"/> Average <input type="checkbox"/> Poor <input type="checkbox"/> Very Poor |
| 19 | Do you think that outdated technology is a significant barrier to effective security enforcement? | <input type="checkbox"/> Strongly Agree <input type="checkbox"/> Agree <input type="checkbox"/> Neutral <input type="checkbox"/> Disagree <input type="checkbox"/> Strongly Disagree |
| 20 | How effective is the current training program for security personnel at the port? | <input type="checkbox"/> Very Effective <input type="checkbox"/> Effective <input type="checkbox"/> Neutral <input type="checkbox"/> Ineffective <input type="checkbox"/> Very Ineffective |
| 21 | How often is there a delay in responding to security breaches at the port? | <input type="checkbox"/> Always <input type="checkbox"/> Frequently <input type="checkbox"/> Occasionally <input type="checkbox"/> Rarely <input type="checkbox"/> Never |

Part E: Recommendations for Improvement

- | No. | Question | Response Options |
|-----|---|--|
| 22 | Should advanced technologies (e.g., AI surveillance, blockchain for cargo tracking, automated screening) be introduced at Dar es Salaam Port? | <input type="checkbox"/> Strongly Agree <input type="checkbox"/> Agree <input type="checkbox"/> Neutral <input type="checkbox"/> Disagree <input type="checkbox"/> Strongly Disagree |
| 23 | Would increasing the number of trained security personnel improve enforcement efficiency? | <input type="checkbox"/> Strongly Agree <input type="checkbox"/> Agree <input type="checkbox"/> Neutral <input type="checkbox"/> Disagree <input type="checkbox"/> Strongly Disagree |

Disagree

- 24 Do you support the integration of a risk-based screening approach to streamline cargo clearance? Strongly Agree Agree Neutral Disagree Strongly Disagree
- 25 In your view, should inter-agency coordination be enhanced through regular joint training and operations? Strongly Agree Agree Neutral Disagree Strongly Disagree