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INFORMATION SECURITY MANAGEMENT AND PERFORMANCE OF MINISTRY OF ROADS AND TRANSPORT IN KENYA

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ABSTRACT

Statistical evidence suggests that there is a problem with the performance of road infrastructure projects in Kenya. Reports show that despite the creation of the Kenya National Highways Authority, Kenya Urban Roads Authority, and Kenya Rural Roads Authority, Kenya continues to face several challenges that lead to poor performance of the projects. This study sought to establish the influence of information security management on performance of Ministry of Roads and Transport in Kenya. The study was guided by Contingency Theory. The research used a cross-sectional survey design. This study adopted a positivism research philosophy. The unit of observation in this study was the three road construction agencies which are the Kenya National Highways Authority, Kenya Urban Roads Authority and Kenya Rural Roads Authority. On the other hand, the unit of analysis was management employees working with the three agencies. The study mainly focused on Procurement and supply chain managers as they play a critical role in providing the requisite data and information for the finalization of the research. Therefore, the target population for this study was 280 Procurement and supply chain managers. Using Mugenda and Mugenda (2017) formula, the sample size for the study was 136 Procurement managers. Quantitative data collected was analyzed using descriptive statistical techniques which are frequencies, mean, standard deviation. Inferential statistics which include Pearson correlation and the Regression Analysis Model was used to test the relationship between study variables. To test moderating effect the study used hierarchical regression model. The significance of the model was tested at 5% level of significance. Data was analysed using Statistical Package for Social Sciences (SPSS) software version 26. The study found that information security management is statistically significant in explaining supply chain performance of Ministry of Roads and Transport in Kenya. Based on the findings, the study concluded that information security management positively and significantly influences performance of Ministry of Roads and Transport in Kenya. This study therefore recommends implementation of strong encryption protocols for sensitive information. Encrypting data both in transit and at rest ensures that even if unauthorized individuals gain access to the data, it remains unreadable and unusable without the proper decryption keys. In addition, ensure compliance with relevant data protection regulations and laws, such as the General Data Protection Regulation (GDPR) if applicable

Key Words: Information Security Management, Ministry of Roads and Transport and Contingency Theory

Background of the Study

Information security management involves the systematic approach to protecting sensitive information assets of an organization from unauthorized access, disclosure, alteration, or destruction, while ensuring their confidentiality, integrity, and availability (O'Regan, & Ghobadian, 2017). It encompasses the policies, procedures, technologies, and practices designed to safeguard information assets and manage associated risks effectively (Mbogo, 2017).

According to Loss and McGarrell (2016) security management on the supply chain is the use of methodology and innovations to safeguard inventory resources (items, offices, gear, information, and staff) from theft, harm, or intimidation, and to prevent the presentation of unapproved stash, individuals, or weapons of mass annihilation into the production network. In accordance with Martin *et al.* (2018) inventory network security is now seen as a critical space in overseeing business risk. Associations are giving a lot of consideration to security by designating additional cash, time, and assets to affirm that security exists in their store network as abrupt episodes result to unmistakable and theoretical injury as far as property, items, framework, individuals, notoriety, market position, generosity and entirety (Securitex, 2018). Though most organizations are devoting accumulated resources and a focus to security efforts, very little data is accessible to corporations seeking to reduce their exposure to sudden and doubtless damaging or troubled occurrences touching their supply chains.

Information security management is part of supply chain risk management and aims to stop man-made attacks, like stealing, harm or destruction of product and assets (Robinson, & Pearce 2017). Therefore, the thought of supply chain security isn't an isolated plan and may be enforced across the supply chain and borders (countries, departments, competitors, customers and transportation modes), whereas awareness ought to be integrated at each stage of interaction (Vel, Creed, & Narayan, 2018). Supply chain security ought to be a high priority for corporations as a result of a breach, at intervals the system may harm or disrupt operations. Vulnerabilities of supply chains may lead to extra prices, inefficient delivery schedules and a loss of belongings. Delivering products that are tampered with or are unauthorized can be harmful to customers and result in unwanted lawsuits. Security management systems will facilitate supply chains from physical and cyber threats. Physical threats include risks with internal and external sources, like stealing, sabotage and terrorist act, whereas cyber threats vulnerabilities in IT and package systems include malware attacks, piracy and unauthorized system access. Whereas threats cannot be eliminated fully, supply chain security will work towards achieving a safer, economical movement of products that may recover quickly from disruptions. Multiple forms of responses and actions are undertaken by completely different governmental organizations, international organizations and businesses to reinforce humanitarian supply chain security. These reactions vary from country specific operational laws to world research programs. As an example, methods associated with contract management, quality management, risk management, network reengineering and create or obtain selections are a unit wide acknowledge by researchers as techniques to enhance performance of supply chains whereas minimizing prices and negative environmental impacts (Badenhorst-Weiss, & Waugh, 2016). Likewise, adding production lines to quickly shift volume will facilitate corporations to take care of their competitive edge up the marketplace (Caplice, & Sheffi, 2016).

The recent concerns on security in the road and transport supply chains have led to the introduction of new security initiatives, standards and measures to such an extent that they have become an integral part of supply chain management. Although management in many organizations are concerned about SCS, they may have challenges dedicating resources to

implement or bolster SCS initiatives. This is understandable because of the heavy cost implication involved in developing or enhancing SCS. As a consequence, supply chain security is now a fundamental requirement in an organization and should be coordinated with supply chain management (Securitex, 2018). Security measures often help organizations to protect organizations against unexpected supply incidents and hence work as detection system for supply chain players in case of a disaster. O'Regan, and Ghobadian, (2017) distinguished the security measures into four categories; cargo/freight management, facility management and information management which form the independent variables of this study. The fourth category is human resource management which is merged with organizational security culture to form the variable organizational culture which supposably moderates the relationship between supply chain security management and supply chain performance.

The Ministry of Transport and Infrastructure in Kenya was established in 2013 as a merger of the Ministry of Transport and the Ministry of Public Works (RoK, 1015). The Ministry's roles and responsibilities include: developing, maintaining and managing the national road network; developing and implementing policies, laws, and regulations for the transport sector; and promoting the development of efficient, safe, and sustainable transport systems; coordinating the activities of all transport-related agencies and parastatals. The Ministry of Roads and Transport (MRT) is responsible for the planning, development, and maintenance of roads, bridges, and other transportation infrastructure in the country (Mwenda, 2016). As such, it is essential that the MRT effectively manages the supply chain of goods and services required to carry out its mandate.

The supply chain performance of the Ministry of Roads and Transport in Kenya is critical to the successful planning, development, and maintenance of roads, bridges, and other transportation infrastructure in the country (Kihoro, 2018). The MRT's supply chain operations include the Procurement of goods and services required to carry out its mandate, such as construction materials, equipment, and consulting services (Mwenda, 2016). Overall, the MRT's supply chain performance can be evaluated based on several key factors such as: On-time delivery by ensuring that goods and services are delivered within the agreed-upon timeframe; cost control- Managing costs associated with the Procurement and delivery of goods and services; and Relationship management by building and maintaining strong relationships with suppliers and other stakeholders (Kihoro, 2018). Also, Mwenda (2016) indicated other measures like inventory management, that is, effective management of inventory levels to minimize stock-outs and overstocking; and quality assurance through ensuring that goods and services meet the required standards and specifications (Mwenda, 2016).

In recent years, the Ministry of Road and Transport Kenya has been under pressure to improve its supply chain performance, with a focus on reducing costs, increasing efficiency, and improving quality (Kihoro, 2018). The Ministry has implemented new policies and procedures to enhance the performance of its supply chain operations (Mwenda, 2016). However, there is still room for improvement as the ministry often face delays in delivering projects and some of the materials used in construction are of poor quality (Kihoro, 2018). Research on this topic could include an analysis of the MRT's current supply chain performance, identification of any vulnerabilities or areas for improvement, and recommendations for enhancing the efficiency and effectiveness of the MRT's (Kihoro, 2018). This study therefore seeks to establish the influence of Information security management on the performance of Ministry of Roads and Transport in Kenya.

Statement of the Problem

In Kenya, the Ministry of Transport, Infrastructure, Housing Urban Development and Public Works plays a critical role in the country's economy. The success of the manufacturing sector is particularly dependent on efficient and reliable infrastructure that would facilitate low-cost production, transportation and distribution of manufactured goods (Sarathy, 2016). For Kenyan manufacturers to thrive in an open and global economy, they must be able to reliably manufacture world-class goods at a competitive cost (Okok & Mboya, 2021). To facilitate this, the government of Kenya continues to invest in high-quality infrastructure and implement transport policies aimed at enhancing efficiency and reducing the cost of doing business.

However, statistical evidence suggests that there is a problem with the performance of road infrastructure projects in Kenya. According to a report by Mwandali (2018), despite the creation of the Kenya National Highways Authority, Kenya Urban Roads Authority, and Kenya Rural Roads Authority, Kenya continues to face several challenges that lead to poor performance of the projects. On average, only 39.4% of the road infrastructure projects constructed by local firms in Kenya were completed within the budgeted cost and scheduled time. This is significantly lower than the performance ratings of other countries in the region, such as Uganda (40.5%) and Tanzania (43.7%). Furthermore, a study by the World Bank found that among the countries rated, Kenya scored the lowest in performance of road construction projects. Also, a study by the World Bank (2020) found that Kenya ranks poorly in terms of logistics performance, with a score of 2.9 out of 5. This is lower than the average for Sub-Saharan Africa and indicates that the country faces significant challenges in terms of supply chain efficiency. Additionally, a study by the Kenya National Bureau of Statistics (KNBS) (2018) found that the transport and logistics sector in Kenya is characterized by high costs, lack of standardization, and inadequate infrastructure, which negatively affects the country's competitiveness.

Empirical studies have shown that the efficacy and efficiency of a supply chain are dependent on internal factors such as progressiveness, collaboration, inter-firm relations, company culture, and management skills (Badenhorst-Weiss & Waugh, 2018). Disruptions in the supply chain can occur due to security threats at any given time (Urciuoli et al., 2017). Research has shown that effective implementation of supply chain security initiatives can be achieved through the coordination of personnel, processes and technology, and the development of technical, formal and informal controls of the security system (Akram, 2018). Schiele (2018) argues that the main challenge for businesses is to invest wisely in security in such a way that they comply with regulations and at the same time attain potential additional benefits that contribute towards achieving efficiency along the supply chain.

Despite the government's efforts to address the performance of road infrastructure projects, empirical studies have shown that the performance of these projects in Kenya is still lacking. Given the above-mentioned statistics and the importance of supply chain security management, it is crucial to establish the relationship between Information security management and supply chain performance in the context of the Ministry of Roads and Transport in Kenya. The current study sought to fill this gap in the literature by investigating the role of Information security management and its interacting effect with legal structure on the performance of Ministry of Roads and Transport in Kenya.

General Objective of the Study

The general objective of the study is to establish the influence of Information Security Management on the Performance of Ministry of Roads and Transport in Kenya.

Theoretical Framework

Contingency Theory

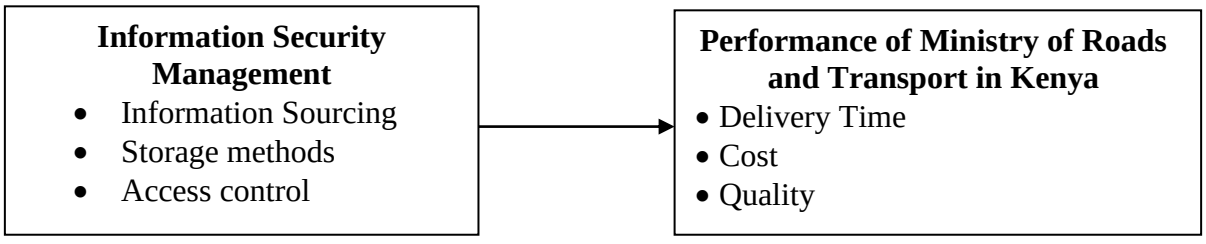
The theory of constraints is a set of management tools created by Eliyahu Goldratt in 1984. The theory is applicable in many areas including project management and performance measurement among many others (Blackstone, 2010). The theory helps organizations to identify the most important constraints or bottlenecks in their processes and systems, and dealing with them in order to improve performance. According to Goldratt (2004), organizational performance is dictated by constraints present in processes and systems. Constraints are restrictions that hinder an organization from maximizing its performance and achieving its goals and objectives (Goldratt, 2004). He states that constraints can involve policies, equipment, information, supplies or even people, and can be either internal or external to an organization.

Theory of constraints can be applied in conjunction with other management techniques such as total quality management and risk management to ensure a comprehensive set of techniques that ensure continuous improvement in all areas of operation in an organization (IMA, 1999). Organizations use this for control and assessment based on their configuration. Managers can track and respond using both feedback mechanisms that is the bottom up and top-down in many ways. In some organizations, monitoring and evaluation may be automated. In the various stages of the project life cycle, companies also use various tracking and assessment methods (Otley, 2016)

Programs depend on the settings of the stakeholders and their actions. The key to the success of a program creativities is depended on how well it manages relationships with key stakeholders, which includes clients, staff, vendors, families, contributors and others, who which influence the goals achievement (Joslin, 2019). Contingency theory was used in this study to establish the influence of information security management on the performance of Ministry of Roads and Transport in Kenya.

Conceptual Framework

According to Hammond and Wellington (2012), the conceptual framework is a description of the basic link amongst variables in research. This allows the researcher to see the projected relationship clearly. This study explored the influence of information security management as independent variables and performance of Ministry of Roads and Transport in Kenya as dependent variable. This is illustrated in figure 2.1.



Information Security Management

Information management (IM) concerns a cycle of organizational activity: the acquisition of information from one or more sources, the custodianship and the distribution of that information to those who need it, and its ultimate disposal through archiving or deletion. This cycle of

information organization involves a variety of stakeholders, including those who are responsible for assuring the quality, accessibility and utility of acquired information; those who are responsible for its safe storage and disposal; and those who need it for decision making (Oromo, & Mwangangi, 2017). Stakeholders might have rights to originate, change, distribute or delete information according to organizational information management policies. Information management embraces all the generic concepts of management, including the planning, organizing, structuring, processing, controlling, evaluation and reporting of information activities, all of which is needed in order to meet the needs of those with organizational roles or functions that depend on information. These generic concepts allow the information to be presented to the audience or the correct group of people. After individuals are able to put that information to use, it then gains more value (Mwangangi, 2016).

Information relating to organizations' business activities and dealings are occasionally provided to suppliers and partners of the organizations and hence protection of such information to ensure it does not fall in the wrong hands is vital in the competitive world (Kolluru and Meredith, 2001). Therefore, it is important for organizations to put in place adequate security measures to enhance protection of this information/data. Mwangangi, (2016) defined information management as protection of vital data of the business in supply chain and misusing information can be a tool for detecting illicit happenings and avoiding security fissures. Possession of comprehensive information about supply chain activities, both downstream and upstream, also assist to evade security breaches and guard members in the supply chain process. Unauthorized access to computers and theft of infrastructure are examples of threats in implementation of security initiatives. It also includes access to secured areas, access to smart cards and gargets that contain important data and sensitive to companies (Njambi, &Katuse, 2018).

Empirical Review

Information Security Management and Performance

One of the greatest pillars for effective and economical supply chains is that of seamless exchange of knowledge from suppliers which is attributed to end customers (Blos *et al.* 2019). Data is ideal for decision-making and generates prices for organizations. Improper management of knowledge might result in irreparable injury to organizations (Michelberger & Labodi, 2019). Over the past decades, organizations have faced challenges in applying transport security (Hutter, 2016), because of the fast development of the technological setting (Hutter, 2016). Organization's area unit currently involved in the transport security of hardware and instrumentality due to the augmented use of mobile devices, together with computers, phones, laborious drives and USB, that makes them susceptible to theft (Carney, 2018). Theft of mobile devices is not the sole approach hackers and attackers will use to get the information they require. Hackers will get vital and sensitive knowledge by connecting a USB or a tiny low memory card to computers while not having to travel into the company database (Scott 2016).

The latest developments of data technology applied to production, transport and consumption of products has introduced mechanical automation, reduced personnel and thereby provided important cost-savings to supply chains. Massive enterprises that are keen to maintain a dominant position within the supply chain in distribution markets ought to promote the appliance of advanced information systems (Dang, Yan, & Lai 2015). The adoption of advanced information systems in supply chains means that sharing and analyzing massive amounts of information among multiple players. Integrated supply chain relationships are vital and integral to the organization's prosperous structure. Supply chain management will be outlined as processes and practices aimed to economical and economical flow of each material and

knowledge between the corporate, suppliers and customers (Lancaster and co., 2016). The exchange of data and communication between partners provide the potential for feedback from customers. Therefore, to explore for solutions to organization issues, can beyond any doubt have a positive impact on the organization's performance and outputs.

Information elements typically include several documents proving regulatory compliance or cargo authenticity. However, there is an overall increased attention towards the security of information systems, raising the opportunity to highlight these issues within the supply chain and logistics scientific communities. While these systems may improve supply chain efficiency, it has also been proven that security can be affected (Urciuoli, Mannisto *et al.* 2018). Harris, (2018) explained that it is difficult to protect corporate data, networks and systems, with the increasing use of computers and smart mobile phones. Almost 74,000 staff, suppliers and contractors were exposed to data penetration in 2014 during the theft of laptops that contain essential and sensitive records about their companies (Scott, 2018).

The dynamic nature of the current environment has contributed to the increase of costs that companies incur because of fraud, sabotage and theft (Hutter, 2016). Earthquakes, volcanoes, floods, and lightning, fire or dust waves are external threats that arise from natural disasters not influenced by human activities (Al-Qahtani, 2015). Such disasters could cause serious damage to information systems and could lead to the interruption of electronic services altogether (Hutter, 2016). There is a great need for an information security structure. Information exchanged by 2017, with supply chain partners is one of the most important assets for organizations. Until information is shared, organizations need to make security arrangements (Kollurum & Meredith 2015).

The risk of security incidents and breaches increases due to increased reliance on information technology, and organizations are increasingly vulnerable to various types of cyber-attacks (Jouini *et al*., 2016). Security breaches can cause significant financial losses, disrupt and stop operations. As a result, Information Security Management (ISM) has become an important and required function for all organizations.

Some researchers suggest that proper information management may also improve the flexibility of supply chains (Glenn Richey, Skipper, & Hanna 2019). Lee and Özer (2017) find that by timely downstream sharing of information, upstream disruptions may be promptly avoided or their negative consequences minimized. Tomlin (2016) suggests that advance information could be used to deal with certain risks, for instance, labor disputes: if a firm has advance information that a strike is imminent, then mitigation inventory may be built in advance. Usage of information sharing in supply chains is an effective approach to deal with supply chain disruptions, for example, those caused by financial, strategic, operational and hazard vulnerabilities (Blos *et al.* 2019).

RESEARCH METHODOLOGY

Research Design

The research used a cross-sectional survey design. Within a cross-sectional survey, the study measures the results and experiences of the sample subjects at the same time (Setia, 2016). Cross-sectional survey design gives a clear image of the patterns and is useful at a particular point in time to monitor current research population circumstances, characteristics and their opinion. A cross-sectional survey also describes the prevalence of a given attribute in a specified population at a particular time point. The choice of this design is suitable for this study since it makes use of a questionnaire as a data collection tool. It is also suitable for this research, as it

thoroughly tests the relationship among variables. Other researchers who have successfully utilized a cross-sectional survey design include (Wambua, 2017; Somba, 2017; Nyambura, 2018).

Research Philosophy

This study adopted a positivism research philosophy. The positivism research technique is defined as a philosophical approach of identifying and recognizing items or elements in a particular social construct that have scientific proof and are based on logical as well as factual proof (Metsamuuronen, 2017). Positivism tends to have a strong belief that development of research hypothesis based on theoretical aspects can be tested through observing social realities, and as such, positivism is a scientific technique (Hewson, Vogel & Laurent, 2016). Depending on the observation made, the positivism research philosophy can be used to explain the existing relationship or realities between elements under investigation, and thus can be used to make predictions. The positivism research philosophy was used in this study to establish the influence of supply chain security management on supply chain performance of Ministry of Roads and Transport in Kenya, and the moderating effect of legal structure.

Target Population

The Kenya government has put several measures to address performance of road infrastructure projects which included the enactment of Kenya Roads act which established the Kenya National Highways Authority, Kenya Urban Roads Authority and Kenya Rural Roads Authority (Kenya roads authority, 2020). The unit of analysis in this study was the three road construction agencies which are the Kenya National Highways Authority, Kenya Urban Roads Authority and Kenya Rural Roads Authority. On the other hand, the unit of observation was Procurement and supply chain management employees working with the three agencies. The study mainly focused on Procurement and supply chain managers as they play a critical role in supply chain of their respective organizations and was in apposition to provide the requisite data and information for the finalization of the research. Therefore, the target population for this study was 420 Procurement and supply chain managers as shown in Table 3.1 below.

Table 3.1: Target Population

Agency	Population (No.)	Proportion (%)
KeRRA	166	39.52
KeNHA	154	36.67
KURA	100	23.80
Total	**420**	**100.00**

Source: Kenya roads authority (2020)

Sampling Frame

A sampling frame is a list of all the items from which a representative sample is taken for research purposes (Sekaran, & Bougie, 2010). It's a list of people in the study's population from whom a random sample can be taken (Kothari, 2014). The sample frame for this study was created from a list of Procurement managers from all the three road agencies in Kenya; that is KeNHA, KeRRA, and KURA. As a result, the sampling frame consisted of 420 Procurement and supply chain managers.

Sample Size

Kothari (2014) explains that a sample size refers to the number of items to be selected from the universe to constitute a sample while sampling procedures refers to the technique used in selecting the items of the sample. The overall sample size for this study was determined using Nassiuma (2000) formula as indicated below.

$$n = \frac{NC^2}{C^2 + (N-1)e^2}$$

Where n is the sample size, N is the population, C is the coefficient of variation (0.5) and e is the precision level of (0.05). The samples sizes were computed as follows for each agency. The study adopted a sample size of 83, 75 and 43 for KeNHA, KeRRA, and KURA respectively.

Therefore, using Nassiuma (2000) formula, the sample size for the study was 201 Procurement managers.

Data Collection Instruments

In this study, primary data was collected using a semi structured questionnaire because they are cost effective and convenient to collect and summarise responses (Zikmond, 2013). Kothari (2014) indicates that a questionnaire is a cost efficient method to collecting information particularly from a huge group of respondents and it facilitates anonymity. Questionnaires consist of a series of specific, short questions that are asked verbally by the interviewer or answered by the respondents on their own (Bryman, 2016). According to Sekaran (2013), the questionnaire is advantageous since it covers a population in a short amount of time and at a low cost, and it increases the independence and accuracy of responses from respondents. In addition, respondents are given a structured questionnaire, which was chosen since it provides a more thorough picture than any other research instrument. The questionnaire is developed in a systematic manner in accordance with the study objectives.

Data Collection Procedure

Before embarking on data collection, relevant approvals were obtained. An introductory letter from the JKUAT Nairobi campus introducing the researcher to relevant authorities for field data collection was first obtained. This letter was used to obtain the permit for research from the National Commission for Science, Technology, and Innovation (NACOSTI). In addition, the researcher sought permission from the respective agency to collect data. Follow-up calls and emails were then made to book an appointment.

Pilot Test

For the purpose of this study, the pilot study was conducted by purposively selecting 14 respondents from the target population. These managers were not be part of the sample while collecting data on a large scale. The questions that have errors, omissions, ambiguous and irrelevant were re-defined and the questionnaire content, structure, and sequence were structured restructured to enhance the content validity and reliability. These improvements made the data collection instruments precise.

Data Analysis and Presentation

The researcher collected questionnaires, code them, and enter them into the Software Package for Social Sciences (SPSS version 26) for analysis. The sort function were used to perform the

initial screening. The data was based on the study's objectives and research hypothesis. The descriptive statistical techniques of frequency, mean, and standard deviation was used to analyze the quantitative data acquired. The results were displayed using frequency distribution tables, which keeps track of how many times a score or response appears. Qualitative data collected was analysed using content analysis and presented in prose form.

Inferential statistics including regression and correlation analysis was used in the study. According to Saunders *et al.* (2017), correlation is a statistical tool that helps to determine the relationships between two or more variables. Cooper and Schindler (2017) indicate that correlation, as measured by a correlation coefficient, is the degree to which a linear predictive relationship exists between random variables. Pearson correlation coefficient was used for testing associations between the independent and the dependent variables. According to Wagana (2017), a correlation coefficient (r) has two characteristics, strength and direction. The strength of the relationship is indicated by how r tends toward 1, the maximum value possible. r is interpreted as follows; when r = +1 it means there is perfect positive correlation between the variables, when r = 0 it means there is no correlation between the variables, that is the variables are uncorrelated, when r = -1 it means there is perfect inverse correlation between the variables.

A multiple regression model was used to test the significance of the influence of the independent variables on the dependent variable. Multiple regression analysis was used to determine how supply chain security management influence supply chain performance of Ministry of Roads and Transport in Kenya. Regression analysis attempts to determine whether a group of variables together predict a given dependent variable and, in this way, attempts to increase the accuracy of the estimate (Mugenda & Mugenda, 2003). The use of regression model is ideal due to its ability to show whether a positive or a negative relationship exists between independent and dependent variables (Mason, Lind, & Marchal, 1999).

RESEARCH FINDINGS AND DISCUSSIONS

Descriptive Analysis

The purpose of descriptive analysis is to give background to the study before carrying out analysis. In this section the study presents findings on Likert scale questions where respondents were asked to indicate their level of agreement with various statements to the influence of supply chain security management on the performance of Ministry of Roads and Transport in Kenya. They used a 5-point Likert scale where 1-strongly disagree, 2-disagree, 3-moderate, 4-agree, 5-strongly agree.

Information Security Management and Organization Performance

The objective of the study was to establish the influence of information security management on performance of Ministry of Roads and Transport in Kenya. This section therefore presents descriptive findings on influence of information security management and performance of Ministry of Roads and Transport in Kenya. On Liker scale questions, respondents were asked to indicate how far they agree or disagree with the statement by ranking your answer in the scale of 1-5. Table 4.1 presents summary of the findings.

From the findings, it is seen that the ministry of roads and transport has the ability to obtain accurate and timely information about the status of transportation routes and cargo (M= 4.007, SD= 0.337); that the ministry uses technology to monitor and track the flow of information within the supply chain (M= 3.988, SD= 0.406); and that the ministry has the ability to identify and respond to potential supply chain disruptions due to information-related issues (M= 3.975,

SD= 0.311). They further agree that the ministry effectively controls access to stored information to prevent unauthorized access (M= 3.961, SD= 0.467); that the Ministry regularly updates and backs up important information to minimize the risk of data loss (M= 3.902, SD=0.332); and that the Ministry uses secure storage methods, such as encryption, to protect sensitive information. (M= 3.902, SD= 0.332). Respondents also agreed that the ministry controls access to sensitive supply chain information (M= 3.817, SD= 0.303); and that there are strict security protocols in place to protect the information stored by the Ministry of Roads and Transport in Kenya (M= 3.764, SD= 0.314). The respondents also agreed that the ministry monitors and tracks who has access to their supply chain information (M= 3.745, SD= 0.376).

From the findings above, it is seen that information security management influences supply chain performance of Ministry of Roads and Transport in Kenya as supported by an aggregate mean of 3.915 (SD= 0.350). The findings concur with those of Blos *et al*. (2019) that one of the greatest pillars for effective and economical supply chains is that of seamless exchange of knowledge from suppliers which is attributed to end customers. Some researchers suggest that proper information management may also improve the flexibility of supply chains (Glenn Richey, Skipper, & Hanna 2019). Lee and Özer (2017) find that by timely downstream sharing of information, upstream disruptions may be promptly avoided or their negative consequences minimized. Tomlin (2016) suggests that advance information could be used to deal with certain risks, for instance, labor disputes: if a firm has advance information that a strike is imminent, then mitigation inventory may be built in advance.

Table 4. 1: Descriptive Statistics on Information Security Management

Statements	**Mean**	**Std. Dev.**
We have the ability to obtain accurate and timely information about the status of transportation routes and cargo	4.007	0.337
We use technology to monitor and track the flow of information within the supply chain	3.988	0.406
We have the ability to identify and respond to potential supply chain disruptions due to information-related issues	3.975	0.311
The Ministry effectively controls access to stored information to prevent unauthorized access.	3.961	0.467
The Ministry regularly updates and backs up important information to minimize the risk of data loss.	3.902	0.332
The Ministry uses secure storage methods, such as encryption, to protect sensitive information.	3.902	0.332
The ministry controls access to sensitive supply chain information	3.817	0.303
There are strict security protocols in place to protect the information stored by the Ministry of Roads and Transport in Kenya	3.764	0.314
The ministry monitors and tracks who has access to their supply chain information	3.745	0.376
Aggregate Score	**3.915**	**0.350**

Performance of Ministry of Roads and Transport

The dependent variable of the study was performance of Ministry of Roads and Transport in Kenya. The respondents were further requested to rate their level of agreement with various

statements on performance of Ministry of Roads and Transport in Kenya. Table 4.2 presents summary of the findings.

The findings show that the Ministry of Roads and Transport in Kenya consistently delivers on time. (M= 3.988, SD= 1.064); that the on-time delivery is a priority for the Ministry of Roads and Transport in Kenya (M= 3.980, SD= 0.876); and that there are few complaints concerning on-time delivery (M=3.979, SD= 1.158). They were also in agreement that the Ministry of Roads and Transport in Kenya effectively controls costs within the supply chain (M= 3.855, SD= 0.902); and that the Ministry of Roads and Transport in Kenya's supply chain is cost-efficient (M= 3.848, SD= 1.010). Respondents further agreed that they are satisfied with the cost control measures put in place (M= 3.841, SD= 0.983); that the Ministry of Roads and Transport in Kenya maintains a high level of quality assurance throughout the supply chain (M= 3.830, SD= 0.935); and that they are satisfied with the quality control measures put in place (M= 3.765, SD= 0.876). The respondents also agreed that the Ministry of Roads and Transport in Kenya's supply chain consistently meets or exceeds quality standards (M= 3.752, SD= 0.932).

Krause, Handfield and Scannell, (2017) argues that supply chain performance is concerned with the effectiveness and efficiency of an organization's supply chain operations in meeting the needs of its customers and other stakeholders. It encompasses a wide range of factors, including on-time delivery, cost control, and quality assurance, all of which are critical to the success of an organization's supply chain operations. A number of studies have highlighted the importance of supply chain performance in achieving organizational success. According to a study by Li, Wang, and Liang (2019), supply chain performance is positively associated with firm performance, and organizations with better supply chain performance are more likely to achieve higher levels of financial performance and customer satisfaction. The study argues that supply chain performance can improve the efficiency and effectiveness of an organization's operations, and can help to reduce costs and improve customer service

Table 4.2: Descriptive Statistics on Organization Performance

	Mean	**Std. Deviation**
The Ministry of Roads and Transport in Kenya consistently delivers on time.	3.988	1.064
On-time delivery is a priority for the Ministry of Roads and Transport in Kenya.	3.980	0.876
There are few complaints concerning on-time delivery	3.979	1.158
The Ministry of Roads and Transport in Kenya effectively controls costs within the supply chain.	3.855	0.902
The Ministry of Roads and Transport in Kenya's supply chain is cost-efficient.	3.848	1.010
Am satisfied with the cost control measures put in place	3.841	0.983
The Ministry of Roads and Transport in Kenya maintains a high level of quality assurance throughout the supply chain.	3.830	0.935
Am satisfied with the quality control measures put in place	3.765	0.876
The Ministry of Roads and Transport in Kenya's supply chain consistently meets or exceeds quality standards.	3.752	0.932
Aggregate	**3.854**	**0.913**

Test for Hypothesis One

The objective of the study was to establish the influence of information security management on performance of Ministry of Roads and Transport in Kenya. The corresponding hypothesis was:

Ho_1 Information security management has no significant influence on performance of Ministry of Roads and Transport in Kenya.

A univariate analysis was therefore conducted to test the null hypothesis. From the model summary findings in Table 4.3, the r-squared for the relationship between information security management and performance of Ministry of Roads and Transport in Kenya was 0.215; this is an indication that at 95% confidence interval, 21.5% variation in performance of Ministry of Roads and Transport in Kenya can be attributed to changes in information security management. Therefore, information security management can be used to explain 21.5% change in performance of Ministry of Roads and Transport in Kenya. However, the remaining 78.5% variation in performance of Ministry of Roads and Transport in Kenya suggests that there are other factors other than information security management that explain Performance of Ministry of Roads and Transport in Kenya

Table 4.3: Model Summary for the Information Security management

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.464[a]	.215	.213	.70838

a. Predictors: (Constant), Information Security management

The analysis of variance was used to determine whether the regression model is a good fit for the data. From the analysis of variance (ANOVA) findings in Table 4.4, the study found out that that Prob>$F_{1,51}$= 0.000 was less than the selected 0.05 level of significance. This suggests that the model as constituted was fit to predict supply chain performance of Ministry of Roads and Transport in Kenya. Further, the F-calculated, from the table (271.08) was greater than the F-critical, from f-distribution tables (3.892) supporting the findings that information security management can be used to predict to predict performance of Ministry of Roads and Transport in Kenya.

Table 4.4: ANOVA for Information Security management

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	40.933	1	40.933	271.08	.000[b]
	Residual	25.602	181	0.151		
	Total	66.535	185			

a. Dependent Variable: Organization Performance

b. Predictors: (Constant), information security management

From the results in table 4.5, the following regression model was fitted.

$$Y = 1.808 + 0.469\ X_3$$

(X_3 is information security management)

The coefficient results showed that the constant had a coefficient of 1.808 suggesting that if information security management was held constant at zero, performance of Ministry of Roads and Transport in Kenya would be at 1.808 units. In addition, results showed that information security management coefficient was 0.469 indicating that a unit increase in information security management would result in a 0.469 unit improvement in performance of Ministry of Roads and Transport in Kenya. It was also noted that the P-value for information security management was 0.000 which is less than the set 0.05 significance level indicating that information security management was significant. Based on these results, the study rejected the null hypothesis and accepted the alternative that information security management has positive significant influence on the performance of Ministry of Roads and Transport in Kenya.

Table 4. 5: Beta Coefficients for Information Security management

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.808	.215		8.398	.000
	Information Security management	.469	.052	.464	9.032	.000

a. Dependent Variable: Performance of Ministry of Roads and Transport

Conclusions

The null hypothesis test was ‘information security management has no significant influence on Performance of Ministry of Roads and Transport in Kenya’. The study found that information security management is statistically significant in explaining supply chain performance of Ministry of Roads and Transport in Kenya’. The influence was found to be positive. This means that unit improvement in information security management would lead to an increase in Supply Chain Performance of Ministry of Roads and Transport in Kenya’. Based on the findings, the study concluded that information security management positively and significantly influences Performance of Ministry of Roads and Transport in Kenya’.

Recommendations

Implement strong encryption protocols for sensitive information. Encrypting data both in transit and at rest ensures that even if unauthorized individuals gain access to the data, it remains unreadable and unusable without the proper decryption keys. In addition, ensure compliance with relevant data protection regulations and laws, such as the General Data Protection Regulation (GDPR) if applicable. This includes obtaining proper consent for data collection and ensuring data subjects' rights are respected.

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