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SUPPLY CHAIN VISIBILITY AND PERFORMANCE OF COMMERCIAL STATE CORPORATIONS IN KENYA

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ABSTRACT

Kenya loses a lot of taxpayers' money to improper supply chain practices, specifically because of poor SC management practices. This is common in state corporations and some of the causes include corruption, litigations, contract cancellations and substandard service or product delivery. Confirmed data shows that the Government of Kenya uses between 10% to 30% of the gross domestic product on acquisition of goods and services. Out of this 5% goes to waste due to lack of proper administration of the procurement contracts. The main objective of this study is to establish the effect of supply chain visibility on performance of commercial state corporations. This study adopted a descriptive research design for the purpose of accessing the study's general intent. The unit of analysis for this study was 46 commercial state corporations in Kenya while the unit of observation was 340 management employees working with the commercial state corporations. The study used Yamane formulae (Yamane 1967) to determine the appropriate sample size for this study. The 184 respondents were chosen with the help of stratified random sampling technique. The study used primary and secondary data. Secondary data was obtained from online sources through desktop review. The study used self-administered questionnaires to collect primary data. Mixed methods data analysis techniques were employed in this study incorporating both descriptive and inferential data analysis. To analyse quantitative data, descriptive statistics was analysed via Statistical Package for Social Sciences (SPSS); these statistics include means, percentages, frequencies and standard deviations. Content analysis was used to analyses qualitative data. Pearson R correlation was used to measure strength and the direction of linear relationship between variables. Correlation analysis is usually used as a statistical tool that determines the association level between two variables. Multiple regression models were fitted to the data in order to test how far the independent variables affect the dependent variable. The study further used hierarchical multiple regression models to measure the effect of supply chain visibility on the on performance of commercial state corporations in Kenya. The study found that supply chain visibility is statistically significant in explaining performance of commercial state corporations in Kenya. The influence was found to be positive. This means that unit improvement in supply chain visibility would lead to an increase in performance of commercial state corporations in Kenya'. Based on the findings, the study concluded that supply chain visibility positively and significantly influences performance of commercial state corporations in Kenya. The study recommends that the management of commercial state corporations in Kenya should implement advanced supply chain management systems and technologies that offer real-time tracking, monitoring, and reporting capabilities

Key Words: Supply Chain Visibility, Commercial State Corporations and General Systems Theory

Background of the Study

Global supply chain (SC) activities have often been disrupted internally and externally due to unpredictable events which include natural disasters, accidents, and intentional disruptions. In a study prepared for a world economic forum, Bhatia et al. (2017) stated that disruptions were unavoidable and the affected companies could lose their share price by as much as 7 per cent. The intensity of supply chain disruptions can be magnified by reconfiguring the functions of the supply chain to mitigate the risks emerging from the dynamic and volatile business environment (Carvalho, Azevedo & Cruz-Machado, 2017). Identifying and quantifying the risks brought by supply chain requires a high complexity risk management approaches that will result in effective responses to disruptions in the market place (Fawcett & Waller, 2018).

Previous studies have also suggested that Supply Chain Resilience (SCRE) is essential for managing the vulnerabilities arising from numerous disruptions and risks (Chowdhury & Quaddus, 2017). The resilience of Supply chain involves the understanding of a reactive capability, post disruption actions. It also involves the proactive efforts to prepare for the unprecedented events or conditions in the organization (KamalAhmadi & Parast, 2016). Supply chain resilience is also defined as the risk mitigation strategy for the supply chain through anticipation, resistance, recovery and responses to the foreseen and unforeseen risks in the supply chain (Christopher & Packs, 2018).

According to Forkmann, Varzandeh, Henneberg, Naude, Mitrega (2016), organizations are becoming increasingly fore warned on disruptions caused by supply chain. Supply chain has is today a key component of the global firms and economies. Firms are therefore developing chain resilience practices to manage the risks facing firms as a result of technology, uncertain global customers and complexity in the supply chain function in so as to remain competitive in the current dynamic marketplace. A resilient supply chain has the capacity to overcome disruptions and continually transform itself to meet the changing needs and expectations of its customers, shareholders and other stakeholders (Jüttner & Maklan, 2017; Chopra & Sodhi, 2018). All firms rely on their suppliers to maintain smooth operations and their customers for continued revenue. Therefore, a resilient firm is truly only as resilient as its supply chain (Welch & Welch 2017).

Fiksel (2016) avers that mitigating supply chain risk using traditional methods of mitigating risk is based on statistical data. Unexpected natural events like natural disasters can therefore challenge risk management strategies based on these traditional methods of mitigating risk. Consequently, managing risk through the traditional methods should be supported by building capacity through implementation of resilience capability practices. Melnyk et, al. (2018) reiterates that the framework of supply chain management (SCM) must be anchored in resilience practices to ensure continuity in the operations of firms and sustainability in the competitive environment.

Commercial state corporations in Kenya have been exposed to supply chain vulnerability which has led to uncertainty in matching demand and supply of their products resulting to late delivery, stock outs, high stockholding costs and customer dissatisfaction, (KNBS, 2017; Transparency International, 2018). Tukamuhabwa *et, al.* (2015) assert that, the main SCRES practices to improve firms' responsiveness to supply chin disruptions comprise: agility, supply chain collaboration, supply chain integration and supply chain risk management. Murigi (2017) recognized that, adoption of supply chain resilience practices improved the performance of Companies with the benefits of improved flexibility and responsiveness to customer demands, creation of collaborative relationships, and development of a robust agile supply chain that aids in reducing supply chain disruptions hence leading to company growth. This study therefore seeks to establish the effect of supply chain resilience on performance of commercial state corporations in Kenya.

In the business environment, the first wide-spread study on supply chain resilience began in the United Kingdom, following transportation disruptions from fuel protests in 2000 and the

outbreak of the Foot and Mouth Disease in early 2001. The study explored the UK's industrial knowledge base about supply chain vulnerabilities and found that: supply chain vulnerability is an important business issue, little research exists into supply chain vulnerability, awareness of the subject is poor and a methodology is needed for managing supply chain vulnerability (Cranfield University, 2017; Pettit, Croxton & Fiksel, 2019).

Kenya's economic growth remains vulnerable to external shocks, especially developments in the global economy, regional stability and security, and weather-related supply shocks. On the domestic front, political stability and national cohesion are essential for improved business confidence and policy predictability. Kenyan authorities should develop mechanisms to respond flexibly to macroeconomic risks and shocks (Republic of Kenya, 2017). For example, in the Kenyan context, many of the security threats identified are attacks perpetrated while oil and gas are transported by sea (for example sea piracy, hijacking), in pipelines (for example theft, sabotage and vandalism) or while it is being extracted from platforms or stored in facilities. For instance, the entire offshore areas of Yemen and Somalia extending to Oman and Kenya have been frequently associated with endemic piracy. Attacks on ships increased by 10 per cent in 2010, mostly by Somali based pirates (Luciani, 2017). This has increased vulnerability of Kenya's supply chain in various sectors.

Statement of the Problem

In the recent past, many state corporations in Kenya have been facing dismal performance trends, a situation that has derailed the sustainability of most of these crucial institutions. While some state corporations have been known to consistently perform well, others have been found to perennially underperform, over rely on the exchequer, and lose viability in equal measure (Walter & Vincent, 2018). Some of the state corporations that have or almost collapsed due to poor performance and the government had to intervene and bail out in the last couple of years include Agricultural Finance Corporation (AFC), Kenya Meat Commission (KMC), Kenya Cooperative Creameries (KCC), Mumias Sugar Company, Uchumi Supermarkets, Kenya Airways, Pan Paper Company, Kenya Broadcasting Corporation and the Athi River Cement among others (Amayi, & Ngugi ,2017).

Kenya loses a lot of taxpayers' money to improper supply chain practices, specifically because of poor SC management practices. This is common in state corporations and some of the causes include corruption, litigations, contract cancellations and substandard service or product delivery (Gordon, 2019). Confirmed data shows that the Government of Kenya uses between 10% to 30% of the gross domestic product on acquisition of goods and services (Maria, 2017). Out of this 5% goes to waste due to lack of proper administration of the procurement contracts, according to Gordon (2018). Over four billion shillings have been misplaced in the financial years 2018 and 2019 summing to grand loss of over thirty three million meant for procurement activities (Daniel 2019). A special audit by the Auditor General has shown that Kenyans lost Sh2.3 billion in the Covid-19 items procurement scandal at Kemsa (Auditor General, 2020). There is an urgent need to resolve the hassle via adopting proper rules and regulations to change the state of affairs CMKN (2018).

According to Cho and Pucick (2017), supply chain resilience improves an organization's operational performance as indicated by various measures, such as, quality, flexibility, speed, efficiency, and supplier relationship. Proper supply chain resilience can significantly lower the factor of risk and uncertainty for the business and customer as well (Haapio & Siedel, 2017). Kabaj (2016) contends that supply chain resilience may be a tool to improve financial and non-financial performance. Despite the importance of supply chain resilience in improving performance, Kenya has over the years reported poor performance in the public sector, especially in the management of public resources which has hindered the realization of sustainable economic growth.

There has been considerable academic interest in recent years in supply chain visibility as this influences supply chain performance (SCP) (Ali *et al.,* 2017; Jain et al., 2017; Tukamuhabwa

et al.,2015). Tukamuhabwaet *al.* (2015) provided a comprehensive literature review of supply chain visibility and determined that only a limited number of empirical studies –mainly cross-sectional and confined to a single large firm in a developed country context –have been conducted with only a few studies using theoretical frameworks to improve supply chain visibility understanding. Ali *et al.* (2017) and Tukamuhabwaet al. (2015) discussed several supply chain visibility definitions; however, for the purpose of the present study, SCRE will be conceptualized in line with the definition of Chowdhury and Quaddus (2017), Ponomarov and Holcomb (2019) and Christopher and Peck (2018) as the "capability of a supply chain to develop required level of readiness, response an recovery capability to manage disruptions risks, get back to the original state or even a better state after disruptions. Although various studies (Ali *et al.* (2017) and Tukamuhabwaet *al.* (2015), Chowdhury and Quaddus (2017) have been conducted on supply chain resilience and organization performance, none of these studies focused on the effect of supply chain integration on performance of commercial state corporations. It is against this background that the current study sought to establish the effect supply chain visibility on performance of commercial state corporations in Kenya.

General Objective of the Study

The main objective of this study is to establish the effect of supply chain visibility on performance of commercial state corporations in Kenya.

Theoretical review

General Systems Theory

General systems theory (GST) was outlined by Ludwig von Bertalanffy (1968). Its premise is that complex systems share organizing principles which can be discovered and modeled mathematically. The term came to relate to finding a general theory to explain all systems in all fields of science. Boulding (1956) defines general systems theory as the main body of science that anchors and relate to certain disciplines in a comprehensible manner. An entity can be described by its organization structure and how the various structures relate with one another through information sharing minimizing ambiguity (Weick, 1979). The systems consist of routine patterns of entities that are linked together bringing out relationships that can express the entire organization (Katz, 1966). Furthermore, systems theory seeks to understand the organization holistically. Therefore, it follows several steps in order to achieve this (Farace, 1977). This theory puts emphasis on both vertical and horizontal organization orientation to get a more accurate view point of the organization. In the organizational context, communication networks are defined in terms of management roles or casual roles which emerge through interactions.

The open systems model was purposefully created for organizations to communicate with another exchange messages in the form of information and receive feedback from the external environment. The model takes into account all aspects of the organization and can be used to measure the stability of the same (Hickson, 1973). Realistically, this was tasked with identifying organization challenges and tackling them through interaction with other entities. It was implemented to single out any difficulties and prescribe solutions on the same Understanding the organization as a whole could help decipher where actual problems lie. Lai (2017) urged businesses to remove all communication complexities with all stakeholders. These include inner, outward, and inter-organizational communication, with employees, customers, suppliers, and organized stakeholders in general.

This theory is crucial for implementing SCV because it advocates for interaction among supply chain members. Similar to this theory, SCV proposes interaction and collaboration of members through sharing of information. The theory acknowledges that any complexity in operation can be solved through interaction with other members. In addition, interactions among firms can lead to acquiring new properties that have a positive influence on their performance. Collaboration among members is therefore fully supported in this theory; SCV borrows from

this concept of collaboration in order to ensure information sharing is achieved among members.

Conceptual Framework

According to Yin (2019), a conceptual framework refers to a diagrammatical representation showing the relationship between dependent and independent variables. Figure 2.1 below shows the independent variable is supply chain visibility and the dependent variable which is performance of commercial state corporations.

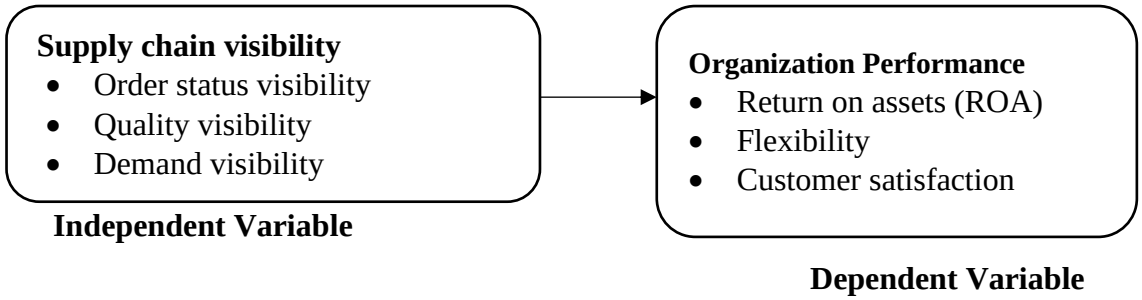

Figure 2.1: Conceptual Framework

Supply Chain Visibility

Gattorna (2019) described Supply Chain Visibility (SCV) as the individuality, position and currency of items moving along the supply chain. These entities have time logs showing at what point they are in the chain and the duration taken for the activities. Barrat (2017) expresses SCV as the level to which partners within a supply chain can gain access to or share information which will add value to their processes. This information should be beneficial to all members of the chain. Being relevant in today's supply chain setting requires businesses to understand the benefits of information technology (IT). Watson (2018) found that the internet has made it easier for businesses to communicate with their partners, that is, suppliers and customers thus increasing collaboration among partners. Graham (2020) recommends that IT be used to solve some of the complexity experiences by physical initiatives.

Visibility within supply chain processes aim to provide businesses, suppliers and their customers quality information on real time basis so that they can make sound supply chain decisions (Graham, 2020). Operational performance on the other hand ensures a firm utilizes its resources effectively and efficiently reaping maximum benefits while cutting down on cost Palevich (2019). Visibility peers through the concept of operational performance by managing time, cost and quality of a product. Constant tracing of components as they move along the supply chain is the key to achieving this (Gattorna, 2019). It is therefore very critical for partners to sustain the accuracy of the information.

Supply chain visibility also cushions a firm against supply chain disruptions; a firm is able to respond rapidly in case of risk (Holcomb, 2018). Visibility in supply chains significantly increases its ability to function because it provides members with information and thus reduces uncertainty. This also translates to a reduction in the amount of safety stock needed (Ponomarov, 2017). SCV therefore can be viewed as catalyst for achieving positive operational performance.

Embracing visibility is becoming more attractive with the belief that visibility amongst stakeholders in the supply chain could offer opportunities for improving performance (Busse, Schleper, Weilenmann, & Wagner, 2017). Visibility plays a key role as supply chains tends towards sustainability as a means for attaining sustainable competitive advantage while fulfilling the needs of the stakeholders. In supply chains, visibility is the ability of the supply chain to see clearly from one end to another whilst sharing information that is key or useful to the stakeholders in the chain (Barratt & Oke, 2017). For sustainable supply chains, visibility is

important as firms seek to reduce waste, improve working conditions, support social causes, minimize risk, meet customer flexible demands, and improve business resilience (Yu & Goh, 2018).

Best-in-class sustainable organisations differentiate themselves by focusing continuously on ethical ways to source, innovate, manufacture, and distribute goods and services while improving their visibility levels (Apeji & Sunmola, 2020)]. However, attaining desirable visibility levels can be challenging, especially regarding exposure to, and appropriate management of various risks including supply disruption, supply delays, demand fluctuations, loss of supplier and customer base, and compliance (Uje, Sunmola, & Khoudian, 2017). With increasing understanding of the significance of sustainable supply chains achieving visibility levels, it has become imperative to also understand effects of visibility in the chains.

Visibility in supply chains significantly increases its ability to function because it provides members with information and thus reduces uncertainty. This also translates to a reduction in the amount of safety stock needed (Ponomarov, 2011). SCV therefore can be viewed as catalyst for achieving positive operational performance. Majority studies concur that indeed supply chain visibility if implemented in the supply chain it would improve the overall performance of the chain (Caridi, Crippa, Perego, Sianesi, & Tumino, 2019). The researchers tend to suggest that firms view SCV as something very important in their operations but very few have implemented it.

Empirical Literature Review

Supply Chain Visibility and Organization Performance

Gustarsson (2019) carried out research on how SCV can be applied in a case of Pulp Company in Sweden. The objective was to find out how SCV can be used to mitigate warehousing complexities. The research employed a systems approach to find out areas where SCV was low and can be improved in order to manage inventory better. The study concluded that information sharing was well implemented at the firm leading to visibility. In addition, it further asserts that increased visibility leads to better inventory management. The study also found out that information sharing is just a tip of the ice berg when it comes to inventory management. The researchers recommend that managerial support is crucial to ensure sustained collaboration among partners so that there is better inventory control.

Brussse (2017) carried out a small-scale field study on Swiss retail firms with low SCV to find out how improved stakeholder supply chain management (SSCM) can mitigate supply chain sustainability risks (SCSR). The research concluded that increased stakeholder consultation and sharing of information is crucial when it comes to mitigating risks along the supply chain. However, the study used a procedural model to model SCSR to the particular industry and as such its findings cannot be generalized to other contexts.

Murphy (2018) carried out research in the life science industry to find out the challenges present and how SCV can be implemented to address these challenges. A mixed approach was used in data collection. Data was analysed using an inductive approach mainly looking at similar behaviour patterns among the professionals. The study concluded with past literature that SCV is important in life sciences. However, the research deduced that a lot of information is available as a result of SCV but little information is used in practicality in the industry. This is further worsened by lack of compatibility among the various visibility systems therefore impeding achievement of SCV in full. The scholars recommended for more research on how frameworks could be developed to ensure standardization in visibility.

Dubey, Gunasekaran, & Childe, et al. (2020) studied upstream supply chain visibility and complexity effect on focal company's sustainable performance: Indian manufacturers' perspective. Understanding supply chain sustainability performance is increasingly important for supply chain researchers and managers. Literature has considered supply chain sustainability and the antecedents of performance from a triple bottom line (economic, social,

and environmental) perspective. However, the role of supply chain visibility and product complexity contingency in achieving sustainable supply chain performance has not been explored in depth. To address this gap, this study utilizes a contingent resource-based view theory perspective to understand the role of product complexity in shaping the relationship between upstream supply chain visibility (resources and capabilities) and the social, environmental, and economic performance dimensions. We develop and test a theoretical model using survey data gathered from 312 Indian manufacturing organizations. Our findings indicate that supply chain visibility has significant influence on social and environmental performance under the moderation effect of product complexity. Finally, we have outlined our research limitations and further research opportunities.

Pandey and Giri (2022) researched on improving supply chain visibility capabilities of a firm. Through the research paper the researchers had tried to understand the factors that could affect supply chain visibility. The said effect has been studied with reference to material and product supply chain. An integrated model for supply chain visibility for firm performance is developed. Established causal relationship has been translated in the form of hypotheses. Hypotheses has been tested using standard multiple regressions. The study looked at asset visibility and supply chain visibility as a perspective field of research and presents new insight into the existing supply chain process and systems.T he research gave an insight to relationship of IT infrastructures for Supply Chain Integration (ITSCI), Supply Chain Process Integration (SCPI), Focal firm-3PL relational orientation (SCRO) and Internal Integration (II), with Supply Chain Visibility (SCV). The evidence from the study do proves that visibility will increase if the processes are integrated.

Singagerda, Fauzan, and Desfiandi, (2022) studied the role of supply chain visibility, supply chain flexibility, supplier development on business performance of logistics companies. This study aimed to determine the effect of supply chain visibility on business performance, to determine the effect of supply chain flexibility on business performance and to determine the effect of supplier development on business performance. The sample of respondents in this study were 120 respondents from logistics companies in Tangerang. Type of research is quantitative research. The data analysis technique used structural equation modeling and SmartPLS for analyzing data. The data collection method in this study was carried out using a survey method, namely by distributing online questionnaires to respondents in the form of questions. The data collection method in this study was an online questionnaire by google form. The sample selection method in this study is simple random sampling. The results of the analysis that have been carried out concluded that Inventory Control, Supply Chain Flexibility, Supply Chain Visibility, Supplier Development had positive and significant influence on business performance.

Odadi (2016) conducted a study to determine the influence of supply chain information systems (SCIS) on inventory tracking among logistics firms in Kenya. The researcher adopted survey design methodology. The population being examined were managers in the logistics industry. The researcher used questionnaires as the main data collection method and descriptive statistics to analyse the data. It concluded that SCIS contributed significantly to improved inventory tracking and reduced risks. However, the researcher identified some challenges which included; lack collaboration among partners to ensure optimum use of SCIS; lack of proper IT infrastructure. The researcher recommended that more research be conducted on the standardization of SCIS because this proved a major hinderance to inventory tracking.

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RESEARCH METHODOLOGY

Research Design

The research problem of the current study was studied through use of cross-sectional survey research design. This design suits the scenario where the correlation of two variables is to be determined at an instant in time (Mugenda, 2008; Cooper & Schindler, 2011). Cross sectional surveys are versatile in nature and therefore give accurate means of evaluating information while enabling the researcher to confirm whether there are significant causalities among the variables (Harlow, 2014). Further, the design offers the researcher the opportunity to capture population characteristics and test hypotheses quantitatively and qualitatively. Orodho (2003) cross-sectional research design analyses the cause-effect relationship between two or more variables. Hence the design was appropriate to the study because the research sought to establish a cause-effect relationship. The study adopted cross-sectional since it uses theories and hypothesis to account for the forces that causes a certain phenomenon to occur (Cooper & Schindler, 2011).

Cross-sectional surveys are diverse in nature, thus they provide an accurate means of analyzing information while also allowing the researcher to confirm whether there are substantial causal relationships between the variables (Harlow, 2014). Furthermore, the design allows the researcher to collect demographic features and statistically and qualitatively test hypotheses. Previous research have utilized cross-sectional survey approach (Musawir, Serra, Zwikael & Imran, 2017; Joslin & Müller, 2016; Pinyarat et al., 2018; Ihab, 2017; Asadullah et al., 2019).

Target Population

The unit of analysis for this study was 46 commercial state corporations in Kenya while the unit of observation was 340 management employees working with the commercial state corporations.

Table 3. 1: Target Population

Category	Target Population
Top Level Managers	46
Middle Level Managers	92
Lower Level Managers	202
Total	**340**

Sample and Sampling Techniques

Sahu (2017) notes that the best sample should give enough data on the population and this data should be adequate and capable of being analyzed easily. The study used Yamane formulae (Yamane 1967) to determine the appropriate sample size for this study. The formula is;

Where n = sample size, $n = \frac{N}{1+Ne^2}$

N = population size (340)

e = error term (0.05)

Hence the sample size for each of the research institutions was as follows:

$n = \frac{340}{1+340(0.05)^2}$

$n = \frac{340}{1.85} = 183.78$

=184

Table 3. 2: Sample Size

Category	Target Population	Sample Size
Top Level Managers	46	25
Middle Level Managers	92	50
Lower Level Managers	202	109
Total	**340**	**184**

The 184 respondents were chosen with the help of stratified random sampling technique. Stratified random sampling technique was used since the population of interest is not homogeneous and could be sub-divided into groups or strata to obtain a representative sample.

Data Collection Instruments

The study made use of primary and secondary data. The study uses self-administered questionnaires to collect primary data. Orodho (2018) argues that well standardized and tested questionnaires are most effective elements of a structured survey. Keeping the central objective of study in mind, the study adopted closed question items that are sufficient to yield only relevant information. A five-point Likert scale was used. Likert scale is an interval scale that specifically uses five anchors of strongly disagree, disagree, neutral, agree and strongly agree.

Pilot Testing

A pilot study was conducted in order to establish the validity and reliability of data collection instruments (Saunders, Lewis & Thornhill, 2019). The questionnaires were pre-tested on a pilot set of 18 respondents for comprehension, logic and relevance. The rule of the thumb suggests that 5% to 10% of the target sample should constitute the pilot test (Cooper & Schindler, 2017). This percentage adopted in the current study is hence 10% (18 respondents) hence an acceptable percentage. The subjects participating in the pilot study were not included in the final study to avoid fatigue. All aspects of the questionnaire that were pre-tested include question content, wording, sequence, form and layout, question difficulty and instructions. The feedback obtained was used to revise the questionnaire before administering it to the study respondents.

Data Analysis and Presentation

Mixed methods data analysis techniques were employed in this study incorporating both descriptive and inferential data analysis. The analysis of the data was guided by the research objectives. The data collected from the field was analyzed using statistical package for social sciences (SPSS) 23 program. The questionnaires were referenced and the items in them coded for easier data entry. The study generated both qualitative and quantitative data. To analyze quantitative data, descriptive statistics were used analyzed via Statistical Package for Social Sciences (SPSS); these statistics include means, percentages, frequencies and standard deviations. Content analysis was used to analyses qualitative data.

Pearson R correlation was used to measure strength and the direction of linear relationship between variables. The bigger the correlation coefficient R, the stronger is the association between two variables. Correlation analysis is usually used as a statistical tool that determines the association level between two variables (Levin & Rubin, 2018). If there is multicollinearity between the variables, Correlation analysis detects it. In case the correlation is 0, there is no relationship existing between the independent and dependent variables. If the correlation is at ±1.0 then a perfect positive or negative relationship exists (Hair et al., 2010). The interpretation is based on the values 0 meaning no relationship and 1.0 meaning a perfect relationship. If the r value is at r = ±0.1 to ±0.29 the relationship is small, if the r value is = ±0.3 to ±0.49 there is a medium relationship, and if the value of r is = ±0.5 and above there is a strong relationship.

Multiple regression models were fitted to the data in order to test how far the independent variables affect the dependent variable. Multiple regressions attempt to determine whether a group of variables together predicts a given variable (Mugenda & Mugenda, 2008). This study used a multiple regression model to establish the effect of supply chain resilience on performance of commercial state corporations.

RESEARCH FINDINGS AND DISCUSSION

Descriptive Analysis

This section presents findings on Likert scale questions where respondents were asked to indicate their level of agreement on various statements that relate with the effect of supply chain visibility on performance of commercial state corporations in Kenya and the moderating effect of supply chain integration. They used a 5-point Likert scale where 1-strongly disagree, 2-disagree, 3-moderate, 4-agree, 5-strongly agree. The means and standard deviations were used to interpret the findings where a mean value of 1-1.4 was strongly disagree, 1.5-2.4 disagree, 2.5-3.4 neutral, 3.5-4.4 agree and 4.5-5 strongly agree. Standard deviation greater than 2 was considered large meaning responses were widely spread out and not tightly clustered around the mean. In other words, there was a lot of variability in the responses, which may suggest that participants had different interpretations or perceptions of the questions being asked.

Supply Chain Visibility and Performance of Commercial State Corporations

The first objective of the study was to determine the effect of supply chain visibility on performance of commercial state corporations in Kenya. The respondents were requested to indicate their level of agreement with various statements on supply chain visibility and performance of commercial state corporations in Kenya. The study results were as shown in Table 4.1

The findings show that the respondents agreed that enhanced order status visibility is crucial for optimizing supply chain efficiency and minimizing disruptions (M= 3.981, SD= 0.371). In addition, the respondents agreed that transparent communication of order processing and delivery status is a key factor in building trust between customers and commercial state corporations (M= 3.942, SD= 0.32). Further, the respondents agreed that implementing digital platforms for order tracking significantly improves customer satisfaction by providing them with timely information on their orders. (M= 3.880, SD= 0.373). The findings also show that clear visibility into the quality control processes is essential for ensuring the delivery of safe and reliable products and services (M= 3.861, SD= 0.364).

From the results, the respondents agreed that transparent communication of quality assurance measures between commercial state corporations and their stakeholders fosters trust and confidence (M= 3.839, SD= 0.335). In addition, the respondents agreed that lack of real-time updates on quality assessments leads to uncertainties and potentially impacts the credibility of commercial state corporations (M= 3.773, SD= 0.346). The respondents also agreed that accurate and real-time visibility into demand patterns is essential to effectively allocate resources and meet customer needs (M= 3.738, SD= 0.367). Further, the respondents agreed that transparent communication of demand forecasts between commercial state corporations and their stakeholders builds trust and helps in strategic planning (M= 3.698, SD= 0.358). The respondents also agreed that improved demand visibility leads to better resource utilization, reduced wastage, and enhanced responsiveness to market dynamics (M= 3.676, SD= 0.349).

The findings therefore show that the respondents were of the pinion that supply chain visibility influences performance of commercial state corporations in Kenya as supported by an aggregate mean score of 3.843 (SD=0.352). The findings agree with those of Murphy (2018) that The study concluded that information sharing was well implemented at the firm leading to visibility. In addition, it further asserts that increased visibility leads to better inventory management. The study also found out that information sharing is just a tip of the ice berg

when it comes to inventory management. In addition, the findings concur with those of Pandey and Giri (2022) who established that supply chain visibility influences firm performance

Table 4.1: Descriptive Statistics for Supply Chain Visibility

Statements	Mean	Std. Dev.
Enhanced order status visibility is crucial for optimizing supply chain efficiency and minimizing disruptions	3.981	0.371
Transparent communication of order processing and delivery status is a key factor in building trust between customers and commercial state corporations	3.942	0.32
Implementing digital platforms for order tracking significantly improves customer satisfaction by providing them with timely information on their orders.	3.880	0.373
Clear visibility into the quality control processes is essential for ensuring the delivery of safe and reliable products and services.	3.861	0.364
Transparent communication of quality assurance measures between commercial state corporations and their stakeholders fosters trust and confidence.	3.839	0.335
Lack of real-time updates on quality assessments leads to uncertainties and potentially impacts the credibility of commercial state corporations.	3.773	0.346
Accurate and real-time visibility into demand patterns is essential to effectively allocate resources and meet customer needs.	3.738	0.367
Transparent communication of demand forecasts between commercial state corporations and their stakeholders builds trust and helps in strategic planning.	3.698	0.358
Improved demand visibility leads to better resource utilization, reduced wastage, and enhanced responsiveness to market dynamics.	3.676	0.349
Aggregate Score	**3.843**	**0.352**

The respondents were further requested to comment on how supply chain visibility has influenced performance of commercial state corporations in Kenya. From the results, the respondents revealed that supply chain visibility has led to efficient operations. Enhanced visibility has allowed state corporations to optimize their operations by identifying inefficiencies, reducing bottlenecks, and improving overall process efficiency. In addition, real-time data enables better demand forecasting, production planning, and inventory management, leading to cost savings and improved resource utilization.

The respondents also revealed that visibility helps in identifying cost-saving opportunities by minimizing excess inventory, avoiding stockouts, and optimizing transportation routes. Efficient supply chain operations contribute to cost reduction and improved financial performance for state corporations. Access to accurate and real-time data has empowered decision-makers within state corporations to make informed and timely decisions. Better decision-making leads to improved responsiveness to market changes, customer demands, and external disruptions.

Test for Hypothesis One

The first specific objective of the study was to determine the effect of supply chain visibility on performance of commercial state corporations in Kenya. The associated null hypothesis was that supply chain visibility has no significant effect on performance of commercial state corporations in Kenya. A univariate analysis was conducted in which performance of commercial state corporations in Kenya was regressed on supply chain visibility.

The R-Squared depicted the variation in the dependent variable that can be explained by the independent variables. The greater the value of R-squared the greater the effect of independent

variable. The R Squared can range from 0.000 to 1.000, with 1.000 showing a perfect fit that indicates that each point is on the line. As indicated in Table 4.2, the R-squared for the relationship between supply chain visibility and performance of commercial state corporations in Kenya was 0.245; this is an indication that at 95% confidence interval, 24.5% of variation in performance of commercial state corporations in Kenya can be attributed to changes in supply chain visibility. Therefore, supply chain visibility can be used to explain 24.5% of changes in performance of commercial state corporations in Kenya but there are other factors that can be attributed to 75.5% change in performance of commercial state corporations in Kenya.

Table 4.2: Model Summary for Supply Chain Visibility

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.498[a]	.245	.241	.67231

a. Predictors: (Constant), Supply Chain Visibility

The analysis of variance was used to determine whether the regression model is a good fit for the data. It also gave the F-test statistic; the linear regression's F-test has the null hypothesis that there is no linear relationship between the two variables. From the analysis of variance (ANOVA) findings in Table 4.3, the study found out that that Prob>$F_{1,}$= 0.000 was less than the selected 0.05 level of significance. This suggests that the model as constituted was fit to predict performance of commercial state corporations in Kenya. Further, the F-calculated, from the table (242.70) was greater than the F-critical, from f-distribution tables (3.895) supporting the findings that supply chain visibility can be used to predict performance of commercial state corporations in Kenya.

Table 4.3: ANOVA for Supply Chain Visibility

Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	45.87	1	45.87	323.03	.000[b]
	Residual	24.735	174	0.142		
	Total	70.605	175			

a. Dependent Variable: Performance of commercial state corporations in Kenya

b. Predictors: (Constant), supply chain visibility

From the results in Table 4.4, the following regression model was fitted.

$$Y = 0.251 + 0.431\ X_1$$

(X_1 is supply chain visibility)

The coefficient results showed that the constant had a coefficient of 0.251 suggesting that if supply chain visibility was held constant at zero, performance of commercial state corporations would be 0.251 units. In addition, results showed that supply chain visibility coefficient was 0.431 indicating that a unit increase in supply chain visibility would result in a 0.431 improvement in performance of commercial state corporations in Kenya. It was also noted that the P-value for supply chain visibility coefficient was 0.000 which is less than the set 0.05 significance level indicating that supply chain visibility was significant. Based on these results, the study rejected the null hypothesis and accepted the alternative that supply chain visibility has positive significant influence on performance of commercial state corporations in Kenya.

Table 4.4: Beta Coefficients for Supply Chain Visibility

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.251	.074		3.347	.000
	supply chain visibility	.431	.092	.429	4.685	.000

a. Dependent Variable: performance of commercial state corporations

Conclusions

The study conclusions were guided by the findings of the study and were presented in line with objectives of the study

The first null hypothesis test was 'Supply chain visibility has no significant effect on performance of commercial state corporations in Kenya'. The study found that supply chain visibility is statistically significant in explaining performance of commercial state corporations in Kenya. The influence was found to be positive. This means that unit improvement in supply chain visibility would lead to an increase in performance of commercial state corporations in Kenya'. Based on the findings, the study concluded that supply chain visibility positively and significantly influences performance of commercial state corporations in Kenya.

Recommendations

The study recommends that the management of commercial state corporations in Kenya should implement advanced supply chain management systems and technologies that offer real-time tracking, monitoring, and reporting capabilities. These technologies can include IoT (Internet of Things) devices, RFID (Radio Frequency Identification) tags, and data analytics tools to provide accurate and timely information about the movement and status of goods within the supply chain. In addition, the management should foster strong communication and collaboration among all stakeholders in the supply chain, including suppliers, manufacturers, distributors, and retailers. Clear communication and information sharing will help in identifying potential bottlenecks, resolving issues, and making informed decisions.

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