



SUPPLY CHAIN COLLABORATION AND PERFORMANCE OF COMMERCIAL STATE CORPORATIONS IN KENYA

¹Ogwang George Odongo, ²Dr. Wachiuri Elizabeth, ³Dr. Nyaberi Duncan,

¹PhD Student, Jomo Kenyatta University of Agriculture and Technology

²Lecturer, Jomo Kenyatta University of Agriculture and Technology

³Lecturer, Jomo Kenyatta University of Agriculture and Technology

ABSTRACT

Kenya loses a lot of taxpayers' money to improper supply chain practices, specifically because of poor supply chain collaboration 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 collaboration 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 analyse 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. The study found that supply chain collaboration is statistically significant in explaining performance of commercial state corporations in Kenya. The influence was found to be positive. Based on the findings, the study concluded that supply chain collaboration positively and significantly influences performance of commercial state corporations in Kenya. The study recommends that commercial state corporations in Kenya should establish clear and efficient communication channels among all stakeholders within the supply chain. The management should regularly share relevant information, updates, and feedback to ensure that everyone is on the same page and working towards common goals

Key Words: Supply Chain Collaboration, Commercial State Corporations and The Lean Theory

Background of the Study

Supply chain resilience requires the reengineering of the supply chain functions and activities, collaboration of the stakeholders in the value chain, creation of supply chain agility, velocity in the supply chain function and development of risk mitigation culture in the organization (Scholten, Sharkey & Fynes, 2018). Collaboration refers to a continuous relationship between suppliers and an organization. It helps organizations to influence their planned and operational efficiencies and capabilities. It emphasizes on long term direct relationships between firms and their suppliers with shared problem solving and planning capabilities (Li et al., 2016). Partnering describes numerous relationships. Lambert and Gardner (2019) identifies three forms and types of collaboration; one with low interactivity, one with relationships taking long time horizons and one where organizations share a significant strategic and operational combination.

According to Forkmann, Varzandeh, Henneberg, Naude, Mitrega (2016), organizations are becoming increasingly fore warned on disruptions caused by supply chain. Supply chain has 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 chain 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 collaboration on performance of commercial state corporations in Kenya.

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 Kemsco (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 collaboration improves an organization's operational performance as indicated by various measures, such as, quality, flexibility, speed, efficiency, and supplier relationship. Proper supply chain collaboration 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 collaboration may be a tool to improve financial and non-financial performance. Despite the importance of supply chain collaboration 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 collaboration as this influences supply chain performance (SCP) (Ali *et al.*, 2017; Jain *et al.*, 2017; Tukamuhabwa *et al.*, 2015). Tukamuhabwa *et al.* (2015) provided a comprehensive literature review of supply chain collaboration 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 collaboration understanding. Ali *et al.* (2017) and Tukamuhabwa *et al.* (2015) discussed several supply chain collaboration definitions; however, for the purpose of the present study, supply chain collaboration will be conceptualized in line with the definition of Chowdhury and Quaddus (2017), Ponomarev and Holcomb (2019) and Christopher and Peck (2018) as the “capability of a supply chain to develop required level of readiness, response and 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 Tukamuhabwa *et al.* (2015), Chowdhury and Quaddus (2017) have been conducted on supply chain collaboration and organization performance, none of these studies focused on the effect of supply chain collaboration on performance of commercial state corporations. It is against this background that the current study seeks to establish the effect supply chain collaboration 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 collaboration on performance of commercial state corporations in Kenya.

Theoretical review

The Lean Theory

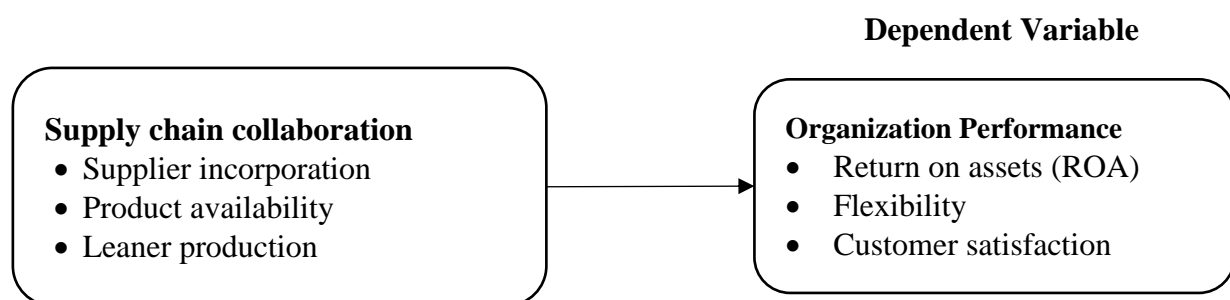
The lean management theory was developed by Daniel (Dan) Jones and James P. (Jim) Womack (1960). Lean is a functional model which basically discounts the value of economies of scale and focuses on how to reduce costs as a result of small, incremental and continuous improvement. Lean supply base has certainly become increasingly significant in supply chain management. Initially organizations involved in manufacturing of products used to involve themselves in lean manufacturing techniques, this has ceased as lean has expanded beyond manufacturing (Fawcett, Gregory & Mathew, 2013).

Lean supply base management seeks to explain how organization should manage its system and needs. It states that supply base can be used as a strategic differentiator by the organization and further goes on to say that not all supply base management is about waste (Finch, 2014). The theory stated that supply base management strategies developed by an organization should support the customer's need and expectations. Supply base management strategies should not be a driver on how much and when a product will be delivered to a customer, rather, the customers' expectations should be understood and supply base management strategies is designed purposely to meet those expectation. Real savings can only be realized through day to day management and optimization of supply base management (Fisher, 2010).

This theory is relevant to the study because the triangle approach is a key component in effective and efficient management of supply base rationalization in which an entity has vendors with interaction levels ranging from arm's length transaction level, capacity building transaction level and strategic collaboration level. It will therefore be used to explain the influence of supply base rationalization on performance of commercial state corporations.

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 variables of supply chain resilience which are supply chain visibility, supply chain collaboration, supply risk management culture, and supply base rationalization and the dependent variable which is performance of commercial state corporations. Further, the moderating variable in this study will be supply chain integration



Independent Variables

Figure 2.1: Conceptual Framework

Supply Chain Collaboration

Supply chain resilience requires the reengineering of the supply chain functions and activities, collaboration of the stakeholders in the value chain, creation of supply chain agility, velocity in the supply chain function and development of risk mitigation culture in the organization (Scholten, Sharkey & Fynes, 2018). Collaboration refers to a continuous relationship between suppliers and an organization. It helps organizations to influence their planned and operational efficiencies and capabilities. It emphasizes on long term direct relationships between firms and their suppliers with shared problem solving and planning capabilities (Li et al., 2016).

Partnering describes numerous relationships. Lambert and Gardner (2019) identifies three forms and types of collaboration; one with low interactivity, one with relationships taking long time horizons and one where organizations share a significant strategic and operational combination.

Collaboration results into mutual benefits with continuous participation in key areas of an organization for example technological use, management of materials, risk identification and customer satisfaction. Collaboration increase efficiency of an organization in transacting with limited number of suppliers. Allowing suppliers to take part in design process of new products at initial stages indicates that an organization would benefit in terms of cost reduction, identification of risks involved and assistance during assessment of the design process (Tan et al., 2016). collaborating is an approach of supply chain resilience in the organization that involves the engagement with suppliers in a such a way that reflect that the needs of the customers are factored in product design, risk assessment and operations of an organization (Lappelt, Forest, Reuter & Hatmann, 2016).

Through literature review, the SC collaboration provides many various advantages. Many studies have been empirically indicated that SC collaboration positively and significantly increased performance in the firms (Al-Doori, 2019; Marín-García et al., 2018). Researches signalize that SC collaboration has the ability to attain competitiveness, reduce the risk through sharing, ease to access the firm's resources, enhance the revenue and performance (Sheu et al., 2019; Mentzer et al., 2021). According to Fu and Piplani (2018), SC collaboration considered as a robust tool to place the SCM with a high extremely officious and responsive. The main purpose of SC collaboration is to utilize the knowledge and innovation within firm to add value for customers.

This study focused on supplier integration, product availability and leaner production as measures of supply chain collaboration. Supplier integration refers to the 'process of interaction and collaboration between the firm and its suppliers to ensure effective flow of supplies' (Zhao et al. 2017). Other authors define supplier integration as a 'process of acquiring and sharing technical, operational and financial information and related knowledge' (Narasimhan, Swink & Viswanathan. 2019). Zhao et al. (2018) stated that many organisations across the globe are creating co-operative, mutually beneficial partnerships with supply chain partners, owing to increasing global competition (Finger, Flynn & Paiva 2018). Zhao et al. (2018) further stated that companies need to implement supply chain integration to meet the new challenges of the global competitive environment.

Availability and accessibility of updated industry information is crucial for proper planning, management and forecasting various issues in the industry. With the availability of real-time and rich content information, firms can sense and respond to market uncertainties rapidly and extensively (Lee & Whang, 2018). For example, through sharing information in the supply chain, a firm can quickly detect the problems related to customer demands, especially when customers want to receive information directed to ward their special needs and interest at any time and place. Such information will help the firm pro actively prepare for responding to such demand changes, which is critical for its operational performance. Supply chain information sharing reduces demand uncertainty and the phenomenon of increasing variability of demand in a supply chain. In general, effective Supply chain information sharing enhances mutual understanding, which reduces miscommunication and prevents unnecessary mistakes, thereby decreasing transaction costs across the supply chain (Frohlich, 2018; Lee & Whang, 2018).

Increased information transparency allows firms to choose suppliers with lower prices, enabling them to produce and deliver products or services at lower cost (Chen, Paulraj & Lado, 2018). This process, in turn, creates a positive effect on firms' business performance. Supply chain information sharing helps firms increase profits by reducing the cost of inventories and enhancing capital and cash flow utilization, thereby improving firm's performance. Shared

information and trust among partners are required for effective supply chain collaboration and successful supply chain integration.

Collaborations between partners in Supply chain information sharing facilitate Supply chain decision synchronization between these partners contributing towards achieving significant firms' performance (Simatupang & Sridharan, 2019). Firms are therefore expected to collaborate on a long-term basis with firms where information is more available. Partners that allow each other information access are able to review their transactions, especially possible redundancies, thus reducing the transaction costs. SCC is very important for success of the global business optimization, and it is only achieved if supply chain members share their information unambiguously.

Empirical Literature Review

Supply Chain Collaboration and Organization Performance

Al-Doori, (2019) assessed the impact of supply chain collaboration on performance in automotive industry: Empirical evidence. This is an empirical investigation conducting among the supply chain department of automotive industries in Pakistan. Data were collected from 232 members of the supply chain that include suppliers, manufacturers, and distributors. Factor analysis and multiple regressions through SPSS have been used for data analysis. The finding of this study reveals that two supply chain management approaches information sharing (IS), joint decision making (JDM) significantly effect, while Electronic Data Interchange (EDI) does not have a significant effect on operational performance. This study consists only three approaches, the next study should include more approaches. Secondly, this study is limited to the automotive sector. This study helps the managers of the automotive industry in making their operation smooth by applying information sharing, joint decision making, and electronic data interchange.

Alhanatleh, Aboalghanamand Awad (2021) studied the impact of supply chain collaboration on operational performance: the moderation role of supply chain complexity. The purpose of the study was to explore the impact of SC collaboration dimensions on Operational Performance (OP) through identifying the moderation role of SC complexity (SCC) Al-Ghalbi International Company for Engineering and Contracting in Oman. To serve the nature of the current research and its objectives, the research selected the quantitative method. 221 valid respondents are used for analysis purposes using SPSS program. A Multiple Linear Regression (MLR) test was employed to obtain the hypotheses findings. The results of the research indicated that the Information Sharing (IS), Goal Congruence (GC), and Knowledge Creation Sharing (KCS) diminutions of the SC collaboration diminutions had a direct and affirmative impact on OP where Resources Sharing (RS) and Decision-Making Synchronization (DMS) diminutions of the SC collaboration did not provide empirical support. The results, further, uncovered that SCC had a moderation role between SC collaboration and OP especially with IS and KCS dimensions. Originality/value: the most important novelty of the current article is that it considers as the first study evaluating the moderation role of SCC on SCM context.

Aggarwal and Srivastava (2016) found out that, supplier selection and exchange of knowledge are the key precursors of SCC while supply chain efficiency and waste reduction are the major outcomes of collaboration. Similarly, Kache and Seuring (2018) in their research found out that, the creation of collaborative practices would lead not only to benefits for buyers and sellers but also to better and sustainable practices for the industry. McDowell et al. (2017) adds that, improved knowledge sharing between supply chain members may lead to improved confidence levels among supply chain partners and improved working relationships.

Madzimure (2020) sought to examine the influence of supplier integration on supply chain performance in South African SMEs. This study was conducted in Gauteng province of South Africa. A quantitative research methodology was employed in this study. A convenient sample

comprising 283 owners and managers from SMEs drawn from the Gauteng Province was used in the study. The collected data were then analysed using Pearson's correlation and regression analysis. Positive correlations were found between supplier integration and both the tangible and intangible sub-dimensions of supply chain performance. Supplier integration also predicted both the tangible and intangible sub-dimensions of supply chain performance. These results imply that to improve the performance of their supply chains, it is imperative for SMEs to ensure that linkages with their suppliers are properly aligned for improved coordination, which leads to better relationships and supply of materials. This study contributes to the literature by proposing and testing the influence of supplier integration on supply chain performance

Scholten and Schilder (2015) examined how teamwork impacts supply chain resilience. The study established that key specific collaboration activities such as information exchange, collective communication, knowledge collectively produced and joint partnership efforts improve SCRES through increased visibility, speed and flexibility. A study by Ongisa et al., (2016) examined the effect of supply base rationalization strategies on the productivity of firms' in foods as well as beverage production in Kenya. Research findings revealed that supplier base risk rationalization approaches influence firm performance in regard to customer satisfaction.

Wafula and George (2017) evaluated how strategic supplier collaborations affected organizational performance. The study used a case of Kenya Pipe Line. The study used sample size of fifty procurement employees. Data was collected using of questionnaires. Descriptive statistics were used to obtain the findings. From the findings, networking and communication channels have improved between firm and its suppliers due to strategic supplier partnerships. It has also improved on delivery time of the products to consumers.

Berut (2020) studied the influence of supply chain collaboration on performance of dairy processing firms in Kenya. The study adopted a mixed research design which covered qualitative and quantitative research. Qualitative research design applied to qualitative data in analysis of interviewed and quantitative research design was applied on quantitative data on the questionnaires. The study targeted 10,488 fresh milk suppliers and 13,906 customers of processed milk products. The sample size was 384 suppliers and 384 customers. Stratified sampling was used to select the suppliers of fresh milk and customers of the processed milk. The survey was carried out in top ten milk supplies of dairy processing firms . The study adopted Mugenda's formula to calculate the sample size. Structured questionnaire was used to collect primary data while secondary data was obtain from published sources such books, journals and research done by other scholars. Data was analyzed with SPSS version 20. The research instrument was tested for reliability using Cronbach alpha. Data was analyzed using descriptive and inferential statistics. The correlation analysis was used to determine the strength and directions of association between two variables while Multiple Regression was used to determine whether a group of independent variables together predict a given dependent variable. Regression model summary with respect to supplier $R=.634$ (without mediator), $R=.642$ (with mediator). With respect to customer $R=.627$ (without mediator), $R=.639$ (with mediator). The coefficient of determination or measure of amount of variability (R^2) with respect to supplier $R^2=.402$ (without mediator) and $R^2=.413$ (with mediator); with respect to customer $R^2=.393$ (without mediator) and $R^2=.399$ (with mediator). All study variables had a positive and significant correlation with performance of dairy processing firms. The study recommends that dairy processing firms should exploit supply chain information sharing, incentive alignment, teamwork and mediation dairy board policies and regulations as it proved to be crucial in the performance of the dairy processing firms. The study also recommends realignment of dairy processing firms policies with other collaborative partners as is driving force behind performance.

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;

$$n = \frac{N}{1 + Ne^2}$$

Where n = sample size,

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 $r = \pm 0.1$ to ± 0.29 the relationship is small, if the r value is $= \pm 0.3$ to ± 0.49 there is a medium relationship, and if the value of r is $= \pm 0.5$ 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 resilience 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 Collaboration and Performance of Commercial State Corporations

The second specific objective of the study was to establish the effect of supply chain collaboration on performance of commercial state corporations in Kenya. The respondents were requested to indicate their level of agreement on various statements relating to supply chain collaboration and performance of commercial state corporations in Kenya. The results were as shown in Table 4.1.

From the results the respondents agreed that their organization has cultivated long term direct relationships with suppliers in order to manage the risks ($M=3.954$, $SD= 0.365$). In addition, the respondents agreed that suppliers are involved in initial stages of product design in their organization ($M= 3.941$, $SD= 0.406$). Further, the respondents agreed that early supplier involvement in product design ensures that the needs and wants of customers are captured in the design ($M=3.926$, $SD= 0.421$). The respondents also agreed that early supplier engagement and collaborations insures against risks in the supply chain in my organization ($M= 3.914$, $SD= 0.407$).

From the results, the respondents agreed that strategic partnerships increase efficiency of their organization in transacting its suppliers ($M= 3.875$, $SD= 0.429$). In addition they agreed that strategic supplier partnerships in their organization has increased networking and communication channels with suppliers ($M= 3.856$, $SD= 0.391$). The respondents agreed that the adoption of lean production principles is crucial for commercial state corporations to streamline operations, eliminate waste, and enhance efficiency ($M=3.845$, $SD= 0.398$). In addition, the respondents agreed that transparent communication of lean initiatives between commercial state corporations and stakeholders can lead to better understanding and support for process improvements ($M= 3.807$, $SD= 0.411$). Further, the respondents agreed that embracing lean principles result in significant cost savings and a more sustainable operational model for commercial state corporations ($M=3.794$, $SD= 0.387$).

Based on the findings as supported by majority of the respondents, it was evident that supply chain collaboration affected performance of commercial state corporations in Kenya as supported by an aggregate mean of 3.984 ($SD= 0.399$). The study findings agree with those of Al-Doori, (2019) that two supply chain management approaches information sharing (IS), joint decision making (JDM) significantly effect, while Electronic Data Interchange (EDI) does not have a significant effect on operational performance. In addition, the results are in agreement

with the findings of Alhanatleh, Aboalghanamand Awad (2021) who established that supply chain collaboration influences organization performance.

Table 4.1: Descriptive Statistics on Supply Chain Collaboration

Statements	Mean	Std. Dev.
My organization has cultivated long term direct relationships with suppliers in order to manage the risks	3.954	0.365
Suppliers are involved in initial stages of product design in my organization	3.941	0.406
Early supplier involvement in product design ensures that the needs and wants of customers are captured in the design	3.926	0.421
Early supplier engagement and collaborations insures against risks in the supply chain in my organization	3.914	0.407
Strategic partnerships increase efficiency of my organization in transacting its suppliers	3.875	0.429
Strategic supplier partnerships in my organization has increased networking and communication channels with suppliers	3.856	0.391
The adoption of lean production principles is crucial for commercial state corporations to streamline operations, eliminate waste, and enhance efficiency.	3.845	0.398
Transparent communication of lean initiatives between commercial state corporations and stakeholders can lead to better understanding and support for process improvements.	3.807	0.411
Embracing lean principles result in significant cost savings and a more sustainable operational model for commercial state corporations	3.794	0.387
Aggregate Score	3.834	0.399

In addition, the respondents were further requested to comment on how supply chain collaboration has influenced performance of commercial state corporations in Kenya. From the results, the respondents revealed that supply chain collaboration fosters improved communication among stakeholders, leading to a better understanding of each party's needs and capabilities. Open lines of communication contribute to more accurate demand forecasting, reducing the risk of stockouts or excess inventory. The respondents also indicated that collaborative efforts lead to streamlined processes and improved efficiency throughout the supply chain. In addition, State corporations optimizes production schedules, reduce lead times, and enhance overall operational efficiency through better collaboration.

The respondents indicated that collaborative relationships enable cost-sharing initiatives and joint planning, leading to overall cost reductions in the supply chain. In addition, the respondents revealed that bulk purchasing, shared transportation, and coordinated inventory management contribute to cost savings. Further, the respondents revealed that collaboration enhances the agility of state corporations to respond to changes in market demand, supply chain disruptions, or regulatory requirements. The respondents also revealed that quick and coordinated responses to challenges contribute to a more resilient and adaptable supply chain.

Test for Hypothesis One

The objective of the study was to establish the effect of supply chain collaboration on performance of commercial state corporations in Kenya. The corresponding hypothesis was:

H_{01} : Supply chain collaboration has no significant effect on performance of commercial state corporations in Kenya.

A univariate analysis was therefore conducted to test the null hypothesis. From the model summary findings in Table 4.2, the r-squared for the relationship between supply chain collaboration and performance of commercial state corporations in Kenya was 0.294; this is an

indication that at 95% confidence interval, 29.4% variation in performance of commercial state corporations in Kenya can be attributed to changes in supply chain collaboration. Therefore, supply chain collaboration can be used to explain 29.4% change in performance of commercial state corporations in Kenya. However, the remaining 70.6% variation in performance of commercial state corporations in Kenya suggests that there are other factors other than supply chain collaboration that explain performance of commercial state corporations in Kenya.

Table 4.2: Model Summary for Supply Chain Collaboration

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.542 ^a	.294	.295	.68365

a. Predictors: (Constant), supply chain collaboration

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 4.18, the study found out that that $\text{Prob} > F_{1,131} = 0.000$ 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 (390.53) was greater than the F-critical, from f-distribution tables (3.895) supporting the findings that supply chain collaboration can be used to predict performance of commercial state corporations in Kenya.

Table 4.4: ANOVA for Supply Chain Collaboration

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	51.159	1	51.159	390.53	.000 ^b
Residual	22.816	174	0.131		
Total	73.975	175			

a. Dependent Variable: performance of commercial state corporations

b. Predictors: (Constant), supply chain collaboration

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

$$Y = 0.292 + 0.476 X_2$$

(X_2 is Supply Chain Collaboration)

The coefficient results showed that the constant had a coefficient of 0.292 suggesting that if supply chain collaboration was held constant at zero, performance of commercial state corporations would be at 0.292 units. In addition, results showed that supply chain collaboration coefficient was 0.476 indicating that a unit increase in supply chain collaboration would result in a 0.476 increase in performance of commercial state corporations in Kenya. It was also noted that the P-value for supply chain collaboration coefficient was 0.000 which is less than the set 0.05 significance level indicating that supply chain collaboration was significant. Based on these results, the study rejected the null hypothesis and accepted the alternative that supply chain collaboration has a positive and significant influence on performance of commercial state corporations in Kenya.

Table 4.5: Beta Coefficients for Supply Chain Collaboration

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	0.292	.067		4.358	.000
supply chain collaboration	.476	.099	.481	4.808	.000

a. Dependent Variable: Performance of Commercial State Corporations

Conclusions

The null hypothesis test was ‘supply chain collaboration does not significantly influence performance of commercial state corporations in Kenya. The study found that supply chain collaboration is statistically significant in explaining performance of commercial state corporations in Kenya. The influence was found to be positive. This means that unit increase in supply chain collaboration would lead to an increase in performance of commercial state corporations in Kenya’. Based on the findings, the study concluded that supply chain collaboration positively and significantly influences performance of commercial state corporations in Kenya’.

Recommendations

The study recommends that commercial state corporations in Kenya should establish clear and efficient communication channels among all stakeholders within the supply chain. The management should regularly share relevant information, updates, and feedback to ensure that everyone is on the same page and working towards common goals. Further, the management should focus on building strong relationships and trust among supply chain partners. This can be achieved through open and transparent communication, mutually beneficial agreements, and a commitment to long-term collaboration.

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