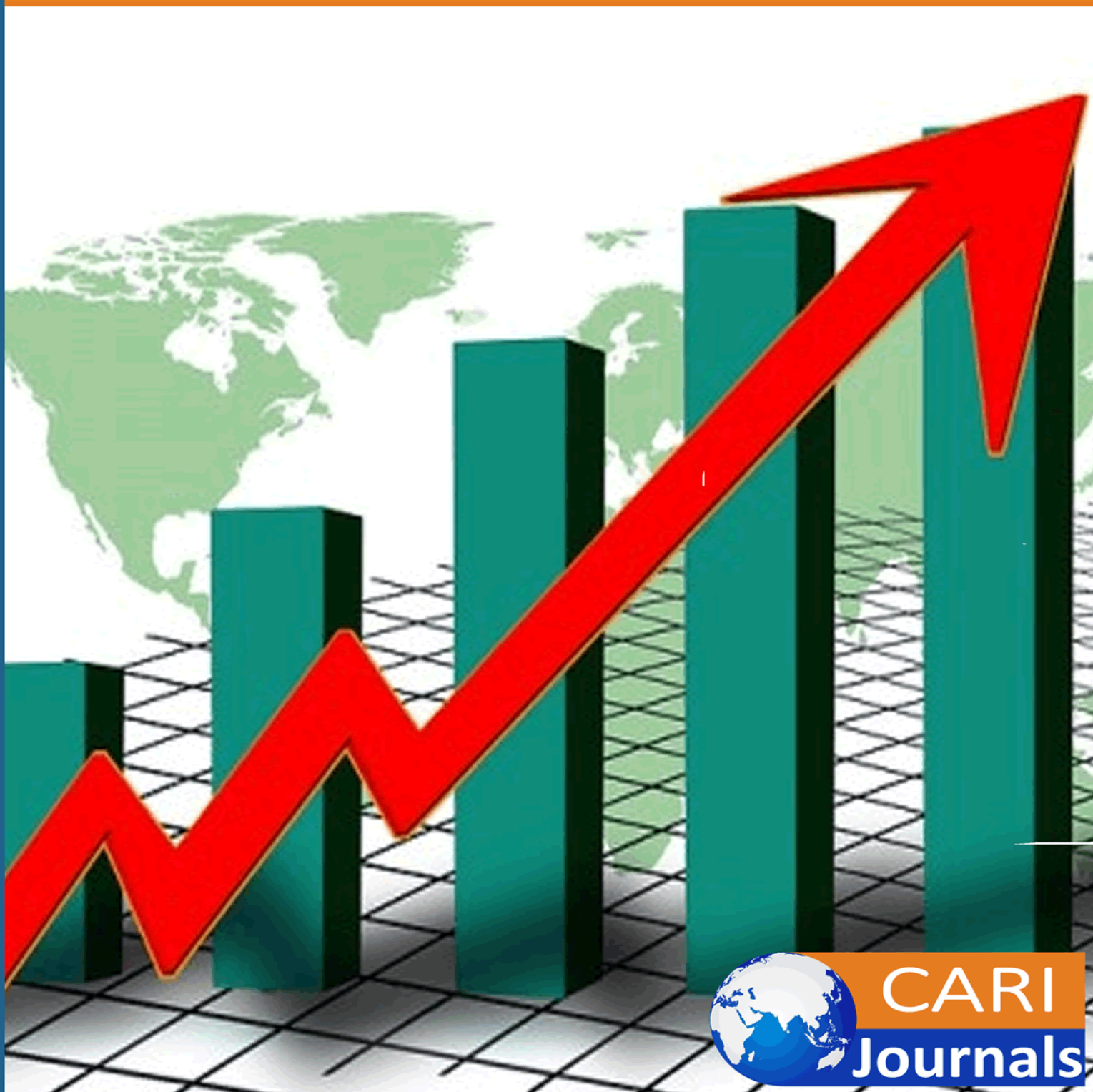
International Journal of
Economic Policy
(IJECOP)

Assessing the Role of Information System in Improving Public Organization Performance in Tanzania: Case Study of Tanzania Port Authority (TPA), Dar es Salaam



CARI Journals

International Journal of Economic Policy
ISSN: 2788-6352 (Online)
Vol. 6, Issue No. 1, pp 63 - 87, 2026
www.carijournals.org

Assessing the Role of Information System in Improving Public Organization Performance in Tanzania: Case Study of Tanzania Port Authority (TPA), Dar es Salaam

Dickson Nasekile Mwanyasi[1*], Dr. Revocatus Kabobe[2], Dr. Jacob Lisakafu[3]

[1]Postgraduate Student,

https://orcid.org/0009-0001-5222-0801

[2,3]Senior Lecturer/Supervisor,

[1,2,3]Department of Political Science, Public Administration, History and Philosophy

The Open University of Tanzania, Dar es Salaam, Tanzania

Accepted: 25th May, 2026, Received in Revised Form: 2nd June, 2026, Published: 18th June, 2026

ABSTRACT

Purpose: This study sought to examine the role of information systems in improving public organisations performance at the Tanzania Ports Authority in Dar es Salaam over the period 2018 to 2024.

Methodology: The study adopted a mixed-methods research design anchored in the Technology Acceptance Model, the Resource-Based View, and Institutional Theory. Quantitative data were collected using structured questionnaires from 270 respondents and analysed using descriptive statistics, while qualitative data were obtained through semi-structured interviews with 30 key informants. This approach enabled the study to capture both statistical evidence and practical experiences regarding the use of information systems at the Tanzania Ports Authority.

Findings: The findings indicate that information systems have significantly improved cargo clearance efficiency through systems such as TANCIS, the Terminal Operating System, the Single Window, and SAP by reducing manual errors, shortening processing time, and enhancing inter-departmental coordination. However, the realisation of full financial benefits remains constrained by system downtime, integration gaps between institutions, limited ICT skills, inadequate infrastructure funding, and inter-institutional dependencies, particularly with the Tanzania Revenue Authority.

Unique Contribution to Theory, Practice and Policy: The study contributes to theory by demonstrating the relevance of the Technology Acceptance Model, the Resource-Based View, and Institutional Theory in explaining information system adoption and performance in public organisations. In practice, the study recommends that the Tanzania Ports Authority strengthen uniform deployment of information systems, institutionalise the use of digital audit trails, and invest in continuous ICT capacity building. At policy level, the Government of Tanzania should increase and stabilise funding for information systems infrastructure to improve public organisation performance.

Keywords: *Information Systems, Organizational Performance, Tanzania Ports Authority, Cargo Clearance, Operational Efficiency, Trade Logistics, Public Organizations*

JEL Codes: *H83, L91, M15, O33*

1.0 INTRODUCTION

Historically, the role of information systems (IS) in enhancing public organization performance has evolved significantly over the past decades, driven by advancements in digital technologies and the increasing need for efficiency in governance. Initially, IS adoption in public institutions focused on basic data processing and record-keeping. However, with the rise of digital transformation, IS has become a strategic tool for decision-making and service delivery (Ahmed et al., 2022). Early studies, such as Enholm et al. (2022), emphasized the automation of administrative tasks, while recent research highlights the strategic role of artificial intelligence (AI) and business intelligence in optimizing efficiency. This progression reflects the growing reliance on technology to enhance organizational performance and service delivery in the public sector. Information systems encompass a range of technologies, including software, databases, and hardware, that facilitate data processing and information dissemination (Laudon & Laudon, 2020). The introduction of IS has transformed the way organizations operate by automating processes, ensuring timely access to information, and supporting resource management.

Globally, particularly in the United States of America, the integration of artificial intelligence and other emerging technologies into IS has further improved performance by automating tasks, reducing operational costs, and enhancing data security, thereby ensuring that public organizations align with modern governance demands (Bu et al., 2021). In the Middle East, governments have recognized the significance of IS in fostering transparency, accountability, and citizen engagement. For example, in Saudi Arabia, information and communication technology (ICT) advancements have played a crucial role in human development, indicating a strong relationship between IS and public service efficiency (Shaaibith & Meziel, 2022). The adoption of privacy-enhancing technologies, such as Privacy by Design, also ensures data protection in public organizations, addressing security concerns while optimizing administrative processes (Bu et al., 2021).

As digital transformation continues to reshape public administration, IS remains a pivotal element in improving organizational performance, facilitating informed decision-making, and increasing public trust in government institutions. Ports such as Singapore, Rotterdam, and Dubai have successfully implemented advanced information systems to streamline operations, resulting in better performance, increased transparency, and improved customer satisfaction (UNCTAD, 2019; Port of Rotterdam, 2021; Maritime and Port Authority of Singapore, 2021). These ports serve as examples of how information systems can transform port operations and contribute to economic growth. Furthermore, the role of information systems in enhancing organizational performance has been widely recognized. The United Nations E-Government Survey (2020) highlighted that countries with higher e-government development indices generally demonstrate better public service delivery and increased transparency.

In Africa, the adoption of information systems in public organizations has been slower, often due to challenges such as limited infrastructure, inadequate funding, and a lack of technical expertise (Metawa et al., 2022). Despite these challenges, many developing nations increasingly recognize the importance of information systems in public administration. For example, Nigeria's Integrated Payroll and Personnel Information System (IPPIS) has helped reduce payroll fraud in the public sector, while Kenya's citizen-service platforms have streamlined access to government services for millions of citizens (World Bank, 2019; Ngugi, 2020). The African Union has also emphasized digital transformation as a key driver of socio-economic development on the continent, as outlined in its Digital Transformation Strategy for Africa 2020–2030 (African Union, 2020). Several African countries, including Kenya, Rwanda, and Ghana, have implemented information systems in public organizations to improve service delivery and enhance government efficiency. For example, Kenya's Huduma Centres provide a one-stop shop for government services by leveraging information systems to offer citizens a wide range of public services efficiently (Ndemo, 2015). Rwanda, often regarded as a leader in digital transformation in Africa, has implemented various e-government initiatives to enhance transparency, accountability, and service delivery in public institutions (Ndung'u, 2020; Republic of Rwanda, 2021). For instance, Rwanda's Irembo platform allows citizens to access a wide range of government services online, significantly improving efficiency and reducing bureaucratic delays (Republic of Rwanda, 2021).

In the Tanzanian context, public organizations often face inefficiencies due to outdated or poorly integrated information systems. These challenges hinder effective decision-making and service delivery, necessitating research on the adoption of modern information technologies, such as AI and accounting information systems, to address existing gaps (Hussain et al., 2023). Existing literature highlights advances in information systems, particularly in AI-driven business applications and customer relationship management (CRM) systems. Chatterjee et al. (2023) explored the adoption of AI-integrated CRM systems, highlighting how digital solutions influence user behaviour and organizational performance. However, much remains to be done to understand the impact of these technologies in public sector organizations in developing countries, particularly in Tanzania. Most studies have focused on private sector applications, leaving a gap in research on the effectiveness of information systems in improving public sector performance.

The implementation of e-government initiatives, such as the e-Government Agency (e-GA), reflects the government's commitment to leveraging technology to modernize public administration (URT, 2021). The e-GA has become instrumental in promoting the use of information systems across various public institutions to improve efficiency, transparency, and accountability. Despite these efforts, the adoption of information systems in some public organizations, including the Tanzania Ports Authority (TPA), has been limited, resulting in challenges related to operational inefficiencies, delays, and inadequate service quality (Mtey & Sulle, 2021).

The Tanzania Ports Authority is a crucial public entity responsible for managing and regulating port activities in the country. Ports are essential gateways for international trade, and their efficiency has a direct impact on a country's economic growth. Efficient port operations facilitate the smooth movement of goods, reduce trade costs, and contribute to national development (World Bank, 2019). The adoption of information systems at TPA, such as automated cargo tracking and electronic documentation systems, offers a promising solution for addressing these challenges (Mtey & Sulle, 2021). By automating processes, improving data management, and providing real-time information, information systems can enhance port efficiency, reduce delays, and improve service quality. The importance of this topic lies in its broad implications for governance, transparency, and service efficiency. Information systems play a key role in transforming public administration by streamlining operations and improving accountability (Saguda, 2021). However, challenges such as limited infrastructure, resistance to technological change, and inadequate technical expertise continue to affect the effective use of information systems. Addressing these gaps is essential for understanding best practices in digital transformation within Tanzanian public administration. By focusing on information systems integration, policymakers and organizational leaders can develop strategies to increase operational efficiency, improve service delivery, and promote transparency, ultimately benefiting the entire public sector.

1.1 Statement of the Problem

Information systems (IS) play a vital role in enhancing the efficiency and effectiveness of public organizations by improving data management, operational efficiency, and service delivery (Mkongo & Macha, 2023). However, despite the adoption of IS, challenges such as ineffective data use, poor system integration, and inadequate technical expertise continue to hinder the full realization of IS benefits (Shao, 2024). The TPA problem is characterized by delays in cargo clearance, financial inefficiencies, and frequent system failures, which not only affect port operations but also the trade and logistics industry (Mushumbusi, 2024). Reports such as Assessment of Effects of Port Tariffs on Dar Es Salaam Port Cargo Traffic indicate that inefficiencies in port operations contribute to an estimated 20% increase in transaction costs for importers and exporters, resulting in economic losses (Mkongo & Macha, 2023).

According to Mboera et al. (2021) found that ineffective use of data in Tanzania's health management information system led to poor decision-making, affecting health service delivery. Similarly, Mkongo and Macha (2023) found that ineffective implementation of human capital management information systems at the Tanzania Revenue Authority (TRA) led to a 30% reduction in labor productivity, demonstrating greater challenges in integrating IS into Tanzania's public sector organizations. Furthermore, Saguda (2021) noted that poor monitoring and evaluation (M&E) systems in civil service reform led to a 40% failure rate in planned government initiatives, indicating significant gaps in IS effectiveness and accountability. In the same vein, Mahamoud (2021) claims that the severity of the problem at TPA is significant. The port handles over 95% of Tanzania's international trade, but poor management results in operational delays,

revenue losses, and logistical bottlenecks, negatively impacting businesses and economic growth. Despite the important role of IS in the performance of public organizations, most of the existing research focuses on health, taxation, and public administration in general, leading to a lack of understanding of the challenges of IS in transport and logistics in Tanzania. Therefore, this study seeks to fill this gap by assessing the role of information systems (IS) in improving the performance of public organizations using the case of Tanzania Port Authority, by identifying the key challenges of IS and proposing practical solutions. This study aims to contribute to increasing efficiency, reducing operational costs, and improving service delivery in one of the most important public organizations in Tanzania.

This study examined the role of information systems in improving public organisations performance at the Tanzania Ports Authority in Dar es Salaam over the period 2018 to 2024. Anchored in the Technology Acceptance Model the Resource-Based View and Institutional Theory the study adopted a mixed-methods research design. Quantitative data were collected using structured questionnaires from 270 respondents and analysed using descriptive statistics while qualitative data were obtained through semi-structured interviews with 30 key informants. The findings indicate that information systems have significantly improved cargo clearance efficiency through systems such as TANCIS the Terminal Operating System the Single Window and SAP by reducing manual errors shortening processing time and enhancing inter-departmental coordination. However, the realisation of full financial benefits remains constrained by system downtime integration gaps between institutions limited ICT skills inadequate infrastructure funding and inter-institutional dependencies particularly with the Tanzania Revenue Authority. The study concludes that information systems play a significant and largely positive role in improving public organisation performance at the Tanzania Ports Authority although the magnitude of benefits depends on human institutional and inter-organisational factors. The study recommends that the Tanzania Ports Authority strengthen uniform deployment of information systems institutionalise the use of digital audit trails and invest in continuous ICT capacity building while the Government of Tanzania should increase and stabilise funding for information systems infrastructure.

2.0 LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Socio-Technical Systems Theory

Socio-Technical Systems Theory, introduced by Eric Trist and his colleagues in 1951, emphasizes the interplay between social and technical components within an organization, suggesting that both needed to be optimized in tandem to achieve overall effectiveness. This theory advocates for alignment between technology, organizational structure, and human needs to enhance productivity, job satisfaction, and overall organizational success. Over the years, scholars have expanded on the understanding of Socio-Technical Systems Theory. Clegg (2000) described it as a framework that ensures an optimal balance between technological and social systems to achieve

effective functioning. Mumford (2006) emphasized that the socio-technical approach prioritizes worker autonomy and active involvement in decision-making, especially when it comes to adapting to technological changes.

In this study, Socio-Technical Systems Theory was used to explore how the implementation of information systems at the Tanzania Port Authority (TPA) can be effectively aligned with employee workflows and organizational culture. Specifically, this study assessed the integration of technical components (e.g., hardware and software) and social components (e.g., employee skills and organizational processes) to ensure successful system adoption and optimal performance outcomes.

The strength of Socio-Technical Systems Theory lies in its holistic perspective, which ensures that both the technical and social dimensions of technology adoption are considered. By employing this theory, the study was able to guide a comprehensive investigation of information system adoption at TPA considering the technology itself, employee readiness, training needs, and the necessary adjustments to workflows. This comprehensive approach provided a clear understanding of the technical and organizational changes required for effective adoption of information systems. However, the theory also comes with limitations, notably its complexity in practical implementation. It demands a detailed analysis of both social and technical factors and requires collaboration among stakeholders something that can be challenging in public organizations characterized by rigid hierarchies and limited flexibility. To address this limitation, the study utilized a mixed-methods approach, incorporating interviews, observations, and surveys. This approach allowed for an in-depth examination of social and technical factors, ensuring that findings are both comprehensive and actionable, ultimately contributing to improved IS adoption at TPA.

2.1.2 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), developed by Fred Davis in 1986, is widely used to explain how users accept and use new technology. TAM posits that perceived usefulness and perceived ease of use are the primary determinants of a user's attitude toward a technology, ultimately shaping their willingness to adopt it. TAM has evolved over the years, with Venkatesh and Bala (2008) introducing Technology Acceptance Model 2 (TAM2), an extended version of the original TAM that includes constructs such as social influence and cognitive instrumental processes to better capture the nuances of technology acceptance. Mathieson (1991) also built upon TAM, suggesting that the model's predictive capacity is influenced by external factors such as training and support, which shape individual attitudes and behaviours toward adopting technology.

In this study, TAM was utilized to examine the factors influencing employee acceptance and use of information systems at TPA. This involved focusing on the key variables of perceived usefulness, perceived ease of use, and external factors such as training programs, system quality,

and organizational support, to understand how these factors affect employees' willingness to adopt information systems.

The main strength of TAM is its simplicity and ability to effectively predict user acceptance, making it highly useful for identifying the primary factors that facilitate or hinder technology adoption. Its application in this study helped identify barriers faced by TPA employees in adopting information systems, thereby enabling the identification of targeted solutions, such as enhancing system usability or improving the availability and quality of training programs. Nevertheless, by integrating both models, the research ensured that the analysis addresses not only individual-level factors but also broader organizational dynamics, providing a more holistic understanding of IS adoption challenges at TPA.

2.3 Empirical Review

Seun et al. (2023) assessed the effect of information systems on operational efficiency. The study found that information systems improve organizational performance by automating tasks, reducing manual errors, strengthening communication, supporting data integration, and improving decision-making. The findings showed that effective information systems reduce operational delays and support continuous performance improvement through key performance indicators.

Smith and Johnson (2023) examined the effect of information systems on operational inefficiencies and service quality in global ports, including Rotterdam and Singapore. A mixed-methods approach was used, involving interviews, surveys, and analysis of historical performance data from 150 respondents. The study found that automated cargo tracking and real-time information systems significantly reduced operational delays and improved customer satisfaction. The authors concluded that advanced information systems are essential for improving port efficiency.

Adewale (2022) investigated the use of information systems in reducing operational inefficiencies at the Port of Mombasa in Kenya. The study used a qualitative case study design with interviews involving 60 port managers, stakeholders, and IT personnel. The findings showed that the Kilindini Waterfront Automated Terminal Operating System improved cargo handling, service quality, and communication among port staff. However, inadequate infrastructure, outdated equipment, poor training, and resistance to technology limited full system effectiveness.

Mtey and Sulle (2022) examined the effect of information systems on operational efficiency at the Tanzania Ports Authority. A quantitative design was used, with survey data collected from 120 TPA employees. The findings revealed that systems such as the Electronic Single Window helped reduce operational delays. However, inadequate infrastructure and limited technical skills continued to affect system performance. The study concluded that information systems can improve port operations when supported by proper infrastructure and user training.

Williams and Lee (2023) explored the role of information systems in enhancing transparency, accountability, and turnaround time in port operations. The study involved 200 respondents and used case study analysis and quantitative performance metrics. The findings showed that real-time data access, automated documentation, and improved communication channels enhanced operational efficiency and accountability. The study recommended the adoption of secure real-time systems, including blockchain-supported platforms, to improve transparency in port operations.

Mensah (2022) studied the role of information systems in enhancing transparency and accountability at Ghana's Port of Tema. The study surveyed 180 port users, stakeholders, and government officials and applied descriptive statistics and correlation analysis. The findings showed that the Ghana Community Network system reduced bureaucratic delays, minimized corruption opportunities, improved stakeholder trust, and strengthened trade logistics. The study concluded that information systems can improve transparency and efficiency in African ports when supported by government commitment and stakeholder collaboration.

Mtey and Sulle (2023) investigated the adoption of the Tanzania Customs Integrated System at TPA. The study used a mixed-methods approach, combining surveys of TPA staff with secondary system performance reports. The findings indicated that TANCIS improved customs processing efficiency, reduced paperwork, enhanced data accuracy, and improved communication between customs officials and stakeholders. However, limited technical expertise, system integration challenges, cybersecurity concerns, and staff resistance reduced its full effectiveness.

Omorodion et al. (2020) examined employee perceptions and adoption of electronic procurement systems in federal public hospitals in Edo State, Nigeria. The study used the Diffusion of Innovations Theory and collected data from 45 management personnel. The findings showed that insufficient financing and weak electronic procurement infrastructure were major obstacles to effective system adoption. The study indicated that financial limitations can reduce the ability of institutions to benefit from digital systems.

Bhatnagar (2021) investigated barriers to effective information system adoption in global port operations. The study used qualitative case studies and interviews with IT experts, port managers, and policymakers. The findings identified high implementation costs, resistance to change, difficulty integrating new systems with legacy infrastructure, and shortage of skilled personnel as major barriers. The study recommended continuous investment, staff training, and stronger technical support for successful system adoption.

Dada (2023) studied barriers to information system adoption at the Port of Lagos in Nigeria. Interviews were conducted with port officials, IT staff, and logistics companies, while content analysis was used to identify major themes. The findings showed that budget constraints, limited infrastructure, inadequate technical expertise, weak government support, and cultural resistance

limited effective adoption. The study concluded that information systems require adequate funding and policy support to produce meaningful improvements.

Mtey and Sulle (2024) examined barriers to effective information system adoption at TPA. A mixed-methods approach was used, involving surveys of TPA employees and interviews with IT personnel, port managers, and logistics partners. The findings revealed that inadequate infrastructure, lack of funding, resistance to change, and insufficient technical expertise affected system performance. The study recommended targeted training, improved technical support, infrastructure upgrading, and partnerships with technology providers.

Generally, the reviewed studies show that information systems improve cargo clearance, operational efficiency, transparency, trade logistics, and revenue control in port operations. However, the studies also show that these benefits depend on adequate infrastructure, funding, staff training, system integration, cybersecurity capacity, management support, and stakeholder collaboration. Therefore, the current study is necessary because it focuses on how information system inefficiencies affect cargo clearance delays and operational performance at the Tanzania Ports Authority.

3.0 METHODOLOGY

3.1 Research Design and Philosophical Orientation

The research used a mixed-methods approach a combination of the quantitative and qualitative approaches to study changes in information systems at the Tanzania Ports Authority (TPA). The reason for using this kind of approach was that information systems work in complex socio-technical environments affected not only by technology, but also by human behaviour, organizational processes, and institutional constraints. So, a single method would have been unlikely to capture all these factors.

The research took a pragmatic philosophy as its basis, which is the idea that different methods can be used depending on the nature of the research problem. This philosophy enabled us to mix both quantitative and qualitative data to obtain thorough insights. The research used an explanatory sequential design which means that the first step was to collect and analyze quantitative data and the second step was to collect qualitative data to confirm and further understand the statistical results.

3.2 Study Area and Context

The study took place at the Tanzania Ports Authority (TPA) in Dar es Salaam, the main maritime gate of the country and a key point for regional commerce. The choice of TPA was logically supported by its major contribution to the handling of the country's international cargo and its readiness to engage in digital transformation. From 2018 to 2024, the Authority has launched various information systems to raise operational efficiency, transparency, and the level of its services. Indeed, this is an extreme operating environment where the impact of information

systems can be clearly observed and quantified. On the other hand, it is fraught with institutional and infrastructural problems typical of public bodies in developing countries thereby making it a very suitable example to study how technology, organizational performance, and environmental limitations are interconnected.

3.3 Target Population and Sampling Strategy

The focus was on TPA staff and operational stakeholders in the main departments like information technology, operations, logistics, finance, and customs-related units.

Since it was important to have a proportional representation of all the departments in the quantitative phase of the study, a stratified random sampling method was used to select the participants. In all, 270 respondents were covered by the survey from a population of 1,192 employees as per official records. On the qualitative side purposive sampling was conducted to select those individuals who had knowledge and experience of the implementation of information systems. These were IT personnel, port supervisors, customs officers, and logistics organisers among others.

3.4 Data Collection Methods

The authors of the study combined primary and secondary data sources in order to provide more detailed and reliable findings. Quantitative data were gathered via structured questionnaires using a five-point Likert scale. Respondents were asked to evaluate the performance of the information system in terms of cargo handling speed, operational efficiency, and financial management, which enabled standard comparison and statistical analysis.

Qualitative data, on the other hand, were collected through semi-structured interviews that allowed the participants to narrate their experiences, difficulties, and attitudes. Interviews were recorded, transcribed, and analyzed for this purpose. Moreover, document analysis was carried out with the use of institutional reports, annual reports, and system logs. They supplied the study with local evidence, as well as assist in the validation and the complementary of the primary data results.

3.5 Data Analysis Procedures

We used a mixed-methods approach for data analysis where we separately checked the quantitative and qualitative data before integrating them.

We conducted descriptive statistical analysis on the quantitative data, e.g., calculating the mean and standard deviation, to uncover the general trends in the perceptions of the effectiveness of the information system by respondents. A piece of statistical software was used for data processing to provide accuracy and reliability.

Thematic analysis techniques such as coding, categorization, and development of the themes that encapsulated major features of the participants' experiences were done to qualify the data.

The last step was to merge interpretations of findings from both sets of data. Quantitative results showed the general patterns, while qualitative results gave contextual explanations. So, linking statistical trends with organizational realities, we were able to get an in-depth understanding of the phenomenon.

3.6 Validity, Reliability, and Ethical Considerations

The investigation retained methodological discipline by employing suitable steps for validity, reliability, and ethics. Validity was guaranteed by a panel of experts' scrutiny of the tools, theoretical framework support, and the use of multiple types of data. The reliability of the tools was checked by conducting a pilot study and calculating the internal consistency through Cronbach's alpha that complied with the standards.

In terms of ethics, the research got permission from the institution, informed the participants when obtaining their consent, and protected their identity and the information they provided at every stage.

4. Findings

4.1 Effects of Information Systems on Cargo Clearance Efficiency

The first objective examined the effects of information systems on cargo clearance efficiency at the Tanzania Ports Authority (TPA). Respondents assessed seven statements using a five-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. Their responses focused on clearance time, documentation accuracy, reduction of manual errors, transparency, cargo tracking, and processing speed, as summarized in Table 1.

Table 1: Effects of Information Systems on Cargo Clearance Efficiency (n = 270)

Statement	Mean	SD	Interpretation
The current IS used at TPA, including TANCIS and Single Window, have reduced the time required for cargo clearance compared to the pre-implementation period	4.03	0.98	Agree
The accuracy and reliability of cargo documentation have improved as a result of IS currently in use	4.20	0.83	Strongly Agree
IS have helped reduce manual errors and paperwork during the cargo clearance process	4.37	0.82	Strongly Agree
Communication and information sharing between TPA departments have improved due to the use of integrated IS	4.09	0.89	Agree
Since IS adoption, there has been greater transparency and traceability in the cargo clearance process	4.21	0.82	Strongly Agree
Compared to pre-IS operations, cargo tracking and monitoring have become faster and more efficient	4.17	0.79	Agree
Cargo clearance performance indicators such as turnaround time, queue length, and processing speed have improved since IS introduction	4.19	0.76	Agree
Overall Mean	4.18	0.84	Agree

Table 1 shows that information systems have contributed positively to cargo clearance efficiency at TPA, with an overall mean score of 4.18. This indicates that respondents generally agreed that digital systems have improved clearance operations. The highest-rated item was the reduction of manual errors and paperwork (Mean = 4.37), suggesting that automation has reduced dependence on paper-based documentation and improved the accuracy of clearance procedures.

The results further show strong agreement that information systems have improved transparency and traceability in cargo clearance (Mean = 4.21) and enhanced the accuracy and reliability of cargo documentation (Mean = 4.20). These results imply that systems such as TANCIS and Single Window have strengthened accountability and reduced opportunities for manipulation during cargo clearance.

However, the lowest mean score was recorded for the reduction of cargo clearance time (Mean = 4.03). Although this still falls within the “Agree” category, it suggests that speed-related improvements remain affected by operational challenges such as system downtime, connectivity problems, and uneven implementation across departments. This finding is consistent with Mtey

and Sulle (2022), who observed that electronic systems improved cargo handling efficiency at TPA, although infrastructural limitations restricted their full effectiveness.

These findings support the Technology Acceptance Model (TAM), which emphasizes perceived usefulness as a key factor influencing technology adoption. In this case, employees appear to perceive information systems as useful tools for improving job performance, which encourages continued reliance on digital systems in cargo clearance processes.

4.2 Effectiveness of Information Systems in Enhancing Operational Efficiency and Trade Logistics

The second objective assessed the effectiveness of information systems in enhancing operational efficiency and trade logistics at TPA. The analysis focused on transparency, automated documentation, transaction security, corruption reduction, data accuracy, and operational continuity, as shown in Table 2.

Table 2: Effectiveness of Information Systems in Enhancing Operational Efficiency and Trade Logistics (n = 270)

Statement	Mean	SD	Interpretation
The use of real-time IS ensures transparency in port operations	4.15	0.78	Agree
The use of automated documentation systems facilitates organisational operations	4.22	0.81	Strongly Agree
IS provide a secure and tamper-proof record of transactions	4.13	0.78	Agree
IS reduce the level of corruption among staff and other stakeholders	4.09	0.92	Agree
IS result in reduced paperwork and enhanced data accuracy	4.28	0.74	Strongly Agree
IS ensure smooth operational continuity and a mindset change within the organisation	4.13	0.76	Agree
Overall Mean	4.17	0.80	Agree

Table 2 indicates that information systems have strengthened operational efficiency and trade logistics at TPA, with an overall mean score of 4.17. The highest mean score was recorded for reduced paperwork and enhanced data accuracy (Mean = 4.28), showing that automation has improved administrative precision and reduced errors associated with manual processing.

The use of automated documentation systems also received strong agreement (Mean = 4.22). This suggests that digitized workflows have facilitated organisational operations by reducing repetitive manual tasks, improving departmental coordination, and supporting faster decision-making. Real-

time information systems were also viewed positively in promoting transparency in port operations (Mean = 4.15), confirming the value of digital visibility in managing port activities.

The lowest mean score in this category was recorded for the reduction of corruption among staff and other stakeholders (Mean = 4.09). Although the score remains positive, it indicates that digital systems alone may not fully address corruption-related risks. Institutional culture, enforcement mechanisms, and governance practices remain important in determining accountability outcomes.

These findings align with Williams and Lee (2023), who found that real-time information systems improve transparency and accountability in global port operations. Similarly, Mensah (2022) reported that port information systems in Ghana improved stakeholder trust by reducing bureaucratic inefficiencies and limiting opportunities for corruption. The results also support Socio-Technical Systems Theory, which argues that technology performs effectively when it is supported by appropriate organisational structures, institutional commitment, and human behaviour.

4.3 Challenges of Information Systems in Mitigating Financial Inefficiencies and Revenue Losses

The third objective examined the challenges affecting the ability of information systems to mitigate financial inefficiencies and revenue losses at TPA. Respondents assessed issues related to revenue leakage, billing accuracy, system downtime, departmental integration, ICT skills, reconciliation accuracy, and discrepancies between recorded transactions and actual operations, as presented in Table 3.

Table 3: Challenges of Information Systems in Mitigating Financial Inefficiencies and Revenue Losses (n = 270)

Statement	Mean	SD	Interpretation
Compared to the period before IS were introduced, cases of revenue leakages at TPA have decreased	3.87	0.95	Agree
The current IS, including TANCIS and Single Window, help ensure accurate calculation and collection of port charges, thereby reducing financial losses	4.01	0.92	Agree
Challenges such as system downtime, slow connectivity, or technical failures contribute to financial inefficiencies at TPA	3.99	0.84	Agree
There are still gaps in system integration between departments such as Customs, Billing, and Finance that lead to delays or errors in revenue collection	3.76	0.86	Agree
Staff limitations in ICT skills negatively affect the ability of IS to prevent financial leakages	3.88	1.02	Agree
Compared to pre-IS operations, the accuracy of billing, invoicing, and payment reconciliation has improved due to IS	3.91	0.86	Agree
Discrepancies between IS-recorded transactions and actual port operations still pose a challenge to achieving full financial efficiency	3.92	0.81	Agree
Overall Mean	3.91	0.89	Agree

Table 3 shows that respondents agreed that information systems help reduce financial inefficiencies and revenue losses, although the overall mean score of 3.91 is lower than those reported for cargo clearance and operational efficiency. This suggests that the financial benefits of information systems are present but less pronounced than their operational benefits.

The highest mean score was recorded for the accurate calculation and collection of port charges (Mean = 4.01). This indicates that systems such as TANCIS and Single Window have improved billing reliability and contributed to reducing revenue losses. However, technical failures remain a major concern, as respondents agreed that system downtime, slow connectivity, and technical interruptions contribute to financial inefficiencies (Mean = 3.99).

The lowest mean score was recorded for gaps in system integration between Customs, Billing, and Finance departments (Mean = 3.76). This implies that weak interdepartmental integration continues to create delays, errors, and inefficiencies in revenue collection. ICT skill limitations also emerged as an important challenge (Mean = 3.88), suggesting that human capacity constraints reduce the ability of information systems to prevent financial leakages effectively.

These findings are consistent with Mahmood et al. (2021), who emphasized staff training as a critical factor in information system performance. They also support Bhatnagar (2021), who identified weak integration and inadequate technical expertise as major barriers to effective information system adoption in port operations. The results therefore suggest that technology alone cannot eliminate financial inefficiencies without stronger institutional coordination, improved infrastructure, and continuous capacity building.

4.4 Qualitative Findings from Key Informant Interviews

Qualitative data were collected through semi-structured interviews with 30 purposively selected key informants, including IT staff, customs officers, logistics managers, and terminal operators at TPA. The interviews were transcribed and analysed thematically. Three key themes emerged from the analysis: cargo clearance efficiency, operational transparency and accountability, and challenges in financial management and system integration.

4.4.1 Information Systems and Cargo Clearance Efficiency

Most key informants reported that information systems such as TANCIS, Single Window System, and Terminal Operating System have improved cargo clearance by reducing paperwork, minimizing documentation errors, and speeding up cargo processing. These interview responses reinforce the quantitative results in Table 1, where respondents strongly agreed that information systems reduced manual errors and improved documentation accuracy.

One customs officer explained, *"Before the system upgrades, cargo verification involved too much paperwork and repeated approvals. Now tracking and document verification are much faster and more transparent."* A terminal operator also stated that *"TANCIS has improved coordination between customs, billing, and terminal operations."* These views show that automation has not only improved clearance speed but also strengthened coordination among key operational units.

4.4.2 Operational Transparency and Accountability

Interview findings also indicated that information systems have improved transparency and accountability by creating digital records and reducing opportunities for manipulation. Real-time access to information has strengthened supervision and made it easier to trace transactions and staff actions. This supports the results in Table 2, where respondents agreed that information systems promote transparency, secure transaction records, and improve data accuracy.

A logistics manager stated,

"Because transactions are recorded electronically, it is now difficult to alter records without detection."

Similarly, a finance officer observed that digital systems increased accountability because every action can be traced to the responsible officer. These responses show that information systems

have improved the visibility of port operations and reduced the weaknesses associated with manual recordkeeping.

4.4.3 Challenges in Financial Management and System Integration

Despite the operational benefits, key informants identified several challenges affecting the financial performance of information systems. These included system downtime, poor connectivity, weak integration between Customs, Billing, and Finance departments, and limited ICT skills among staff. These qualitative findings directly support Table 3, where respondents identified technical failures, integration gaps, ICT skill limitations, and transaction discrepancies as continuing barriers to full financial efficiency.

One IT officer noted,

"Sometimes the systems do not communicate properly with each other, especially between customs and finance."

A finance manager added,

"When the system fails, we are forced to revert to manual processes, which increases the risk of errors and financial leakages."

These responses demonstrate that the effectiveness of information systems depends not only on their availability but also on system reliability, staff competence, and integration across departments.

4.5 Documentary Review Findings

The documentary review covered TPA operational reports, ICT implementation documents, and port performance records. The reviewed documents showed that information systems such as TANCIS and Single Window System have helped improve cargo processing efficiency, revenue collection, and operational transparency. This documentary evidence supports the survey findings in Tables 1, 2, and 3, particularly in relation to improved cargo clearance, better documentation accuracy, stronger coordination, and enhanced revenue-related processes.

However, the documents also highlighted persistent challenges, including system downtime, infrastructure limitations, and gaps in integration among government agencies and internal departments. These issues are consistent with the results in Table 3, where respondents agreed that technical failures and weak system integration still affect financial efficiency. The documentary evidence therefore confirms that information systems have improved port operations, although structural and technical constraints continue to limit full performance realization.

4.6 Discussion of Findings

The findings show that information systems have contributed to improved cargo clearance, operational efficiency, transparency, and financial management at TPA. Table 1 demonstrates that

information systems have strongly improved cargo clearance efficiency, particularly through reduced manual errors, improved documentation accuracy, enhanced transparency, and better cargo tracking. These findings align with Seun et al. (2023) and Mtey and Sulle (2023), who reported that digital port systems improve logistics efficiency and reduce operational delays.

Table 2 shows that information systems enhance operational efficiency and trade logistics by reducing paperwork, improving data accuracy, supporting automated documentation, and securing transaction records. These findings are consistent with Williams and Lee (2023), who argue that real-time information systems enhance transparency and accountability in port management. The findings also support the Technology Acceptance Model (Davis, 1989), as users appear to rely on the systems because they perceive them as useful in supporting daily operations.

However, Table 3 indicates that financial efficiency remains more difficult to achieve than operational efficiency. System breakdowns, weak integration between departments, limited ICT skills, and infrastructure constraints continue to affect revenue collection and increase the risk of financial leakages. These findings are consistent with Bhatnagar (2021) and Mahmood et al. (2021), who argue that technical systems achieve stronger results when supported by institutional commitment, staff capacity, and reliable infrastructure.

Taken together, the quantitative, qualitative, and documentary findings show that information systems have improved TPA operations, especially in cargo clearance, documentation accuracy, transparency, and coordination. Nevertheless, the full value of these systems, particularly in financial management, depends on stronger system integration, improved infrastructure, continuous staff training, and sustained institutional support.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

The conclusions of this study are drawn directly from the findings of the study in relation to each of the three specific research objectives and the overarching general objective. With respect to the first objective, the study concludes that information systems have fundamentally and positively transformed cargo clearance efficiency at TPA. The evidence from both the survey and the key informant interviews establishes that the deployment of TANCIS, the Single Window, the Terminal Operating System, and SAP has eliminated many of the bottlenecks inherent in the previous manual, paper-based clearance regime. Documentation that once required physical movement between multiple desks and departments over several days can now be processed digitally in hours or minutes, with multiple stakeholders accessing and updating shared records simultaneously in real time. The accuracy and reliability of cargo documentation have improved substantially as a result of IS adoption, inter-departmental communication has become more structured, consistent, and auditable, and pre-arrival processing and risk-based selectivity have compressed clearance timelines while directing inspection resources more efficiently toward high-risk consignments. IS have therefore served as indispensable enablers of cargo clearance efficiency

at TPA, delivering tangible, measurable, and broadly perceived improvements in this operational domain.

With respect to the second objective, the study concludes that IS have been broadly effective in enhancing operational efficiency and trade logistics at TPA, producing improvements across multiple dimensions of performance. Real-time information systems have significantly increased transparency in port operations by making critical operational and transactional data visible to all authorised parties, reducing the opacity that previously created opportunities for misinformation, facilitation payments, and disputes over cargo status. The automation of billing, payment processing, cargo clearance approvals, and scheduling has substantially reduced individual staff discretion in key operational decisions, attenuating the structural conditions under which corrupt practices historically flourished. Electronic payment systems and automated invoicing have standardised charges, made all financial transactions traceable and attributable, and created audit trails that enable proactive detection of irregularities. IS have further supported operational continuity by embedding institutional procedures within centralised digital platforms and have driven a discernible cultural transformation, progressively shifting employee and institutional orientations from suspicion of digital tools toward their genuine embrace as professional necessities. The benefits of IS in this domain therefore extend beyond narrow technical improvements to encompass broader institutional, cultural, and governance dimensions of organisational performance.

With respect to the third objective, the study concludes that while IS have contributed meaningfully to improved revenue collection accuracy, more reliable invoicing and billing processes, and a reduction in revenue leakages relative to the pre-IS operational environment, the financial management domain represents the area in which the transformative potential of IS at TPA is most incompletely realised. System downtime, slow connectivity, and technical failures create interruptions in financial transaction processing that result in billing delays and revenue recording errors. Gaps in system integration between the Finance, Customs, and Billing departments introduce vulnerabilities in cross-departmental data exchange, undermining the accuracy and completeness of revenue collection records. Staff limitations in ICT skills, particularly in data analytics, system integration management, and cybersecurity, reduce the organisation's capacity to use IS platforms to their full financial management potential. Insufficient and inconsistently allocated funding has necessitated phased and partial deployment, leaving certain financial workflows inadequately digitised, while inter-institutional dependencies with TRA mean that resource constraints outside TPA's direct control create cascading delays in customs revenue processing. A comprehensive and sustained strategy addressing infrastructure investment, human capital development, inter-departmental and inter-institutional system integration, and organisational change management is therefore necessary if TPA is to fully realise the financial efficiency benefits that its IS investments are capable of delivering.

Drawing together the conclusions arising from the three specific objectives, the study concludes that information systems play a significant, consequential, and broadly positive role in improving the performance of public organisations, as demonstrated through the case of the Tanzania Ports Authority. IS have transformed cargo clearance operations, enhanced operational transparency and accountability, supported anti-corruption efforts, and contributed to improved revenue collection processes. However, the benefits of IS are not uniformly realised across all operational domains, and the financial management dimension in particular remains constrained by infrastructure, capacity, integration, and governance challenges that require targeted and sustained institutional attention. The study further concludes that the effective deployment of IS in a complex public sector port environment is not primarily a technical matter but a fundamentally organisational one. The full potential of IS to improve public organisation performance is contingent not only on the quality and reliability of the technology itself but also on the human, institutional, and inter-organisational conditions within which that technology operates.

5.2 Recommendations

On the basis of the conclusions drawn from the findings of this study, the following recommendations are directed at TPA management, the Government of Tanzania, and development partners. TPA should accelerate the full and uniform rollout of integrated IS platforms, particularly TANCIS and the Single Window, to all operational units and departments that continue to rely on partially manual or semi-digital clearance workflows. The variability in clearance time reduction experiences identified among survey respondents suggests that the benefits of these platforms are not yet uniformly accessible across the organisation, and closing these deployment gaps would produce a more consistent and predictable clearance environment for all port users. TPA should further invest in expanding pre-arrival processing capabilities and deepening risk-based cargo selectivity systems, as these were identified by key informants as among the most impactful mechanisms for compressing clearance timelines and reducing unnecessary physical inspections.

TPA management should institutionalise the comprehensive use of digital audit trails and system-generated performance reports as standard tools for operational oversight and staff accountability. Embedding their use formally within departmental governance and performance management frameworks would consolidate the transparency and accountability gains that IS have already generated. TPA should also develop and implement a structured anti-corruption strategy that explicitly integrates IS controls with complementary governance, cultural, and disciplinary mechanisms, given that the study's findings confirm technology alone is insufficient to fully eradicate corrupt practices without strong leadership commitment, clearly communicated ethical standards, and consistent enforcement of accountability protocols. TPA should additionally invest in deepening the integration of its IS platforms across all operational departments, ensuring that Operations, Finance, Human Resources, and Marine departments share seamless, real-time access

to common operational data so as to reduce information gaps and support more consistent service delivery.

The Government of Tanzania, through the Ministry of Finance and the relevant sectoral ministries, should substantially increase and stabilise annual IS infrastructure budget allocations for both TPA and TRA. The study clearly establishes that inconsistent and insufficient funding is a root cause of system downtime, partial deployment, and maintenance gaps that directly undermine IS financial effectiveness, and treating IS infrastructure investment as a strategic national priority would significantly improve the reliability and coverage of digital systems across both institutions. TPA and TRA should jointly develop and implement a comprehensive inter-institutional IS integration roadmap that prioritises the elimination of data exchange gaps between their financial and customs management systems, supported by shared data exchange protocols and regular joint system audits. TPA should further establish a sustained ICT skills development programme specifically addressing identified gaps in advanced data analytics, system integration management, and cybersecurity, incorporating structured career pathways for ICT professionals, partnerships with universities and professional training institutions, and regular knowledge transfer from system vendors. Finally, TPA should create a dedicated digital change management function responsible for facilitating organisational adaptation to IS implementation and upgrades, employing structured change management frameworks and actively involving employees in the design and testing of new IS features so as to build ownership, reduce resistance, and improve adoption rates across the workforce.

DECLARATIONS

Funding: The authors received no specific funding for this study.

Conflict of Interest: The authors declare that they have no conflict of interest.

Ethical Approval: This study involved human participants and was conducted in accordance with accepted ethical standards for social science research. Permission to conduct the study was obtained from the relevant institutional authorities before data collection.

Informed Consent: Informed consent was obtained from all participants before their involvement in the study. Participation was voluntary, and respondents were assured of confidentiality and anonymity.

Data Availability: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions: All authors contributed to the conception, design, data collection, analysis, interpretation, drafting, and revision of the manuscript. All authors read and approved the final version of the manuscript.

Acknowledgements

The authors acknowledge the Tanzania Ports Authority for granting access to relevant information and for supporting the data collection process. Appreciation is also extended to the staff and key informants who participated in the study and provided valuable insights on the role of information systems in improving public organization performance.

REFERENCES

Adewale, B. (2022). Adoption of information systems at the Port of Mombasa. *East African Journal of Technology and Innovation, 8*(2), 98–112.

African Union. (2020). *Digital transformation strategy for Africa (2020–2030).* African Union. https://au.int/sites/default/files/documents/38507-doc-dts-english.pdf

Ahmed, A. S. A., Albaz, M. M., & Metwaly, A. Z. (2022). The role of artificial intelligence technologies in improving the performance of the management accountant considering the Egyptian state's trend toward digital transformation. *World Research of Business Administration Journal, 2*(3), 167–182. https://doi.org/10.56830/ZAAF5463

Bhatnagar, S. (2021). Barriers to effective information systems adoption in port operations. *Port Operations Journal, 7*(3), 145–160.

Bu, F., Wang, N., Jiang, B., & Jiang, Q. (2021). Motivating information system engineers' acceptance of privacy by design in China: An extended UTAUT model. *International Journal of Information Management, 60*, 102358. https://doi.org/10.1016/j.ijinfomgt.2021.102358

Chatterjee, S., Rana, N. P., Khorana, S., Mikalef, P., & Sharma, A. (2023). Assessing organizational users' intentions and behavior to AI-integrated CRM systems: A meta-UTAUT approach. *Information Systems Frontiers, 25*(4), 1299–1313. https://doi.org/10.1007/s10796-021-10181-1

Clegg, C. W. (2000). Sociotechnical principles for system design. *Applied Ergonomics, 31*(5), 463–477. https://doi.org/10.1016/S0003-6870(00)00009-0

Dada, A. (2023). Barriers to information systems adoption at the Port of Lagos. *West African Journal of Port Studies, 4*(2), 75–89.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340. https://doi.org/10.2307/249008

Enholm, I. M., Papagiannidis, E., Mikalef, P., & Krogstie, J. (2022). Artificial intelligence and business value: A literature review. *Information Systems Frontiers, 24*(5), 1709–1734. https://doi.org/10.1007/s10796-021-10186-w

Hussain, H. N., Alabdullah, T. T. Y., Jamal, K. A. M., & Ries, E. (2023). Time management as a critical success factor in the oil industry of Basra Governorate: An accounting information systems study. *International Journal of Scientific and Management Research, 6*(6), 59–76. https://doi.org/10.37502/ijsmr.2023.6605

Laudon, K. C., & Laudon, J. P. (2020). *Management information systems: Managing the digital firm* (16th ed.). Pearson Education.

Mahamoud, A. (2021). *Impact of human capital management information system on organisation performance in Tanzania* [Doctoral dissertation, The Open University of Tanzania].

Mahmood, N. H., Ahmed, N., & Fadhil, S. N. (2021). The significance of management information system in improving organizational performance and effectiveness. *Journal of Garmian University, 7*(4), 195–211.

Maritime and Port Authority of Singapore. (2021). *Annual report 2021*. Maritime and Port Authority of Singapore. https://www.mpa.gov.sg/who-we-are/newsroom-resources/publications/annual-report

Mathieson, K. (1991). Predicting user intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior. *Information Systems Research, 2*(3), 173–191. https://doi.org/10.1287/isre.2.3.173

Mboera, L. E. G., Rumisha, S. F., Mbata, D., Mremi, I. R., Lyimo, E. P., & Joachim, C. (2021). Data utilisation and factors influencing the performance of the health management information system in Tanzania. *BMC Health Services Research, 21*, Article 498. https://doi.org/10.1186/s12913-021-06559-1

Mensah, K. (2022). Transparency and accountability in African ports: The case of Tema Port. *Ghana Journal of Public Administration, 11*(2), 88–102.

Metawa, N., Elhoseny, M., & Mutawea, M. (2022). The role of information systems for digital transformation in the private sector: A review of Egyptian SMEs. *African Journal of Economic and Management Studies, 13*(3), 468–479. https://doi.org/10.1108/AJEMS-01-2021-0037

Mkongo, A., & Macha, L. J. (2023). Impact of human capital management information system on organization performance: A case of TRA headquarters in Dar es Salaam. *Research Trend in Technology and Management, 1*(1), 25–47.

Mtey, V., & Sulle, A. (2021). Challenges facing the implementation of information systems in public institutions in Tanzania. *International Journal of Technology and Management, 6*(1), 12–23.

Mtey, F., & Sulle, D. (2022). Information systems and service quality improvement at Tanzania Port Authority. *African Journal of Logistics, 5*(4), 150–165.

Mtey, F., & Sulle, D. (2023). Information systems adoption and operational performance at Tanzania Ports Authority.

Mtey, F., & Sulle, D. (2024). Challenges in information systems adoption at Tanzania Port Authority. *East African Journal of Information Systems, 10*(1), 12–28.

Mumford, E. (2006). The story of socio-technical design: Reflections on its successes, failures and potential. *Information Systems Journal, 16*(4), 317–342. https://doi.org/10.1111/j.1365-2575.2006.00221.x

Mushumbusi, J. M. (2024). Assessment of effects of port tariffs on Dar es Salaam Port cargo traffic. *Technology, 9*(7).

Ndung'u, N. (2020). *Digital transformation in Africa: The role of ICT strategy in growth.* Brookings Institution. https://www.brookings.edu

Omorodion, A., & Osifo, S. J. (2020). Employee perceptions of the electronic procurement system and rate of adoption of EPS by the federal public hospitals in Edo State of Nigeria based on the diffusion of innovations theory. *OUSL Journal, 15*(2), 97–120. https://doaj.org/article/649a2ac59c634172a6bc02d333c5b6d4

Port of Rotterdam. (2021). *Annual report 2021.* Port of Rotterdam Authority. https://www.portofrotterdam.com/en/about-port-authority/finance/annual-reports

Republic of Rwanda. (2021). *Irembo digital platform.* Government of Rwanda. https://irembo.gov.rw

Saguda, T. L. (2021). *Factors affecting monitoring and evaluation system performance of public service reform initiatives in Tanzania* [Doctoral dissertation, The Open University of Tanzania]. https://repository.out.ac.tz

Seun, A., [additional authors required]. (2023). Effect of information systems on operational efficiency. [Full publication details required]

Shaaibith, S. J., & Meziel, K. J. (2022). The information, communication technology and its relationship to human development in Saudi Arabia: An analytical study. *Al-Qadisiyah Journal for Administrative and Economic Sciences, 24*(4).

Shao, D. (2024). Empirical analysis of open government data usage in Tanzania. *Information Discovery and Delivery, 52*(1), 73–84. https://doi.org/10.1108/IDD-10-2022-0098

Smith, J., & Johnson, R. (2023). Reducing operational inefficiencies and enhancing service quality in global ports. *Journal of Maritime Logistics, 12*(3), 210–225.

Tanzania Ports Authority. (2024). *Annual report and accounts 2024.* Tanzania Ports Authority. https://www.ports.go.tz

UNCTAD. (2019). *Review of maritime transport 2019.* United Nations Conference on Trade and Development. https://unctad.org/system/files/official-document/rmt2019_en.pdf

United Nations. (2020). *E-Government survey 2020: Digital government in the decade of action for sustainable development.* United Nations. https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2020

United Republic of Tanzania. (2021). *e-Government initiatives and digital transformation in public administration.* Government of Tanzania.

Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision Sciences, 39*(2), 273–315. https://doi.org/10.1111/j.1540-5915.2008.00192.x

Williams, A., & Lee, H. (2023). Enhancing transparency in port operations through information systems. *Global Logistics Review, 9*(1), 33–47.

World Bank. (2019). *Digital economy for Africa initiative.* World Bank. https://www.worldbank.org/en/programs/all-africa-digital-transformation

World Bank. (2019). *Doing business 2019: Training for reform.* World Bank. https://www.worldbank.org/content/dam/doingBusiness/media/Annual-Reports/English/DB2019-report_web-version.pdf