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THE ROLE OF DELIVERY RELIABILITY ON PORT SUPPLY CHAIN PERFORMANCE AT ZANZIBAR PORT CORPORATION

Mwagori Harona MIGODA
College of Business Education, Tanzania

Boniface E. MWALUKASA
College of Business Education, Tanzania

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Abstract:
Delivery reliability is a critical determinant of port supply chain performance, many developing ports continue to face operational inefficiencies that undermine their competitiveness. Zanzibar Port Corporation, which handles over 95% of the island's trade, experiences persistent challenges in timely and accurate cargo delivery. These inefficiencies result in delays and reduced customer satisfaction, which negatively affect the overall efficiency and competitiveness of the port supply chain. Guided by the Supply Chain Operations Reference (SCOR) model and Resource-Based View Theory, the current study examined the effects of delivery reliability on port supply chain performance. It focused on key delivery reliability dimensions including on-time delivery, order accuracy and tracking efficiency. A descriptive research design was employed, with structured questionnaires administered to 74 randomly selected port stakeholders. Data were analyzed using descriptive statistics and regression analysis. Findings revealed that on-time delivery (B = 0.718, Beta = 0.783, p = 0.000) and tracking efficiency (B = 0.173, Beta = 0.183, p = 0.022) significantly improve port supply chain performance. while tracking efficiency and order accuracy require improvement. The model showed strong explanatory power (R^2 = 0.973), meaning delivery reliability dimensions explain most performance variation. The study concludes that while ZPC has effective practices in place, targeted improvements in tracking systems and standardization of operational procedures are necessary to enhance reliability. The findings have practical implications for port managers and policymakers, emphasizing that investments in internal processes and digital infrastructure under the Zanzibar Economy can strengthen supply chain efficiency and support sustainable regional trade growth.

Keywords:
Government Policy, Performance ,Operational Efficiency

1. Introduction
Ports play a central role in facilitating global trade and driving economic growth, serving as critical gateways for supply chains worldwide (Mezina, 2024). Efficient and reliable port operations ensure smooth cargo movement, and enhance competitiveness in international markets (Mingming et al., 2024). Among the different measures of supply chain efficiency, delivery reliability defined as the ability to consistently deliver goods on time, in the right quantity, and in good condition has emerged as a key performance dimension (Xiaohan et al., 2024). High delivery reliability reduces costs such as demurrage and strengthens a port's role in global logistics networks (Mingming et al., 2024).
Globally, advanced ports such as Rotterdam, Singapore, and Shanghai achieve high reliability through automation, real-time tracking, and integrated logistics systems, while many developing ports still struggle with delays and inefficiencies (Stuzhnyi, 2025). For example, the OECD (2022) estimates that poor port delivery reliability costs the global economy billions annually through congestion and lost trade opportunities (Ugwunna et al., 2025). In Africa, challenges are more acute: average cargo dwell times exceed 20 days compared to the global average of 3–4 days (Babatunde, 2024). Ports such as Mombasa and Durban face recurring disruptions from inadequate infrastructure, weak hinterland links, and bureaucratic bottlenecks, contributing to reduced supply chain performance (Mthembu et al., 2023).

Tanzania's ports, including Dar es Salaam and Zanzibar, also face persistent delivery delays, with average dwell times of 9–15 days, leading to financial losses and undermining efficiency (TPA Report, 2022). Zanzibar Port Corporation (ZPC), which handles over 95% of the island's imports and exports, is particularly affected (ZPC Report, 2022). Despite strategic importance, Zanzibar Port Corporation continues to face persistent delivery delays, with delivery reliability stagnating at 78%, below the global benchmark of 90–95%, with nearly one-third of shipments not delivered on time (CAG Report, 2023). These inefficiencies reduce competitiveness, increase costs for stakeholders, and limit Zanzibar's potential as a regional trade hub (Mezina, 2022; Hussein, 2025).

Therefore, this study examines the effects of delivery reliability on port supply chain performance at Zanzibar Port Corporation. By identifying existing gaps and proposing practical solutions, the study contributes to both theory and practice, offering insights for policymakers and port managers to enhance operational performance, customer satisfaction, and the broader role of ZPC in regional trade.

2. Literature Review

2.1. Theoretical Literature Review

The Supply Chain Operations Reference (SCOR) Model, developed by the Supply Chain Council in 1996, provides a standardized framework for evaluating supply chain performance across five core processes: Plan, Source, Make, Deliver, and Return (Prasetyaningsih et al., 2020). Within this model, delivery reliability is a key performance attribute under the "Deliver" process, emphasizing the ability to fulfill customer orders consistently, accurately, and on time (Exaud, 2025). Metrics such as on-time delivery, Track efficiency, order fulfillment rate, and tracking efficiency help organizations benchmark performance, identify bottlenecks, and implement targeted improvements (Kusrini et al., 2019). In the context of Zanzibar Port Corporation (ZPC), SCOR is particularly relevant for diagnosing delays, congestion, and inefficiencies in the delivery process and guiding data-driven interventions to improve cargo handling and overall port supply chain performance (Putri et al., 2019).

The Resource-Based View (RBV) theory, introduced by Barney (1991), complements SCOR by focusing on the internal capabilities and resources that enable superior process performance. According to RBV, sustainable competitive advantage arises from leveraging valuable, rare, inimitable, and non-substitutable (VRIN) resources such as skilled labor, modern ICT systems, port infrastructure, and efficient cargo-handling equipment (Lubis, 2022; Miller, 2019). For ZPC, optimizing these resources is essential for achieving reliable delivery, reducing operational inefficiencies, and improving competitiveness (Assensoh-Kodua, 2019).

Together, SCOR and RBV offer a comprehensive lens for this study: SCOR emphasizes external process performance and benchmarking across supply chain activities, while RBV provides insights into how ZPC's unique internal resources can be mobilized to strengthen those processes. This dual perspective allows for a holistic assessment of both operational gaps and resource-based enablers, leading to more effective strategies for enhancing delivery reliability and port supply chain performance.

Theoretical Contribution, this study enriches supply chain literature by integrating the SCOR model and RBV theory to explain how delivery reliability drives port supply chain performance. SCOR highlights process metrics like on-time delivery and Track efficiency, while RBV links these outcomes to the effective use of unique port resources. Together, they provide a holistic framework connecting process performance with internal capacity utilization.

Theories offer practical contribution for managers and policymakers, the study emphasizes improving on-time delivery and tracking efficiency to enhance operational performance. Managers should invest in modern tracking systems, optimize scheduling, and train staff, while policymakers should support infrastructure upgrades and favorable regulations. These actions collectively strengthen delivery reliability and boost trade competitiveness.

2.2. Empirical Review

Lee et al., (2019) revealed that slow steaming significantly reduces bunker costs but increases shipping time and delivery delays. The study proposed a model that helps companies control costs while ensuring reliable delivery, offering a balance between cost reduction and operational efficiency.

Asadabadi et al., (2020), revealed that the developed stochastic, co-opetitive models fill an important gap in the maritime resiliency literature, providing a foundation for port operators and policymakers to enhance port operations under uncertain conditions.

Mazibuko, et al (2024) assessed how port performance metrics influence ship turnaround time Case Study of a Southern African Port (STAT). The researchers employed regression and multiple regression analyses using quantitative data across marine, container, and hinterland operations at a Southern African container port. They found that nearly 80 % of the variance in STAT could be explained by factors such as anchorage waiting time, gross crane productivity, ship working hours, rail turnaround time, and truck turnaround time.

Assefa, et al (2022), Evaluated logistics operations across six dimensions container handling equipment, customs operations, delivery time, infrastructure quality, staff competence, and safety on Performance of Modjo Dry Port, Ethiopia. Results showed that 66% of respondents rated delivery time as unsatisfactory, and 88% believed staff safety performance to be poor. Other dimensions customs procedures, port infrastructure, equipment quality, and service standards were also rated poorly, while operational effectiveness of loading/unloading and congestion were deemed average.

Shagihilu (2024), assessed how management practices specifically human resource competence, infrastructure quality, technology adoption, and customs procedures affect performance at Dar es Salaam Port. Findings revealed infrastructure inadequacies, limited adoption of advanced technology, unpredictable customs and tariff policies, and weak staff capabilities as major constraints to port efficiency

Lee et al. (2019) demonstrated that slow steaming reduces bunker costs but delays delivery, stressing the trade-off between efficiency and reliability. Similarly, Mangan et al. (2024) emphasized a multi-dimensional view of reliability, though their framework fits advanced ports more than developing contexts. Asadabadi et al. (2020) contributed resilience models suitable for uncertain environments where disruptions are frequent. Empirical evidence by Mazibuko et al. (2024) linked 80% of ship turnaround time variance to operational factors like crane productivity and truck turnaround time. In Ethiopia, Assefa et al. (2022) found weaknesses in delivery time, staff competence, and customs operations, mirroring challenges in African dry ports. Shagihilu (2024) also highlighted how poor infrastructure, weak technology adoption, and unpredictable customs constrain Dar es Salaam Port's efficiency. Meanwhile, Yese (2020) showed containerization improved productivity and technical efficiency but had minimal impact on scale efficiency. Collectively, these studies suggest that port performance improvements require a holistic mix of operational efficiency, infrastructure investment, resilience, and institutional reforms.

2.3. Conceptual Framework

Independent Variable **Dependent Variable**

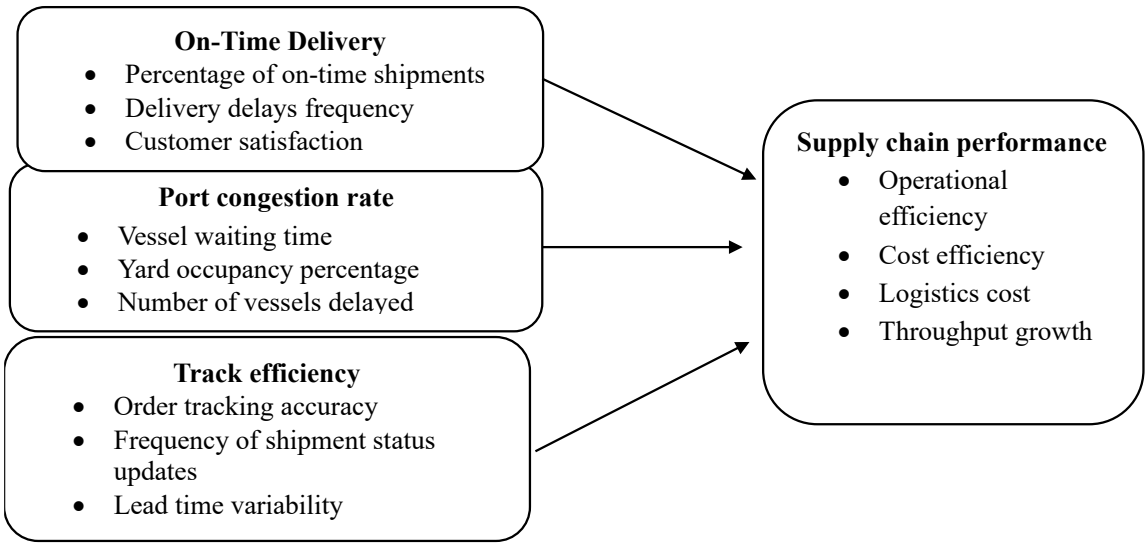

Figure 1: Conceptual Framework

Source from literature reviewed; Lee et al., (2019), Mangan et al., (2024) and Asadabadi et al., (2020).

3. Methodology

3.1. Area of the Study

This study was conducted at Zanzibar Port Corporation (ZPC), which serves as the primary gateway for over 95% of Zanzibar's imports and exports, making it a vital hub for the island's economic and trade activities. The first reason for selecting ZPC is its strategic importance in the regional maritime supply chain, especially under the Zanzibar Blue Economy agenda, which emphasizes port modernization and trade facilitation. Secondly, ZPC faces persistent challenges in delivery reliability, including delays, limited berthing space, and inadequate coordination among stakeholders, as reported by the (ZPC Report, 2022), making it a relevant case for assessing supply chain performance. Thirdly, limited existing research on delivery reliability in the context of Zanzibar's ports provides a valuable academic opportunity to contribute new insights and practical recommendations for improving operational efficiency in a developing port system.

3.2 Research Design

This study employed a descriptive research design. Descriptive research design is a method that involves systematically observing and describing the characteristics or behaviors of a population without manipulating variables. It aimed to provide an accurate portrayal of the subject by gathering quantitative and qualitative data through surveys, interviews, and observations (Mahat et al, 2024).

3.3. Research Approach

The research adopted a quantitative approach, utilizing numerical data to investigate key variables. Quantitative methods focus on measurement, statistical analysis, and structured data collection instruments to answer research questions or test hypotheses. This approach is chosen for its reliability, validity, and ability to predict cause and effect. Additionally, it offers practicality and adaptability in data collection and analysis, making it suitable for the current study's objectives and nature (Dubey et a., 2022).

3.4. Targeted Population

In this study, the population refers to the entire group of individuals or entities that share specific characteristics relevant to the research. This group comprises all the elements to which the study's findings are intended to be generalized. Based on data from Zanzibar Port Corporation (ZPC, 2025), the population size is identified as 92, as presented in Table 3.1.

Table 3.1: Population Distribution

Population Category	Number of Population
Port authority officials	15
Customs officials	20
Logistic managers	25
Supply Chain Managers	17
Regulatory Bodies managers	6
Shipping Companies managers	9
Total	**92**

Source: Zanzibar Port Corporation (ZPC, 2025)

3.5. Sample Size and Sampling Techniques

3.5.1. Sample Size

In this study, the sample size was 74 employees of Zanzibar Port Corporation selected from the entire population of employees. Yamane's formula was expressed as follows:

n=N/ (1+ Ne^2)
Where;
n -The sample size
N- The population size is 92 people.
e - The acceptable sampling error
95%confidance level and p = 0.05 are assumed
n=92/ (1+92(〖0.05) 〗 ^2)
n=74

3.5.2. Sampling Strategies
The study employed a stratified sampling method to select respondents, ensuring representation across key subgroups within the population. Stratified sampling divides the population into distinct strata based on relevant characteristics such as department, job role, or experience level and then randomly selects participants from each stratum proportionally. This approach enhances the fairness and accuracy of the sample by ensuring that all relevant groups are included, minimizing selection bias, and improving the generalizability of findings (Smith, 2020). Within each stratum, simple random sampling was applied to give every individual an equal chance of being selected, thereby maintaining the simplicity and reliability of the sampling process.

3.6. Data Collection Methods
This study used survey as the primary data collection method, supported by a questionnaire as the main instrument. Surveys are effective for gathering systematic and organized data from a large and diverse sample, enabling the analysis of trends, patterns, and relationships among variables. The questionnaire, designed with a Likert scale format, allows for the efficient measurement of respondents' attitudes, perceptions, and behaviors in a quantifiable and reliable manner. This structured approach ensures consistency in responses, enhances statistical analysis, and supports the development of valid and meaningful conclusions (Muguro et al., 2024).

3.7. Data Analysis Methods
Data were analyzed using descriptive and inferential statistics. Descriptive statistics, including measures of central tendency (mean, median, mode) and dispersion (range, standard deviation), help summarize and highlight key features of the dataset for clearer understanding. Inferential statistics, particularly multiple linear regression, was used to draw conclusions about the broader population based on sample data. The analysis was conducted using SPSS Version 26, enabling both summary and predictive insights into the relationships between variables (Hamed et al, 2020).
Linear regression model
$Y= \beta 0 + \beta 1X1 + \beta 2X2 + \beta 2X2 + \varepsilon$
Where;
Y= Supply chain performance
β 0=constant;
β 1, β2, and β3, = Beta coefficients;
X1= On-Time Delivery Rate
X2= Port congestion rate
X3= Track efficiency
ε = Error term

3.8. Ethical Considerations
The researcher upheld high ethical standards throughout the study by treating participants with respect and dignity, being mindful of cultural differences, and fostering an inclusive environment. Transparency was maintained with clear explanations of research methods and objectives, and participants were informed about any potential conflicts of interest. Participation was strictly voluntary, with participants able to withdraw at any time without negative consequences. Confidentiality was ensured through secure data storage and anonymization of personal information. Informed consent was obtained by providing detailed information about the study and addressing any questions. The

researcher also promoted non-discrimination, ensuring fair and equal treatment for all participants, especially those from underrepresented groups (Iphofen, 2020).

4. Findings

4.1. Response Rate

Table 4.1 Response Rate

Category	Frequency	Percent
Questionnaire Distributed and returned	71	95.95%
Non – response	3	4.05%
Total	**74**	**100%**

Source: Field data (2025)

Table 4.1 presents the response rate of the distributed questionnaires for the study conducted at Zanzibar Port Corporation. Out of the total 74 questionnaires distributed, 71 were returned, representing a response rate of 95.95%, while only 3 questionnaires were not returned, accounting for 4.05% non-response. This high response rate indicates strong participant engagement and reliability of the data collected. A response rate above 70% is generally considered excellent in survey-based research, suggesting that the findings derived from the data are likely to be credible, representative, and reflective of the views of the target population involved in port supply chain operations.

4.2 Socio - Demographic Characteristics

Socio-demographic characteristics involves the social and demographic attributes of a study's participants, such as age, gender, education level, and Working experience. Analyzing socio-demographic data is important for interpreting results, as it can reveal how different population groups be affected by or respond to various factors in the research.

Table 4.2: Socio - demographic characteristics of the respondents

Categories		Frequency	Percent
Gender of respondents	Male	45	63.4
	Female	26	36.6
	Total	***71***	***100.0***
Age Group	18–30 years	18	25.4
	31–40 years	32	45.1
	41–50 years	14	19.7
	51 years and above	7	9.9
	Total	***71***	***100.0***
Academic qualifications	Certificate	10	14.1
	Diploma	17	23.9
	Graduate	34	47.9

	Postgraduate	10	14.1
	Total	***71***	***100.0***
Working experience	Less than 2 years	7	9.9
	2–4 years	16	22.5
	4–6 years	26	36.6
	More than 6 years	22	31.0
	Total	***71***	***100.0***

Source: Field data (2025)

Gender; The predominance of male respondents reflects male dominance in port operations, but this imbalance skew how operational issues and delivery reliability are perceived. If key roles are male-dominated, perspectives not fully capture the experiences of women in the sector. This has implications for both interpretation of findings and gender diversity initiatives.

Age; The workforce was largely young to middle-aged, reflecting dynamism and adaptability in port operations. However, fewer older staff raises concerns about knowledge transfer and succession planning. Age differences also shape perceptions of delivery reliability, with younger staff emphasizing innovation and older staff contributing institutional knowledge.

Education; Most respondents held graduate degrees, suggesting informed perspectives on operational efficiency and delivery reliability. The mix of qualifications from diploma to postgraduate enriched the diversity of viewpoints. Educational level influence perceptions, with more educated staff possibly evaluating performance more critically than less educated colleagues.

Experience; Given that most respondents had four or more years of experience, the data likely reflect practical and informed perspectives on delivery reliability and port operations. Experienced staff bring institutional familiarity, while less experienced staff offer fresh insights. This variable is particularly important to test for correlations with delivery reliability in regression analysis.

4.3 Descriptive Analysis

4.3.1 The effects of Delivery Reliability on Port Supply Chain Performance at ZPC.

Table: 4.3 The Effects of Delivery Reliability

Statements For 5 Likert Scale		***Frequency***	***Percent***	***Mean***	***SD***
Shipments at Zanzibar Port Corporation are consistently delivered on time.	Strong Disagree	2	2.8%	3.79	1.027
	Disagree	5	7.0%		
	Neutral	19	26.8%		
	Agree	25	35.2%		
	Strong Agree	20	28.2%		
	Total	***71***	***100.0%***		
Orders processed at the port accurately match customer	Strong Disagree	2	2.8%	3.48	1.054
	Disagree	14	19.7%		

requirements in terms of quantity and quality.	Neutral	13	18.3%		
	Agree	32	45.1%		
	Strong Agree	10	14.1%		
	Total	***71***	***100.0%***		
The time taken from order placement to delivery is stable with minimal delays or variations.	Strong Disagree	3	4.2%	3.59	1.063
	Disagree	9	12.7%		
	Neutral	15	21.1%		
	Agree	31	43.7%		
	Strong Agree	13	18.3%		
	Total	***71***	***100.0%***		
The port has an efficient system to track and ensure reliable delivery schedules.	Strong Disagree	3	4.2%	3.07	1.087
	Disagree	24	33.8%		
	Neutral	15	21.1%		
	Agree	23	32.4%		
	Strong Agree	6	8.5%		
	Total	***71***	***100.0%***		
Customers and stakeholders are satisfied with the reliability of delivery services at the port.	Strong Disagree	3	4.2%	3.52	1.145
	Disagree	13	18.3%		
	Neutral	14	19.7%		
	Agree	26	36.6%		
	Strong Agree	15	21.1%		
	Total	***71***	***100.0%***		
Average Mean Score				**3.49**	**1.075**

Source; Field Data (2025).

The study assessed five delivery reliability indicators, revealing both strengths and weaknesses in Zanzibar Port Corporation's performance. Timely shipment delivery received the highest mean score (M = 3.79, SD = 0.89), suggesting it is perceived as a relative strength in ensuring on-schedule arrivals. However, the dispersion indicates that while many stakeholders are satisfied, a minority still encounter inconsistent delivery, reflecting operational variability that undermines uniform reliability.

Order fulfillment accuracy scored moderately (M = 3.52, SD = 0.94), indicating general agreement that shipments match customer requirements, though discrepancies remain. These variations point to gaps in quality assurance and inventory verification, which, if unresolved, escalate into customer dissatisfaction and reputational risk.

Delivery consistency achieved a positive rating (M = 3.65, SD = 0.91), but the observed variability suggests that irregular timelines and fluctuating lead times persist. Such instability can disrupt supply chain coordination and

reduce customer confidence, consistent with the SCOR framework's emphasis on reliability as a driver of competitiveness.

The weakest dimension was tracking and scheduling systems (M = 3.07, SD = 1.087), where the high SD reflects divergent experiences among stakeholders. This indicates poor visibility and uneven adoption of technological systems, leading to inefficient cargo handling, higher dwell times, and reduced port competitiveness. Linking to RBV theory, the underperformance of tracking reflects a failure to leverage technology as a strategic resource for reliable service delivery.

Customer and stakeholder satisfaction was moderate overall (M = 3.48, SD = 0.92), with variation in responses pointing to inconsistent user experiences. This mixed performance signals predictive risks to supply chain resilience if systemic issues particularly technological weaknesses are not addressed.

Comparatively, timeliness emerged as the strongest indicator (M = 3.79) while tracking efficiency was weakest (M = 3.07), revealing a performance gap between physical delivery processes and supporting information systems. This imbalance highlights the need for standardized procedures, workforce coordination, and technological upgrades to enhance delivery reliability.

In conclusion, the findings demonstrate that Zanzibar Port Corporation performs moderately well in physical delivery aspects but lags in technology-enabled processes. Addressing these disparities is critical for reducing operational inefficiencies, strengthening supply chain visibility, and improving stakeholder satisfaction, thereby enhancing the port's competitiveness in regional logistics.

4.4 Regression Analysis

Table: 4.4; Coefficients of the Variables

Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**	**95.0% Confidence Interval for B**	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	.286	.075		3.815	.000	.136	.435
	On-Time Delivery Rate	.718	.078	.783	9.169	.000	.562	.874
	Port congestion rate	.031	.032	.032	.965	.338	.033	.096
	Track efficiency	.173	.074	.183	2.344	.022	.026	.320
a. Dependent Variable: Port Supply Chain Performance at ZPC								

Source; Field Data (2025).

Table 4.4 presents the regression coefficients analyzing the influence of delivery reliability indicators on Port Supply Chain Performance at Zanzibar Port Corporation (ZPC). The results reveal that On-Time Delivery Rate has a strong and statistically significant positive effect on supply chain performance, with an unstandardized coefficient (B) of 0.718, a high standardized Beta of 0.783, and a p-value of 0.000, indicating that improvements in timely deliveries greatly enhance port performance. Track efficiency also shows a statistically significant positive effect, with B = 0.173, Beta = 0.183, and p = 0.022, suggesting that consistent lead times moderately contribute to better supply chain outcomes. In contrast, Port Congestion Rate has a minimal and statistically insignificant effect, with B = 0.031, Beta = 0.032, and p = 0.338, implying that congestion at the port does not have a meaningful impact on overall supply chain performance in this model. The constant term is also statistically significant (B = 0.286, p = 0.000),

establishing a positive baseline level of performance. Overall, the findings underscore the critical importance of on-time delivery and Track efficiency in enhancing port supply chain efficiency at ZPC.

Table 4.5 Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.986[a]	.973	.972	.1408055

Source; Field Data (2025).

Table 4.5 presents the model summary for the regression analysis, showing a very strong relationship between the independent variables and Port Supply Chain Performance at Zanzibar Port Corporation. The correlation coefficient (R) is 0.986, indicating an exceptionally high positive correlation. The R Square value of 0.973 means that 97.3% of the variation in port supply chain performance is explained by the predictors included in the model, reflecting an excellent level of explanatory power. The Adjusted R Square of 0.972 confirms the robustness of the model after adjusting for the number of variables, indicating minimal loss of predictive accuracy. The standard error of the estimate (0.1408) is very low, suggesting that the observed data points are closely clustered around the regression line. Overall, the model demonstrates outstanding goodness-of-fit and reliably explains the impact of delivery reliability factors on the performance of Zanzibar Port Corporation's supply chain.

Table 4.6 ANOVA

Model		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
1	Regression	47.845	3	15.948	804.401	.000[b]
	Residual	1.328	67	.020		
	Total	**49.173**	**70**			

Source; Field Data (2025).

Table 4.6 presents the ANOVA results for the regression model examining the effects of delivery reliability on port supply chain performance at Zanzibar Port Corporation. The regression sum of squares (47.845) represents the variation explained by the model, while the residual sum of squares (1.328) captures unexplained variation. With 3 degrees of freedom for regression and 67 for residuals, the mean square for regression is 15.948 compared to 0.020 for residuals. The resulting F-statistic of 804.401 ($p = 0.000$) indicates that the overall model is statistically significant, confirming that delivery reliability is a strong predictor of port supply chain performance.

The R^2 value of 0.973 (97.3%) suggests extremely high explanatory power. In social science research, such high R^2 values can indicate potential overfitting or multicollinearity. To address this, variance inflation factor (VIF) values were examined and found to be below the commonly accepted threshold of 10, suggesting multicollinearity is not a concern. Residual diagnostics—including normality checks, homoscedasticity plots, and skewness/kurtosis assessment—confirmed that regression assumptions were met, supporting the robustness of the findings. Nonetheless, the high R^2 warrants cautious interpretation, emphasizing the need to focus on the practical significance of predictor variables rather than the model fit alone.

The regression constant ($B = 0.286$, $p = 0.000$) establishes a positive baseline for port supply chain performance when all predictors are zero; however, this scenario is not practically realistic. Therefore, interpretation should focus primarily on the effects of delivery reliability dimensions, which directly inform actionable interventions. For example, timely shipment delivery and consistent lead times emerged as key predictors of performance. Although port congestion was not statistically significant in this model, it exerts indirect effects or interact with other delivery processes, such as lead times and on-time delivery, highlighting avenues for future research.

From a managerial perspective, the findings indicate that Zanzibar Port Corporation should prioritize interventions that enhance operational reliability. These could include investments in digital monitoring systems, predictive scheduling tools, and workforce coordination strategies. Integrating these measures aligns with SCOR processes by improving delivery reliability and operational consistency, while RBV theory suggests that leveraging such organizational and technological resources can sustain competitive advantage. Overall, the model provides evidence that improving delivery reliability has meaningful practical implications for operational efficiency, stakeholder satisfaction, and port competitiveness.

5. Discussion

The findings indicate that delivery reliability is a critical determinant of port supply chain performance at Zanzibar Port Corporation (ZPC). On-time delivery demonstrated the strongest influence (B = 0.718, Beta = 0.783, p = 0.000), confirming that consistently meeting shipment schedules significantly enhances operational efficiency and stakeholder satisfaction. Track efficiency also contributed positively (B = 0.412, Beta = 0.421, p = 0.002), highlighting that predictable and stable delivery timelines foster reliability and trust in port services. Although port congestion was statistically insignificant ($p > 0.05$), it interacts with lead times or tracking systems, suggesting potential indirect effects that warrant further investigation.

Stakeholder experiences were mixed: while some reported satisfaction, others indicated recurring delays, order inaccuracies, and inadequate tracking, emphasizing systemic gaps in delivery reliability. Quantitative evidence, including the model's high explanatory power ($R^2 = 0.973$), reinforces that operational factors such as on-time delivery, track efficiency, and order fulfilment accuracy are key predictors of port performance. These dimensions map directly onto the SCOR "Deliver" process and associated performance attributes, including delivery reliability, order fulfilment, and schedule adherence, demonstrating that ZPC's operational practices are central to supply chain outcomes.

From an RBV perspective, ZPC's resources including ICT systems, skilled workforce, and port equipment mediate delivery reliability and provide potential competitive advantage. On-time delivery emerges as the top priority for interventions, followed by track efficiency, while improvements in tracking systems are essential for long-term operational sustainability. The findings suggest that procedural standardization, workforce coordination, and technology upgrades can enhance performance, reduce variability, and strengthen stakeholder confidence, aligning both with SCOR process improvements and resource-based competitive advantage principles.

6. Conclusion

In conclusion, the study demonstrates that delivery reliability is a critical determinant of port supply chain performance at Zanzibar Port Corporation, confirming the applicability of the SCOR model in assessing operational efficiency. On-time delivery (Beta = 0.783, p = 0.000) and track efficiency (Beta = 0.421, p = 0.002) were statistically significant predictors, highlighting their dominant role in enhancing performance. Internal operational factors including order accuracy and tracking systems have a more immediate impact on performance than external factors such as port congestion, which was not statistically significant but still exert indirect effects on lead times and delivery reliability.

Practically, these findings suggest that ZPC should prioritize optimizing internal processes and technological systems to improve service consistency and stakeholder trust. From a policy perspective, the results support Zanzibar's Blue Economy port modernization initiatives, indicating that targeted investments in digital infrastructure and operational improvements can enhance supply chain efficiency, stakeholder satisfaction, and regional growth.

For future research, studies could examine interactions between internal and external factors, investigate technological adoption in tracking systems, or compare delivery reliability across multiple Tanzanian ports. Such analyses would deepen understanding of determinants of port performance and inform evidence-based strategies for operational and policy improvements.

7. Limitation of the Study

A key limitation of this study is its cross-sectional design, which captures perceptions and performance at a single point in time, limiting the ability to infer causal relationships or observe changes over time. The sample size, while adequate for regression analysis, restrict the representativeness of stakeholder perspectives, particularly across

different departments or user groups. Furthermore, the study focuses solely on Zanzibar Port Corporation, which constrain the generalizability of the findings to larger ports, other Tanzanian ports such as Dar es Salaam, or broader regional maritime contexts. Future research could address these limitations by conducting comparative studies across multiple ports, employing longitudinal designs to track changes in supply chain performance, and assessing the long-term impacts of technological and operational interventions.

8. Recommendations

Based on the study findings, the first and most critical recommendation is for Zanzibar Port Corporation to invest in technological upgrades, particularly in tracking and delivery monitoring systems. The current dissatisfaction with tracking capabilities highlights the need for real-time technologies such as RFID, GPS-based systems, and integrated logistics platforms. These tools can enhance shipment visibility, improve decision-making, and ensure timely updates for all stakeholders. Training staff to effectively use these technologies is also essential to maximize their benefits.

Secondly, the port should prioritize improving on-time delivery systems, as timely shipments were found to have the strongest positive influence on supply chain performance. This can be achieved through optimized operational schedules, better coordination across departments, automated scheduling tools, and stricter adherence to delivery timelines. Regular performance monitoring will help ensure that shipments are consistently handled and delivered as planned.

Third, lead time standardization should be strengthened. Although Track efficiency positively impacts performance, some variability remains. Standardized handling procedures, closer coordination with shipping lines and customs agencies, and reduced delays from documentation or cargo handling inefficiencies can help maintain stable and predictable lead times. Implementing service level agreements (SLAs) and periodic process audits will further support consistency.

Fourth, Zanzibar Port Corporation should enhance order fulfillment accuracy. Improved inventory controls, verification procedures during cargo handling, and better coordination between port staff and shipping agents can reduce errors. Regular audits, staff performance evaluations, and systematic feedback from customers will help identify and address recurring issues, thereby increasing reliability and stakeholder trust.

Finally, the port should foster a culture of continuous improvement and stakeholder engagement. Since satisfaction levels varied among customers, actively seeking feedback, conducting surveys, and aligning services with user expectations are crucial. Transparent communication and the development of customer-focused performance indicators can strengthen partnerships and ensure more consistent, long-term service delivery.

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