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SUPPLIER BASE OPTIMIZATION PRACTICES AND PERFORMANCE OF FOOD AND BEVERAGE MANUFACTURING FIRMS IN NAIROBI CITY COUNTY, KENYA

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ABSTRACT

The purpose of this study was to investigate the influence of supplier base optimization practices on performance of food and beverage manufacturing firms in Nairobi City County, Kenya. Specifically, the study sought to examine effect of lead-time on performance of food and beverage manufacturing firms in Nairobi City County, Kenya and to establish effect of technology on performance of food and beverage manufacturing firms in Nairobi City County, Kenya. The target population of this study was 130 registered food and beverage manufacturing firms in Kenya as per KAM Directory 2023. The study targeted management employees. In this study, the sampling frame was a list of all 130 registered food and beverage manufacturing firms in Nairobi. The Yamane formula was adopted to calculate a sample size of 264 respondents. A questionnaire was developed to capture the various variables under study, and for the independent variables. Questionnaire was self-administered to the respondents and two research assistants were recruited and trained so that they were able to get quality results. Secondary data was collected from published sources such as library, internet and research done by other scholars. The returned and duly filled questionnaires were verified, coded and tallied according to the themes and thereafter the quantitatively and qualitatively analyzed through the use of tables and figures. The tool for data analysis was SPSS v24. The study concludes that lead time has a significant effect on the performance of food and beverage manufacturing firms in Nairobi City County, Kenya. The study also concludes that technological integration has a significant effect on the performance of food and beverage manufacturing firms in Nairobi City County, Kenya. Based on the findings, the study recommends that the management of food and beverage manufacturing firms in Kenya should invest in automation and digital technologies to optimize production processes and improve operational efficiency. By integrating technologies, firms can enhance production speed, reduce human error, and minimize waste.

Key Words: Lead-Time, Technology Integration, Performance of Food and Beverage Manufacturing Firms, Supplier Base Optimization Practices

Background of Study

Manufacturing firms are businesses engaged in the transformation of raw materials or components into finished goods through the use of labor, machinery, tools, and chemical or biological processing (Womak *et al*., 2021). These firms play a critical role in the global economy by supplying products for both consumer use and industrial applications. They range from small-scale operations producing specialized goods to large-scale factories mass-producing items like automobiles, electronics, and household appliances (Wisner, 2020). Efficiency, innovation, and supply chain management are key to their success, and many are increasingly adopting automation, robotics, and sustainable practices to stay competitive in a rapidly evolving market. Food and beverage manufacturing firms play a vital role in the economy and daily life by processing raw agricultural products into consumable goods, ensuring food safety, quality, and availability (Monczka, *et al*, 2020). These firms range from small artisanal producers to large multinational corporations, and they contribute significantly to employment, trade, and innovation within the sector. They are responsible for producing a wide array of products—from packaged snacks and beverages to ready-to-eat meals—while adhering to strict health regulations and adapting to changing consumer preferences, such as the demand for healthier, organic, or sustainably sourced options. Additionally, they drive advancements in packaging, preservation, and supply chain efficiency to meet global food demands (Ellram & Carter, 2021).

The business environment in which firms compete today is markedly different from that in past decades. Improvements in computational power coupled with the advent of the internet have decreased the coordination operational costs needed to successfully integrate disparate firms across the globe into a single supply chain (Friedman, 2021). In the past, firms commonly contracted with a huge number of suppliers and currently there is a significant movement from the traditional adversarial buyer-seller relationships to the use of a few qualified suppliers with close relationships. This trend is attributed to the customers' demand for higher quality, wider range of products, shorter time to market and faster deliveries. This has forced the producing firms to keep up with these demands in order to survive (Karlsson 2022).

One key aspect of managing the complex global supply chain is through strategic sourcing decisions. However, as the concept of strategic sourcing gains momentum many firms seeking to shift to this strategy have found themselves riddled with a supply base that does not support implementation as they have too many suppliers. Supply base rationalization thus becomes a key to change from transactional to strategic purchasing (Womak et al., 2023; Ogden et al., 2023).

Large manufacturing firms in Kenya play an important role in employment of the populace, production of needed goods and service and overall economic growth. However, the sector is faced with the challenge of becoming flexible and efficient in their manufacturing methods as customer's demand for quality, speed, reliability and service (Awino et al., 2023).

In order to deal with the unpredictable environment that they operate in, the private large manufacturing firms in Nairobi, need different strategies to enable them manage the movement of goods from the source to consumption as they turn to global suppliers (Awino et al., 2020). One such strategy is supply base rationalization (Monczka et al., 2023). Supply base rationalization results in real improvement in manufacturability, design, operational costs, quality, delivery, and improved information sharing between buyer and supplier. And since the process identifies the best suppliers in terms of quality and number, the remaining suppliers become able to improve performance to the buyer- supplier relationship leading to longer term relationships and joint value addition (Ogden et al., 2023; Fawcett et al., 2021; Womak et al., 2021).

Statement of the Problem

The food and beverage manufacturing sector is a key contributor to the economic growth of Kenya, playing a vital role in employment creation, income generation, and food security. As one of the largest manufacturing sub-sectors in the country, it supports numerous ancillary industries, such as agriculture, logistics, packaging, and retail (Ihiga, 2020). Additionally, the sector provides a wide range of essential products to both local and international markets, helping to meet the growing demand for food and beverage products. The success and sustainability of this sector are crucial to Kenya's overall industrialization efforts and its broader development goals, especially in enhancing the country's export potential and reducing poverty (Ochieng, 2021).

Food and beverage manufacturing firms in Nairobi City County, Kenya, face several challenges. Profitability remains a critical challenge for food and beverage manufacturers in Nairobi City County (Kivite, 2021). The sector is faced with high input costs such as raw materials, labor, and energy, which erode profit margins. For example, the 2020 Kenya National Bureau of Statistics (KNBS) report indicated that inflation rates in Kenya had increased by 5.6% that year, significantly raising the costs of imported raw materials, including grains, sugars, and oils—key components for food and beverage manufacturing (Ihiga, 2020). Furthermore, a survey conducted by the Kenya Association of Manufacturers (KAM) in 2021 revealed that over 70% of manufacturers in the food and beverage sector reported difficulty in maintaining profitability due to rising energy costs, with energy prices in Kenya increasing by 10% in the same year. According to the World Bank, the cost of energy in Kenya is approximately 2-3 times higher than the global average, which places additional pressure on manufacturers (Ochieng, 2021). These challenges contribute to the average profit margins of 3-5% reported by food and beverage firms, which is considerably lower than the global average of around 8-10% for similar industries, further highlighting the profitability challenges they face (Kivite, 2021).

Food and beverage firms in Nairobi are facing stiff competition that threatens their market share, especially from both local and international brands. In 2020, the Kenya National Chamber of Commerce and Industry (KNCCI) survey found that 60% of food and beverage companies in Nairobi cited increased competition from new entrants as a significant challenge (Ihiga, 2020). Additionally, imports accounted for approximately 30% of the total food and beverage market in Kenya, with a large portion coming from neighboring countries within the East African Community (EAC) and even Asia. The influx of low-cost imported goods, often undercutting local manufacturers, exacerbates the challenge for local companies, particularly those targeting price-sensitive customers (Ochieng, 2021). Furthermore, changing consumer preferences, especially towards health-conscious and organic food options, have resulted in market fragmentation. A 2020 study by the Food and Agriculture Organization (FAO) revealed that the market for organic food in Kenya had grown by 10% annually, indicating a shift towards healthier product choices (Kivite, 2021). However, local manufacturers often struggle to respond to these changing trends, with only 25% of firms having the necessary infrastructure and R&D capabilities to innovate and meet new consumer demands (Ihiga, 2020).

Customer satisfaction is another major challenge for food and beverage manufacturers in Nairobi, with increasing consumer demand for higher-quality, safe, and consistent products. A 2021 survey by the Consumer Federation of Kenya (COFEK) found that 40% of consumers expressed dissatisfaction with the quality of food and beverage products, with most complaints focused on issues like poor packaging, inconsistent product quality, and contamination (Ochieng, 2021). This survey also highlighted that nearly 15% of respondents had experienced health issues linked to food safety concerns, including foodborne illnesses from improperly handled or poorly stored products. The Kenya Bureau of Standards (KEBS) data from 2020 revealed that 25% of food and beverage products on the market did not meet

national food safety standards, a fact that significantly undermines customer trust in locally produced goods (Kivite, 2021). Additionally, over 50% of customers in the same survey reported that they would choose imported goods over local brands if they perceived them to have better quality assurance and safer packaging. This consumer skepticism is further supported by a 2022 study by the Global Food Safety Initiative (GFSI), which noted that consumer confidence in local food products in Kenya was 35% lower than in other African countries, illustrating the ongoing struggle to maintain customer satisfaction in a competitive market (Ihiga, 2022).

Various studies have been conducted in different parts of the world on supplier base optimization practices on organization performance. However, none of these studies focused on operational cost, lead-time, service quality and technology on performance of food and beverage manufacturing firms in Nairobi City County, Kenya. To fill the highlighted gaps, the current study sought to investigate the influence of supplier base optimization practices (operational cost, lead-time, service quality and technology) on performance of food and beverage manufacturing firms in Nairobi City County, Kenya.

General Objective of Study

The purpose of this study was to investigate the influence of supplier base optimization practices on performance of food and beverage manufacturing firms in Nairobi City County, Kenya

Specific Objectives

i. To examine effect of lead-time on performance of food and beverage manufacturing firms in Nairobi City County, Kenya

ii. To establish effect of technology on performance of food and beverage manufacturing firms in Nairobi City County, Kenya

LITERATURE REVIEW

Theoretical Framework

Deming's theory of Total Quality Management

Deming's theory of Total Quality Management rests upon fourteen points of management he identified, the system of profound knowledge, and the Shewart Cycle (Plan-Do-Check-Act). He is known for his Ratio - Quality is equal to the result of work efforts over the total operational costs. If a company is to focus on operational costs, the problem is that operational costs rise while quality deteriorates. Deming's system of profound knowledge consists of the following four points: System Appreciation – an understanding of the way that the company's processes and systems work. Variation Knowledge - an understanding of the variation occurring and the causes of the variation. Knowledge Theory - the understanding of what can be known. Psychology Knowledge - the understanding of human nature. By being aware of the different types of knowledge associated with an organization, then quality can be broached as a topic. Quality involves tweaking processes using knowledge. Plan-Do-Check-Act (PDCA) is a cycle created for continuous improvement. Hence supplier monitoring in the organization is one way of quality management. The purpose of supplier performance monitoring is to ensure that all legal and contractual arrangements are met in accordance with any agreed standard, specification, contract or order. Hence this theory is relevant to variable two of the study that is supplier monitoring

Resource Dependency Theory

This theory states that firms earn sustained competitive advantage because they have access to strategic resources. These resources have unique characteristics which are rare, valuable, cannot be imitated, and have no close substitute. When these conditions are met, competitive

advantage is created. This theory deals with competitive advantages related to the firm's possession of heterogeneous resources (financial, physical, human, technological, organizational, and reputational) and capabilities (combination of two or more resources) (Grant, 2020). These resources and capabilities constitute the core competence of the particular firm and serve ultimately as its source of competitive advantage (Herbert *et al*., 2020).

The RBV consider a firm's core competence to be its ability to react quickly to situational changes and build further competencies or dynamic capabilities (Eisenhardt & Martin, 2020). Hence, a firm's competitiveness is associated with the configuration of resources and capabilities as the markets evolve. However, inter-organizational relationships may also facilitate and advance the learning processes of individual firms. As such, relationships are not only output-oriented but also learning oriented (Grant, 2020; Herbert *et al*., 2020). Efficiency may not only be explained in terms of productivity or operational measures, but also in terms of the opportunity to access another firm's core competency through cooperative arrangements as an alternative to building such competencies in-house (Haakansson *et al*., 2020). Often, outsourcing decisions are based on the idea of focusing on core competencies and outsourcing complementary competencies to external partners. For example, TPL and outsourcing of standard components and processes enables manufacturing firms to achieve their competitive edge.

Resources and capabilities can only be acquired from the market to a limited degree. Under certain circumstances, firms in the supply chain interact closely on a long-term basis exchanging confidential information. Hence, TPL is both a means of improving the logistics services of the TPL buyer and a way to achieve a mutual transfer of logistics experience (Herbert *et al*., 2020). A long-term mutual commitment and adjustments as well as a customized rather than standardized solution contribute to the uniqueness and heterogeneity of logistics resources and capabilities. Resource based view could help manufacturing firms to understand how to use TPL to shortcut an upcoming need for competence configuration. The primary aim of every company is to maximize the overall value generated throughout logistics process.

Conceptual Framework

A conceptual framework is a model of presentation where a researcher conceptualizes or represents the relationships between variables in the study and shows the relationship graphically or diagrammatically. Mugenda (2018) and Orodho (2018) define a variable as a measurable characteristic that assumes different values among units of specific population. The independent variables of the study were operational cost, lead time, service quality and technology while the dependent variable was performance of food and beverage manufacturing firms in Nairobi City County, Kenya.

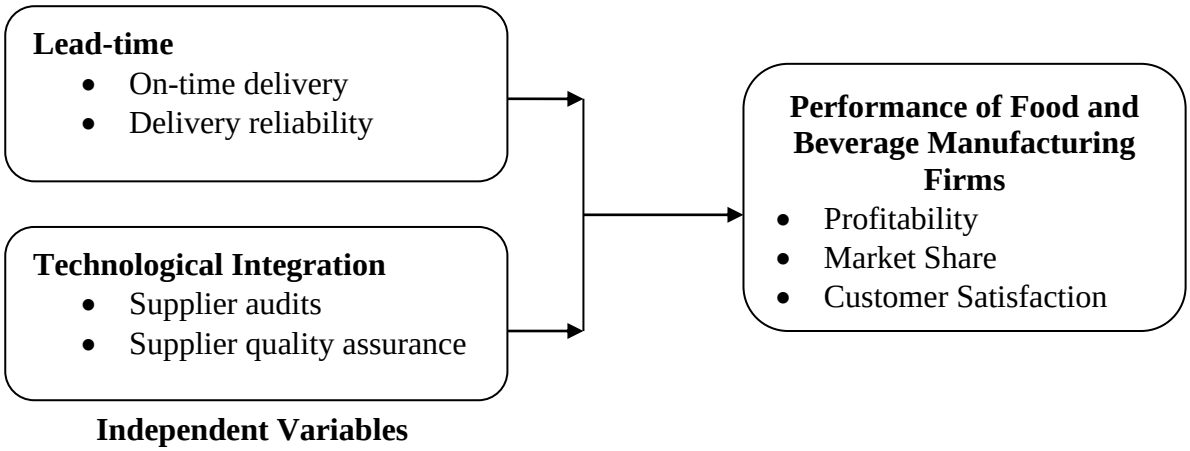

Figure 2. 1: Conceptual framework

Lead-Time

In manufacturing firms, lead-time is important because it sets the timelines for delivery of materials to production schedule. Lead-time is the total time that elapses between an order's placement and its receipt. It includes the time required for order transmittal, order processing, order preparation, and transit (Treville, Shapiro, & Hameri, 2020; Christopher (2020). According to Stewart (2020), an increase in delivery performance is possible through a reduction in lead-time attributes such as on-time delivery, on time orders fill and order completeness. Another aspect of delivery is the percentage of finished goods in transit, which if high signifies low inventory turns, leading to unnecessary increases in tied up capital. Various factors that can influence delivery speed include vehicle speed, driver reliability, frequency of delivery, and location of depots. An increase in efficiency in these areas can lead to a decrease in the inventory levels (Novich, 2020). By comparing these with the previously made agreement, it can be determined whether perfect delivery has taken place or not, and areas of discrepancy can be identified so that improvements can be made. Flexibility of delivery systems to meet particular customer needs can be achieved by meeting a particular customer delivery requirement at an agreed place, agreed mode of delivery and with agreed upon customized packaging. This type of flexibility can influence the decision of customers to place orders, and thus can be regarded as important in enchanting and retaining customers (Novich, 2021).

Lead-time has serious effects on the coordination among logistics partners and thus a key aspect in logistics service. Therefore, lead-time reduction can be viewed as a coordination enabler in supply chain. In some studies, lead time reduction has been viewed as an investment strategy. Lead-time reduction is considerably emphasized in waste reduction, especially in excess inventory. Time-based competition is a competitive strategy and it can be achieved by lead-time reduction. Time-based competition is emphasized in literature solely based on speed and is directly derived from lead time reduction. Nevertheless, another aspect of time-based competition may be the monotonic filling of the orders, which means uniform response time of received orders. This latter aspect of time-based competition can be considered by lead time variance reduction (Forrest, *et al*., 2020). Lead-time uncertainty reduction can be viewed like lead-time reduction because it will promote the responsiveness of the chain by providing products to the customers in less uncertain supply time. The key to successful outsourcing of logistics services lies in finding a supplier base optimization practices provider that has the most strategic fit with the company’s goals.

Technological Integration

Risk is an uncertainty or a potential financial loss inherent in an investment decision. It is a possibility of an outcome deviating from the expected earnings. Risk is an activity or undertaking that may have an adverse impact on the achievement of an objective i.e. outsourcing objective (Lysons & Farrington, 2020). Technology is a systematic process of evaluating the potential risks that may be involved in a projected activity or undertaking. Technology is the process of identifying, analysing and evaluating hazards or uncertainties and determination of the likelihood of occurrence of each risk factor (Tummala, & Schoenherr, 2021).

Outsourcing a supplier base optimization practices provider may introduce or reduce risk to the business of the appointing company. Technology is therefore concerned with identifying and evaluating all potential risks in outsourcing supplier base optimization practices providers. The assessment process allows the risk taker (supplier base optimization practices providers) to develop a risk matrix based on probability of occurrence or vulnerability and device methods to mitigate or safeguard the impact. Technology is synonymous with the assessment of uncertainties and is concerned with the determination of the likelihood of each risk factor (Tummala, & Schoenherr, 2021). Outsourcing may adversely affect company’s performance by increasing its operating operational costs which include staff training to

monitor and communicate the performance of supplier base optimization practices (Ellramet *et al*., 2020). The probability of the anticipated risk occurring or not occurring at all is a matter of the judgement of the risk assessor on the outsourced company.

Outsourcing of Supplier base optimization practices play a crucial role in spreading logistics risk and it is important for a company to select the right supplier base optimization practices providers from the beginning. In order to qualify for appointment, the supplier base optimization practicess providers should possess the necessary processes, quality, technology, employees and equipment (Kumar & Eichhoff, 2020). Lonsdale and Cox (2020) suggest that supplier base optimization practicess provider's selection must be carried out by use of a cross functional team that ensures that all aspects are taken into account. There are no universal selections criteria for supplier base optimization practicess providers but instead, factors depend on the objectives that are sought for (Lonsdale & Cox, 2020). The selection of supplier base optimization practices providers maybe be based on various factors including; previous performance, capacity, operational cost, lead-time, technology, quality and among others (Aron *et al*., 2020). Through technology, a company is able to reveal the risks associated with logistics service provision and put in place appropriate mitigating measures.

Empirical Review

Lead-Time and Organization Performance

Mukasa, (2020), discussed effects of supply chain management practices on performance in the telecommunication industry in Kenya. The study found that indeed supply chain management practices affect the organizational performance. However, this study was general in referring to supply chain management practices and not specific areas of supply chain management that affect performance. The study was also particular to the telecommunication industry and hence not sufficient for generalization of its findings in all other sectors.

Kamau (2021) in the study of the relationship between Buyer-supplier relationships and business performance among large manufacturing firms in Nairobi, Kenya concluded that Buyer-supplier relationships had assisted the large manufacturing firms in enhancing the performance of their organizations. The study though pointed out that indeed a supplier relationship improved performance, it had a general application on relationships but did not focus on supplier development concepts. By maintaining healthy relationships with their suppliers, manufacturing firms ensure that they perform well and also help the suppliers themselves to perform well and also achieve their goals. More research on other supplier base optimization practices would be necessary to establish how such would influence operational performance.

Technological Integration and Organization Performance

PohLean, *et al* (2020) examines the mediation role of supplier base optimization practices on the influence of power asymmetry and competition intensity on supplier performances. The framework pieced together an idea from the marketing literature and organization theory. Based on the study, high involvement work practices (HIWP) in an organization are indeed important as it mediates the influence of competition intensity on supplier quality and flexibility. The study also showed that no single formula could fit all situations. Managers need to understand its supplier base optimization practices to better leverage organizational context of competition and power in managing performance.

Frohlich and Westbrook (2020) reported a growing consensus concerning the strategic importance of integrating suppliers, manufacturers, and customers into value/supply chains. Firms need complementary cognitive competence from partners to appreciate opportunities and threats they could not have appreciated themselves. By engaging in specific investments,

one may develop a unique competence value for the partner, which makes the other party dependent too.

Shalle, Guyo, & Amuhaya, I.M. (2021) Concluded that buyer/supplier collaboration enhances procurement performance hence creating a competitive advantage through sharing information making a joint decision, inter-organizational relationship. This indicates that the level of supply chain collaboration has a critical interaction effect on the relation between external resources and buying firm performance, where collaborative forms of buyer-supplier exchange facilitate greater access to external resources. The findings are a pointer to the responsiveness; flexibility, commitment and the belief of the trading partners are willing to devote energy to sustaining the relationship.

RESEARCH METHODOLOGY

Research Design

Research design refers to a detailed outline of how the overall strategy integrates the different components of the study in a coherent and logical way to effectively address the research problem. It is the plan on how to answer research questions (Saunders, Lewis & Thornhill, 2017). This study adopted cross-sectional survey design using both quantitative and qualitative approaches. Quantitative approach emphasizes measurement and data is analyzed in a numerical form to give precise description. According to Mugenda (2018), quantitative approach also known as the scientific method has traditionally been considered as the traditional mode of inquiry in both research and evaluation. Quantitative approach places emphasis on methodology, procedure and statistical measures to test hypothesis and make predictions. Qualitative research helps in analyzing information in a systematic way in order to come to some useful conclusions and recommendations on the social settings and the individuals who portray those characteristics. Cross-sectional survey design was adopted for this study. Cross-sectional survey design helps in hypothesis formulation and testing the analysis of the relationship between variables (Kothari, 2018).

Target Population

A population is the total of all the individuals or items that have certain characteristics which are of interest to a researcher. Mugenda (2018) describes target population as a complete set of individual cases object with some common characteristics to which researchers want to generalize the result of the study. The target population of this study was 130 registered food and beverage manufacturing firms in Kenya as per KAM Directory 2023. The study targeted management employees as shown in Table 1

Sample and Sampling Technique

According to Eric and Marko (2017) sampling is the process of selecting a few individuals for a study in such a way that the individual represents a larger group from which they are selected. A sample is a small group obtained from accessible population (Mugenda & Mugenda 2018). The Yamane formula was adopted to calculate the study sample size as follows;

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

Where n is the sample size, and N is the population size, e- acceptable sampling error (0.05)

$$= \frac{780}{1+780\ (0.05^2)}$$

$= \frac{780}{2.95} = 264.41$

n≈ 264

Therefore, the study sample size was 264 respondents.

Table 1: Sample Size

Category	Target Population	Sample Size
Top Managers	130	44
Middle Managers	260	88
Lower Managers	390	132
Total	**780**	**264**

Data Collection Instruments

A questionnaire was developed to capture the various variables under study, and for the independent variables. A questionnaire is a research instrument that gathers data over a large sample and its objective is to translate the research objectives into specific questions, and answers for each question provide the data for hypothesis testing. The advantages of a questionnaire over other instruments include: information can be collected from large samples, no opportunity for bias since it is presented in paper form and confidentiality is upheld. The questionnaire contains both closed and open ended questions. The closed ended questions aimed at giving precise information which minimized information bias and facilitated data analysis, while the open ended questions gave respondents freedom to express themselves.

Pilot Test

Pilot test refers to the preliminary study conducted to evaluate feasibility and statistical variability in an attempt to predict an appropriate sample size and improve upon the study design prior to performance of a full-scale investigation. The aim of pilot study is to test the reliability of the questionnaires. According to Sekeran (2019) a pilot test is necessary for testing the reliability of data collection instruments. Pilot study is thus conducted to detect weakness in design and instrumentation and to provide accurate data for selection of a sample (Cooper & Schindler, 2018). In this study, 10% of the questionnaires were pilot tested on 26 manufacturing firms that were part of the target population but not in the sample in order to get the correct feedback (Mugenda 2018).

Data Analysis and Presentation

The returned and duly filled questionnaires were verified, coded and tallied according to the themes and thereafter the quantitatively and qualitatively analyzed through the use of tables and figures. The findings of the survey were analyzed. Quantitative analysis was done and results presented in tables and figures. This analysis was based on the responses obtained from the respondents. Inferential data analysis was carried out by the use of factor analysis and correlation analysis to determine the strength and the direction of the relationship between the dependent variable and the independent variables. Regression model was fitted and hypothesis testing carried using linear regression analysis and standard F tests. The tool for data analysis was SPSS version 24.

According to Mugenda and Mugenda (2018), linear regression analysis attempts to determine whether a group of variables together predict a given dependent variable and in this way, attempt to increase the accuracy of the estimate.

RESEARCH FINDINGS AND DISCUSSION

Descriptive Statistics Analysis

Descriptive statistics entails measures of central tendency (mean), measures of dispersion (standard deviation), frequencies and percentage (Russell, 2019). This study used descriptive statistics with the help of Statistical Package for Social Sciences to analyze the study variables.

Lead-Time and Organization Performance

The second specific objective of the study was to determine effect of lead-time on performance of food and beverage manufacturing firms in Nairobi City County, Kenya. The respondents were requested to indicate their level of agreement on various statements relating to lead-time and performance of food and beverage manufacturing firms in Nairobi City County, Kenya. A 5 point Likert scale was used where 1 symbolized strongly disagree, 2 symbolized disagree, 3 symbolized neutral, 4 symbolized agree and 5 symbolized strongly agree. The results were as presented in Table 2.

As shown in the results, the respondents agreed that the firm has structured and segmented suppliers as suppliers of critical items and engaged in collaborative ties with them. This is shown by a mean of 3.975 (std. dv = 1.000). In addition, with a mean of 3.937 (std. dv = 0.858), the respondents agreed that the firm ensures that the suppliers meet product performance requirements. The respondents also agreed that the firm ensures that the suppliers demonstrate delivery capability. This is supported by a mean of 3.837 (std. dv = 0.941).

With a mean of 3.748 (std. dv = 0.955), the respondents agreed that the firm has structured and segmented suppliers as suppliers of leverage items and standardized specifications to make supplier switching easier, and also use competitive bidding to secure best deals. The respondents also agreed that the firm ensures that the suppliers demonstrate sustained production competency. This is supported by a mean of 3.735 (std. dv = 0.984). In addition, as shown by a mean of 3.734 (std. dv = 0.950), the respondents agreed that the firm ensures that the suppliers meet the technical requirements.

As shown in the results, the respondents agreed that the firm has structured and segmented suppliers as suppliers of bottleneck items and developed alternative suppliers as well as penalties in contracts to ensure reliability of suppliers. This is shown by a mean of 3.717 (std. dv = 0.958). In addition, with a mean of 3.655 (std. dv = 0.850), the respondents agreed that the firm has structured and segmented suppliers as suppliers of non-critical items and employed blanket ordering and vendor managed inventory techniques. The respondents also agreed that the firm ensures that the suppliers demonstrate willingness to share information. This is supported by a mean of 3.651 (std. dv = 0.981).

Table 2: Lead-Time and Organization Performance

	Mean	Std. Deviation
The firm ensures that the suppliers meet the technical requirements	3.734	0.950
The firm ensures that the suppliers meet product performance requirements	3.937	0.858
The firm ensures that the suppliers demonstrate sustained production competency	3.735	0.984
The firm ensures that the suppliers demonstrate delivery capability	3.837	0.941
The firm ensures that the suppliers demonstrate willingness to share information	3.651	0.981
The firm has structured and segmented suppliers as suppliers of critical items and engaged in collaborative ties with them	3.975	1.000
The firm has structured and segmented suppliers as suppliers of leverage items and standardized specifications to make supplier switching easier, and also use competitive bidding to secure best deals	3.748	0.955
The firm has structured and segmented suppliers as suppliers of non-critical items and employed blanket ordering and vendor managed inventory techniques	3.655	0.850
The firm has structured and segmented suppliers as suppliers of bottleneck items and developed alternative suppliers as well as penalties in contracts to ensure reliability of suppliers	3.717	0.958
Aggregate	**3.721**	**0.906**

Technology Integration and Organization Performance

The second specific objective of the study was to determine effect of technology on performance of food and beverage manufacturing firms in Nairobi City County, Kenya. The respondents were requested to indicate their level of agreement on various statements relating to technology and performance of food and beverage manufacturing firms in Nairobi City County, Kenya. A 5 point Likert scale was used where 1 symbolized strongly disagree, 2 symbolized disagree, 3 symbolized neutral, 4 symbolized agree and 5 symbolized strongly agree. The results were as presented in Table 3.

As shown in the results, the respondents agreed that the firm has categorized its spend and identified current and potential suppliers for each category. This is shown by a mean of 3.973 (std. dv = 0.858). In addition, with a mean of 3.955 (std. dv = 0.688), the respondents agreed that technological integration influences organization performance. The respondents also agreed that in their firm, supplier audits are done electronically. This is supported by a mean of 3.844 (std. dv = 0.910).

With a mean of 3.807 (std. dv = 0.752), the respondents agreed that the organization as improved in terms of technology adoption. The respondents also agreed that in their firm, supplier quality assurance is conducted electronically. This is supported by a mean of 3.786 (std. dv = 0.987). In addition, as shown by a mean of 3.893 (std. dv = 0.859), the respondents agreed that the firm has identified the right number of suppliers to deal with in an effort to maximize customer value.

With a mean of 3.605 (std. dv = 0.800), the respondents agreed that they are satisfied with the level of technology adoption in the firms. The respondents also agreed that Most of the operations in the firm are automated. This is supported by a mean of 3.582 (std. dv = 0.984)

Table 3: Technology and Organization Performance

	Mean	Std. Deviation
The firm has identified the right number of suppliers to deal with in an effort to maximize customer value	3.893	0.859
The firm has categorized its spend and identified current and potential suppliers for each category	3.973	0.858
Technological integration influences organization performance	3.955	0.688
The organization as improved in terms of technology adoption	3.807	0.752
Most of the operations in the firm are automated	3.582	0.984
Am satisfied with the level of technology adoption in the firms	3.605	0.800
In our firm, supplier audits are done electronically	3.844	0.910
In our firm, supplier quality assurance is conducted electronically	3.786	0.987
Aggregate	**3.817**	**0.801**

Performance of Food and Beverage Manufacturing Firms

Performance of food and beverage manufacturing firms in Nairobi City County, Kenya was measured in terms of profitability, market share and customer satisfaction. The study results were presented through use of figures.

Profitability

The respondents were requested to rate the level of improvement in the profitability of their firm between 2015-2019. The results were as shown in Figure 1. From the results profitability improved from 11% to 13% in 2015 and 2016 respectively, in 2017, flexibility was at 12% which improved to 15% and then 18% in 2018 and 2019 respectively.

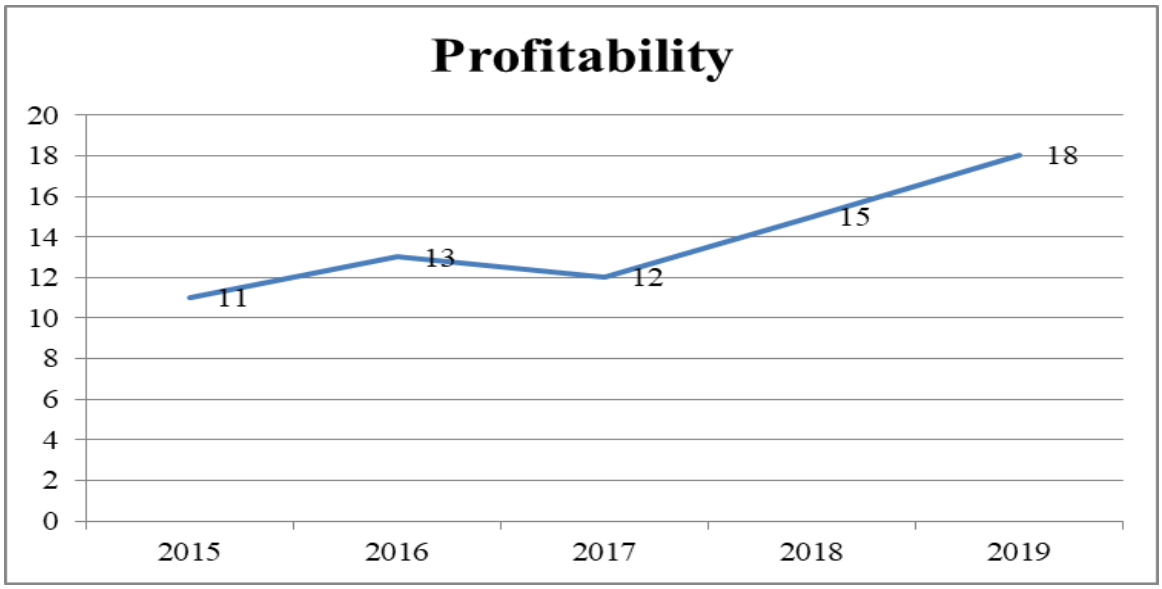

Figure 1: Profitability

Flexibility

The respondents were requested to rate the level of improvement in the flexibility of their firm between 2015-2019. The results were as shown in Figure 2. From the results flexibility improved from 21% to 24% in 2015 and 2016 respectively, in 2017, flexibility was at 23% which improved to 26% and then 32% in 2018 and 2019 respectively.

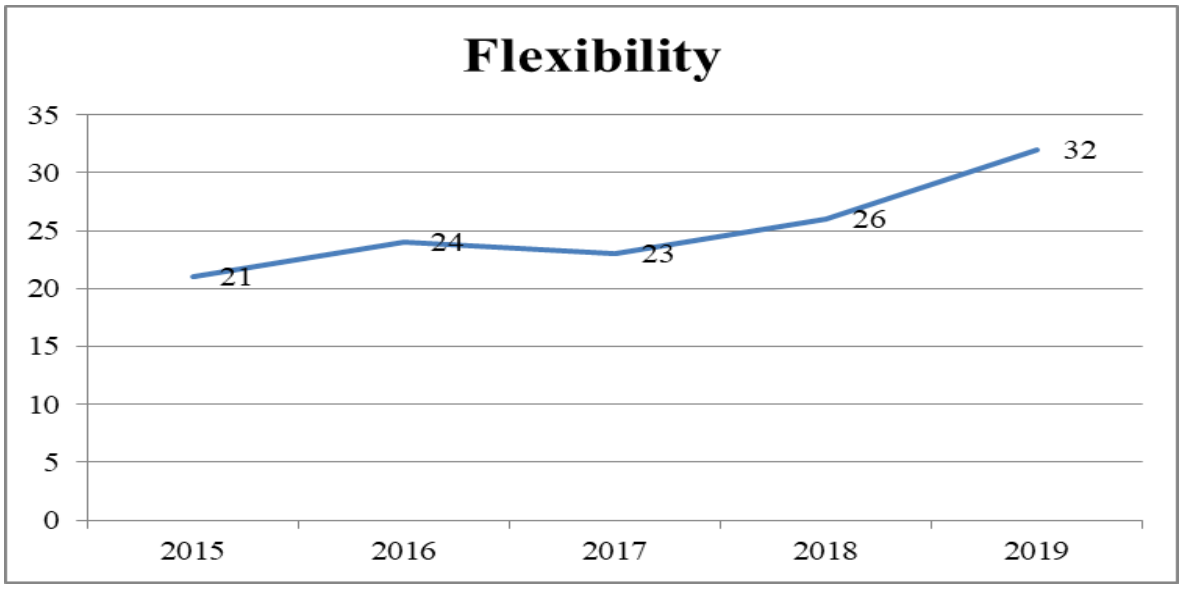

Figure 2: Flexibility

Delivery Time

The respondents were requested to rate the level of improvement in the delivery time of their firm between 2015-2019. The results were as shown in Figure 3. From the results delvery time reduced from 22% to 18% in 2015 and 2016 respectively, in 2017, delivery time was at 19% which improved to 16% and then 14% in 2018 and 2019 respectively.

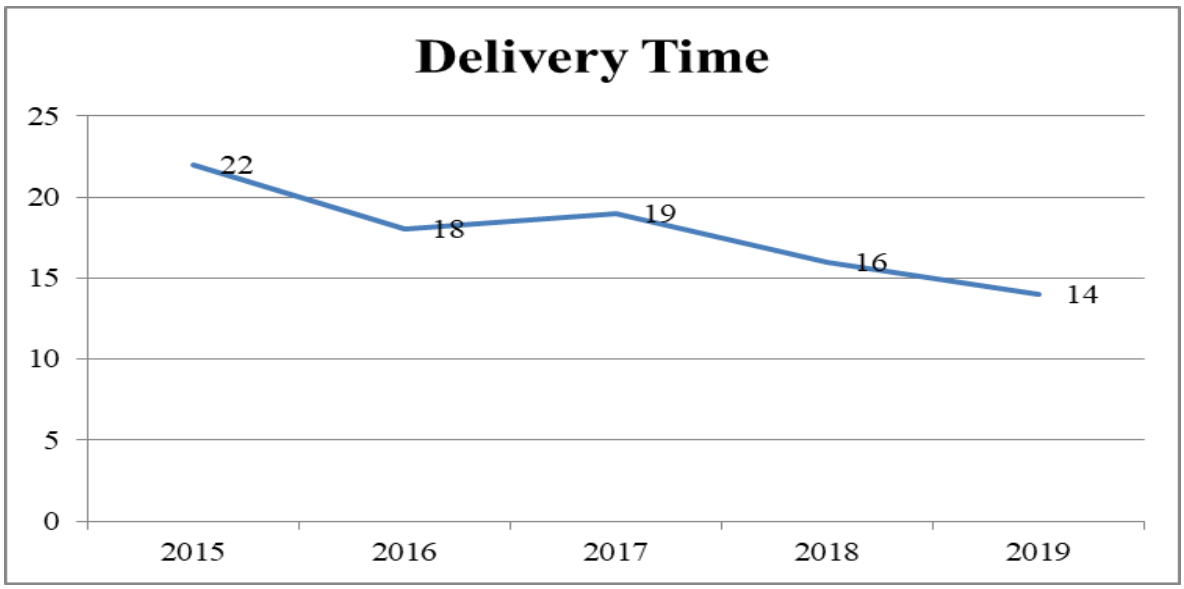

Figure 3: Delivery Time

Correlation Analysis

The present study used Pearson correlation analysis to determine the strength of association between independent variables (lead-time and technology integration) and the dependent variable (performance of food and beverage manufacturing firms in Nairobi City County, Kenya). Pearson correlation coefficient range between zero and one, where by the strength of association increase with increase in the value of the correlation coefficients.

Table 4: Correlation Coefficients

		Organization Performance	Lead-Time	Technology Integration
Organization Performance	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	233		
lead-time	Pearson Correlation	.895**	1	
	Sig. (2-tailed)	.000		
	N	233	233	
Technology Integration	Pearson Correlation	.820**	.145	1
	Sig. (2-tailed)	.001	.089	
	N	233	233	233

The results revealed that there was a very strong relationship between lead-time and performance of food and beverage manufacturing firms in Nairobi City County, Kenya (r = 0.895, p value =0.000). The relationship was significant since the p value 0.000 was less than 0.05 (significant level). The findings are in line with the findings of Njeru (2023) who indicated that there is a very strong relationship between lead-time and organization performance.

The results also revealed that there was a very strong relationship between technology integration and performance of food and beverage manufacturing firms in Nairobi City County, Kenya (r = 0.820, p value =0.001). The relationship was significant since the p value 0.001 was less than 0.05 (significant level). The findings are in line with the findings of Kannan and Choon Tan (2022) who indicated that there is a very strong relationship between technology integration and organization performance.

Regression Analysis

Multivariate regression analysis was used to assess the relationship between independent variables (lead-time and technology integration) and the dependent variable (performance of food and beverage manufacturing firms in Nairobi City County, Kenya).

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.919[a]	.845	.847	.11672

a. Predictors: (Constant), lead-time and technology integration

The model summary was used to explain the variation in the dependent variable that could be explained by the independent variables. The r-squared for the relationship between the independent variables and the dependent variable was 0.845. This implied that 84.5% of the variation in the dependent variable (performance of food and beverage manufacturing firms in Nairobi City County, Kenya) could be explained by independent variables (lead-time and technology integration).

Table 6: Analysis of Variance

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	118.027	2	59.01	1134.885	.000[b]
	Residual	5.968	228	.026		
	Total	123.995	232			

a. Dependent Variable: performance of food and beverage manufacturing firms in Nairobi City County, Kenya

b. Predictors: (Constant), lead-time and technology integration

The ANOVA was used to determine whether the model was a good fit for the data. F calculated was 1134.885 while the F critical was 2.411. The p value was 0.000. Since the F-calculated was greater than the F-critical and the p value 0.000 was less than 0.05, the model was considered as a good fit for the data. Therefore, the model can be used to predict the influence of lead-time and technology integration on the performance of food and beverage manufacturing firms in Nairobi City County, Kenya.

Table 7: Regression Coefficients

	Unstandardized Coefficients		**Standardized Coefficients**	**t**	**Sig.**
	B	**Std. Error**	**Beta**		
(Constant)	0.353	0.079		4.468	0.003
Lead-Time	0.402	0.106	0.403	3.792	0.002
Technology Integration	0.411	0.087	0.412	4.724	0.000

a Dependent Variable: performance of food and beverage manufacturing firms in Nairobi City County, Kenya

The regression model was as follows:

$$\mathbf{Y = 0.353+0.402X_1 + 0.411X_2 +\varepsilon}$$

The results revealed that lead-time has a significant effect on performance of food and beverage manufacturing firms in Nairobi City County, Kenya β1=0.402, p value= 0.002). The relationship was considered significant since the p value 0.002 was less than the significant level of 0.05. The findings are in line with the findings of Njeru (2023) who indicated that there is a very strong relationship between lead-time and organization performance.

In addition, the results revealed that technology integration has a significant effect on the performance of food and beverage manufacturing firms in Nairobi City County, Kenya β1=0.411, p value= 0.000). The relationship was considered significant since the p value 0.000 was less than the significant level of 0.05. The findings are in line with the findings of Kannan and Choon Tan (2022) who indicated that there is a very strong relationship between technology integration and organization performance.

Conclusions

The study concludes that lead time has a significant effect on the performance of food and beverage manufacturing firms in Nairobi City County, Kenya. Findings revealed that on-time delivery and delivery reliability influence performance of food and beverage manufacturing firms in Nairobi City County, Kenya.

The study also concludes that technological integration has a significant effect on the performance of food and beverage manufacturing firms in Nairobi City County, Kenya. Findings revealed that supplier audits and supplier quality assurance influence performance of food and beverage manufacturing firms in Nairobi City County, Kenya.

Recommendations

The study recommends that the management of food and beverage manufacturing firms in Kenya should streamline their supply chain and adopt real-time inventory management systems to reduce lead-time. By minimizing delays in sourcing raw materials and accelerating the production-to-distribution cycle, firms can respond more quickly to market demands, reduce stockouts and overproduction, and enhance customer satisfaction.

The study also recommends that the management of food and beverage manufacturing firms in Kenya should invest in automation and digital technologies to optimize production processes and improve operational efficiency. By integrating technologies, firms can enhance production speed, reduce human error, and minimize waste.

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