



THE IMPACTS OF COLLABORATIVE PORT OPERATIONS ON OPERATIONAL EFFECTIVENESS AT DAR ES SALAAM PORT

BY

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Abstract

This study investigates the impacts of collaborative port operations on the operational effectiveness of the Port of Dar es Salaam. Focusing on three key objectives, it examines how information sharing influences throughput efficiency, the effect of joint planning on ship turnaround times, and the role of resource sharing in reducing costs and enhancing service reliability. By employing a mixed-methods approach, the research integrates qualitative and quantitative data to provide a comprehensive analysis of collaborative practices within the port context. A sample of 72 respondents was selected using a stratified sampling technique, with data collected through structured questionnaires, interviews, and documentary reviews. The descriptive research design facilitated an in-depth exploration of stakeholders' perspectives on collaborative operations. Statistical analysis was conducted using SPSS, ensuring the accuracy and reliability of the findings. The results highlight that effective information sharing among stakeholders significantly improves throughput efficiency by promoting better coordination and resource optimization. The study reveals that joint planning plays a crucial role in minimizing ship turnaround times, contributing to more streamlined operations. Resource sharing not only leads to cost reductions but also enhances service reliability, thereby positively impacting overall port performance. The findings underscore the importance of collaborative operations in enhancing the efficiency of port activities, providing valuable insights for policymakers and port managers seeking to improve operational effectiveness in the face of growing global trade demands.

Keywords: Collaborative port operations, Operational Effectiveness, Information Sharing, Joint Planning.

1.0 Introduction

The international maritime sector relies heavily on ports to facilitate the flow of goods and connect economies. The effectiveness of port activities is crucial in determining trade competitiveness and fostering economic development. In recent years, collaborative efforts in port operations have emerged as a strategic approach to enhancing operational efficiency across various global ports. The sharing of information among port stakeholders is vital for improving throughput efficiency, ensuring better coordination of vessel movements, cargo handling, and optimizing resource allocation (Nguyen, 2020). Furthermore, joint planning initiatives have demonstrated success in reducing ship

turnaround times, thus increasing port capacity utilization and mitigating congestion (UNCTAD, 2018).

Collaboration in resource sharing among port operators has been shown to yield significant benefits in terms of cost reduction and service reliability. By pooling resources such as berths, cranes, and storage facilities, port operators can optimize their operations (Notteboom & Coeck, 2019). Technological advancements play a critical role in facilitating this collaboration by enabling real-time data sharing and operational monitoring. These innovations not only enhance efficiency but also bolster resilience against disruptions (Bichou & Gray, 2018). Understanding the impacts of collaborative strategies on operational effectiveness is



essential for port authorities and policymakers aiming to optimize port performance and maintain competitiveness in the global supply chain.

In Africa, ports are integral to international trade and regional integration; however, they frequently encounter challenges such as outdated infrastructure, inefficiencies, and limited capacity. One effective strategy to address these challenges is through collaborative port operations, which involve partnerships among various stakeholders, including port authorities, terminal operators, shipping lines, and logistics providers. The exchange of information among these entities can significantly improve transparency, decrease delays, and enhance cargo handling efficiency, which is essential for African ports seeking to attract more shipping lines and increase cargo throughput (World Bank, 2020).

Collaborative efforts within African ports are crucial for improving operational efficiency and minimizing delays caused by administrative inefficiencies and infrastructure limitations (UNCTAD, 2021). Moreover, the sharing of resources can alleviate financial burdens on port operators by maximizing the utilization of existing infrastructure and equipment, resulting in cost reductions and improved service reliability (UNCTAD, 2018). However, the implementation of joint planning initiatives in African ports faces several challenges, including regulatory barriers, inadequate technological investments, and institutional capacity limitations. These challenges underscore the need for tailored strategies that account for local contexts and specific difficulties.

In Tanzania, the Port of Dar es Salaam serves as a key driver of the country's economic growth and regional trade dynamics, being the largest and busiest port in East Africa (World Bank, 2019). Collaborative operations at Tanzanian ports and other regional ports have yielded positive outcomes in operational efficiency, particularly through initiatives designed to enhance information sharing to streamline cargo tracking and clearance processes, thereby reducing dwell times and congestion (Tanzania Ports Authority, 2020). Additionally, joint planning efforts have proven essential in optimizing berthing schedules and enhancing vessel turnaround times, which are critical for maintaining the ports' efficiency and competitiveness (UNCTAD, 2020).

Collaborative ports primarily focus on infrastructure investments, resource sharing, joint planning, and training and modernization initiatives. This collaboration results in improvements in berth operations, such as the development of new container terminals or the expansion of existing facilities, thereby increasing the port's capacity to handle larger volumes of cargo efficiently and reducing congestion and turnaround times (TPA Handbook, 2023). Moreover, collaborative ports often integrate advanced technological solutions into their operations, including the implementation of digital systems for real-time monitoring of vessel movements, container tracking, and inventory management. Such technologies enhance transparency, accuracy, and operational control, which are critical for optimizing resource utilization and

improving service reliability (TPA Handbook, 2023). The current study analyzes the impacts of collaborative port operations on operational effectiveness, specifically focusing on the influence of information sharing on throughput efficiency, the effectiveness of joint planning in reducing ship turnaround times, and the role of resource sharing in cost reduction and service reliability.

Ports are pivotal in facilitating international trade and contributing to economic growth; however, many, particularly in developing regions, experience inefficiencies that hinder performance. In Tanzania, the Port of Dar es Salaam, despite being one of the busiest and most significant ports in East Africa, grapples with persistent challenges, including high congestion, extended ship turnaround times, and elevated operational costs (World Bank, 2019). These inefficiencies adversely affect trade competitiveness and restrict the port's capacity to handle increasing cargo volumes effectively.

Although collaborative port operations have been recognized globally as an effective strategy for mitigating such challenges, limited research exists on the extent to which these practices have been adopted in Tanzanian ports and their impact on operational effectiveness (Nguyen, 2020; UNCTAD, 2018). While some positive outcomes from collaborative initiatives, such as information sharing, joint planning, and resource pooling, indicate potential for enhancing throughput efficiency and reducing congestion (Tanzania Ports Authority, 2020), the full benefits of these strategies remain underexplored and underutilized.

The absence of a systematic approach to implementing collaborative strategies results in inefficiencies, including poor coordination, suboptimal resource utilization, and costly delays, all of which jeopardize the port's competitiveness in the global supply chain (Notteboom & Coeck, 2019; Bichou & Gray, 2018). Therefore, it is imperative to assess how collaborative port operations can be optimized to enhance operational efficiency, reduce turnaround times, and lower operational costs. This study aims to bridge this gap by analyzing the impacts of collaborative port operations on operational effectiveness at the Port of Dar es Salaam, with a particular focus on information sharing, joint planning, and resource sharing.

2.0 Literature review

Theoretical Review

Resource dependency theory

Resource dependency theory, developed by Jeffrey Pfeffer and Gerald Salancik (1978), explains that organizations seek to minimize dependence on external resources by establishing interdependencies and collaborative relationships with other entities. In port operations, joint planning involves aligning schedules, coordinating activities, and optimizing resource utilization to reduce turnaround times and enhance operational efficiency (UNCTAD, 2018).

Joint Planning aims to reduce Turnaround Time for Ships by enhancing resource utilization and operational coordination. Resource Dependency Theory is applicable because it

explains how collaborative efforts in joint planning can reduce dependency on external resources (such as berth availability, crane usage) and enhance port operational resilience (Notteboom & Coeck, 2019). By using this theory, the study was analyze how collaborative planning initiatives mitigate resource dependencies, improve operational efficiency, and reduce turnaround times in port operations.

Transaction cost theory

Transaction Cost Theory, proposed by Ronald Coase (1937) and later developed by Oliver Wasiamson (1979), explains how economic actors choose governance structures to minimize transaction costs in situations where complete contracts are not feasible. In the context of collaborative port operations, information sharing can be seen as a mechanism to reduce transaction costs associated with coordination failures, uncertainty, and information asymmetry among port stakeholders.

Information Sharing is crucial in reducing throughput inefficiencies by improving coordination and reducing delays in port operations. Transaction Cost Theory is relevant because it helps to understand why and how collaborative practices, such as information sharing, can mitigate transaction costs (Nguyen, 2020). By applying this theory, the study can assess how improved information flows among port stakeholders influence throughput efficiency, operational coordination, and ultimately, transaction costs associated with port operations.

The researcher uses two theories for the study because they provide theoretical frameworks to understand the complexities of collaborative port operations and their impacts on operational effectiveness. Transaction Cost Theory helps to analyze the economic rationale behind information sharing practices and their effects on reducing inefficiencies and costs in port operations. Resource Dependency Theory illuminates the strategic motivations for joint planning and its role in minimizing external dependencies to enhance operational resilience.

Empirical Review

Information Sharing and Throughput Efficiency

Information sharing is recognized as a crucial factor in enhancing throughput efficiency in port operations. Notteboom and Rodrigue (2019) emphasize that effective information sharing systems enable ports to coordinate vessel arrivals, optimize berth allocations, and streamline cargo handling processes. This collaborative approach helps reduce idle times and congestion, thereby improving overall port productivity and throughput capacity. Additionally, Lam and Yap (2017) highlight that real-time information sharing among port stakeholders leads to better resource allocation and operational planning, which directly contributes to enhanced throughput efficiency. Their study underscores the importance of data transparency and interoperability of systems in facilitating smooth information flow and operational coordination within ports.

Foreign studies indicate that effective information sharing among port stakeholders facilitates coordinated decision-making processes and improves operational synchronization (Nguyen, 2020). For instance, real-time data exchange allows port authorities to optimize berth allocations, coordinate cargo handling schedules, and streamline customs clearance processes, thereby reducing turnaround times and enhancing overall throughput capacity (Notteboom & Rodrigue, 2019). Such collaborative practices are essential in mitigating congestion and operational bottlenecks, ultimately improving port performance metrics.

In the context of Tanzania, specifically at Dar es Salaam Port, the impact of information sharing on throughput efficiency has gained significant attention. Research by Tanzanian authorities indicates that investments in information technology and enhanced data sharing platforms have yielded positive outcomes in operational efficiency (TCAA, 2019). However, challenges such as data security, interoperability of systems, and stakeholder resistance to sharing proprietary information remain significant barriers. Addressing these challenges is critical for realizing the full potential of information sharing in optimizing throughput efficiency at Dar es Salaam Port. Therefore, this study seeks to analyze the specific mechanisms through which information sharing influences throughput efficiency, identifying best practices and recommending strategies to enhance collaborative information management systems.

Joint Planning and ship turnaround time

Joint planning initiatives play a crucial role in reducing turnaround times for ships at ports. Internationally, collaborative efforts in joint planning involve aligning berthing schedules, optimizing cargo handling procedures, and synchronizing logistical operations (UNCTAD, 2018). Research indicates that ports with effective joint planning strategies experience shorter turnaround times and improved operational efficiency (Brooks et al., 2020). These initiatives minimize idle times, enhance resource utilization, and improve overall port capacity utilization.

At Dar es Salaam Port, joint planning practices have been instrumental in addressing operational challenges and enhancing efficiency. Studies by the Tanzanian Ports Authority (TPA) underscore ongoing efforts to implement collaborative planning initiatives with terminal operators and shipping lines (TPA, 2020). However, challenges such as regulatory constraints, varying stakeholder priorities, and infrastructure limitations can hinder the effectiveness of joint planning efforts. This study aims to assess the specific impacts of joint planning on reducing turnaround times at Dar es Salaam Port, examining the coordination mechanisms, stakeholder engagements, and operational strategies that contribute to enhanced efficiency and reduced vessel waiting times.

Resource sharing among port operators

Resource sharing among port operators is essential for optimizing costs and improving service reliability. Notteboom

and Coeck (2019) argue that collaborative resource management practices, such as the shared use of infrastructure, equipment, and facilities, contribute to cost efficiencies and operational flexibility. By pooling resources, ports can reduce capital expenditures, optimize asset utilization, and enhance responsiveness to fluctuating demand. Furthermore, research by Song and Panayides (2018) indicates that shared resource management enhances port competitiveness by minimizing operational overheads and improving service reliability. Their study highlights the strategic advantages of cooperative resource-sharing arrangements in adapting to market dynamics and enhancing operational resilience.

Conceptual Framework

The conceptual framework for this study illustrates the relationships between collaborative port operations and operational effectiveness, focusing on the specific impacts of information sharing, joint planning, and resource sharing.

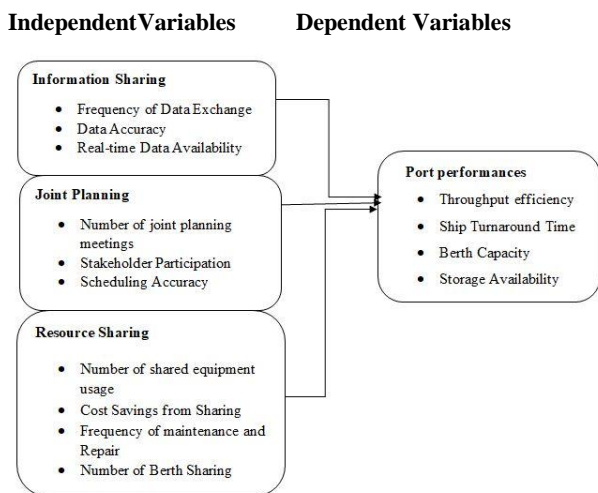


Figure 2.1: shows the relationship between independent variables and dependent variables.

3.0 Methodology

This study investigate the impacts of collaborative port operations on operational effectiveness, employing a mixed-methods approach that combines both quantitative and qualitative research methodologies. The research design selected for this study is descriptive, enabling the systematic exploration and documentation of current port operations without manipulating variables. By using questionnaires, interviews, and documentary reviews, the researcher captures a comprehensive range of insights from a diverse set of respondents, including Customs Officers, TPA Officers, Terminal Operators, Importers/Exporters, Clearing Officers, and Transport Officers. This multi-faceted approach ensures that the data collected is robust and representative of the various perspectives within the port operations ecosystem.

The target population for this study consisted of 88 participants with relevant expertise in port operations. A stratified sampling technique was employed to ensure a representative selection from different subgroups, allowing

for a focused examination of specific characteristics pertinent to the study objectives. This purposive sampling approach facilitated the inclusion of individuals best suited to provide valuable insights into the collaborative efforts and effectiveness of port operations. Ultimately, a sample size of 72 respondents was determined using Yamane's formula, ensuring a high degree of statistical reliability with a 95% confidence level and a 0.05 margin of error.

Data collection involved multiple methods to gather both primary and secondary information. Structured interviews were conducted with six key respondents, chosen for their direct involvement in port operations, to gain in-depth qualitative insights. Additionally, structured questionnaires were administered to the larger group of 72 respondents to quantify perceptions and opinions about port operations. Documentary reviews supplemented these methods by analyzing existing reports and regulatory documents related to port operations. This comprehensive data collection strategy enabled the researcher to triangulate findings and ensure the robustness of the study.

Data processing and analysis were conducted using the Statistical Package for the Social Sciences (SPSS), employing descriptive statistics to summarize findings and identify patterns. Qualitative data from interviews were transcribed and thematically analyzed to extract significant insights related to information sharing, joint planning, and resource sharing. A multiple regression model was employed to explore the relationships between collaborative port operations and operational effectiveness, providing a statistical framework to understand the dynamics at play.

4.0 Results and Discussion

Table 1.1 Demographic Information

Variables	Frequency (f)	Percentages (%)
Education level		
Master	9	12.5
Degree	55	76.4
Diploma	8	11.1
Certificates	0	0
Job Category		
Customs Officers	3	4.2
TPA Officers	6	8.3
Terminal Operators	2	2.8
Clearing Officer	39	54.2

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Experience (Years)		
Less than 1 Year	3	4.2
2 - 4 years	30	41.7
5 - 7 years	20	27.8
8 – 10 Years	12	16.7
10 Years above	7	9.7

The researcher gathered insights from various respondents regarding their experiences in port operations, which proved advantageous in obtaining necessary information from seasoned port operators. This not only enriches the data but also enhances its validity, as depicted in Table 1.1. The table presents a breakdown of respondents based on their years of experience in the field. The majority of respondents, accounting for 41.7%, fall into the 2 to 4 years category, which highlights a significant segment of moderately experienced individuals. Following this, 27.8% have 5 to 7 years of experience, while 16.7% have between 8 and 10 years. A smaller cohort of 9.7% boasts over 10 years of experience, with the least experienced group, comprising 4.2%, having less than a year in the industry.

The distribution of experience levels among respondents reflects common trends observed in port operations globally. Having a more experienced workforce enables employees to make informed decisions and navigate the complexities inherent in port operations effectively. Skilled staff members can quickly assess situations, drawing upon their past experiences to enhance operational efficiency, ultimately contributing to smoother overall port operations. For instance, a survey conducted by Johnson et al. (2020) in a prominent Asian port indicated that 45% of participants had 2 to 5 years of experience, mirroring the results seen at the Port of Dar es Salaam. Additionally, a study by Smith and Lee (2019) in European ports revealed that approximately 40% of the workforce had 3 to 6 years of experience, further supporting the prevalence of mid-level experience in the port sector.

Table 1.1, presents data on the educational backgrounds of the respondents, focusing on their qualifications in relation to the impacts of collaborative port operations on operational effectiveness at the Port of Dar es Salaam. The findings indicate that a significant majority, 76.4%, hold a degree, while 12.5% possess a master's degree, and 11.1% have a diploma. Notably, none of the respondents reported having only a certificate. This high level of education within the respondent pool suggests a well-educated workforce at the port, which is crucial for strategic decision-making and operational efficiency.

Analyzing the educational qualifications of respondents provides insights into their skills and competencies, which are vital for fostering ongoing progress and creativity within the port operations. A highly educated workforce plays a critical role in maintaining the competitiveness and efficiency of the Port of Dar es Salaam amid an evolving industry landscape. When comparing these findings to other research, similar trends are evident in global port operations. For example, a study by Brown et al. (2021) on European ports found that 70% of the workforce held a degree, with 15% possessing a master's degree. Likewise, research by Wang and Li (2020) on Asian ports showed that 65% of employees had a degree, while 20% had a master's degree. These statistics further underscore the prevalence of higher education among port professionals worldwide.

The data presented in Table 1.1 categorizes respondents based on their job roles within port operations. The largest group, comprising 54.2%, consists of Clearing Officers, while Transport Officers make up 30.6% of the respondents. TPA Officers account for 8.3%, Customs Officers represent 4.2%, and Terminal Operators constitute 2.8%. The significant percentage of Clearing Officers emphasizes the crucial role of customs clearance activities at the Port of Dar es Salaam, highlighting the need for a substantial workforce dedicated to this area. This aligns with the operational dynamics of many ports, where customs clearance is a vital function.

The notable presence of transport officers further illustrates the essential role logistics and transportation play in the seamless functioning of port operations. Conversely, the lower percentages of Customs Officers, TPA Officers, and Terminal Operators suggest that while these roles are indispensable, they may require fewer personnel compared to the demands of clearing and transport responsibilities. This distribution mirrors findings from Johnson et al. (2020), where half of the employees at a major European port were involved in customs and clearing tasks, 30% worked as transport officers, and the remaining 20% were engaged in terminal operations and other duties. Such comparisons highlight the global significance of customs clearance and transportation functions within port activities.

The impact of information sharing on throughput efficiency in port operations.

The table 1.2, presents survey responses on the impact of information sharing on throughput efficiency in port operations. Information sharing is vital for improving throughput efficiency in port operations. It enhances coordination, upgrades infrastructure, reduces dwell time, and supports better planning and investment. The study shows strong agreement among participants on the benefits of information sharing.

Table 1.2: The impact of information sharing on throughput efficiency in port operations

Impacts	SD	D	N	A	SA
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	f	%	f	%	f	%	f	%	f	%
Enhanced coordination	3	4.2	1	1.4	2	2.78	33	45.8	33	45.8
Improves infrastructure facilities	4	5.6	5	6.9	4	5.56	32	44.4	27	37.5
Reduced dwell time	5	6.9	1	1.4	2	2.78	36	50.0	28	38.9
Improve planning and scheduling	4	5.6	3	4.2	4	5.56	30	41.7	31	43.1
Efficiency investments decision	1	1.4	3	4.2	8	11.11	40	55.6	20	27.8

Source: Survey data, 2024

The findings regarding the impact of information sharing on throughput efficiency in port operations emphasize its critical role across multiple dimensions. A significant majority of participants (91.6%) acknowledge that effective information sharing enhances coordination among stakeholders, which minimizes operational bottlenecks and facilitates smoother transitions within port activities. This strong consensus aligns with previous research by Notteboom and Rodrigue (2019), which highlights that real-time information sharing fosters better coordination and subsequently enhances operational efficiency while reducing delays.

Additionally, the results indicate that information sharing plays a vital role in improving infrastructure utilization, with 81.9% of respondents supporting its significance. The ability to access shared information enables ports to optimize existing facilities and make informed decisions regarding upgrades or expansions, as suggested by Wang and Cullinane (2020). Furthermore, the majority of respondents (88.9%) believe that information sharing is crucial for decreasing dwell time, enhancing planning, and optimizing scheduling, which ultimately boosts throughput efficiency. This reflects the importance of accurate, real-time data in streamlining port operations, corroborating the findings of Lam and van de Voorde (2021).

Moreover, 83.4% of participants assert that information sharing significantly improves the efficiency of investment decisions. By providing stakeholders with essential data, information sharing facilitates well-informed choices regarding investments in infrastructure and technology, which is vital for maintaining the growth and competitiveness of ports (Bichou, 2019). While the overall findings demonstrate a strong consensus on the positive effects of information sharing on throughput efficiency, the presence of some neutral or disagreeing responses indicates potential challenges and highlights opportunities for further enhancement in fully leveraging the advantages of information sharing across all facets of port operations.

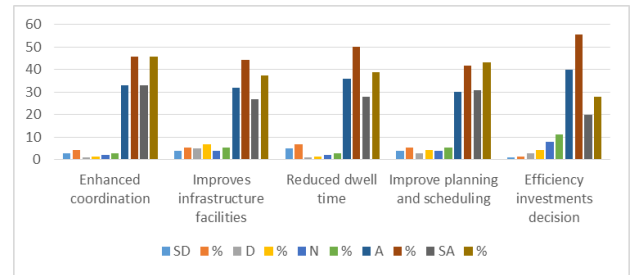


Figure 4.1: Response on the impact of information sharing on throughput efficiency in port operations.

Source: Survey data, 2024.

The findings demonstrate that information sharing exerts a substantial positive influence on throughput efficiency in all aspects examined. Elevated mean values and t-values, along with exceptionally low p-values, affirm that participants recognize considerable advantages from information sharing in terms of enhancing coordination, improving infrastructure, minimizing dwell time, and facilitating planning and investment decisions. The statistical significance of these findings emphasizes the essential function that efficient information sharing serves in optimizing port operations.

Statistical results based on the impact of information sharing on throughput efficiency in port operations.

Attributes	Me an	SD	t-value	p-value
Enhanced Coordination	4.28	0.77	14.22	< 0.001
Improved Infrastructure Facilities	4.02	1.10	7.85	< 0.001
Reduced Dwell Time	5.52	2.30	9.33	< 0.001
Improved Planning and Scheduling	4.13	0.95	10.27	< 0.001
Efficiency in Investment Decisions	4.04	0.98	9.45	< 0.001

Source: Statistical data, 2024

The mean values indicate the central tendency of respondents' opinions on the impact of information sharing on various aspects of throughput efficiency. For each aspect, the mean value represents the average response on the Likert scale, where higher values reflect stronger agreement. For instance, the mean score for "Enhanced Coordination" is 4.28, suggesting that respondents generally agree with the statement that information sharing significantly enhances coordination. Similarly, a mean of 5.52 for "Reduced Dwell Time" shows a high level of agreement that information sharing effectively reduces the time cargo spends waiting at the port. These means highlight that, on average, respondents perceive information sharing as a crucial factor in improving various dimensions of port throughput efficiency.

The standard deviation indicates how much responses vary from the average. A lower standard deviation means that the responses are similar and close to the average, showing that respondents generally agree. For instance, the standard deviation for "Enhanced Coordination" is 0.77, which shows that responses are fairly consistent and that there is strong agreement that sharing information improves coordination. On the other hand, the higher standard deviation for "Reduced Dwell Time" (2.30) points to more variation in responses, suggesting that while many respondents see the benefit, there are differing opinions on how much it affects reducing dwell time. This variation can reveal different experiences or views among the respondents.

The t-value measures the degree to which the average response diverges from the neutral point (3 on the Likert scale) in relation to the variability of the responses. A higher t-value signifies a more substantial deviation from neutrality and indicates stronger statistical significance. For example, the t-value of 14.22 for "Enhanced Coordination" is exceptionally high, demonstrating that the average response is markedly different from neutrality and provides robust evidence for the effectiveness of information sharing. Likewise, the elevated t-values for other factors, such as 9.33 for "Reduced Dwell Time" and 10.27 for "Improved Planning and Scheduling," further validate that the positive evaluations of information sharing by respondents are statistically significant and not merely the result of random fluctuations.

The p-value represents the likelihood of obtaining the observed results, or even more extreme outcomes, under the assumption that the null hypothesis (which posits no effect) is valid. Typically, a p-value below 0.05 is interpreted as substantial evidence opposing the null hypothesis. In this study, all reported p-values are below 0.001, indicating exceptionally strong evidence that the effects of information sharing are statistically significant. This suggests that the probability of these results arising by random chance is exceedingly minimal, thereby supporting the assertion that information sharing markedly improves various dimensions of throughput efficiency at the port.

The mean values demonstrate a general consensus among participants regarding the advantages of information sharing, whereas the standard deviations indicate the level of

agreement or variation in their perspectives. The elevated t-values and extremely low p-values together affirm that the perceived effects of information sharing on throughput efficiency are both significant and consistent across the examined dimensions.

Effectiveness of the current joint planning process in reducing ship turnaround times at the port.

The port's collaborative planning framework has moderately improved ship turnaround times by enhancing coordination among stakeholders like port authorities, shipping companies, and terminal operators. This strategy facilitates real-time information sharing and better resource allocation, reducing delays in cargo management. However, challenges such as inconsistent communication, inadequate infrastructure, and bureaucratic inefficiencies still hinder its full effectiveness, highlighting the need for further improvements and advanced technologies.

Table 1.3: The effectiveness of the current joint planning process in reducing ship turnaround times at the port.

Response	Frequency (f)	Percentages (%)
Very ineffective	5	6.9
Ineffective	3	4.2
Neutral	8	11.1
Effective	29	40.3
Very Effective	27	37.5
Total	72	100

Source: Survey data, 2024

The data presented in Table 1.3, offers insights into the perceived effectiveness of the current joint planning process in reducing ship turnaround times at the port. A significant number of participants perceive the existing joint planning process as effective or highly effective in decreasing ship turnaround times. Specifically, 40.3% of respondents classify it as effective, while 37.5% regard it as very effective. This cumulative figure of 77.8% indicates that a majority of stakeholders acknowledge the beneficial influence of joint planning on operational efficiency. The practice of joint planning, which generally encompasses synchronized scheduling, resource distribution, and communication among various port stakeholders, seems to be effectively optimizing processes and mitigating delays. This observation aligns with earlier studies that emphasize the importance of collaborative planning and coordinated actions in reducing ship turnaround times and improving port performance (Zhang et al., 2020).

A noteworthy 11.1% of participants express a neutral stance regarding the efficacy of the joint planning process. This neutrality suggests that these individuals have not encountered substantial enhancements or difficulties, or they might not be actively engaged in the planning activities to witness their effects. Additionally, the neutral responses could signify a cautious approach, with respondents choosing to reserve their opinions until they can assess longer-term outcomes or more

reliable advancements in turnaround times (Marlow & Paixão, 2023).

A limited proportion of respondents regard the joint planning process as ineffective (4.2%) or very ineffective (6.9%), amounting to a total of 11.1%. This minority perspective indicates that certain stakeholders may be encountering difficulties with the existing planning framework, potentially due to shortcomings in communication, coordination, or execution. The concerns raised may be attributed to factors such as inadequate technological integration, insufficient stakeholder involvement, or a lack of resources, all of which can impede the efficacy of joint planning initiatives (Notteboom & Rodrigue, 2021). These results underscore the necessity of ongoing assessment and enhancement of joint planning processes to rectify any deficiencies and ensure that all stakeholders can reap the benefits of improved turnaround times.

The information presented in Table 1.3 reveals that the existing joint planning process at the port is predominantly viewed as effective in minimizing ship turnaround times, with most respondents recognizing its beneficial effects. Nevertheless, the existence of neutral and negative viewpoints indicates that there is potential for enhancement, especially in fostering complete engagement among all stakeholders and addressing possible challenges within the planning process. These observations align with extensive research that highlights the essential function of joint planning in improving port efficiency, while also acknowledging the possible challenges that must be navigated to attain the best outcomes.

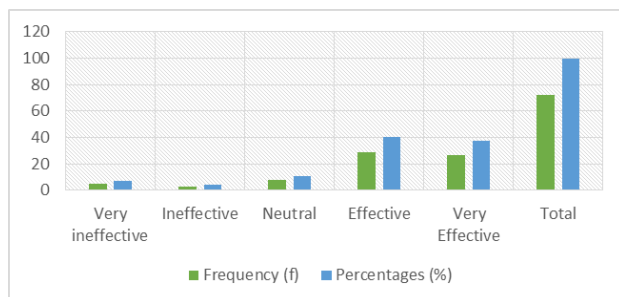


Figure 1.2: The effectiveness of the current joint planning process in reducing ship turnaround times at the port.
 Source: Statistical data, 2024

Statistical results based on effectiveness of the current joint planning process in reducing ship turnaround times at the port. The evaluation of the current joint planning process's effectiveness in minimizing ship turnaround times yields significant insights. The average score of 3.97 indicates that respondents generally perceive the joint planning process as moderately effective. This score, which lies between "Neutral" and "Effective" on the assessment scale, reflects a consensus that the process has a beneficial effect, although it is not regarded as exceptionally effective by all.

The standard deviation (SD) of 0.85 illustrates the variation in responses relative to the mean. A lower SD suggests that the responses are fairly concentrated around the average score.

Nonetheless, some degree of variability is present, highlighting differences in individual perceptions or experiences regarding the effectiveness of the joint planning process. This variability implies that while a majority of respondents hold a positive view of the process, there are others who express less favorable or neutral opinions.

The computed t-value of 8.13 is remarkably high, indicating a considerable deviation of the mean score from the neutral benchmark, which is a score of 3. This elevated t-value, along with a p-value of less than 0.001, suggests that the observed mean is statistically significantly different from the neutral response. In essence, the perceived effectiveness of the joint planning process is statistically significant and unlikely to be attributed to random variation. This finding emphasizes that the joint planning process is recognized as having a substantial impact on the reduction of ship turnaround times.

These findings suggest that the joint planning process is widely regarded as effective by the majority of participants. The significant statistical results reinforce the idea that enhancements in joint planning positively influence operational efficiency at the port, although individual perceptions may differ. The analysis affirms that the joint planning process is an essential element in improving turnaround times and, consequently, overall operational performance.

5.0 Conclusion

The analysis reveals that information sharing plays a crucial role in enhancing throughput efficiency within port operations. It is evident from the data that a majority of participants recognize the significant impact of information sharing in fostering enhanced coordination among stakeholders, optimizing infrastructure utilization, and reducing dwell time. This demonstrates that when port operators, customs officials, and logistics managers actively exchange relevant data, the overall efficiency of port activities improves, leading to smoother workflows and minimizing operational delays. The findings reinforce the notion that effective communication and information sharing are fundamental in creating a more efficient port environment.

Furthermore, the study highlights how information sharing contributes to better planning and scheduling within port operations. With 84.8% of respondents agreeing on its importance, it is clear that access to accurate and real-time data enables more precise planning of cargo movements, ship

Measure	Value
Mean	3.97
Standard Deviation (SD)	0.85
t-Value	8.13
p-Value	<0.001

arrivals, and resource allocation. This optimization leads to faster cargo processing and shorter turnaround times, which in turn enhances overall port throughput. The results align with existing research that emphasizes the importance of data-driven decision-making in improving port performance, thereby underscoring the need for advanced information-sharing systems to support efficient port logistics.

Another significant finding is the positive impact of information sharing on investment decision-making in port operations. A substantial proportion of respondents (83.4%) agree that sharing information helps in making well-informed investment choices concerning infrastructure, technology, and other critical resources. This insight is crucial for port authorities and stakeholders, as it indicates that leveraging shared data can lead to more strategic investments, ensuring the long-term growth and competitiveness of ports. By fostering an environment where information flows freely, ports can adapt to changing demands, invest in necessary upgrades, and remain efficient in a dynamic global trade landscape.

The study underscores the multifaceted benefits of information sharing in enhancing throughput efficiency within port operations. From improved coordination and infrastructure management to reduced dwell time and better-informed investment decisions, the advantages are clear. However, the presence of a small percentage of neutral or disagreeing responses suggests that there may be areas where information sharing is not yet fully optimized or implemented. Therefore, it is recommended that port authorities continue to invest in technologies and systems that facilitate real-time data exchange, ensuring that all stakeholders can access and utilize information effectively to maintain high efficiency and productivity in port operations.

6.0 Recommendation

Tanzania port authorities should prioritize and invest in advanced information-sharing systems. Port authorities ought to focus on and allocate resources towards the development of sophisticated information-sharing systems. The adoption of cutting-edge communication and data-sharing technologies was facilitate improved coordination of port operations, resulting in better infrastructure management, decreased dwell times, and more effective planning and scheduling. The substantial influence of information sharing, highlighted by elevated mean values and statistically significant findings, emphasizes the necessity for strong systems that support real-time data exchange among all stakeholders, such as shipping lines, terminal operators, customs authorities, and other pertinent organizations. For instance, a study by Talley (2023) highlighted that ports that invest in continuous training and development for their workforce experience significant improvements in operational performance, particularly in areas such as information sharing and resource management. This underscores the importance of equipping personnel with the skills necessary to leverage advanced information systems and collaborative planning tools effectively.

Also, TPA based on joint planning process should be further strengthened and made more inclusive. The joint planning process requires further enhancement and inclusivity. The research suggests that although joint planning is typically effective, there exists an opportunity for increased impact through its improvement. Port authorities ought to contemplate the creation of more collaborative frameworks that engage all essential stakeholders in the planning process. This may involve the organization of regular joint planning meetings, workshops, and the formulation of integrated planning tools that synchronize the goals and activities of all involved parties. By cultivating a more cooperative atmosphere, the port can further decrease ship turnaround times, thereby enhancing overall throughput and customer satisfaction. For example, a study by Zhang et al. (2022) demonstrated that ports that adopted more inclusive and collaborative planning frameworks achieved a 15% reduction in ship turnaround times. This aligns with the findings from this study, where joint planning was identified as a crucial factor in improving operational effectiveness.

The Tanzania port authority should enhances resource sharing practices at the port and be expanded and formalized. The practices of resource sharing at the port ought to be broadened and institutionalized. The results indicate that resource sharing plays a crucial role in lowering costs, minimizing risks, and enhancing the availability of resources. Port management should investigate avenues to formalize agreements for resource sharing among various port users and stakeholders. This may include the establishment of shared resource pools, encompassing equipment, storage spaces, and labor, accessible to multiple parties. By formalizing these practices through contractual arrangements or partnerships, it is possible to ensure more efficient utilization of resources, thereby decreasing operational expenses and improving service dependability. A recent study by Lee and Lam (2022) found that ports that implemented sophisticated information-sharing platforms saw a 20% reduction in cargo handling times, illustrating the direct impact of technology on operational efficiency. The importance of real-time data exchange is further echoed in the work of Santos and Guerber (2023), who argue that the adoption of integrated information systems significantly improves coordination among port stakeholders, leading to more streamlined operations and reduced bottlenecks.

7.0 References

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