Challenges And Success of Dares Salaam Port Operational Efficiency and Containers Management Tanzania

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Abstract
This study evaluates the operational efficiency of container terminals in Tanzania, particularly focusing on the Dar es Salaam Port. It achieved a 100% response rate, indicating strong engagement from respondents and enhancing the reliability of the findings. However, a gender imbalance was noted, with males overrepresented compared to females. Despite this, there was a balanced representation across different age groups, with most respondents in the younger age brackets and holding at least a bachelor's degree. In terms of working experience, respondents had a moderate level of expertise, with most having 6-10 years of experience. Efforts to improve terminal efficiency included optimizing crane operations, utilizing terminal space and quay length efficiently, and addressing infrastructure challenges. Strategies for improvement involved investing in modern equipment, technology, infrastructure, and workforce development, as well as enhancing collaboration among stakeholders. These findings offer valuable insights for enhancing operational efficiency and competitiveness in the Tanzanian maritime sector, providing guidance for terminal operators, policymakers, and industry stakeholders.

Key Words: *Evaluation, Efficiency, Port Operation, Container Efficiency*

1.0 Introduction

All the world, shipping transport is a crucial aspect in worldwide commercial and cargo conveyance, however global business depends on shipping as a means of transporting cargo from one place to another. On the other hand, commercial shipping is influenced by various types of goods and latest vessel designs for quick longer distance cargo transportation, guaranteeing a reduced cost per each long tonnage transported (Awodun and Jongbo, 2017). Moreover, development of seaports resulting to an increase degree of worldwide business as far as transportation of cargo is concerned for an effective and efficient cargo loading and unloading from the vessels. Thus, port management is required to have sufficient skills which enables them perform their duties in effectively and efficiently, in conjunctions with favourable port infrastructure as well as modern technological transport equipment and ships (Maneno, 2019).

Ucla, (2019) noted that most governments worldwide have invested a lot of efforts in controlling ports since most ports increase more revenue to the respective countries, these efforts include increasing port investments specifically in port infrastructures, terminal sites, information technology systems and stowage facilities to which all these boosts cargo handling as well as saving time of cargo loading at the port environment. UNCTAD (2019). argued that poor planning, inefficiency, incapacity, institutional framework and poor regulatory frameworks are the factors which bring some obstacles to gate operations at the port area.
Tanzania is a maritime nation, having 61,500 km^2 of its 945,087 km^2 total land area sheltered by water bodies. Tanzania's residents increased from 12.3 million in the years after the 1967 independence census to 59.7 million in 2020 census. Tanga, Mtwara, and Dar es Salaam are three of Tanzania's main seaports along its 1,424 km of Indian Ocean coastline (AFDB, 2013).

2.0 Statement of the problem

Seaports are grappling with escalating requirements to modernize and deliver cutting-edge equipment due to increasing intercontinental sea traffic and altering technologies in the maritime transport sector. Also, they are under pressure to upturn terminal efficiency in order to offer comparative benefits that will increase traffic. Providing adequate and functional equipment, reducing delays and berth times, permitting significant storage size, and ensuring multi-modal connections to the hinterland are some of the difficult challenges (UNCTAD, 2016).

The development and modernization of maritime seaports have become one of the primary concerns of seaport authorities and political leaders in most countries of the world because the economic development of landlocked and coastal regions depends mainly on seaport services. The seaport cities have experienced great prosperity and remarkable development, unlike the cities located in the interior of the country. Major seaports in Tanzania are serving Tanzania hinterland and other landlocked countries including Burundi, Rwanda, Eastern DRC, Uganda, Zambia, Malawi, and Mozambique. There is a sense in which the potentiality of economic growth in the region created the increased demands for overseas products from their products and their people and therefore creating congestion at the seaports in Tanzania.

The efficiency of seaports has been the subject of numerous studies, but most of them have concentrated on developed and emerging economies. Studies on container terminals in poor

nations are scarce (Almawsheki and Shah, 2015). As far as the researcher is aware, relatively few empirical studies have been conducted to evaluate the relative efficiency of container terminals in the principal African seaports. Yet, there is no any empirical research on the efficiency of container for Tanzanian seaports

3.0 Research Objective

The main objective of this study was to evaluate the operational efficiency of container terminals in Tanzania the case study of Dares Salaam Port.

4.0 Theory Review

4.1 Queuing theory

The mathematical analysis of how waiting lines or queues arise, function, and get congested is known as queuing theory. A queue situation essentially consists of two components. The customer, job, or request is the term used to describe someone or anything making a service request. The server is typically referred to as someone or something that delivers or completes the services. Agner Krarup Erlang's early 20thcentury study, in which he developed models to represent the system of the Danish corporation Copenhagen Telephone Exchange, is where queueing theory first emerged (Sanish, 2017). The mathematical analysis of how waiting lines or queues arise, function, and get congested is known as queuing theory. Queuing theory is highly relevant to the study. In the case of container terminals, queuing theory can be applied to understand and improve the efficiency of processes such as container handling, truck and ship queuing, and overall terminal operations

4.2 Efficiency Theory

According to Gray (2008), he compares the efficiency of 31 European and North American seaports for the year 1998 in terms of outputs like container throughput and number of inputs like total berth length. Efficiency theory focuses on maximizing outputs while minimizing inputs, which aligns closely with the goals of optimizing port operations to enhance performance and reduce costs. In this study, it can be it can be used to assess the efficiency of container handling processes, including the time taken to unload and load containers from ships, the utilization of handling equipment such as cranes, and the efficiency of storage and retrieval processes

5.0 Empirical Literature Review

According to Xiaoling HUANG et al. (2019), they used a three-stage data envelopment analysis to assess the effectiveness of two seaports in China. They also looked at the relationship between emissions and efficiency to see if it had an impact on the development of the port. Their findings showed that the Shanghai seaport is inefficient, but this is due to its high pollutant emissions, and they ultimately recommended remedies. Using the Malmquist Productivity Index and DEA analysis, Joanna Baran and Aleksandra Górecka (2015) assessed the technical efficiency and total factor productivity of container ports. Their research revealed that changes in productivity at container ports were more affected by productivity changes than technical efficiency enhancements.

In a research by Tianci Huang et al. (2020), they evaluated the effectiveness of the principal seaports near the 21st-century Maritime Silk Road using the DEA-SCOR Model. Their research

showed that the seaports in Shanghai Yangshan, Ningbo Zhoushan, and Rotterdam experienced the least inefficiency among the major ports situated along the 21st-century Maritime Silk Road, whereas Qingdao seaport experienced significant expansion. Also, their report included some recommendations for action.

In their article from 2017, Pascal K. P. Gamassa and Y. Chen analyzed and compared the efficiency of seaports in East and West African regions. Their research revealed that Tema seaport in Ghana is the most effective seaport among the two regions they chose, while Dar es Salaam seaport in Tanzania is the least effective. Finally, they offered development plans for seaports. To evaluate the effectiveness of the six main seaports in West Africa, George Kobina and Van Dyck (2015) used the DEA approach. The results of the study showed that, over a period of seven years, Tema, a seaport in Ghana, was the most effective, while Cotonou, a seaport in Benin, was the least effective. The study also discovered that, overall, of the six seaports that were chosen, four had average efficiency that was higher than 76 percent. DEA was performed by Hamadou et al. (2019) to evaluate the effectiveness of five dry ports in Africa over a period of four years. According to the study's findings, Mombasa's dry port is the most effective, scoring an average of nearly 1 during the course of the investigation, followed by Casablanca's with a score of 0.762, and Tanzania's Isaka, with a score of 0.142, as the least effective dry port. The report also identified areas for improvement.

According to Bomboma Kalgora et al. (2019), they measured the efficiency of five important commercial seaports in West Africa over an 11-year period using several data envelopment analysis techniques, including BCC, CCR, and Windows I-C approaches (2005-2016). The study concluded that in order to increase seaport efficiency, Cotonou and Abidjan should limit their operating scales. They also discovered that the operations of West African seaports were impacted by terrorism and disease outbreaks like Ebola.

In Bomboma Kalgora's (2019) analysis of the competitiveness of West Africa's strategic five container seaports over an 11-year period, he employed the Windows I-C approach of the DEA model (2005-2016). His research's conclusions supported the notion that Tema seaport in Ghana, with a 95 percent average efficiency score, is the most effective seaport in West Africa, followed by Lagos seaport in Nigeria, Abidjan seaport in the Ivory Coast, Lome seaport in Togo, and Cotonou seaport in Benin. In their study, Rajasekar T et al. (2014) used DEA to analyze the operational effectiveness of important Indian ports from 1993 to 2011. The results of the study showed that the operations of the larger Indian ports, such as Jawaharlal Nehru and Mormugao, as well as the smaller ports of Tuticorin and Ennore, were clearly efficient. The JNPT port is the most effective port among the important ports in India, according to the study.

5.1 Research gap

The choice of the subject fell on the study of the Tanzanian seaport sector for several reasons which we can cite; my experience in the field, the lack of research in organizational efficiency especially seaports and also my penchant for econometrics and quantitative studies. Until proven otherwise, no previous study has evaluated the efficiency of container terminals of Tanzania

seaports using the DEA method. As for the choice of a nonparametric method, several reasons can be presented. For example, this method allows to have reliable results even with a small sample size, it uses several variables like input and output to indicate the efficiency (instead of using arbitrary ratios to measure the latter), and finally, I will expose this method which remains unknown in the research of developing countries.

6.0 Conceptual Framework

The concept of the influence of input variables to the efficiency of container terminal is as described and presented in the figure 2.1 whereby independent variables such as number of crane, number of berth, total terminal areas and quay length of the mentioned seaports under study are related to the container throughput and container terminal efficiency in terms of congestion of cargo, release time, loading time and cost in business. The conceptual framework also presents workable measures to improve terminal efficiency including extended gates availability of seaport facilities, reliability and quality of services, safety and security, customer satisfaction strategy, and improved governance performance

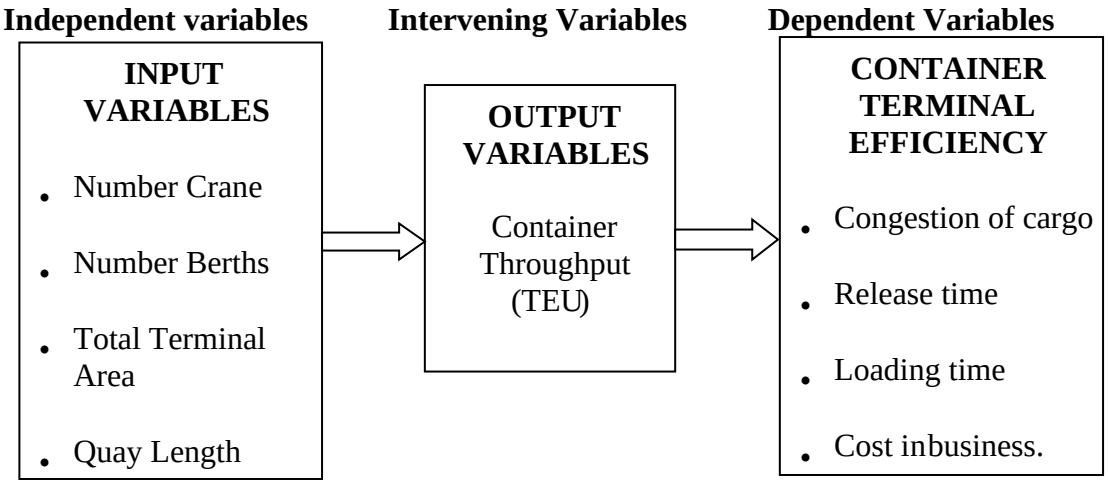

Figure 1: Conceptual Framework Developed by Author (2024)

6.0 Research methodology

A case study research design was used in this Study. The sample size of 50 respondents was adopted in this study to represent the whole population.Random and Purposive sampling techniques were used in the process of selecting suitable respondents. Respondents with literacy skills in the research community was asked to complete questionnaires. This involved Dar es Salaam Port staff, Business people using the Dar es salaam Port, ICD staff using the Dar es salaam Port. The quantitative data was analyzed with an assistance of a computer package through and Microsoft excels. Microsoft tools were employed after coding data collected data. In the analysis, data was tabulated to produce percentage of responses. Tables were used in presenting research information for interpretation whereby frequency and mean are used and discussed to give about the conclusion of the findings.

7.0 Findings

7.1 Evaluation of the operational efficiency of container terminals in Tanzania

The study was conducted to evaluate the operational efficiency of container terminals in Tanzania the case study of Dares Salaam Port. Specifically, the study was interested to find out the efficiency of terminal area, crane, quay length and berth on container terminal efficiency, determine the specificities operational efficiency of each container terminal in Tanzania and propose adequate means for improving container terminal efficiency in Tanzania.

7.1.1 Efficiency of terminal area, crane, quay length and berth on container terminal efficiency

The first objective of the study was interested to assess the efficiency of container terminals plays a critical role in facilitating global trade and economic development. One key aspect of terminal efficiency is the optimization of terminal area, crane operations, quay length, and berth utilization. These factors directly impact the terminal's ability to handle containerized cargo efficiently, minimize vessel turnaround times, and reduce operational costs. In the context of Tanzania, where container terminals, such as those in Dar es Salaam, are vital gateways for regional trade, understanding and enhancing these operational aspects are of paramount importance. This research aims to evaluate the efficiency of terminal area utilization, crane operations, quay length, and berth utilization in Tanzanian container terminals, with a focus on identifying strategies to improve overall operational efficiency and competitiveness in the global market. Data was collected, analyzed and findings are presented as shown in table 1 below:

Table 1: Efficiency of terminal area, crane, quay length and berth on container terminal efficiency

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Crane operations are the key factor in determining the efficiency and effectiveness of a container terminal	14	19	10	5	2	3.82
Terminal area have great influence on container terminal efficiency	21	24	3	2	0	4.32
Total Quay length have a great influence on efficiency of container terminal	14	19	10	5	2	3.82
Number of berths have direct influence to efficiency of container terminal	11	7	3	25	4	3.34
Insufficient of super structures and infrastructures are the key challenges associated to the inefficiency of container terminal	21	17	3	8	1	4.12
the upgrading terminal facilities and equipment will improve sustainability in terminal operations	23	17	4	5	1	4.2

Source: Field data: 2024

The findings from the study on the operational efficiency of container terminals in Tanzania, based on mean scores, reveal several key insights regarding the factors influencing terminal efficiency. Firstly, respondents generally agree that crane operations play a crucial role in determining the efficiency and effectiveness of a container terminal, with a mean score of 3.82. This underscores the importance of optimizing crane operations to improve overall terminal efficiency, as efficient crane operations are essential for timely loading and unloading of containers, which directly impacts vessel turnaround times and terminal productivity.

Secondly, the study indicates that terminal area has a significant influence on container terminal efficiency, as evidenced by a high mean score of 4.32. This finding highlights the importance of efficiently utilizing terminal space to enhance operational flow and minimize congestion. Efficient use of terminal area can lead to streamlined operations, reduced waiting times for vessels, and improved overall efficiency.

Thirdly, while respondents believe that total quay length has a great influence on the efficiency of a container terminal, with a mean score of 3.82, there is somewhat neutral sentiment regarding the direct influence of the number of berths on terminal efficiency, as indicated by a mean score of 3.34. This suggests that while quay length is considered important, the number of berths may not be perceived as a critical factor affecting efficiency. This finding suggests that other factors, such as crane operations and terminal area, may have a more significant impact on overall terminal efficiency compared to the number of berths available. The findings of the study suggest that optimizing crane operations, efficiently utilizing terminal area, and addressing infrastructure challenges are key strategies for improving the operational efficiency of container terminals in Tanzania. Additionally, upgrading terminal facilities and equipment is seen as crucial for improving sustainability in terminal operations. By focusing on these key areas, stakeholders in the Tanzanian maritime industry can enhance terminal efficiency, reduce operational costs, and improve overall competitiveness in the global trade market.

The findings from the study highlight several key factors influencing the operational efficiency of container terminals in Tanzania. Firstly, respondents emphasized the importance of optimizing crane operations, recognizing their crucial role in determining terminal efficiency. Efficient crane operations are essential for timely loading and unloading of containers, which directly impact vessel turnaround times and overall terminal productivity. This underscores the need for continuous improvement and investment in crane technology and operational practices to enhance terminal efficiency.

Secondly, the study indicates that terminal area utilization significantly influences terminal efficiency. Efficient use of terminal space can improve operational flow, reduce congestion, and lead to streamlined operations. The high mean score for terminal area highlights the importance of effective space management to enhance overall efficiency, indicating a need for terminal operators to prioritize space optimization strategies.

Thirdly, while respondents acknowledged the importance of total quay length for terminal efficiency, they expressed a neutral sentiment regarding the influence of the number of berths. This suggests that factors such as crane operations and terminal area utilization may have a more substantial impact on terminal efficiency compared to the number of berths available. Terminal operators should focus on optimizing quay length and berth allocation strategies to improve efficiency, while also considering other key factors identified in the study. The findings suggest that optimizing crane operations, efficiently utilizing terminal area, and addressing infrastructure challenges are crucial strategies for improving the operational efficiency of container terminals in Tanzania. Upgrading terminal facilities and equipment is also essential for enhancing sustainability in terminal operations. By focusing on these key areas, stakeholders in the Tanzanian maritime industry can improve terminal efficiency, reduce operational costs, and enhance overall competitiveness in the global trade market.

These findings aligns with the study conducted by According to Xiaoling HUANG et al. (2019),that assessed the effectiveness of two seaports in China. They also looked at the relationship between emissions and efficiency to see if it had an impact on the development of the port. Their findings showed that the Shanghai seaport is inefficient, but this is due to its high pollutant emissions, and they ultimately recommended remedies. Using the Malmquist Productivity Index and DEA analysis, Joanna Baran and Aleksandra Górecka (2015) assessed the technical efficiency and total factor productivity of container ports. Their research revealed that changes in productivity at container ports were more affected by productivity changes than technical efficiency enhancements.

7.1.2 The specificities of operational efficiency of each container terminal in Tanzania

The second objective of the study was interested to assess the specificities operational efficiencies of each container terminal in Tanzania. Tanzania's container terminals, particularly those in Dar es Salaam, are pivotal hubs for regional trade, handling a substantial portion of the country's imports and exports. Each terminal has its own unique operational dynamics, influenced by factors such as infrastructure, technology, management practices, and geographic location. Understanding the specific operational efficiency of each container terminal is crucial for identifying strengths, weaknesses, and opportunities for improvement. This research aims to assess the operational efficiency of individual container terminals in Tanzania, focusing on factors such as cargo handling capacity, vessel turnaround times, equipment utilization, and overall productivity. By analysing the specificities of each terminal, this study seeks to provide insights and recommendations to enhance operational efficiency, streamline processes, and ultimately strengthen Tanzania's position as a key player in the regional trade landscape. Data was collected, analysed and findings are presented as shown in table 4.3 below:

Table 4.2: The specificities of operational efficiency of each container terminal in Tanzania **(**Very high (5), High (4), Moderate (3), Low (2) and Very low (1)

Statement	Very high	High	Moderate	Low	Very low	Mean
How would you rate the efficiency of crane operations at the terminal?	2	6	4	31	7	2.78
How would you rate the efficiency of terminal area utilization	5	10	3	29	3	3.22
How would you rate the efficiency of quay length utilization?	6	11	5	26	2	3.34
How would you rate the efficiency of berth utilization?	7	11	3	24	5	3.2
How would you rate the efficiency of container handling equipment?	6	5	2	32	5	3.04
How would you rate the efficiency of terminal layout and design?	9	3	2	26	10	2.82
How would you rate the efficiency of workforce management?	5	6	6	32	1	3.26
How would you rate the efficiency of information technology systems?	2	3	6	31	8	2.66
How would you rate the efficiency of customs and border clearance processes?	5	4	7	29	5	2.98
How would you rate the overall efficiency of the terminal in comparison to other terminals in Tanzania	3	6	11	26	4	3.0

Source: Field data: 2024

Findings from table 2 above on the specificities of operational efficiency of each container terminal in Tanzania, indicates that findings from the study on the specificities of operational efficiency of container terminals in Tanzania, based on mean scores, provide valuable insights into the perceived performance of various aspects of terminal operations. Firstly, respondents rated the efficiency of crane operations relatively low, with a mean score of 2.78. This suggests that there

is significant room for improvement in crane operations at Tanzanian container terminals, which could lead to enhanced efficiency in container handling processes and reduced vessel turnaround times. Respondents rated the efficiency of terminal area utilization slightly higher, with a mean score of 3.22. While this indicates that terminal operators are somewhat more satisfied with how terminal space is utilized, there is still room for improvement to optimize terminal layout and storage facilities for better operational efficiency. The efficiency of quay length utilization received a moderate rating, with a mean score of 3.34. This suggests that respondents believe there is some level of efficiency in how quay length is utilized, but improvements could be made to further enhance terminal efficiency, possibly by increasing quay length or improving berth allocation strategies. In general, the findings highlight the need for continuous improvement in various aspects of terminal operations to enhance overall efficiency. Improving crane operations, optimizing terminal area and quay length utilization, and enhancing workforce management practices are key areas that could lead to significant improvements in the operational efficiency of container terminals in Tanzania.

The findings regarding the specificities of operational efficiency at each container terminal in Tanzania provide valuable insights into the perceived performance of various aspects of terminal operations. Firstly, the relatively low rating for crane operations suggests that there is significant room for improvement in this area. Enhancing crane operations could lead to improved efficiency in container handling processes and reduced vessel turnaround times, which are crucial for overall terminal productivity. Terminal operators should consider investing in modern crane technology and optimizing operational practices to address this key area for improvement,

Secondly, while respondents rated the efficiency of terminal area utilization slightly higher, there is still room for improvement in optimizing terminal layout and storage facilities. Efficient use of terminal space is essential for enhancing operational flow and minimizing congestion, which can lead to improved overall efficiency. Terminal operators should explore strategies to better utilize terminal space, such as redesigning layout configurations and implementing more efficient storage solutions, to further enhance operational efficiency in this area.

Thirdly, the moderate rating for the efficiency of quay length utilization suggests that while respondents believe there is some level of efficiency, improvements could be made to further enhance terminal efficiency. Increasing quay length or improving berth allocation strategies could help optimize quay length utilization and improve overall terminal efficiency. Terminal operators should consider these factors when planning terminal expansion or infrastructure development projects to ensure that quay length is utilized effectively to meet operational demands.

Generally, the findings highlight the need for continuous improvement in various aspects of terminal operations to enhance overall efficiency. Improving crane operations, optimizing terminal area and quay length utilization, and enhancing workforce management practices are key areas that could lead to significant improvements in the operational efficiency of container terminals in Tanzania. Terminal operators should prioritize these areas for improvement to enhance terminal efficiency, reduce operational costs, and improve competitiveness in the global trade market. These findings aligns with the study conducted by Mwendapole et al, (2022) that evaluated operations efficiency of major seaports along the eastern and southern coast of Africa for the period of 10 years using DEA model. Their findings showed South African seaport are less efficient compared to Eastern Africa seaports also it depicted that that even the small seaport in terms of area can be efficient once the input variables are well utilized to have maximum output.

7.1.3 Adequate means for improving container terminal efficiency in Tanzania

The fourth objective of the study was interested to assess the means for improving container terminal efficiency in Tanzania is essential for enhancing the country's competitiveness in global trade and fostering economic growth. Adequate means for improving efficiency encompass a wide range of strategies and initiatives aimed at optimizing various aspects of terminal operations. This research seeks to identify and evaluate effective means for enhancing container terminal efficiency in Tanzania, focusing on areas such as infrastructure development, technology adoption, operational practices, and regulatory frameworks. By analysing these factors, the study aims to provide actionable recommendations for policymakers, port authorities, and terminal operators to enhance efficiency, reduce costs, and improve service quality. Ultimately, the findings of this research are intended to contribute to the development of a more efficient and competitive maritime sector in Tanzania, capable of meeting the growing demands of global trade. Data was collected, analysed and findings are presented as shown in table 4.3 below:

Table 3: Adequate means for improving container terminal efficiency in Tanzania

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Investing in modern container handling equipment	18	23	6	2	1	4.12
Implementing advanced technology for cargo tracking and management	10	21	8	7	4	3.58
Improving infrastructure such as terminal layout and storage facilities	6	31	8	2	3	3.68
Enhancing workforce training and development programs	11	19	7	9	4	3.58
Streamlining customs and border clearance processes	10	21	8	7	3	3.58
Increasing collaboration and coordination among terminal stakeholders	12	18	12	4	4	3.6
Upgrading information technology systems for better operational efficiency	13	28	3	5	1	4.02
Implementing environmentally friendly practices for sustainability	6	23	5	9	7	3.28
Enhancing safety and security measures at the terminal	11	30	2	4	3	3.86
Improving communication and information sharing among terminal operators	9	27	6	7	1	4.84

Source: Field data: 2024

The findings from the study on adequate means for improving container terminal efficiency in Tanzania, based on mean scores, reveal several key insights into the perceived effectiveness of different strategies. Firstly, investing in modern container handling equipment received a high mean score of 4.12, indicating strong agreement among respondents that this is a viable strategy for enhancing terminal efficiency. Modern equipment can improve productivity, reduce handling times, and enhance overall operational efficiency. Implementing advanced technology for cargo tracking and management, improving infrastructure such as terminal layout and storage facilities, and enhancing workforce training and development programs all received moderate mean scores between 3.58 and 3.68. These findings suggest that while respondents generally agree that these strategies are important for improving efficiency, there may be varying degrees of effectiveness or feasibility depending on the specific context of each terminal. Upgrading information technology systems for better operational efficiency received a relatively high mean score of 4.02, indicating strong agreement among respondents that this is an effective means for improving efficiency. Information technology plays a crucial role in modern terminal operations, enabling better tracking, communication, and coordination among stakeholders.

In general, the findings suggest that a combination of strategies, including investment in modern equipment, technology, infrastructure, and workforce development, as well as enhancing collaboration and communication among stakeholders, are key for improving container terminal efficiency in Tanzania. These findings provide valuable insights for terminal operators, policymakers, and industry stakeholders seeking to enhance operational efficiency and competitiveness in the Tanzanian maritime sector.

The findings regarding adequate means for improving container terminal efficiency in Tanzania highlight several key strategies that can enhance operational effectiveness. Firstly, investing in modern container handling equipment is perceived as a highly effective strategy, as indicated by the high mean score. Modern equipment can significantly improve productivity and reduce handling times, leading to overall operational efficiency. Secondly, implementing advanced technology for cargo tracking and management, improving infrastructure such as terminal layout and storage facilities, and enhancing workforce training and development programs are also viewed as important strategies, albeit with slightly lower mean scores. These strategies are essential for modernizing terminal operations and ensuring that they are aligned with industry best practices.

The relatively high mean score for upgrading information technology systems indicates strong agreement among respondents that this is an effective means for improving efficiency. Information technology plays a crucial role in modern terminal operations, enabling better tracking, communication, and coordination among stakeholders. By upgrading IT systems, terminal operators can streamline operations, reduce errors, and improve overall efficiency. However, the varying degrees of effectiveness or feasibility of these strategies depending on the specific context of each terminal suggest that a tailored approach may be necessary to maximize their impact. The findings suggest that a combination of strategies, including investment in modern equipment, technology, infrastructure, and workforce development, as well as enhancing collaboration and communication among stakeholders, are key for improving container terminal efficiency in Tanzania. These findings provide valuable insights for terminal operators, policymakers, and

industry stakeholders seeking to enhance operational efficiency and competitiveness in the Tanzanian maritime sector. By implementing these strategies, container terminals in Tanzania can improve their efficiency, reduce operational costs, and enhance their competitiveness in the global trade market.

8.0 Conclusion

This study evaluates the operational efficiency of container terminals in Tanzania, particularly focusing on the Dar es Salaam Port. It achieved a 100% response rate, indicating strong engagement from respondents and enhancing the reliability of the findings. However, a gender imbalance was noted, with males overrepresented compared to females. Despite this, there was a balanced representation across different age groups, with most respondents in the younger age brackets and holding at least a bachelor's degree. In terms of working experience, respondents had a moderate level of expertise, with most having 6-10 years of experience. Efforts to improve terminal efficiency included optimizing crane operations, utilizing terminal space and quay length efficiently, and addressing infrastructure challenges. Strategies for improvement involved investing in modern equipment, technology, infrastructure, and workforce development, as well as enhancing collaboration among stakeholders. These findings offer valuable insights for enhancing operational efficiency and competitiveness in the Tanzanian maritime sector, providing guidance for terminal operators, policymakers, and industry stakeholders.

9.0 Recommendations

Given the importance of crane operations in terminal efficiency, consider implementing measures to enhance crane performance. This could include regular maintenance schedules, operator training programs, or investment in advanced crane technology.

There is a need to focus on optimizing terminal space utilization to improve operational flow and minimize congestion. This could involve revising terminal layout designs, implementing better storage solutions, or adopting digital technologies for real-time space management.

There is a need to address infrastructure challenges identified in the study, such as improving quay length utilization. This could involve expanding quay length where feasible, upgrading existing infrastructure, or implementing better berth allocation strategies to enhance overall terminal efficiency.

There is a need to continue investing in modern equipment, technology, and workforce development programs. This will not only improve current operational efficiency but also ensure long-term sustainability and competitiveness in the global trade market.

There is a need to ensure future research efforts aim for a more balanced gender representation to capture a more comprehensive range of perspectives and experiences in the maritime sector. This could involve targeted outreach programs or incentives to encourage female participation.

10.0 Policy implication

The findings of this study have several policy implications for enhancing the operational efficiency of container terminals in Tanzania. Firstly, policymakers and terminal operators should prioritize investments in modern equipment, technology, and infrastructure to improve terminal operations. Upgrading information technology systems and enhancing workforce development programs are also crucial for enhancing operational efficiency. Secondly, there is a need to address the gender imbalance in the maritime sector by implementing policies that promote gender diversity and inclusion. This could involve implementing affirmative action programs to encourage more female participation in the sector. Thirdly, efforts should be made to optimize crane operations, efficiently utilize terminal space and quay length, and address infrastructure challenges. By implementing these recommendations, policymakers and industry stakeholders can improve the efficiency and competitiveness of container terminals in Tanzania, ultimately contributing to the overall development of the maritime sector in the country

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