

# The Impact of Cargo Handling Time on Trade Flow at Dar Es Salaam Port

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## Abstract:

This study assessed the impact of cargo handling time on trade flow at Dar es Salaam Port, Tanzania's principal maritime gateway. Given the port's central role in facilitating national and regional trade, the research aimed to empirically examine how delays in cargo operations influence logistics efficiency, cost structures, and stakeholder behavior. A quantitative research design was adopted, with data collected from 243 respondents directly involved in port operations. These included staff from DP World (Dar es Salaam Terminal), shipping agents, customs officers from the Tanzania Revenue Authority (TRA), and importers and exporters. Respondents were purposively selected for their relevance and expertise in cargo handling and trade facilitation processes. Data were analyzed using the Statistical Package for the Social Sciences (SPSS). Findings revealed that cargo handling delays are both persistent and systemic. Over 70% of respondents reported delays of four days or more, significantly exceeding global benchmarks. These delays were particularly acute in bulk cargo operations and were attributed to outdated equipment, insufficient mechanization, terminal congestion, poor stakeholder coordination, and labor shortages. Such inefficiencies substantially increase transaction costs through demurrage charges, storage fees, and prolonged vessel turnaround times. Moreover, the perception of inefficiency has contributed to cargo diversion to alternative regional ports, undermining Tanzania's strategic position in East African logistics. Importantly, Pearson correlation analysis demonstrated a statistically significant relationship between cargo handling factors such as vessel turnaround time, equipment availability, and labor efficiency and overall trade efficiency. These results provide empirical confirmation that operational bottlenecks directly constrain trade facilitation. The study concludes that addressing these challenges requires targeted reforms, including investment in modern handling technologies, improved inter-agency coordination, and enhanced workforce capacity. Evidence-based recommendations are provided to guide infrastructure upgrades, policy reforms, and strategic interventions aimed at optimizing cargo handling performance, reducing trade costs, and strengthening Tanzania's competitiveness in maritime trade.

**Keywords:** Cargo Handling, Time Trade Flow, Port Efficiency, Port Performance, Logistics and Supply Chain, International Trade, Turnaround Time, Port Operations

## 1.1 Introduction:

Globally, port efficiency plays a pivotal role in facilitating international trade, reducing logistics

costs, and enhancing supply chain reliability (Wilmsmeier & Monios, 2022). Yet, even high-

performing ports such as Algeciras in Spain and Tanger Med in Morocco have recently experienced congestion-related inefficiencies, resulting in increased turnaround times and elevated shipping costs, particularly for time-sensitive cargo (Afensia & Rutt, 2023). These global cases illustrate how strained port operations can disrupt trade dynamics, reroute cargo flows, and negatively affect competitiveness a pattern increasingly observed across other busy maritime hubs.

At the continental level, empirical studies have shown that African ports generally underperform when compared to global standards. According to UNCTAD (2023), container ships at African ports spend a median of 6 days in port, compared to a global average of 1 day, signaling widespread inefficiencies. These challenges are attributed to aging infrastructure, limited digitalization, bureaucratic procedures, and insufficient cargo-handling equipment (Asiedu & Boateng, 2021). The impact is not just operational; such delays elevate logistics costs, reduce port attractiveness, and impede intra-African trade under the African Continental Free Trade Area (AfCFTA) framework (Egu et al., 2022).

Within East Africa, logistical assessments further highlight that prolonged cargo dwell times, poor hinterland connectivity, and inefficient inter-agency coordination significantly affect trade competitiveness (Wekesa & Musau, 2024). Structural issues common across ports in the region such as mechanical breakdowns, administrative delays, and weak multimodal integration have been identified as persistent contributors to revenue losses and high trading costs (Kunambi & Zheng, 2025).

In Tanzania, the Port of Dar es Salaam handles over 90% of the country's seaborne trade and serves as a crucial transit gateway for several landlocked countries, including Zambia, Rwanda, Uganda, Burundi, and the Democratic Republic of Congo (TPA, 2023). While reforms under partnerships such as the DP World concession and the Port Master Plan have modernized aspects of operations, empirical evidence suggests that

inefficiencies persist. Mdipi, Mbise, and Kang'ombe (2024) confirm that delays especially in bulk cargo handling remain significant due to equipment unreliability, stakeholder misalignment, and weak enforcement of scheduling systems.

A recent study by Elias (2024), which applied SPSS-based statistical analysis, revealed that customs bureaucracy and lack of modern mechanization were major drivers of delays in containerized cargo clearance. This has prompted some shippers to divert goods to Mombasa and Beira ports, undermining Tanzania's regional competitiveness. Despite the integration of digital platforms and investment in port logistics, unresolved operational bottlenecks continue to result in vessel queueing, inefficient offloading, and complex clearance workflows (WTO & TRS Report, 2023).

In sum, empirical literature and operational reviews reveal that while marginal progress has been achieved, persistent cargo handling delays at Dar es Salaam Port continue to inflate trade costs, disrupt flow, and weaken Tanzania's trade position. However, there remains a knowledge gap in quantitatively assessing how specific delay factors impact trade flows and stakeholder behavior. This study was therefore undertaken to empirically examine the nature and impact of cargo handling delays at Dar es Salaam Port, identify their root causes, and assess how they influence trade dynamics. The findings are intended to guide targeted policy and operational reforms that enhance port performance, reduce trade costs, and reinforce Tanzania's strategic maritime role.

## 2.1 Methodology:

This section presents the research methodology employed in the study. It outlines the systematic approach used to investigate the impact of cargo handling time on trade flow at Dar es Salaam Port. The following subheadings provide detailed explanations of the research design, data collection methods, and analysis techniques employed to investigate the relationship between

cargo handling time and trade flow. The methodological choices were guided by the need to gain both quantitative insights and qualitative understanding of port operations and their implications on trade performance.

## 2.2 Research Approach and Design:

While the main study employed a mixed-methods approach to explore various aspects of port efficiency, this journal article focuses solely on the quantitative findings related to one specific objective: assessing the impact of cargo handling time on trade flow at Dar es Salaam Port. A quantitative research approach was adopted to allow for the systematic collection and analysis of numerical data relevant to cargo handling operations and trade performance. The study was guided by a descriptive research design, which is suitable for examining and presenting characteristics of a phenomenon in a structured manner. This design enabled the researcher to objectively describe and analyze how variations in cargo handling time influence the flow of goods through the port, providing measurable insights into port efficiency and trade dynamics.

## 2.3 Participants:

This study involved a diverse group of participants who are directly involved in or affected by cargo handling operations and trade processes at the Dar es Salaam Port. The participants were selected based on their roles, expertise, and relevance to the study's focus on port efficiency and trade flow. These included staff from DP World (Dar es Salaam Terminal), who are responsible for ground-level cargo handling and operational procedures; Shipping Agents, who coordinate ship schedules and cargo documentation; Customs Officers from the Tanzania Revenue Authority (TRA), who oversee cargo clearance and regulatory compliance; and Traders (Importers and Exporters), who are the end-users of port services and are directly impacted by delays in cargo handling. Their selection was based on their practical experience, knowledge of port operations, and their strategic positions within the port logistics chain, all of

which are critical to understanding how cargo handling time affects trade flow at the port.

## 2.4 Data Collection Methods:

The study employed both primary and secondary data collection methods to assess the impact of cargo handling time on trade flow at Dar es Salaam Port. Primary data was collected through questionnaires. These questionnaires consisted of closed-ended questions and Likert scale items to gather quantitative data on cargo handling time, port efficiency, and trade flow. Secondary data was gathered through document review, including reports, statistical records, and publications from the Tanzania Ports Authority, TRA, and other relevant sources. This combination of methods ensured a comprehensive understanding of how cargo handling time influences trade performance at the port.

## 2.5 Data Analysis and Ethical Consideration:

The quantitative data collected for this study were coded and analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics such as frequencies and percentages were used to summarize the responses, while cross-tabulations were employed to explore relationships between cargo handling time and trade flow indicators. This analytical approach provided clear insights into the patterns and trends affecting port efficiency at Dar es Salaam Port.

Ethical considerations were strictly observed throughout the research process. Participation in the study was voluntary, and respondents were informed about the purpose of the study and assured of the confidentiality of their responses. No personal identifiers were collected, and the data were used solely for academic purposes. The study was conducted in line with ethical guidelines for research involving human subjects

## 3.1 Findings and Discussions:

This section presents the key findings and discussion based on the quantitative data collected in relation to the impact of cargo handling time on trade flow at Dar es Salaam Port. A total of 243 questionnaires were distributed to selected

respondents, including terminal operators, customs officers, shipping agents, and traders.

### 3.1.1 Cargo handling delays at the port:

The study found that cargo handling delays remain a prevalent issue at Dar es Salaam Port, with over 86% of respondents reporting that they experience delays to some extent. Specifically, 43.2% of respondents reported delays occurring sometimes, 27.8% frequently, and 15.0% indicated that delays always occur. Only 13.9% reported encountering such delays rarely. These results suggest that handling inefficiencies are a routine part of port operations and significantly affect trade flow. The recurrence of such delays contributes to longer vessel turnaround times, increased logistics costs, and reduced competitiveness for businesses dependent on timely cargo movement. The findings reinforce the critical role of cargo handling efficiency in determining the reliability and effectiveness of trade logistics at the port.

### 3.1.2 Time Required for Cargo Offloading and Processing:

The findings indicate that cargo offloading and processing at Dar es Salaam Port is generally time-consuming, with a significant majority of respondents experiencing delays. Over 54.9% of respondents reported that the process typically takes 4 to 7 days, while an additional 24.2% stated it takes more than a week. Only 20.9% reported that cargo is offloaded and processed within 1 to 3 days. This means that nearly 80% of port users face extended handling times beyond what would be considered efficient in modern logistics standards. Such delays can result in higher operational costs, longer vessel turnaround times, and disruptions in supply chains, particularly for time-sensitive cargo. The results highlight the need for operational improvements, such as better coordination, investment in modern equipment, and streamlined procedures, to enhance efficiency and facilitate smoother trade flow through the port. Figure 1 gives the presentation of the findings.

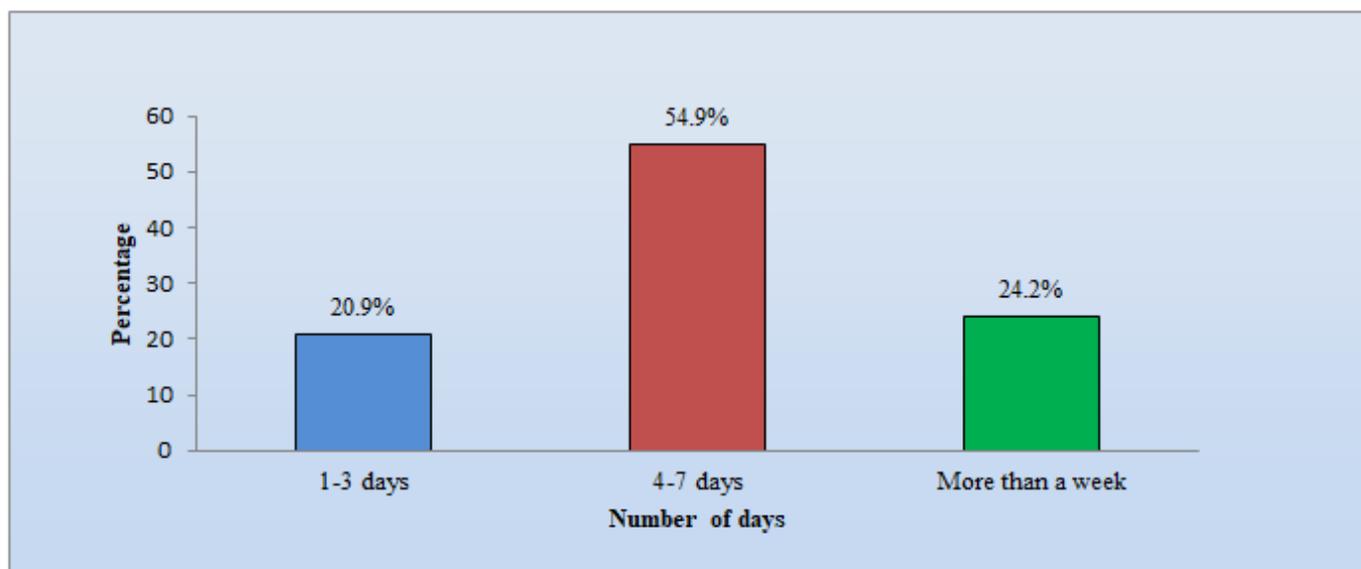


Figure 1: Time Required for Cargo Offloading and Processing

### 3.1.3 Comparison of cargo handling time at Dar es Salaam Port with other regional ports:

The results reveal that Dar es Salaam Port is widely perceived as less efficient in cargo handling compared to other regional ports. According to the data, 46.9% of respondents

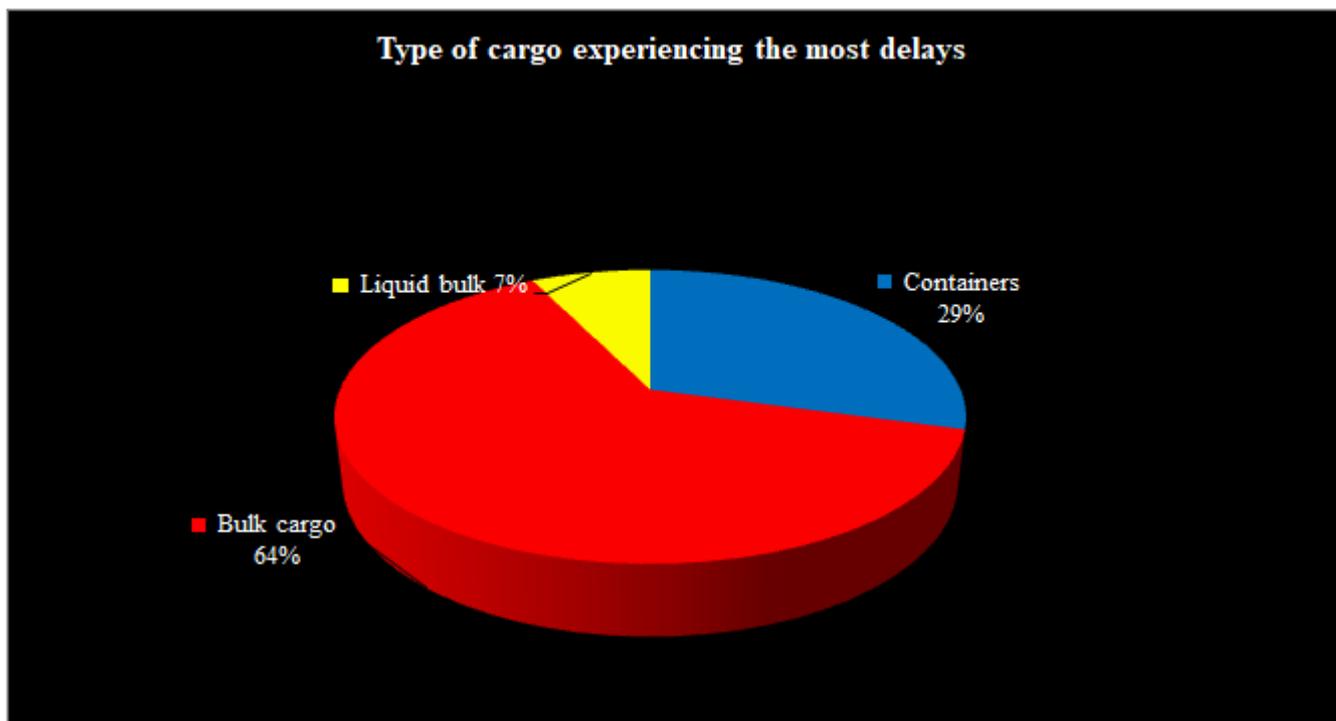
believe the port is slightly slower, while 11.7% consider it much slower, bringing the total to nearly 59% who view Dar es Salaam Port as lagging behind its regional counterparts. In contrast, 20.5% perceive no significant difference, while a smaller group 15.4% and 5.5% view it as faster or much faster, respectively.

These perceptions suggest a competitive disadvantage, as delays in cargo handling may prompt shippers to divert cargo to more efficient alternatives in the region, such as Mombasa or Beira. The findings highlight an urgent need for strategic reforms and operational improvements at Dar es Salaam Port to enhance its competitiveness, reduce delays, and retain regional trade volumes.

**3.1.4 Type of cargo experiencing the most delays:**

The findings indicate that bulk cargo is the most affected by delays at Dar es Salaam Port, as reported by 63.4% of respondents. This is followed by containerized cargo at 29.3%, while only 7.3% identified liquid bulk as experiencing

the most delays. The high incidence of delays associated with bulk cargo suggests underlying inefficiencies in handling procedures, equipment availability, and possibly storage capacity. These challenges may be attributed to limited mechanization, manual offloading processes, or congestion in areas designated for bulk cargo. The results point to a need for targeted infrastructure upgrades, improved scheduling systems, and optimized resource allocation in bulk cargo operations. Addressing these inefficiencies would significantly reduce turnaround times and contribute to enhanced trade facilitation, ultimately strengthening the port’s regional competitiveness. Figure 2 provide a presentyation of the findings.



**Figure 2: Type of cargo experiencing the most delays**

**3.1.5 Primary Causes of Cargo Handling Delays:**

The study findings indicate that equipment breakdowns are the leading cause of cargo handling delays at Dar es Salaam Port, cited by 45.8% of respondents. This points to significant challenges related to mechanical reliability, maintenance practices, and possibly the use of outdated machinery. The second most reported factor was poor coordination among stakeholders

(22.0%), highlighting weaknesses in communication and planning among key actors such as port authorities, customs officials, shipping agents, and logistics providers. Labor shortages were noted by 19.4% of respondents, suggesting inadequate staffing or inefficient deployment of available personnel. Additionally, congestion at terminals was mentioned by 12.8%, indicating infrastructural or procedural constraints that disrupt the smooth flow of cargo.

Collectively, these findings underscore the urgent need for investments in equipment modernization, improved inter-agency collaboration, and better workforce management to mitigate delays and enhance overall port performance.

### 3.1.6 Cargo Delays at Dar es Salaam Port Lead to Trade Diversions:

A considerable proportion of respondents (49.1%) reported that delays at Dar es Salaam Port frequently result in trade being diverted to other ports. An additional 27.5% acknowledged that such diversions occur, albeit infrequently. Only 23.4% believed that delays do not contribute to trade diversion. These insights suggest that over three-quarters of stakeholders recognize that port inefficiencies are prompting shippers to seek alternative routes. This trend can erode the port's regional competitiveness, leading to potential revenue losses and undermining its strategic position. To address this, enhancing reliability and reducing delays should be prioritized to restore trader confidence and retain cargo flow.

### 3.1.7 Cargo Delays Affecting Trade Efficiency at Dar es Salaam Port:

Most respondents confirmed that cargo delays negatively impact trade efficiency, with 43.6% stating that the effect is very severe and 27.5% noting a somewhat negative impact. Meanwhile, 15.8% felt there was no effect, and only 13.2% perceived a minor positive outcome—likely due to limited flexibility gained during delays. However, the overwhelming majority associated delays with inefficiency, suggesting serious disruptions in logistics, increased costs, and reduced competitiveness. These findings reinforce the need for strategic improvements to streamline cargo handling and optimize trade operations.

### 3.1.8 Influence of Cargo Delays on the Cost of Trade Transactions

Nearly half of the respondents (49.1%) stated that cargo delays significantly raise the cost of trade, while 34.8% reported a moderate cost increase. Only 16.1% believed there is no financial impact. The data strongly indicate that delays at the port lead to direct financial consequences, including

increased demurrage, storage charges, and extended labor costs. These added burdens diminish the port's appeal as a cost-effective logistics hub. Reducing delays would not only enhance operational efficiency but also alleviate the financial strain on traders, making the port more competitive in the regional market.

### 3.2 Correlation Analysis:

The study used Pearson correlation to examine the relationship between cargo handling factors and trade efficiency at Dar es Salaam Port (N = 243). The results are summarized as follows:

- Cargo handling delays (Q1) were moderately and positively correlated with reduced trade efficiency ( $r = 0.28^{**}$ ,  $p < 0.01$ ). This means that the more often delays occur, the more negatively trade efficiency is perceived.
- Primary causes of delays (Q5) were moderately and negatively correlated with trade efficiency ( $r = -0.27^{**}$ ,  $p < 0.01$ ). This indicates that the existence of issues such as equipment breakdowns or poor coordination is strongly associated with lower efficiency levels.
- Cargo handling time (Q2: offloading days, Q3: comparison with other ports) and type of cargo experiencing delays (Q4) also showed weaker but statistically significant correlations with trade efficiency.

For longer offloading times or bulk cargo delays were linked to higher inefficiencies, though the strength of these relationships was smaller than for direct delays and causes.

The correlation results suggest that cargo handling factors are not independent of trade efficiency. Instead, they are meaningfully associated:

- Frequent and prolonged delays are linked with greater inefficiency in trade operations.
- Specific operational bottlenecks (equipment failures, congestion, poor coordination) significantly contribute to inefficiency.
- The type of cargo and comparative port performance also matter, but to a lesser degree.

These findings provide empirical evidence that port efficiency directly affects trade facilitation.

#### 4.1 Conclusions:

The empirical findings confirm that cargo handling delays at Dar es Salaam Port are not only widespread but also structurally embedded in port operations. These delays are systemic inefficiencies that undermine the port's role as a facilitator of regional and international trade. The fact that over 86% of respondents reported delays highlights a persistent operational weakness that compromises both efficiency and reliability.

The predominance of delays in bulk cargo operations further signals a sector-specific challenge requiring targeted infrastructural and technological interventions. Moreover, the extended time required for offloading where the majority of shipments take more than four days reflects outdated procedures and inadequate resource deployment. These shortcomings collectively inflate logistics costs, reduce throughput, and erode competitiveness.

The Pearson correlation analysis provides additional empirical evidence that port efficiency and trade facilitation are strongly linked. Cargo handling factors such as turnaround time, equipment availability, and labor productivity were found to be significantly correlated with trade efficiency indicators, thereby confirming that inefficiencies in operations directly constrain the smooth flow of trade. Importantly, this relationship reinforces stakeholder perceptions that Dar es Salaam Port is slower than its regional counterparts, a weakness that not only diverts trade flows to competing ports but also undermines Tanzania's strategic positioning in East African maritime logistics.

Therefore, a critical conclusion emerges: without deliberate reforms to modernize cargo handling processes, enhance coordination among stakeholders, and strengthen human and technical capacity, the port will continue to underperform. Such inefficiencies will persist in limiting its contribution to national trade objectives and regional integration efforts

The empirical findings confirm that cargo handling delays at Dar es Salaam Port are not only widespread but also structurally embedded in port operations. These delays are not isolated incidents; rather, they reflect systemic inefficiencies that hinder the port's role as a facilitator of regional and international trade. The fact that over 86% of respondents reported some form of delay highlights a critical operational weakness that compromises both efficiency and reliability.

The predominance of delays in bulk cargo operations further points to a sector-specific challenge that demands targeted infrastructural and technological interventions. Furthermore, the extended time required for cargo offloading with the majority of shipments taking more than four days reflects outdated procedures and inadequate resource deployment, which collectively inflate logistics costs and reduce port throughput.

Crucially, the perception that Dar es Salaam Port is slower than its regional counterparts underscores the reputational and competitive risks posed by these inefficiencies. This perception is not without consequence, as nearly half of the stakeholders confirm that delays often lead to the diversion of trade to other ports, thereby weakening Tanzania's strategic positioning in East African maritime logistics.

Therefore, these findings lead to a critical conclusion: unless deliberate reforms are undertaken to modernize cargo handling processes, strengthen stakeholder coordination, and invest in human and technical capacity, the port will continue to underperform, undermining national and regional trade ambitions.

#### 5.1 Recommendations:

Based on the findings of this study, several practical and actionable recommendations are proposed to address the persistent cargo handling delays at Dar es Salaam Port. First, since equipment breakdowns were identified as the leading cause of delays, the Tanzania Ports Authority (TPA) should urgently conduct a technical audit of all cargo handling equipment,

followed by the implementation of a routine preventive maintenance plan. This should include the replacement of outdated machinery and the enforcement of monthly equipment inspections supported by digital maintenance records.

In response to the reported delays in bulk cargo handling which 63.4% of respondents identified as the most affected the port should prioritize investment in dedicated bulk cargo terminals equipped with automated systems. To reduce clearance times, which most respondents indicated exceed four days, a fast-track clearance system should be introduced for cargo that arrives with complete documentation. This system could be integrated with electronic pre-clearance mechanisms, allowing processing before cargo arrives at the port.

Additionally, to decongest the port, the government should enhance the use of Inland Container Depots (ICDs) in Dodoma, Morogoro, and Mwanza, supported by rail links via TAZARA and TRC. These ICDs should serve as clearance points for non-urgent cargo, easing the load on the port terminals.

To discourage recurring delays and restore port competitiveness, a performance-based incentive system should be introduced. This would reward importers and agents who consistently meet deadlines and penalize those responsible for unjustified slowdowns. Lastly, to consolidate all these efforts and ensure sustained improvements, the government should develop and adopt a National Port Efficiency Improvement Policy. This policy should include a clear strategy, implementation timeline, budget allocations, and monitoring frameworks, aligning port efficiency with the broader national trade and logistics agenda.

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