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MANAGEMENT INFORMATION SYSTEMS CAPABILITIES AND PERFORMANCE OF SHIP BUILDING INDUSTRY IN KENYA

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ABSTRACT

The study investigated the capabilities of management information systems and the performance of ship building industry in Kenya. The study employed a quantitative approach by use of questionnaires to collect data on the variables. The reliability of the data collection instrument was measured using Cronbach's Alpha and the pilot test was carried out at Kenya Shipyards Limited. The study established that Centralized Database significantly influence Performance of Ship Building Industry (β=0.253; p=0.010). Furthermore, it was found that Service Delivery significantly improves Performance of Ship Building Industry (β=0.174; p=0.045). Moreover, it was observed that Information Security significantly impacted Performance of Ship Building Industry (β=0.248; p=0.008). Finally, it was revealed that Digital Infrastructure significantly impacts performance of Ship Building Industry (β=0.345; p=0.000). The study concludes that since a centralized database provides accurate and timely access to data from every division, it is considered essential for managing the operations of the company. Secondly, a company's ability to stay relevant depends on having efficient corporate information systems in place. That is why one of the most important measures of a company's efficacy is how fast it can fix everyday issues. Thirdly, businesses must put in place a variety of information security measures and create strategies to guard their data from threats if they hope to stay competitive. Finally, an ICT infrastructure is necessary for a business to operate efficiently. Thus, when information technology infrastructure is not properly deployed in the company, it may hinder business operations. The study recommended that a system audit be conducted on a regular basis to verify that the company's data management system is configured and operating as intended to support management goals. It is suggested that businesses spend more on cyber security in order to stay competitive, as organizations with strong network security systems are believed to be less vulnerable to data theft and sabotage. Finally, businesses gain from e-business because it gives them the opportunity to access clients at a fair price and without being restricted by geographic location. Establishing contemporary e-business protocols in this area can help businesses perform better as an organization.

Key Words: *Management Information Systems, Marine Vessels, Trade Volume, Digital Infrastructure*

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INTRODUCTION

The digitalization of business processes in firms enabled by the new digital technologies such as virtual reality, IoT, block chain, big data analytics, artificial intelligence, and cloud computing is an ever-evolving phenomenon in the manufacturing industry according to Chaudhuri et al., (2022). The firms will succeed in their mandate through embracing transformation by use of digital technologies to improve in areas such as customer experience and engagement, streamlining operations and creating new business models or else they risk under performance (Khin & Ho, 2019).

Global trade up to 90% basically is carried out through the sea and it is said that trade and the sea are inseparable since the colonial time where merchant ships ply the waters to trade and facilitate movement of people (Hossain & Zakaria, 2017). According to Hossain & Zakaria, 2017, the building, refit, repair, maintenance, and overhaul of ships has become more global than before due to the increasing demand for reliable means for movement of raw materials, components, and finished products in bulk and at a lower cost.

Developing trends in the ship building industry include green ship building technology, automation in the industry, modular ship building technique, advanced outfitting, ship launching airbag, liquefied natural gas/ liquefied petroleum gas (LNG/LPG) fueled engines and solar and wind powered ships and use of information systems in management of operations at the Shipyard (Mlimbila & Mbamba, 2018).

Management information systems (MIS) capabilities facilitate and simplify the work procedures of Shipyards and improve their performance over time according to Chaudhuri, A., Subramanian, N., & Dora, M. (2022). Success of industrial corporations that are involved in manufacturing like Shipyards depends on the availability of sound and timely information to the management and the ease of process flow in time, accuracy and cost- effective which is facilitated by information systems (Saputra et al., 2022).

Since industries are part of the global economy, they continue to be affected by factors beyond their area of operation like technological advances that force them to adapt to these rapid transformations for survivability and business continuity as stated by Ndubuisi et al. (2021). The increasing complexity of doing business in the ever volatile global environment, has forced Kenyan Shipyards to embrace new technologies in their daily running of operations in order to have a competitive advantage through use of ERP a case in point at SECO and cloud computing at KSL (Owino & Waema, 2020).

Leading industries in Ghana have been seen to be deliberately digitizing their processes and services as a way of checking on increase in expenditure due to environmental factors beyond their control and in a bid to increase efficiency and effectiveness of operations and enhance organizational performance (Ngatoro, 2018). Ngatoro (2018) further notes that the digitalization of processes and services offered by firms failed due to inability to deploy required capabilities such as well-trained technical and informed non-technical staff to manage the information systems.

MIS capabilities in the manufacturing industry in Kenya have largely contributed to improved productivity and profitability of firms when integrated in daily operations (Oketch & Muathe, 2022). According to Owino & Waema (2020), Kenya's high speed internet connection together with the availability of information technology devices like the mobile phones have facilitated the quick adoption of technology in running businesses which has expanded the market reach and at the same time improved on productivity and profitability of businesses. KSL, SECO and AMGECO are all connected to high speed fibre internet and the Shipyards have laid the necessary IT infrastructure to facilitate seamless operations. Management information systems in this 21st century .is therefore a necessary investment by firms who want to compete at high levels (Otioma,

2022).

Statement of the Problem

The ship building industry has been very instrumental in the creation of employment and at the same time contributing to Kenya's economy as the building, refit, repair, maintenance and overhaul of marine vessels that were done overseas are now available locally (Mlimbila & Mbamba, 2018). The ship building industry is, however, not immune to performance issues arising out of environmental factors that include technological advances.

According to a study done in the US, there are challenges that affect ship building and they affect the delivery of work and primarily arise from damage to shipyard infrastructure, supply chain interruptions and labor costs which can be resolved through the integration of management information systems in workflows to detect risks, facilitate supply chain services and make workflows effective and efficient (Hill et al., 2022).

Ship building industry in Kenya is synonymous with the use of traditional information systems which are built around functions and/ or departments and they have no functionality for collaboration, and no capability for automatic information exchange. The management and staff in KSL, SECO and AMGECO have therefore had a hard time assembling information for decision making, and seamless operations.

There is inability to deliver ad hoc reports for managerial decision making as the information is held in scattered locations and is not summarized in a way that can help management make timely decisions which negatively impacts on the performance of the Shipyards (Purkar et al., 2023). Firms like KSL and AMGECO that are yet to embrace advanced collaboration systems like the ERP, are faced with critical issues of duplicate data in multiple files and data inconsistency due to erroneous input, processing and storage of information as a result of human error (Owino & Waema, 2020).

The bulkiness of physical files also puts pressure on office space and thereby leading to unnecessary increase in expenditure on acquisition of more physical office space and it also brings a challenge of access to information by management and staff thereby impeding smooth operations which negatively affects the performance of the Shipyards (Otioma, 2022).

Whilst these studies at the time addressed issues that affect the performance of a ship building industry, there is still more to be researched on considering the evolving world and the continuous advancement in technology which renders some of the technologies used obsolete. Further, management and staff are reluctant to switch to newer technologies due to fear of restructuring that may lead to job losses and the fear of closure of loopholes in the supply chain management.

Further, most of the studies on ship building industry performance have been carried out in developed countries due to the low penetration of the industry in the Great Lakes region and in Africa as it is capital-intensive in nature. However, the East African Region Governments have laid down deliberate policies and infrastructure to revive the ship building industry which was active during the colonial period.

These reasons justify the need for a study to look at the contextual, empirical, and conceptual gaps in past studies with the aim of adding knowledge in the field of management information systems capabilities and the performance of ship building in Kenya.

The objective of the study

The main objective of the study was to investigate the influence of management information system capabilities and the performance of ship building industries in Kenya. The specific objectives of the study were as follows;

- To determine the influence of centralized database and the performance of ship building industry in Kenya.
- To find out the relevance of service delivery

and the performance of ship building industry in Kenya.

- To establish the effect of information security and the performance of ship building industry in Kenya.
- To ascertain the role of digital infrastructure and the performance of ship building industry in Kenya.

Research Questions

The study attempted to answer the following research questions.

- What is the influence of centralized database and the performance of ship building industry in Kenya?
- What is the relevance of service delivery and the performance of ship building industry in Kenya?
- What is the effect of information security and the performance of ship building industry in Kenya?
- What is the role of digital infrastructure and the performance of ship building industry in Kenya?

LITERATURE REVIEW

Theoretical Literature Review

Technology Organization Environment Theory

The framework advanced by Jeff Baker in 2012 postulates how the firm's environment influences the onboarding of technology. It is a theory that has three dimensions, technology, organization and environment contexts.

The technological context includes the technology that is currently in use in the firm and the technology that is in the market and that the firm could bring onboard to improve effectiveness and efficiency of workflows (Hong & Zhu, 2006). The existing technologies are an important consideration in the process of digitalization of the firm's processes as they give the baseline of implementation (Hong & Zhu, 2006). The technology that is in the market also assist the management in decision making on whether the technologies will be appropriate for the firm in pursuit of its end goal (Hong & Zhu, 2006).

The organization context includes the characteristics and resources of a firm. Firms that embrace decentralization are fluid and allow employees have lateral and vertical communication which is a recipe for adoption of innovation (T. Burns, 1962). Centralized structures on the other hand, emphasize formal reporting mechanisms, formal decision- making mechanisms and clearly outlined roles for employees. Centralized structures are best suited for implementation of the innovation.

Communication within the organization can promote innovation through various ways including, reward of innovation, communicating and emphasizing the history and the importance of innovation to subordinate workers (T. Burns, 1962).

The environmental context includes the structure of the industry (competitive or monopolistic), the regulatory structures and presence of technology service providers. Intense competition encourages innovation and dominant partners in a monopolistic competition force the rest to innovate (Ramanathan et al., 2017). According to Ramanathan et al., (2017), the support structure in terms of hardware and software also facilitates innovation. Firms that require highly skilled labor must innovate to save on costs.

Therefore, technology organization environment theory is exceptionally important in highlighting the benefits accrued from centralized database that include accuracy, consistency and frequent updates and its positive effect on the performance of ship building industry.

Information System Success Theory

DeLone and McLean introduced their first Information System Success Model in 1992 and it basically consists of six interrelated dimensions of success which include system quality, information quality, system use, user satisfaction, organizational impacts, and individual impacts. DeLone & McLean (2003) proposed an updated IS

Success Model that in addition to the six success dimensions included service quality that explains the importance of service and support in successful systems, intention to use and net benefits which include organizational and individual impacts in one dimension. The model stipulates that an IS consists of variables that include a system, information and service quality that ultimately determine the intention to use and satisfaction (DeLone & McLean, 2003). The net benefits that include individual and organizational will influence positively or negatively the user satisfaction and the need to continually use the system (Urbach & Müller, 2012).

DeLone & McLean (2003) postulated that system quality is said to be measured by access, convenience, customization, data accuracy, data currency, ease of learning, ease of use, efficiency, flexibility, integration, interactivity, navigation, reliability, response time, sophistication, system accuracy, system features and turnaround time.

Nguyen et al., (2015) outline measures of organizational impact that include business process change, competitive advantage, cost reduction, enhancement of communication and collaboration, enhancement of coordination, enhancement of internal operations, enhancement of reputation, improved outcomes, improved decision making, increased capacity, overall productivity, overall success, quality improvement, customer satisfaction and management control.

Information system success theory is relevant to the study as it expounds on the issue of authentication and authorization of users and audit of information systems which ensures information security and ultimately improves the performance of ship building industry in Kenya.

Resource Based Theory

Resource based theory gained traction in the 1980s to 1990s through studies done by Prahalad & Hamel on core competencies of corporations, Wanerfelt's work on resource- based view of the firm and Barney's work on firm resources and sustained competitive advantage. Barney later formalized the theory in 1991 which entails assessment of capacities and resources which a firm employ in order to achieve a competitive advantage over other firms in the same industry (J. Barney et al., 2001). The theory states that the value of capacities and resources employed if deployed and utilized in the right way, is more important than any other contributing factor to the success of the organization (J. B. Barney et al., 2011). The competencies of a firm are the strengths that the firm rely on for increased productivity and they include apart from individual competencies, digital infrastructure that is employed in the firm and facilitates innovation of products and services, improvement of work flows and enhancement of quality of products and services that meet customer demands (Madhani, 2010).

According to Madhani (2010) the theory provides the foundation upon which firm's capacities and resources are seen to contribute immensely to the performance of the firm through effectiveness and efficiency of workflows. It enables management get a better understanding of the contribution made by individual capacities and resources employed in their pursuit of excellence in their industry (Vasudevan et al., 2021). The theory gives a better understanding of the need to have the best strategy in employing different capacities and resources in order to meet the firm's objectives effectively and efficiently (Furrer et al., 2004).

Resource based theory is relevant in the study in that the role of digital infrastructure and the performance of ship building industry in Kenya is discussed in theoretical perspective which brings out the aspects of hardware, software and connectivity which are critical in digitization of workflows.

Technology Acceptance Model

Technology Acceptance Model was developed by Davis (1989) to explain the importance of technological advances in e-commerce where he mentioned that there are two beliefs in the transaction of e-commerce including the perceived ease of use and the perceived usefulness of the

technology. The perceived ease of use is the degree to which a user believes that the system will be of use to him if he uses it and the perceived usefulness of the system is the degree to which a user deems the use of the system as effortless (Davis, 1989).

The significance of the model can be concluded to mean that trust and perceived usefulness are closely related in consumer behavior since perceived usefulness is the consequence of perceived ease of use of the technology (Venkatesh & Bala, 2008). It also describes the attractiveness of the technology and how it facilitates the trust of users and its influence and positive effects derived from use of the technology as seen in the use of computers and internet services in offices and at home for official use and other uses (Scherer et al., 2019). Scherer et al., (2019) further notes that computers have made a remarkable change in the 21st century through making work easier, efficient, and effective and that nowadays anything can be done using technology at the office and at home. Information technology comprising of different forms of hardware and software that are used for instance in e- commerce, is a major contributor to ease of doing business and the ease and usefulness of the technology contributes to the formation of online trust (Ma & Liu, 2005).

The theory is built on the foundation of the role technology plays in the performance of organizations and the need to have newer technologies every time in order to meet customer needs (Granić & Marangunić, 2019). When people use technology, they get value and importance every time and this creates a relationship between the users and the technology which almost always results in its continuous use (Magsamen-Conrad et al., 2022).

The Technology acceptance model is a relevant model to the study as it explains in theoretical perspective, the tenets of service delivery that include user flexibility, quality service and enhanced interactivity and their contribution in the performance of ship building industry.

Empirical Literature Review

Centralized Database and Performance of Ship Building Industry

A study in Nigeria was done on blood bank management system with the aim of improving the existing blood banks efficiency and optimization and provide easy platforms for easy access to blood during emergencies by patients by Ismail et al., (2021). The app was built on an android platform connected to a secured virtual database designed to maintain privacy and data security whilst ensuring seamless access by hospitals, blood banks and patients (Ismail et al., 2021).

A study was carried out in Chinese Universities to analyze data sharing model widely used in information centers by Dandan et al., (2017). A University Centralized Data-Sharing Model (UCDSM) was proposed to provide unified data standards, exchange services, data quality control and comprehensive data sharing services for Universities in China (Dandan et al., 2017). The results of the study indicate that UCDSM supports large scale data sharing for digital campus and all the processes can be monitored and managed under a unified management platform (Dandan et al., 2017).

With the rapid development of manufacturing in developing countries like Kenya, centralized databases will be crucial in the performance of industries as they will be able to collect big data from various data sets and units, centrally stored, located and maintained for timely and efficient access by those in need for ease of decision making (Odira, 2021). A study done by Odira (2021) in Anambra state, Nigeria using questionnaires in 15 selected manufacturing firms with a sample size of 334 and using purposive sampling found out that decision support system, process control system and AI which utilize databases of information have a positive effect on manufacturing performance.

Service Delivery and Performance of Ship Building Industry

According to a study by Owino & Waema (2020),

the use of management information systems enhances access to resources and employee satisfaction leading to improved job performance. However, it was found that the new MIS tended to cause fear and anxiety among employees who thought that the system would render them jobless (Owino & Waema, 2020).

In a study by Lutfi et al., (2022), it was established that Information Technology (IT) enables timely and accurate reporting of accounting and financial information required for the organization's management, those that affect the organization decision making process and ultimately the operational performance of the organization.

Success of corporations that are involved in manufacturing is measured primarily by the service delivery which is because of the availability of sound and timely information for the management to make decisions and the ease of process flow in good time, accuracy and cost-effective manner as found in a study by Saputra et al., (2022).

The perceived ease of use of a particular technology refers to the degree to which a user believes that the system will be of use to him if he uses it and the perceived usefulness of the system is the degree to which a user deems the use of the system as effortless according to Scherer et al., (2019).

Information Security and Performance of Ship Building Industry

Information Security refers to the ability of digital technology to process, store, transfer, and facilitate retrieval of information as and when necessary and it encompasses confidentiality, integrity and availability (Shao et al., 2018). Firms are adopting diverse information protection solutions and devising ways aimed at protecting their information against threats and dangers and investment in information security by firms is now established as a determinant of organizational success (Martínez Bravo et al., 2021). According to Shao et al. (2018), targets of information security include the information itself, technologies used in the processing and storage of information, organizational structures and procedures for processing and storage of information, human resources engaged in the processing of information and the activities of processing, maintaining, and managing information.

According to a study by Heredia et al. (2022), firms experience intrusions and security incidents which are due to mismanagement of personal information and information related to the firm. While assessing the effect of information security and the performance of a firm, the study revealed that the confidentiality, integrity and availability of information contributed positively to the performance of the firm (Heredia et al., 2022).

According to a study by Khin & Ho (2019) on the role of information security on the performance of a firm, to achieve the best out of digital technology, firms out to ensure appropriate investment in information security to affirm its credibility. The study was done to establish the importance of digital systems to store and transmit information in a secured way and its effect on the performance of a firm (Khin & Ho, 2019). The study used survey data of 105 SMEs in Malaysia and employed structural equation model (SEM) analysis from partial least square (PLS) approach and the findings showed that digital capability and the inherent information security have a positive effect on digital innovation and that the digital innovation mediates the effect of digital capability on the firm's performance (Khin & Ho, 2019).

Digital Infrastructure and Performance of Ship Building Industry

Digital infrastructure consists of IT infrastructure, human IT resources and IT-enabled intangibles that the firm can use to improve on business performance (Wang et al., 2018). With the growth of the ERP system environment, it is crucial for practitioner and researcher circles to acknowledge how the system can contribute value to a business and influence its performance (Lutfi et al., 2022). Recent studies have shown that some small and medium- sized enterprises (SMEs) involved in

recycling plastic waste to produce innovative products have adopted digital technologies such as 3D printing and block chain to gain competitive advantage from their circular economy based business model (Chaudhuri et al., 2022). Through digital technologies that are tangible like the fiber network and the intangibles like cloud computing, organizations are able to improve their performance and ultimately their profitability (Saputra et al., 2022).

Heredia et al. (2022) in a study assessed digital capabilities and the performance of a firm. A survey was conducted on 999 respondents from 27 countries and the findings showed that there was correlation between digital infrastructure and the performance of a firm (Heredia et al., 2022). Accordingly, they said that digital capabilities are best illustrated in terms of the extent to which a firm incorporates all the essential inputs that support the success of a firm and that digital infrastructure is among the inputs (Heredia et al., 2022). The basic need for digitalization is digital infrastructure and its availability determines enhancement of organizational performance if it is integrated in business processes (Zhen et al., 2021).

A study was conducted on 45 Sub-Saharan Africa countries from 1996 to 2017 to find out the effect of digital infrastructure on service sector employment and it was positively confirmed. It was also found that positive effect of digital infrastructure on services sector employment increases as institutional quality becomes better whereas poor macro- economic conditions decrease the effect of digital infrastructure on employment in the service sector (Ndubuisi et al., 2021). According to Ndubuisi et al. (2021), digital infrastructure including the hardware and software are essential elements in the determination of implementation of digitalization in a firm with the aim of enhancing operational efficiency and effectiveness in pursuit of improved performance.

Conceptual Framework

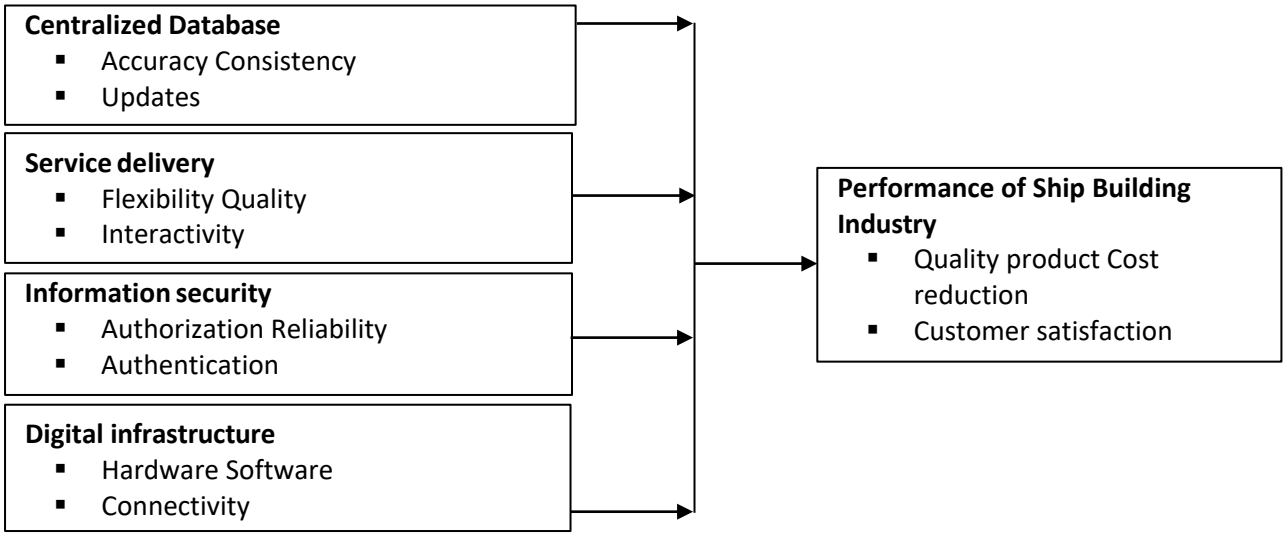

Figure 1: Conceptual Framework

Source: Author (2023)

METHODOLOGY

The study used descriptive research design. The target population for this study is Kenya Shipyards Limited, SECO and AMGECO. A representation of the target population totaling 70 personnel will be used for the study. The method to be used for this study will be purposive sampling as it is an intentional selection of a participant because of the characteristics and qualities they possess (Etikan et al., 2016). This research conducted a survey using

questionnaires and observation for collection of quantifiable primary data from a selected sample. Questionnaires were used by the researcher for pilot testing at Kenya Shipyards Limited before the research was conducted. Principal Component Analysis (PCA) was used to test construct validity of the research instrument in this study. The reliability of the instrument was measured using Cronbach's Alpha. The study utilized both descriptive and inferential statistics in analysis of the collected data.

FINDINGS AND DISCUSSION

Descriptive Analysis

Centralized Database and The Performance of Ship building industry in Kenya

The first objective of the study was to determine the influence of centralized database and the performance of ship building industry in Kenya. In this section, proportions, means and standard deviation were utilized.

Table 1: Centralized Database and The Performance of Ship building industry in Kenya.

Statement	SD	D	N	A	SA	Mean	SD
The data accuracy enabled by use of databases in our firm has contributed positively to its performance	20%	19%	17%	33%	11%	2.95	1.33
Data back has improved reliability of information leading to better performance of the firm	16%	20%	16%	33%	16%	3.12	1.33
Policy on user access of repositories has positively affected the performance of the firm by ensuring the security of company information	16%	28%	22%	19%	16%	2.90	1.31
Disaster recovery policy and practices have ensured business continuity hence positively impacting the performance of the firm	19%	20%	19%	30%	13%	2.96	1.33
Auditing of directories has ensured confidentiality, integrity and availability of information which has positively contributed to the performance of the firm	9%	27%	16%	33%	16%	3.18	1.25

A centralized database is essential for managing the company's operations by providing fast and accurate access to data from every department. The study established that 44% of the participants indicated that the data accuracy enabled by use of databases in their firms has contributed positively to its performance. This suggests that centralized data has simpler, lower-cost procedures and fewer resource requirements, making it more productive and competitive.

The primary benefits of data backup include its adaptability, dependability, and degree of security. According to 49% of the participants, data back-up in the directories has improved reliability of information leading to better performance of their firms. Similarly, 43% of the participants indicated that disaster recovery policy and practices have ensured business continuity hence positively impacting the performance of the firm. This implies that the fundamental goal of data backup is to produce a replica of the data that can be restored in the case of a primary data loss. Backups also guard against other dangers including malware assaults, device malfunctions, and human mistake.

Data privacy auditors are required to oversee adherence to pertinent standards and laws while navigating the intricate web of legal requirements. According to 49% of the participants auditing of directories has ensured confidentiality, integrity and availability of information which has positively contributed to the performance of the firm. This suggests that failing to safeguard sensitive data increases the risk of it being used fraudulently in addition to the possibility of losing company or clients. One essential element of secure data involves access control, which establishes permissions for users to access and utilize company data. The findings from this research established

that 35% of participants indicated that policy on user access of repositories has positively affected the performance of the firm by ensuring the security of company information.

Relevance of Service Delivery and The Performance of Ship building industry in Kenya.

The second objective of the study was to find out the relevance of service delivery and the performance of ship building industry in Kenya. In this section, proportions, means and standard deviation were utilized.

Table 2: Service Delivery and The Performance of Ship building industry in Kenya

Statement	SD	D	N	A	SA	Mean	SD
Connectivity and compatibility of information systems have facilitated delivery of services regardless of user location hence positively affecting the performance of the firm	14%	14%	19%	23%	30%	3.40	1.41
There is interactivity between the information systems and the users which has led to customer retention leading to improved performance of the firm	17%	27%	23%	20%	13%	2.84	1.28
There is round the clock monitoring and reporting on information systems leading to customer satisfaction which has positively affected the performance of the firm	14%	22%	11%	33%	20%	3.23	1.37
Recovery of systems from unplanned downtime is immediate and it has improved performance of the firm	8%	25%	14%	36%	17%	3.29	1.244
Data confidentiality and integrity measures are in place, and has improved the performance of the firm	17%	25%	23%	23%	11%	2.85	1.27
The systems can restore data if a session is lost which ensures business continuity and has positively affected the performance of the firm	20%	19%	19%	30%	13%	2.95	1.35

All businesses need to have strong business information systems in order to stay competitive. According to the finding, 53% of the respondents indicated that Connectivity and compatibility of information systems have facilitated delivery of services regardless of user location hence positively affecting the performance of the firm.

The firm's effectiveness and efficacy can be increased with a management information system by giving decision-makers access to accurate and reliable data. According to 33% of the participants, there is interactivity between the information systems and the users which has led to customer retention leading to improved performance of the firm. This suggests that businesses may use technologies to automate processes and improve communication, resulting in faster decision-making and more output. One crucial step in the business's strategy for innovation is advancing technology. The study established that 53% of the participants indicated that there is round the clock monitoring and reporting on information systems leading to customer satisfaction which has positively affected the performance of the firm. It is implied by this that administrators can obtain the data they need to determine the advantages and disadvantages of a company by using a functioning management information system.

Effective performance of an organization is measured by how fast the company can solve down times. In this study, 53% of the respondents indicated that recovery of systems from unplanned downtime is immediate and it has improved performance of the firm. Similar views were propounded by 43% of the participants who observed that the systems can restore data if a session is lost which ensures business continuity and has positively affected the performance of the firm.

Organizations must prioritize the integrity and confidentiality of data safeguards to protect their data. According to 34% of the data confidentiality and integrity measures are in place and has improved the performance of the firm. These results align with those of Nabi et al. (2010), who highlight that while security measures for data are thought to reduce incidents of data loss and maintain privacy, they still fall short of necessary measures.

Information Security and The Performance of Ship building industry in Kenya.

The third objective of the study was to establish the effect of information security and the performance of ship building industry in Kenya. In this section, proportions, means and standard deviation were utilized.

Table 3: Information Security and The Performance of Ship building industry in Kenya

Statement	SD	D	N	A	SA	Mean	SD
The policy and practice on user permissions and access has ensured confidentiality, integrity and availability of key information leading to positive effect on the performance of the firm	11%	28%	13%	41%	8%	3.06	1.20
Multi-factor authentication has ensured data and systems protection which has positively affected the performance of the firm through ensuring cyber security	22%	20%	14%	23%	20%	3.00	1.46
The network is secured by firewall, VPN, and/or Secure Access Service Edge has ensured network security leading to positive impact on the performance of the firm	27%	16%	16%	30%	13%	2.85	1.42
Secure password policy and practice has ensured security of information which has positively affected the performance of the firm	13%	25%	16%	31%	16%	3.12	1.303
Staff are frequently updated on security protocols and practices, and this has ensured data integrity and availability which has a direct impact on the performance of the firm	25%	17%	19%	23%	16%	2.87	1.43

Adopting a variety of information protection strategies and coming up with plans to shield their data from dangers are essential for businesses that need to stay competitive. In this study 49% of the respondents affirmed that the policy and practice on user permissions and access has ensured confidentiality, integrity and availability of key information leading to positive effect on the performance of the firm. This suggests that by putting in place an extensive security of data monitoring program, firms may guarantee the accessibility, privacy, and security of their information assets. According to Mishra et al. (2022), the majority of companies nowadays place a high value on security in order to protect their Information and Communication Technology business environments from cyberattacks.

According to 53% of the respondents' multi-factor authentication has ensured data and systems protection which has positively affected the performance of the firm through ensuring cyber security. It may be inferred from this that multi-factor authentication serves as an extra security measure to keep hackers out of these accounts, even in cases where passwords are obtained. These results align with those of Hasan et al. (2021), who reiterate that information technology accessibility and use are critical to supporting business operations inside an organization. When assessing the accessibility and utilization of IT, firms must consider factors such as infrastructure, investment, and scalability.

Businesses are said to be less vulnerable to data theft and sabotage when they have a strong network security system in place. Employers' workstations are shielded from dangerous spyware

via network security. The findings showed that 43% of the participants agreed that the network is secured by firewall, VPN, and/or Secure Access Service Edge has ensured network security leading to positive impact on the performance of the firm. This suggests that the reason network security matters is that it protects private information from online threats and guarantees the network's dependability and usability. This research supports Kaur's (2022) assertion that network security is now a critical factor for modern businesses, particularly those seeking to stay competitive. The goal of a virtual private network (VPN) is to offer various security features including data integrity, secrecy, and authenticity. For this reason, VPNs are becoming more and more popular, affordable, and user-friendly. Tablets, PCs, and smartphones can all use VPN services.

The cornerstone of any secure password policy is a strong password. In this study, 47% of the respondents affirmed that secure password policy and practice has ensured security of information which has positively affected the performance of the firm. It follows that a firewall's capacity to filter network traffic is likely its most crucial component. This is important because the firewall filters traffic to identify safe signals and potentially dangerous signals. The findings align with the assertions made by Khin and Ho (2019) that digital innovation is positively impacted by digital orientation and capability, and that digital innovation acts as a mediator between the effects of technology orientation and digital capability on both financial and non-financial performance.

Staff training on cyber security is critical for the performance of any organization. The study established that 39% of the respondents indicated that staff are frequently updated on security protocols and practices, and this has ensured data integrity and availability which has a direct impact on the performance of the firm. This suggests that training on cyber security awareness lowers the possibility of expensive legal repercussions by ensuring that staff members comprehend and abide by these requirements. This viewpoint is in line with Olabode's (2023) assertion that staff members need thorough cybersecurity awareness training in light of the growing frequency and complexity of cyber-attacks. A thorough examination of recent literature and empirical studies demonstrates that cybersecurity awareness training increases cyber resilience, lowers human error, enhances threat detection, increases employee productivity, maintains customer confidence, assures regulatory compliance, and cultivates a security culture.

Digital Infrastructure and The Performance of Ship building industry in Kenya

The fourth objective of the study was to ascertain the role of digital infrastructure and the performance of ship building industry in Kenya. In this section, proportions, means and standard deviation were utilized.

Table 4: Digital Infrastructure and The Performance of Ship building industry in Kenya

Statement	SD	D	N	A	SA	Mean	SD
Adequate ICT hardware have been deployed to support company operations and has positively contributed to the performance of the firm	2%	42%	17%	25%	14%	3.07	1.14
Up to date software has been installed on company's hardware which has facilitated daily operations hence positively affecting the performance of the firm	30%	11%	27%	27%	6%	2.68	1.31
The firm is connected to high-speed internet service which has facilitated connectivity hence improving the performance of the firm	23%	20%	13%	23%	20%	2.96	1.49
The firm has a Data Centre with functional servers and is fully equipped to sustain business operations which has contributed to the performance of the firm	16%	23%	16%	34%	11%	3.01	1.29
Scalability of ICT infrastructure in the firm has facilitated newer technologies uptake which has positively affected the performance of the firm	17%	22%	25%	30%	6%	2.85	1.20

ICT infrastructure is necessary for an organization to operate effectively. However, 44% of the sample disagreed that adequate ICT hardware have been deployed to support company operations and has positively contributed to the performance of the firm. This indicates that business operations may be hindered by information technology infrastructure

ICT infrastructure is thought to enhance the degree of cooperation amongst different companies in the supply chain network, hence reducing inventory expenses. In this research, 41% of the respondents disagreed that up to date software has been installed on company's hardware which has facilitated daily operations hence positively affecting the performance of the firm.

One of the biggest advantages of using the internet for business is the speed and ease with which information can be accessed. In this research, 43% agreed that the firm is connected to high-speed internet service which has facilitated connectivity hence improving the performance of the firm. This suggests that businesses gain from e-business by being able to reach clients anywhere in the globe at an affordable price while avoiding being constrained by geographical boundaries. Numerous firms, especially those that rely significantly on digital data, require data centers. According to the study, 45% of the participants agreed that the firm has a data centre with functional servers and is fully equipped to sustain business operations which has contributed to the performance of the firm. This means that if the data gets destroyed or disrupted, the company can recover them with the help of a reliable data center.

The performance of a company is positively impacted by ICT systems and applications. According to finding, 30% of respondents agreed that scalability of ICT infrastructure in the firm has facilitated newer technologies uptake which has positively affected the performance of the firm.

The Performance of Ship building industry in Kenya

The dependent variable of the study was Performance of Ship building industry. This variable was analyzed by measuring quality product, cost reduction and customer satisfaction.

Table 5: Performance of Ship building industry in Kenya

Statement	SD	D	N	A	SA	Mean	SD
Customer satisfaction derived from the interaction with information systems has positively contributed to the performance of the firm	17%	27%	25%	20%	11%	2.81	1.25
Cost reduction in production has been realized from the use of MIS thereby positively impacting on the performance of the firm	27%	16%	25%	25%	8%	2.71	1.31
Quality product realized from the implementation of MIS has increased the demand for products and services hence improving the performance of the firm	22%	20%	14%	23%	20%	3.00	1.46

The research indicated that 31% of the participants agreed that customer satisfaction derived from the interaction with information systems has positively contributed to the performance of the firm while 44% had a different observation. Furthermore, 33% indicated that cost reduction in production has been realized from the use of MIS thereby positively impacting on the performance of the firm. Furthermore, up to 43% agreed that quality product realized from the implementation of MIS has increased the demand for products and services hence improving the performance of the firm.

Evidence suggests that computer technology helps businesses to raise the caliber of their services by boosting data, systems, employee productivity,

creativity, and delivery services, among other things.

Correlation Analysis

A statistical technique for determining whether two continuous variables may be linearly correlated is correlation. In this study, Pearson and multiple linear regression analyses were used to compute the extent of the relationship as well as influence of independent variables on dependent variables.

Pearson correlation Analysis

The most widely used metric for determining the existence of a linear relationship is the Pearson correlation coefficient (r). The intensity and direction of the association between two variables is represented by a number that ranges from -1 to +1. The results are presented in Table 6.

Table 6: Correlations Matrix

		Performance	X1	X2	X3	X4
Centralized Database	Pearson Correlation	.874**	1			
	Sig. (2-tailed)	.000				
	N	64	64			
Service Delivery	Pearson Correlation	.833**	.843**	1		
	Sig. (2-tailed)	.000	.000			
	N	64	64	64		
Information Security	Pearson Correlation	.875**	.802**	.771**	1	
	Sig. (2-tailed)	.000	.000	.000		
	N	64	64	64	64	
Digital Infrastructure	Pearson Correlation	.883**	.797**	.737**	.837**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	64	64	64	64	64

**. Correlation is significant at the 0.01 level (2-tailed).

X1= Centralized Database; x2= Service Delivery; x3= Information Security; x4= Digital Infrastructure

The findings established that there exist a statistically and significant relationship between Centralized Database and Performance of Ship Building Industry (α =0.05, **r** =0.874**; **p** <0.05). This implies that a centralized database with more accurate, consistent and up to date data could enhance Performance of Ship Building Industry.

Moreover, the results of the study established that there was a statistically significant relationship between Service Delivery and Performance of Ship Building Industry (**α** =0.05, **r** =0.833**; **p** <0.05). This proves that providing services with an emphasis on quality, flexibility, and collaboration could improve the performance of the shipbuilding sector.

Furthermore, it was observed that Information Security significantly associates with Performance of Ship Building Industry (α =0.05, **r** =0.875**; **p** <0.05). This suggests that in order for the Ship Building Industry to remain competitive, it is imperative that they implement a range of information protection measures and devise plans to safeguard their data from threats.

Finally, there was evidence of a statistically and significant relationship between digital Infrastructure and Performance of Ship Building Industry (α =0.05, **r** =0.883**; **p** <0.05). This suggests that an organization's ability to function efficiently depends on its ICT infrastructure.

Regression Analysis

Model Summary

The model summary is always computed in a regression analysis. The degree of correlation between the model and the dependent variable is shown in the model summary table. The linear correlation between the dependent variable's measured and model-predicted quantities is known as the multiple correlation coefficient, or R. Given its high significance, a strong relationship is indicated.

Table 7: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.942[a]	.887	.880	.41673

a. Predictors: (Constant), Digital Infrastructure, Service Delivery, Information Security, Centralized Database

The model specifies that 88% in the variation of Performance of Ship Building Industry is influenced by independent variables which include digital infrastructure, service delivery, information security and centralized database.

The research revealed that 12% of the variation was unexplained. In this instance, factors not included in the model may account for these.

Coefficients

Regression coefficients provide estimations of certain unknown parameters used to characterize the correlation between an outcome variable and a predictor variable. The findings are presented in table 8.

Table 8: Coefficients

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	-.402	.169		-2.370	.021		
Centralized Database	.266	.100	.253	2.662	.010	.212	4.719
Service Delivery	.204	.100	.174	2.043	.045	.264	3.795
Information Security	.246	.089	.248	2.763	.008	.236	4.228
Digital Infrastructure	.367	.092	.345	3.975	.000	.254	3.937

a. Dependent Variable: Performance of Ship Building Industry

The test of null hypothesis rests on the 0.05 level of significance. According to the finding, it was established that Centralized Database significantly influence Performance of Ship Building Industry (β=0.253; p=0.010). This implies that one-unit increase in central database impacts Performance of Ship Building Industry by 0.253. It is evident from this that having appropriately consolidated data can help with the coordination of multi-channel marketing campaigns, thereby improving business success.

Furthermore, it was found that Service Delivery significantly improves Performance of Ship Building Industry (β=0.174; p=0.045). This indicates that the ease of use of a system in terms of flexibility, quality and interactivity could impact significantly on Performance of Ship Building Industry.

Moreover, it was observed that Information Security significantly impacted on Performance of Ship Building Industry (β=0.248; p=0.008). This suggests that the performance of the ship building industry is greatly improved by improving system security through well-secured authorization, data accuracy, and verification.

Finally, it was revealed that Digital Infrastructure significantly impacts performance of Ship Building Industry (β=0.345; p=0.000). It suggests that the implementation of advanced ICT systems and applications has a favorable effect on a company's performance.

Empirical Equation

The study thus adopted the following equation:

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \varepsilon$$

Performance =-0.402+ (0.253 * *centralized database*) + (0.174 * *Service Delivery*) + (*Information Security**0.248) +(*Digital Infrastructure**0.345)

SUMMARY, CONCLUSSION AND RECOMMENDATIONS

A centralized database is thought to be crucial for

overseeing the business's operations since it offers quick and precise access to information from every division. According to the study, some participants said that their company's performance has benefited from the data accuracy made possible by the use of databases. In a similar vein, a few participants mentioned that the firm's performance has benefited from the disaster recovery policy and practices, which have guaranteed business continuity.

This suggests that creating a replica of the data that can be recovered in the event of a main data loss is the basic objective of data backup. Backups also protect against other threats, such as virus attacks, equipment faults, and human error.

Effective business information systems are essential for any company to maintain its competitive edge. Findings show that half of the respondents said that information system connectivity and compatibility have made it easier to supply services to users regardless of where they are, which has improved the firm's performance. Management information systems enable quick decision-making by providing timely responses, making businesses more agile.

Multi-factor authentication is primarily intended to increase security and decrease the possibility of account takeovers. Over half of the respondents claimed that multi-factor authentication had guaranteed cyber security and hence improved data and system protection, which in turn had improved the company's performance. Based on this, it can be concluded that multi-factor authentication acts as an additional security precaution to prevent hackers from accessing these accounts, even in situations where passwords are stolen. Organizations need to take infrastructure, investment, and scalability into account when evaluating how accessible and useful IT is.

The efficient operation of a company requires an ICT infrastructure. A portion of the sample, meanwhile, disagreed that the company's performance had improved as a result of the deployment of enough ICT infrastructure to support business operations. This suggests that information technology infrastructure might impede corporate operations when it is lacking or not fully implemented in the firm.

CONCLUSION

The study comes to the conclusion that since a centralized database provides accurate and timely access to data from every division, it is considered essential for managing the operations of the company. Databases designed for backups also guard against other dangers like malware infections, malfunctioning hardware, and human error. Secondly, a company's ability to stay relevant depends on having efficient corporate information systems in place. That is why one of the most important measures of a company's efficacy is how fast it can fix everyday issues. Thirdly, businesses must put in place a variety of information security measures and create strategies to guard their data from threats if they hope to stay competitive. Therefore, the main goals of multi-factor authentication are to improve security and lessen the likelihood of account takeovers. Finally, an ICT infrastructure is necessary for a business to operate efficiently.

RECOMMENDATIONS

It is advised that a system audit be conducted on a regular basis to verify that the company's data management system is configured and operating as intended to support management goals. It is suggested that businesses spend more on cyber security in order to stay competitive, as organizations with strong network security systems are believed to be less vulnerable to data theft and sabotage.

Businesses gain from e-business because it gives them the opportunity to access clients at a fair price and without being restricted by geographic location. Establishing contemporary e-business protocols in this area can help businesses perform better as an organization.

Suggestions for further Research

Risk related to cyber security has become a major worry for businesses undergoing digital transformation. In addition to stimulating corporate innovation, the incorporation of advanced technologies presents challenging cyber security issues. Accordingly, it is recommended that studies be conducted to ascertain the impact of cyber security on the performance of ship building in Kenya.

REFERENCES

Barney, J. B., Ketchen, D. J., & Wright, M. (2011). The Future of Resource-Based Theory: Revitalization or Decline? *Journal of Management*, *37*(5), 1299–1315. https://doi.org/10.1177/0149206310391805

Barney, J., Wright, M., & Ketchen, D. J. (2001). The resource-based view of the firm: Ten years after 1991. *Journal of Management*, *27*(6), 625–641. https://doi.org/10.1177/014920630102700601

Chaudhuri, A., Subramanian, N., & Dora, M. (2022). Circular economy and digital capabilities of SMEs for providing value to customers: Combined resource-based view and ambidexterity perspective. *Journal of Business Research*, *142*, 32–44. https://doi.org/10.1016/j.jbusres.2021.12.039

Dandan, H., Yajuan, Z., Junfeng, L., Chen, L., Mo, X., & Zhihai, S. (2017). Research on Centralized Data-Sharing Model Based on Master Data Management. *MATEC Web of Conferences*, *139*, 00195. https://doi.org/10.1051/matecconf/201713900195

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, １３(3), ３１９.

https://doi.org/10.2307/249008

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. *Journal of Management Information Systems*, *19*(4), 9–30. https://doi.org/10.1080/07421222.2003.11045748.

Furrer, O., Krug, J. A., Sudharshan, D., & Thomas, H. (2004). Resource-based theory and its link to the global strategy, structure, and performance relationship: An integrative framework. *International Journal of Management and Decision Making*, *5*(2/3), 99. https://doi.org/10.1504/IJMDM.2004.005343

Granić, A., & Marangunić, N. (2019). Technology acceptance model in educational context: A systematic literature review. *British Journal of Educational Technology*, *50*(5), 2572–2593. https://doi.org/10.1111/bjet.12864

Heredia, J., Castillo-Vergara, M., Geldes, C., Carbajal Gamarra, F. M., Flores, A., & Heredia, W. (2022). How do digital capabilities affect firm performance? The mediating role of technological capabilities in the "new normal." *Journal of Innovation & Knowledge*, *7*(2), 100171. https://doi.org/10.1016/j.jik.2022.100171

Hill, D., Becker, A., & Vieira, A. (2022). The U.S. shipbuilding and repair industry's considerations of coastal hazards resilience—A baseline survey. *Maritime Policy & Management*, 1–22. https://doi.org/10.1080/03088839.2022.2138597

Hong, W., & Zhu, K. (2006). Migrating to internet-based e-commerce: Factors affecting e-commerce adoption and migration at the firm level. *Information & Management*, *43*(2), 204–221. https://doi.org/10.1016/j.im.2005.06.003

Hossain, K. A., & Zakaria, N. M. G. (2017). A Study on Global Shipbuilding Growth, Trend and Future

Forecast. *Procedia Engineering*, *194*, 247–253. https://doi.org/10.1016/j.proeng.2017.08.142

Ismail, O., Misra, S., Oluranti, J., & Ahuja, R. (2021). Centralized Blood Bank Database and Management System. In P. K. Singh, Y. Singh, M. H. Kolekar, A. K. Kar, J.

Khin, S., & Ho, T. C. (2019). Digital technology, digital capability and organizational performance: A mediating role of digital innovation. *International Journal of Innovation Science*, *11*(2), 177–195. https://doi.org/10.1108/IJIS-08-2018-0083

Lutfi, A., Alshira'h, A. F., Alshirah, M. H., Al-Okaily, M., Alqudah, H., Saad, M., Ibrahim, N., & Abdelmaksoud, O. (2022). Antecedents and Impacts of Enterprise Resource Planning System Adoption among Jordanian SMEs. *Sustainability*, *14*(6), 3508. https://doi.org/10.3390/su14063508

Ma, Q., & Liu, L. (2005). The Technology Acceptance Model: A Meta-Analysis of Empirical Findings. In M. A. Mahmood (Ed.), *Advances in End User Computing* (pp. 112–128). IGI Global. https://doi.org/10.4018/978-1-59140-474-3.ch006

Madhani, P. M. (2010). *The Resource—Based View (RBV): Issues and Perspectives.*

Magsamen-Conrad, K., Billotte Verhoff, C. C., & Dillon, J. M. (2022). Technology Acceptance Models. In E. Y. Ho, C. L. Bylund, & J. C. M. Van Weert (Eds.), *The International Encyclopedia of Health Communication* (1st ed., pp. 1–8). Wiley. https://doi.org/10.1002/9781119678816.iehc0776

Martínez Bravo, M. C., Sádaba Chalezquer, C., & Serrano-Puche, J. (2021). Meta- framework of digital literacy: A comparative analysis of 21st-century skills frameworks. *Revista Latina de Comunicación Social*, *79*, 76–110. https://doi.org/10.4185/RLCS-2021-1508

Mlimbila, J., & Mbamba, U. O. L. (2018). The role of information systems usage in enhancing port logistics performance: Evidence from the Dar Es Salaam port, Tanzania. *Journal of Shipping and Trade*, *3*(1), 10. https://doi.org/10.1186/s41072- 018-0036-z

Ndubuisi, G., Otioma, C., & Tetteh, G. K. (2021). Digital infrastructure and employment in services: Evidence from Sub-Saharan African countries. *Telecommunications Policy*, *45*(8), 102153. https://doi.org/10.1016/j.telpol.2021.102153

Ngatoro, M. (2018). *THE VALUE OF A SCHOOL BASED DIGITAL LEARNING FRAMEWORK: DOES IT OFFER THE SUPPORT AND GUIDANCE NEEDED FOR TEACHERS OF VARYING DIGITAL CAPABILITIES?*

Nguyen, T. D., Nguyen, T. M., & Cao, T. H. (2015). Information Systems Success: A Literature Review. In T. K.

Odira, O. C. (2021). *Effect of Management Information System on Organizational Performance in Manufacturing Firms*. *1*(10).

Oketch, C., & Muathe, S. (2022). What do strategic responses achieve? An analysis of performance of telecommunication firms in Kenya. *International Journal of Research in Business and Social Science (2147- 4478)*, *11*(2), 104–118. https://doi.org/10.20525/ijrbs.v11i2.1591

Scherer, R., Siddiq, F., & Tondeur, J. (2019). The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education. *Computers & Education*, *128*, 13–35. https://doi.org/10.1016/j.compedu.2018.09.009

T. Burns, G. M. S. (1962). T. Burns and G.M. Stalker, The Management of Innovation.

Urbach, N., & Müller, B. (2012). The Updated DeLone and McLean Model of Information Systems Success. In Y. K. Dwivedi, M. R. Wade, & S. L. Schneberger (Eds.), *Information Systems Theory* (Vol. 28, pp. 1–18).

Springer New York. https://doi.org/10.1007/978-1-4419-6108-2_1

Vasudevan, H., Nilai, P., & Perdana, P. (2021). RESOURCE-BASED VIEW THEORY APPLICATION ON THE EDUCATIONAL SERVICE QUALITY. *International*

Journal of Engineering Applied Sciences and Technology, *6*(6), 174–186. https://doi.org/10.33564/IJEAST.2021.v06i06.026

Venkatesh, V., & Bala, H. (2008). Technology Acceptance Model 3 and a Research Agenda on Interventions. *Decision Sciences*, *39*(2), 273–315.

Wang, Y., Kung, L., Wang, W. Y. C., & Cegielski, C. G. (2018). An integrated big data analytics-enabled transformation model: Application to health care. *Information & Management*, *55*(1), 64–79. https://doi.org/10.1016/j.im.2017.04.001

Zhen, Z., Yousaf, Z., Radulescu, M., & Yasir, M. (2021). Nexus of Digital Organizational Culture, Capabilities, Organizational Readiness, and Innovation: Investigation of SMEs Operating in the Digital Economy. *Sustainability*, *13*(2), 720. https://doi.org/10.3390/su13020720

Otioma, C. (2022). IT Capability, Organisational Learning and Innovation Performance of Firms in Kenya. *Journal of the Knowledge Economy*. https://doi.org/10.1007/s13132-021-00886-8

Owino, V., & Waema, T. (2020). *Digital Transformation as A Source of Competitiveness among Small and Medium Enterprises in Nairobi City County, Kenya*.

Purkar, S., Jaiswal, D. R. C., & Munot, D. M. V. (2023). *The Role of Management Information Systems in Organizations*. *9*(9).

Ramanathan, R., Philpott, E., Duan, Y., & Cao, G. (2017). Adoption of business analytics and impact on performance: A qualitative study in retail. *Production Planning & Control*, *28*(11–12), 985–998. https://doi.org/10.1080/09537287.2017.1336800

Saputra, N., Sasanti, N., Alamsjah, F., & Sadeli, F. (2022). Strategic role of digital capability on business agility during COVID-19 era. *Procedia Computer Science*, *197*, 326–335. https://doi.org/10.1016/j.procs.2021.12.1