

**INVENTORY MANAGEMENT PRACTICES AND PERFORMANCE OF SUGAR
MANUFACTURING FIRMS IN KENYA**

BY

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**MASTER OF BUSINESS ADMINISTRATION IN PROCUREMENT AND LOGISTICS
MANAGEMENT**

KCA UNIVERSITY

2025

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE AWARD OF MASTER OF BUSINESS
ADMINISTRATION IN PROCUREMENT AND LOGISTICS MANAGEMENT IN THE
SCHOOL BUSINES AT KCA UNIVERSITY**

DECEMBER, 2025

DECLARATION

I declare that this dissertation is my original work and has not been previously published or submitted elsewhere for award of a degree. I also declare that this contains no material written or published by other people except where due reference is made and author duly acknowledged.

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Dr. Jackson Ndolo

ABSTRACT

In Kenya, sugar manufacturing firms face challenges relating to inventory management that hampers their operations. It is evident that inventory management practices are crucial in improving the performance of any manufacturing firm but few studies have examined the effects of different inventory practices in the performance of sugar manufacturing firms in the country. The main objective of the study was to establish the effect of inventory management practices on performance of sugar manufacturing firms in Kenya. The specific objectives of the study were to; analyze the effect of Economic Order Quantity adoption on performance, evaluate the effect of vendor managed inventory practice on performance, establish the effect of ABC analysis on performance and assess the effect of Just in Time production technique on performance of sugar manufacturing firms in Kenya. The study was guided by scientific management theory, lean theory, contingency theory and system theory. Descriptive research design was adopted by the study. The study targeted 105 respondents comprising of 15 Factory managers, 15 Supply chain managers, 15 Operations managers, 15 Sales and distribution managers, 15 Finance managers, 15 Warehouse supervisors and 15 Marketing managers. Census sampling approach was utilized where all the respondents participated in the study during data collection. Pilot test was conducted at Chemelil Sugar Company Ltd. Reliability was tested using Cronbach's alpha. Validity of research instruments was tested using KMO test and Bartlett's test. Data was analyzed using descriptive statistics such as, frequency and percentages and inferential statistics such as correlation and regression analysis. Diagnostic tests such as normality test, autocorrelation test, heteroscedasticity test, and multicollinearity test were conducted. The results were presented using Tables and Figures. The correlation results indicated that economic order quantity, vendor managed inventory, ABC Analysis and Just in time had a correlation coefficient of 0.885, 0.891, 0.894 and 0.898 each with a p value of 0.000 respectively indicating a positive and significant relationship between each of the independent variable and the dependent variable. The results indicated an R^2 value of 0.220 depicting that 22.0% of the variation in company performance is accounted for by the collective impact of the inventory management practices analyzed. Regression results indicated that economic order quantity, vendor managed inventory, ABC Analysis and Just in time had a regression coefficient of 0.466, 0.405, 0.245, and 0.285, respectively indicating positive and significant effect on performance of sugar manufacturing firms. The study concluded that economic order quantity, vendor managed inventory, ABC Analysis and Just in time had a positive and significant effect on performance of sugar manufacturing firms. The research recommended that sugar production companies should establish EOQ practices by routinely calculating optimal order quantities to reduce holding and ordering expenses. The study also recommended that companies work together with suppliers to create and implement delivery timelines that match production needs, guaranteeing prompt and sufficient restocking. The study also suggested that sugar should conduct periodic assessments and revisions of ABC inventory classifications to align with existing consumption trends and worth. Future researchers should investigate why EOQ principles are not consistently applied or integrated into inventory management systems.

ACKNOWLEDGEMENT

I want to extend my heartfelt thanks to God for providing me with the strength and determination needed to finish this research. I am truly grateful to my supervisor, Dr. Jackson Ndolo, for their essential guidance and assistance. I am also grateful to the management and employees of the sugar production companies who supplied crucial information for this research. Heartfelt gratitude is extended to my teachers, peers, and friends for their support, and most significantly, to my family for their love, patience, and steadfast faith in me.

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DEDICATION

This research is devoted to my dear family for their constant support, motivation, and prayers during my educational journey. Their faith in my abilities has consistently provided strength and inspiration. I dedicate this work to all the professionals working to enhance operational efficiency and performance in Kenya's manufacturing industry.

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ACCRONYMS AND ABBREVIATION

ABC analysis	Always Better Control Analysis
EOQ	Economic Order Quantity
JIT	Just in Time
RBV	Resource-Based View Theory
SCM	Supply Chain Management
SPSS	Statistical package for social science
VMI	Vendor Managed Inventory

OPERATIONAL DEFINITION OF TERMS

inventory management practices	This study defines inventory management practices as the procedures, methods and policies used by the sugar manufacturing firms to manage their inventories (Ndiwa, 2022).
Economic Order Quantity	This is the process of using a particular inventory model that calculates the most appropriate order size for replenishment of inventory which will help to reduce both the ordering costs and holding cost for the sugar manufacturing firms in Kenya (Kehinde, Ogunnaike, & Adegbuyi, 2020).
Vendor Managed Inventory	This refers to the situation wherein inventory control functions are delegated to the supplier. In this system the vendor is directly responsible for managing the inventory levels of the firm and is also responsible for restocking the inventory when necessary, so that the firm does not have to constantly keep track of it (Hassan, 2021).
ABC analysis	This is a classification technique used in managing inventories wherein the inventory is classified into three groups: group A, group B, and group C depending on the value and usage frequency of the inventory. The items under category A are valuable but not many; the items under B are moderately

valuable, while the items under C are of low value but many (Kingori, 2023).

Just in Time production Refers to an inventory management strategy that emphasizes producing and receiving inventory only when needed in the production process (Kibisu, 2020).

Organization performance This is defined as the efficiency and success of a sugar manufacturing firm in terms of the performance indicators such as profitability, operational efficiency, cost control, productivity, and customer satisfaction (Wakhisi, 2021).

Sugar firms These are companies that specialize in the production of sugar from products such as sugarcane or sugar beet. Some of these firms engage in the extraction of sugar while others are involved in the refining and packaging of sugar products (Altaf & Ali, 2023).

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

In the today's dynamic and volatile world, different industries have to look for new and better ways of doing business in order to thrive. Companies in developed countries especially those in the manufacturing industry have realized the importance of operating efficiently especially in managing inventories (Opoku et al., 2020). The necessity of good inventory management practices for improving the performance of an organization is evident as organizations strive to cut down on costs and ensure that they have their products available in their supply chain networks. It is therefore important to determine how various inventory management practices affect performance of industries as they grow and adapt over time especially for industries in the sugar manufacturing sector (Julius, 2024).

1.1.1 Inventory Management Practices

The management of inventories is crucial to the survival of manufacturing organizations, especially those in industries such as the sugar manufacturing industry where raw materials, production and distribution can be challenging. Inventory management refers to the process of developing and implementing proper procedures and policies on the number of stocks a firm needs to keep in order to meet its clients' demands at an agreed upon time with minimal cost. To the sugar manufacturing firms in Kenya, inventory management is crucial in handling of issues to do with raw materials in as far as procurement and distribution are concerned (Ndiwa, 2022).

One of the best practices of inventory management is Economic Order Quantity (EOQ). EOQ is a formula that aids in the determination of optimum order quantity which will cost less in terms of holding and ordering costs. Therefore, the use of EOQ by sugar manufacturers would help

them avoid the problem of overstocking and hence lead to low storage costs besides improving on the production processes. The application of EOQ helps the firms to keep the inventory at optimum levels hence avoiding the worst situation of stock out that causes the manufacturing process to be stopped due to lack of raw materials (Mondol, 2021).

Another practice is the Vendor Managed Inventory (VMI) where the supplier takes the responsibility to manage inventories. VMI helps the manufacturer to have a closer relationship with suppliers so that inventory levels can be checked and restocked on a more frequent basis. This helps decrease the possibilities of stock out situations, also means that manufacturers do not have to hold excess inventory and that suppliers handle inventory issues. To Kenyan sugar manufacturers, this means that VMI can ensure effective supply chain management and availability of raw materials (Oboge et al., 2024).

Another common method of inventory control is the ABC analysis which classifies the items according to their value and their turnover rates. This saves firms cost by directing its efforts on major inputs that attract high traffic and turnover, to help ensure that key inputs get the attention they need to prevent disruptions in production. ABC analysis can help sugar manufacturers to control their resources effectively, determine the necessary quantity of products in stock and increase the productivity of the company (Rutto & Omwenga, 2023).

The last is the Just-In-Time (JIT) inventory control technique that aims at keeping a company's inventories to a minimum by manufacturing goods as they are required in the production line. JIT is effective in cutting down the cost of holding much inventory and makes for a smooth process flow. The implementation of JIT in Kenyan sugar manufacturers can help in the elimination of waste, proper management of cash, and better use of resources. However, JIT calls

for the right inventory to be delivered at the required time, which often involves the collaboration between suppliers and production units (Cheptoo, Kiongera, & Rutto, 2024).

1.1.2 Performance of sugar manufacturing firms

Performance is an important indicator of the effectiveness of a firm in achieving its strategic objectives and market competitiveness. It involves factors such as profits, productivity, market and customer satisfaction levels. The performance of sugar manufacturing firms can be measured by both financial and operational indicators, including Profitability, Costs and time factors which include; Production rates, Resource utilization, and delivery time. Enhancing performance means the improvement of costs, speed of response to market needs, and efficiency of business operations (Wakhisi, 2021).

When it comes to the manufacturing industries, enhancement of performance through inventory management is quite evident. For instance, business firms operating in the Pakistan have realized that when acceptance of inventory management solutions, many costs associated with inventory, storage, and ordering can be cut down to the bare minimum (Altaf & Ali, 2023). In Canada especially, those that have put in place such practices not only get better financial results but also gain a competitive advantage in the market. These countries have provided the best example that demonstrates how inventory management impacts performance (Opoku et al., 2020).

Currently, the sugar industry plays a significant role in the development of the African countries such as Nigeria and South Africa among others. Consequently, the sugar manufacturers in these countries are also experiencing some problems such as poor inventory management, constrained logistics and shifting market environments. African sugar industry has relied on poor infrastructure and lack of good inventory management equipment. On the other hand, in the region,

factors such as; EOQ and JIT have been effective ways to enhance production efficiency and cost (Akinlabi, 2021).

The sugar industry of Kenya has several problems that are associated with its production capacity, one of which is the problem of inventory management which has negative impacts on the productivity of this sector. The proper management of inventory to ensure that there is an optimal level of raw materials and finished goods, is crucial for optimizing the performance of an organization. This is because a well-managed inventory minimizes the risks of production downtimes, stock out and wastage which are costly to any firm in terms of profitability and time. To Kenyan sugar manufacturers, performance is more than just the ability to generate profits and revenues but a fine-tuning of its business to deliver a product that meets the market standards of Kenyan and international markets (Mondol, 2021).

Another important factor is that performance is directly related to how resources are allocated and the decisions made within the organization. In the sugar manufacturing industry, there is high raw material dependency and this makes production costs to be a key factor affecting the profitability of a firm. Inventory management within an organization is crucial since it plays a direct role in determining the balance between stock, supply, and control over losses. To the Kenyan sugar manufacturers, striking this balance is crucial in enhancing their performance. Therefore, identifying the factors that affect the relationship between inventory management and performance is important in the sustainability of firms in the sector (Kingori, 2023).

It has been identified that the implementation of contemporary inventory management systems can have a positive impact on performance indicators. They also benefit from better cash flow, operational efficiency, as well as the ability to meet customer needs with better inventory management. Through the assessment of the relationship between inventory management and the

general performance of Kenyan organizations, this study aims at offering the following recommendations to the Kenyan sugar firms in order to enhance their competitiveness and growth in the long-run (Ndiwa, 2022).

1.1.3 Sugar manufacturing firms in Kenya

The Kenyan sugar industry is a very important sub-sector of the Kenyan economy and the agricultural sector in particular. It is a very important sector in as much as it offers employment opportunities and boosts the development of rural areas. It also provides direct and indirect employment to people where at least 50% of the population is dependent on this industry (FAO 2023). However, the Kenyan sugar industry still has various challenges such as poor production techniques, instable supply chain, and volatile global prices for sugar. These issues have led to low-capacity utilization of production in local sugar mills, situations that are not favorable to the profitability of sugar manufacturers (Altaf & Ali, 2023).

Some of the major challenges affecting Kenyan sugar manufacturers include the following: Inadequate systems of inventory management. Lack of effective inventory management results in high costs in production, time delays and wastage of resources. These inefficiencies limit the exploitation of production capacity by firms and reduces their capacity to meet local demand for sugar. In addition, issues in raw material sourcing particularly sugarcane are also some of the reasons that hinder the efficiency of the industry. These problems are further compounded by ineffective inventory management leading to high production costs and poor profitability (Akinlabi, 2021).

Government policies and regulation also have a great influence on the operations of sugar manufacturers in Kenya. The measures such as the price controls on sugar, subsidies for local producers of sugarcane and the ban on the importation of sugar are policies meant to protect the

local industries. However, these policies also present problems to manufacturers who want to innovate how they manage their inventories. The regulatory environment, together with supply chain issues limits the growth of the industry in many ways (Ndiwa, 2022).

To tackle these challenges, Kenyan sugar manufacturers need to employ best practices in inventory management that will enhance efficiency of production, costs reduction and effective supply chain management. The inventory issues faced in the industry can be solved by different strategies such as EOQ, VMI, ABC analysis, and JIT. Therefore, by adopting these strategies, firms can improve their performance, minimize wastage, as well as ensure improved product availability to the local and international market hence increasing their competitiveness (Cheptoo et al., 2024).

The Kenyan sugar industry is currently facing challenges most of which relate to issues of production, sourcing of raw materials and stock. Despite this, the sector has been lagging as to the effective supply chain management practices and outdated business practices. This research is crucial in examining how various inventory management practices that include EOQ, VMI, ABC Analysis, and JIT affect the performance of organizations in Kenyan sugar manufacturing sector. Through the use of successful global and regional case studies, this research will be useful in providing solutions on how Kenyan sugar firms can overcome operation challenges that affect their competitiveness in the local and global markets. In light of this, it is imperative to examine the correlation between inventory management and performance in Kenya's sugar industry for sustainability (Korir et al., 2021).

1.2 Statement of the problem

The sugar sector is essential for the economic growth of numerous developing nations, especially in Africa, where it fosters job creation, industrial advancement, and contributes to national revenue. In Kenya, the sugar industry plays a vital role in the agricultural economy, providing direct employment for over 100,000 individuals and aiding more than 60,000 smallholder farmers (Ochieng, 2021). Notwithstanding this importance, the industry has faced ongoing inefficiencies, especially in inventory control. Despite the widespread adoption of inventory methods like Economic Order Quantity (EOQ), Just in Time (JIT), ABC Analysis, and Vendor Managed Inventory (VMI) in global supply chains aimed at lowering costs and enhancing responsiveness, the Kenyan sugar sector still experiences challenges with inadequate stock management, elevated inventory holding expenses, regular stockouts, and delays in production.

Numerous studies have pointed out the operational difficulties encountered by sugar manufacturing companies in Kenya. For example, Cheptoo et al., (2024) discovered that numerous sugar companies face significant expenses due to either maintaining excessive inventories or encountering frequent shortages, both of which adversely affect profitability and supply chain effectiveness. In a similar vein, Mbugi and Lutego (2022) found that poor inventory management has led to higher production costs, delayed deliveries, and rising financial losses, resulting in the shutdown of significant companies like Mumias Sugar Company. By the conclusion of 2021, total liabilities in the sector reached over Kshs. 58 billion, with almost 50% of companies facing a similar drop in financial performance each year.

Despite an increasing recognition of the significance of inventory control systems, an examination of current literature indicates a restricted comprehension of how particular inventory management techniques influence organizational performance within the Kenyan sugar sector. The

majority of existing research has concentrated generally on supply chain issues or operational inefficiencies without analyzing the specific impact of practices such as EOQ, JIT, VMI, and ABC Analysis. Scholars also disagree on which practices are the most effective in specific local conditions. Although some believe that JIT boosts efficiency by minimizing waste and increasing responsiveness, others warn that it may not be feasible in situations with unstable supply chains and insufficient technological integration. In the same way, the success of VMI and ABC Analysis has displayed diverse outcomes across various sectors and areas, indicating a requirement for research tailored to specific contexts.

The absence of research that is targeted, specific to practice, and sensitive to context creates a significant knowledge deficiency. Industry stakeholders lack practical insights on which inventory management approaches are most effective in enhancing operational and financial performance in Kenya's distinct manufacturing landscape. Consequently, this research aims to close this gap by assessing the impact of distinct inventory management methods; EOQ, JIT, ABC Analysis, and VMI on the performance of sugar manufacturing companies in Kenya.

1.3 Objectives of the Study

1.3.1 Purpose of the study

The main objective of the study was to establish the effect of inventory management practices on performance of sugar manufacturing firms in Kenya.

1.3.2 Specific Objectives

- i. To analyze the effect of Economic Order Quantity adoption on performance of sugar manufacturing firms in Kenya.
- ii. To evaluate the effect of vendor managed inventory practice on performance of sugar manufacturing firms in Kenya.

- iii. To establish the effect of ABC analysis on performance of sugar manufacturing firms in Kenya.
- iv. To assess the effect of Just in Time production technique on performance of sugar manufacturing firms in Kenya.

1.4 Hypothesis of the study

H₀₁: Economic Order Quantity adoption has no significant effect on the performance of sugar manufacturing firms in Kenya

H₀₂: Vendor managed inventory practice has no significant effect on the performance of sugar manufacturing firms in Kenya

H₀₃: ABC analysis has no significant effect on the performance of sugar manufacturing firms in Kenya

H₀₄: Just in Time production technique has no significant effect on the performance of sugar manufacturing firms in Kenya

1.5 Significance of the study

1.5.1 Policymakers

The results of this study may help policymakers to understand the importance of efficient inventory management in the sugar industry. The policy implications drawn from the findings can help to formulate policies that may encourage the adoption of modern inventory practices in order to improve sector efficiency and boost national economic growth.

1.5.2 Sugar Farmers

This study shows that inventory management can improve supply chain reliability and lessen market volatility for sugar farmers. By knowing best practices, farmers will get more stable income and easier access to the market.

1.5.3 Management Boards of Sugar Firms

The study may of benefit to the management boards of sugar firms as they will be able to gain some knowledge of the strategies that can be used by firms to reduce costs and improve operational efficiency of the firms. They may use this knowledge to make more informed decisions that will help them make more profitability and more competitiveness.

1.5.4 Local Communities

An improved inventory practice may also make a more profitable and sustainable sugar industry, generating more job opportunities and boosting the local economy by increasing production and infrastructural development.

1.5.5 Future Academicians

This study may be valuable for future academicians as it adds to the body of knowledge on inventory management in emerging markets as a ground for further research and practical insights for the students in operation and supply chain management.

1.6 Scope of the study

This research examined the impact of inventory management techniques on organizational performance in the sugar manufacturing industry in Kenya. The study explored four main inventory management strategies: Economic Order Quantity (EOQ), Just in Time (JIT), ABC Analysis, and Vendor Managed Inventory (VMI), along with their impact on the performance of sugar manufacturing companies. Organizational performance was assessed based on operational efficiency, cost savings, and supply chain dependability.

The research took place in chosen sugar production companies throughout Kenya. These companies are deliberately selected for their crucial contribution to the nation's economy,

particularly in rural job creation and agricultural progress, and because they are key players in the current debates surrounding the government's Big Four Agenda, especially in manufacturing.

The study's timeframe spanned from 2024 to 2025. This period is suitable for examining the existing inventory management strategies and analyzing their recent and ongoing effects on organizational performance in the sugar industry.

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CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section pertains to the examination and analysis of existing literature. The content comprises of a theoretical framework, conceptual framework, empirical literature evaluation, critique, and identification of research gaps.

2.2 Theoretical literature review

The purpose of theories is to provide explanations, predictions, and understanding of occurrences. Additionally, theories often aim to question and expand upon current knowledge while adhering to fundamental assumptions. The study will be based on scientific management theory, lean theory, contingency theory and system theory.

2.2.1 Scientific Management Theory

The Scientific Management Theory was developed by (Taylor, 1967). Taylor's main concept was that work could be analyzed scientifically to find the most effective method for carrying out tasks. He implemented time and motion analyses, standardized work processes, and specialized tasks to boost efficiency and minimize waste. Scientific Management highlighted the importance of efficiency via measurement and analysis concepts, which later impacted systematic methods for inventory management, including the Economic Order Quantity (EOQ) model.

Greenblatt, (1992) expanded on Taylor's research by implementing motion study, which analyzed how workers executed tasks and pinpointed superfluous movements. Their efforts enhanced operational efficiency and were closely aligned with the concept of reducing redundant processes, such as unnecessary ordering and overstocking in inventory management systems. Taylor, (2004) played a key role in advancing scheduling methods and performance criteria that

made manufacturing systems more consistent and reliable. Gantt's planning tools also facilitated effective ordering and delivery cycle principles evident in EOQ calculations.

Aitken, (2014) emphasized the importance of organized decision-making and the significance of operations management in attaining cost effectiveness. His concepts underscored the necessity of matching resources to production requirements, strengthening the rationale for EOQ in optimizing order sizes and reducing overall inventory expenses.

The Scientific Management Theory was pertinent to this research as it establishes the basis for organized, efficiency-oriented methods such as EOQ. Kenyan sugar companies facing high operational expenses and inadequate inventory management can boost efficiency, minimize waste, and ultimately enhance organizational performance by implementing scientifically calculated order quantities.

2.2.2 Lean Theory

Lean Theory was formally established in academia by Howell and Ballard, (1994) although it is rooted in the Toyota Production System created in Japan. Lean Theory focuses on removing all types of waste while enhancing value for the customer. A core practice within Lean is Just in Time (JIT) a method where inventory arrives solely as needed in the manufacturing process, reducing holding costs and inefficiencies.

In 1990, Womack and others presented Lean Thinking globally in their book *The Machine That Changed the World*, which analyzed the superior performance of Japanese companies over Western rivals through lean manufacturing techniques. They highlighted that JIT enabled companies to react more swiftly to market needs and minimize surplus inventory a clear difference from conventional mass production methods.

Ciarniene and Vienazindiene, (2012) continued with Lean Thinking, where they summarized lean into five key principles: value, value stream, flow, pull, and perfection. They also illustrated how Lean, along with JIT, could be utilized in different sectors beyond car manufacturing, such as healthcare, electronics, and food production. Solaimani, Veen and Sobek, (2019) detailed 14 management principles of Lean that focus on long-term thinking, just-in-time inventory, ongoing improvement, and respect for individuals. His efforts emphasized the significance of JIT in attaining operational excellence and adjusting to evolving market circumstances.

Lean Theory was crucial to this research as JIT, being a Lean practice, inherently aids in reducing costs and enhancing responsiveness both essential for sugar production companies in Kenya. Applying JIT can enable these companies to lower storage expenses, minimize waste, and better satisfy varying customer needs.

2.2.3 Contingency Theory

The origins of Contingency Theory were found in the work of Lawrence and Lorsch, (1967), who stated that the best organizational structures and practices are contingent upon a firm's specific external and internal conditions. In other words, there isn't a one size fits all and organizations need to adapt their strategy, structure, and management practice to their environment. The heart of the Contingency Theory is that different conditions necessitate different approaches and what works in one situation might not work in another. This study in relation to Contingency Theory suggests that sugar manufacturing firms in Kenya are encouraged to adopt inventory management practices that their operational environment, market conditions and challenges dictate.

On the basis of Lawrence and Lorsch work, Klemm, (1984) put forward the notion that situational factors should be used to match the leadership style. He argued that the leadership

strategy has to change depending on favorable or unfavorable situation. In the inventory management context, the success of such practices as EOQ, JIT, and VMI may in part depend on such factors as supply chain reliability, market demand, and technological infrastructure. This therefore means that Kenya's sugar firms have to consider their peculiar situations before settling for the best inventory management practices to adopt.

In fact, Sousa and Voss, (2008) also made a contribution to the Contingency Theory by examining the connection between the organizational structure and the external environment. They distinguished between mechanistic and organic structures and argued that more rigid, hierarchical structures should be employed by firms in stable environments and more flexible, decentralized structures should be employed by firms in dynamic environments. In a volatile market, where market demand changes and supply chain disruptions have to be responded to quickly, using such JIT systems may suit the sugar firms in Kenya better.

As noted by McAdam, Miller and McSorley, (2019) contingency theory was also extended by him to argue that organizations need to match their structure and practices with environmental forces like competition, technology and regulation. In complex industries like the sugar manufacturing industry, he maintained that firms have to keep evaluating and updating their internal processes to remain competitive. This means that Kenyan sugar firms must adapt their practices for inventory management that takes into account both the local challenges (inconsistencies in supply of raw material) and the global trend (changes in consumer demand). One major criticism of Contingency Theory as mentioned by Shala, Prebreza, and Ramosaj, (2021) is that it can be too complex and difficult to apply. The theory contemplates that organizations need to review and change their strategies at all times, taking into account countless factors which it is difficult for managers to make it happen. Moreover, some critics have argued that the theory

does not offer direct guidelines for selecting the right strategy or practices, which leaves the organizations too ambiguous.

Contingency Theory applies to this research as it rationalizes the implementation of ABC Analysis for prioritizing inventory management according to the unique traits of each item. For sugar companies in Kenya, utilizing a context-aware strategy for inventory focusing on high-value products guarantees effective resource utilization and enhances overall performance of the organization.

2.2.4 Systems Theory

Systems Theory was initially formulated by Easton and Cliffs, (1949). They suggested that organizations ought to be seen as open systems interrelated components that operate collectively and engage with their surroundings. This comprehensive perspective endorses methods such as Vendor Managed Inventory (VMI), which depend on robust collaboration between suppliers and purchasers for maximum efficiency.

Dennett, (2009) broadened Systems Theory to social sciences, outlining hierarchical systems that depend on feedback loops and the interdependence of sub-systems. His work highlighted that supply chains are not standalone processes but rather interconnected systems necessitating collaboration a core principle for VMI. Friedman and Allen, (2011) utilized Systems Theory for organizations, describing how companies receive inputs from their surroundings (such as raw materials), modify them, and release outputs into the surroundings. VMI corresponds with this model by managing vendor input streams according to real-time demand in the system.

Lai and Lin, (2017) enhanced the visibility of Systems Theory in The Fifth Discipline, where he presented the idea of the "learning organization" a system that evolves and advances via feedback.

He stressed the significance of information exchange and goal alignment, which are critical for successful VMI collaborations.

Systems Theory was pertinent to this research as it reinforces the notion that organizational effectiveness enhances when internal operations and external collaborations are in harmony. For sugar production companies in Kenya, implementing VMI from a systems viewpoint improves supply chain cooperation, minimizes inefficiencies, and aids in attaining stable production output.

2.3 Empirical Literature Review

This section reviews the previous studies on supplier relationship management and procurement performance.

2.3.1 Economic Order Quantity adoption and performance

Economic Order Quantity (EOQ) is one of the most important inventory management techniques used for the calculation of optimal order quantity so as to minimize the total inventory cost consisting of ordering and carrying cost. EOQ is based on the theory of balancing between ordering cost like delivery charges and holding cost like storage fees and inventory deterioration. From a study point of view, the adoption of EOQ has a great impact on the sugar manufacturing firms in terms of helping them maintain an optimal stock level and order frequency. The use of EOQ will help the firms in Kenya's sugar industry control their inventory, reduce wastage, and avoid overstocking or stockouts, which has a direct effect on operational costs and efficiency (Kehinde, Ogunnaike, & Adegbuyi, 2020).

The adoption of EOQ is a major factor that determines performance in the sugar manufacturing firms. Implementation of EOQ can help firms reduce operational costs and increase the inventory turnover to make production processes more efficient. According to the theory, the firms can lower their storage costs and avoid production delays because of inventory shortages

when they order the optimal quantity of raw materials or components. Direct impact on the overall performance of sugar manufacturing firms in Kenya is that there is always adequate supply of inputs for production without excessive inventories hindering operations of capital (Akinlabi, 2021).

Mbugi and Lutego, (2022) conducted a study on the impact of economic order quantity on the performance of organization in Tanzania manufacturing industry. To help achieve the above goal, the study adopted a qualitative approach. In purposive sampling, five participants involved in the inventory and production department of the organization were interviewed. Data was analyzed by content analysis procedures with the help of Nvivo Qualitative Analysis software. Other data was obtained from documentary review company and other industry published report. The research study results indicated that the economic order quantity influenced the performance of food and beverage manufacturing company.

Korir, Kaitany and Sang (2021) conducted a study on the relationship between Economic Order Quantity stock control technique and the performance of selected level five hospitals in south rift region, Kenya. The study used economic quality theory. Correlation study design was used. The target population of the study involved 248 employees in the level five hospital recruited in the procurement and supply chain department. Purposive sampling was used to recruit 156 respondents and self-administered questionnaires were used to collect data from the respondents. The data was analyzed descriptively and the results presented in the form of frequency tables. Inferential statistics was also conducted in this study by use of regression models. The analysis of the data showed there was a positive correlation between economic order between quantity and performance of the level five hospitals.

Ndiwa, (2022) did a study on the effects of supply chain performance and inventory management techniques on the dairy processing firms in Kiambu County. The study focused on Theories of Constraints, Resource Based View theory, and the Institutional theory. In this study, descriptive research was used. The study used a census sampling technique in order to obtain 96 respondents from the supply chain departments, shops department, and the consumer department of three dairy enterprises in Kiambu. Out of the questionnaires distributed, 85 of the closed ended questionnaires were filled and returned. The analysis established that EOQ had a positive correlation with the performance of the supply chain and the result was statistically significant.

2.3.2 Vendor managed inventory practice and performance

Vendor Managed Inventory (VMI) refers to a collaborative inventory management strategy in which the supplier takes responsibility for managing the inventory levels at the customer's location. In VMI, the inventory level in the firm is less burdened to track and manage inventory as the supplier monitors the inventory levels and replenished stock as needed. VMI can be a viable practice for sugar manufacturing firms in Kenya to enable assured supply of raw materials and at the same time reduce inventory holding costs. Outsourcing inventory management with the supplier allows the firm to concentrate more on production, and less on stock management, thereby improving overall operational efficiency (Hassan, 2021).

VMI has the potential to enhance organization performance in terms of stronger relationships between suppliers and manufacturers, improve supply chain visibility and decrease lead times. The implementation of VMI will assist Kenyan sugar firms in streamlining the procurement process, reduce the cost of stock outs and ensure continuous production by ensuring raw materials are available. Additionally, it can enable better communication and working with suppliers which is a vital requirement in an industry where supply chain disruptions happen

frequently. Firms are able to rapidly respond to changes in the market and optimize their production processes for better profitability and performance (Altaf & Ali, 2023).

Hassan, (2021) investigated on the impact of inventory management on the performance of food and beverage firms in Kwara State, Nigeria. The study used cross-sectional survey research design. In this study, the target population was 902 and to reach out to the target population, questionnaires were distributed to 225 respondents. This involved a sample of 225 respondents for the analysis of the data collected from the study. In the study, the researcher employed non-probability sampling technique known as convenient sampling. Questionnaires were administered in three food and beverage firms in Kwara State of Nigeria, while Regression Analysis was used to analyze the data. In order to address the objective of the study, there were four hypotheses formulated as follows: The result further revealed that inventory management has a significant impact on the profitability of the food and beverage firms in Kwara State, Nigeria.

Opoku et al., (2020) examined the impact of vendor managed inventory on the manufacturing firms in Ghana. The research design used in the study was the descriptive survey design. The target population was 246 registered manufacturing firms with the Association of Ghana Industries from which 152 Procurement and Operations managers and officers were selected through random sampling. The study used structured questionnaires as the main data collection instrument and the data was analyzed using descriptive and inferential statistics tools such as mean, standard deviation and ordinary least square regression. The research revealed that VMI had a positive and significant relationship with operational performance.

Chebet et al., (2021) studied how various inventory management techniques influence procurement performance with the help of empirical evidence. In particular, the research focused on the effects of the Vender Managed Inventory on procurement performance. It also sought

academic papers on the topic of focus, inventory management. Hypothesis two was tested using Economic Order Quantity Model, Network Theory and Resource Dependency Theory to show the relationship between inventory control systems and procurement performance. This research revealed that the implementation of Vendor Managed Inventory technique has a significant influence on the procurement performance.

2.3.3 ABC analysis and performance

ABC analysis is a method for classifying inventory as to value of each item relative to its contribution to overall sales or production cost. While the technique divides inventory into three categories: A (high value, low quantity); B (moderate value, moderate quantity); and C (low value, high quantity). This classification informs firms on how to allocate their management efforts to the most valuable items (A) and least valuable items (C), with more resources dedicated to the former and with less attention paid to the latter. The ABC analysis can be very useful in the sugar manufacturing industry for managing raw materials and components used in the manufacturing process. Firms can gain better control over their critical items, lower their waste and eliminate the unnecessary costs, if they can identify and prioritize key inputs (Kingori, 2023).

ABC analysis is useful in relation to performance since it helps optimize inventory levels and improve operational efficiency. ABC analysis can be used by sugar firms in Kenya to manage their inventory better by maintaining a constant supply of the most critical products for production at all times. It enables production cycles to flow smoothly, reduces the downtime and disruption of the supply chain. However, ABC analysis improves financial performance of firms by increasing production capacity and reducing the costs by reducing stockouts or overstocking and increasing inventory turnover. It also enables firms to have a competitive advantage in the market

by enhancing their chances to meet customer demand without stocking excess inventory (Mbugi & Lutego, 2022).

Mikhago, (2024) conducted a study on the impact of ABC analysis in enhancing the performance of the sugar manufacturing firms in Kenya. The study was based on the pragmatism philosophy and used a correlational research design. The target population for this study was 144 respondents including procurement managers, stores managers, chief engineers, dry production managers, field supervisors, volume supervisors, finance managers, marketing managers and factory managers. The technique used in this study to select the respondents was simple random sampling and the total number of respondents was one hundred and eight. Questionnaires were used in collecting the primary data while secondary data was gathered from the financial statements. Simple statistical tabulations were performed to obtain frequencies and percentages. Inferential statistics used were multiple regression and Pearson correlation coefficient. The findings have revealed that ABC analysis has a significant and positive impact on the performance.

Odumusor (2024) carried a study on the effect of inventory management on the production efficiency of manufacturing organisations in Nigeria. The study also used the descriptive research design. The target population comprised of seven hundred seven (707) employees from the management and non-management positions in the four selected companies; the sample size was determined to be three hundred seventy (370) using the Taro Yamane formula. In terms of the sampling technique, the study used a stratified random sampling technique while questionnaires with standardized questions were used to elicit response from the participants. Quantitative and qualitative data analysis was conducted using statistical package for social sciences (SPSS) version 27.0. The findings were analyzed descriptively and using the Ordinary Least Squares regression

technique. On the basis of the regression results, it was confirmed that ABC analysis had a significant positive impact on the selected manufacturing firms' production efficiency in Calabar.

Gatari and Osoro, (2022) conducted a study to establish the role of inventory management on sustainable performance of state enterprises in Kenya. In conducting this research, the researcher employed a descriptive research design. The target respondents for the study included the heads of finance, and procurement in all the 187 state corporations in Kenya. In this study, the target population was the head of procurement department and head of finance of each state corporation; and the total number of respondents was 374. The major research tool used in this study was a questionnaire and this was the primary source of data collection. The conclusions also confirm that ABC analysis has a significant effect on the sustainable development of state-owned enterprises in Kenya.

2.3.4 Just in Time production technique and performance

An inventory management strategy where goods are produced only when needed, in order to reduce in process inventory and associated carrying costs is known as Just in Time (JIT). JIT aims to produce the right amount of product at the right time, thereby eliminating inventory as the buffer to supply chain variability. JIT is beneficial for sugar manufacturing firms in Kenya because it enables them to be more responsive to the market demand, minimize wastage and improve cash flow by minimizing the amount of capital tied up in inventory. JIT also can improve operational efficiency by streamlining the production process and preventing oversupply as is common in the sugar industry (Kibisu, 2020).

It is expected that the adoption of JIT will improve performance by improved production schedules, reduction in operational costs and increased customer satisfaction. JIT can be used in the Kenyan sugar industry where delays in production and distribution cause huge financial losses,

but can keep the sugar manufacturers more agile to be swift in responding to changes in demand by consumers. It not only enables the company to adequately meet the market needs but also gives it an edge in competition in both domestic and overseas markets. Therefore, in order to achieve lower cost effectiveness and responsiveness of the sugar manufacturing process, adoption of JIT becomes imperative (Ralahallo, 2021).

Cheptoo et al., (2024) conducted a study on the impact of just in time on supply chain performance in the context of sugar manufacturing firms in Kenya. A cross-sectional research design was used to undertake the study. The target population was 95, and they included procurement officers, finance officers, production officers, quality assurance officers, operations officers, director of audit services, logistics and firm engineers working in 11 sugar manufacturing firms in western Kenya. The type of sampling used was census where all the 95 employees were included in the survey. The research used both primary data sources, whereby primary data was collected through the use of closed-ended questionnaires. To analyze the data, descriptive statistics was used and the data analyzed as tables, pie charts and bar graphs. Quantitative research was used in this study whereby inferential statistics was used to test hypotheses and analyze data. In summary, the researcher employed Pearson correlation and linear regression analysis to show the relationship between the adoption of lean production techniques and supply chain performance of the sugar manufacturing firms in western Kenya. Data analysis was done using the Statistical Package for the Social Sciences (SPSS) software version 27. As for the findings of the study, it showed that just-in-time leads to a significant improvement in the supply chain.

Ralahallo, (2021) carried a study on the impact of just in time and supply chain management on company performance in seafood restaurants in Ambon city. The data in this study were collected from the questionnaires that were filled by 35 customers from 20 seafood

restaurants in Ambon city. The data collection method employed in this study was a questionnaire. This was done before carrying out the analysis and include validity test, reliability test, multicollinearity test, heteroscedasticity test, data normality test. To test the hypothesis, data analysis techniques that were utilized were multiple linear regression analysis. The findings revealed that just in time enhanced the performance of the company with statistical significance while supply chain management also improved the performance of the company with statistical significance.

Kibisu (2020) conducted a study on the impact of just in time inventory management technique on efficiency of supply chain in processing firms in Kenya with reference to Crown Paints Limited. This study used descriptive research design. The target population of the study was a total of 279 employees working in different departments in Crown Paints Limited. This study used stratified random sampling technique in a bid to arrive at the sample size of 81 respondents. The method of data collection that was employed was questionnaires, which yielded primary data. Data was both qualitative and quantitative and quantitative data was analyzed using the SPSS (Version 22) whereby the data collected was coded. Results are presented through frequency tables and figures while explanation has been done in narrative form. Inferential statistics was used to test relationship between just in time inventory management technique on supply chain performance. Consequently, the study establishes that just in time inventory management technique is positively correlated with supply chain performance in processing firms.

2.4 Conceptual Framework

This section shows the relationship between Inventory Management practices and performance of sugar manufacturing firms in Kenya. This is presented in Figure 2.1.

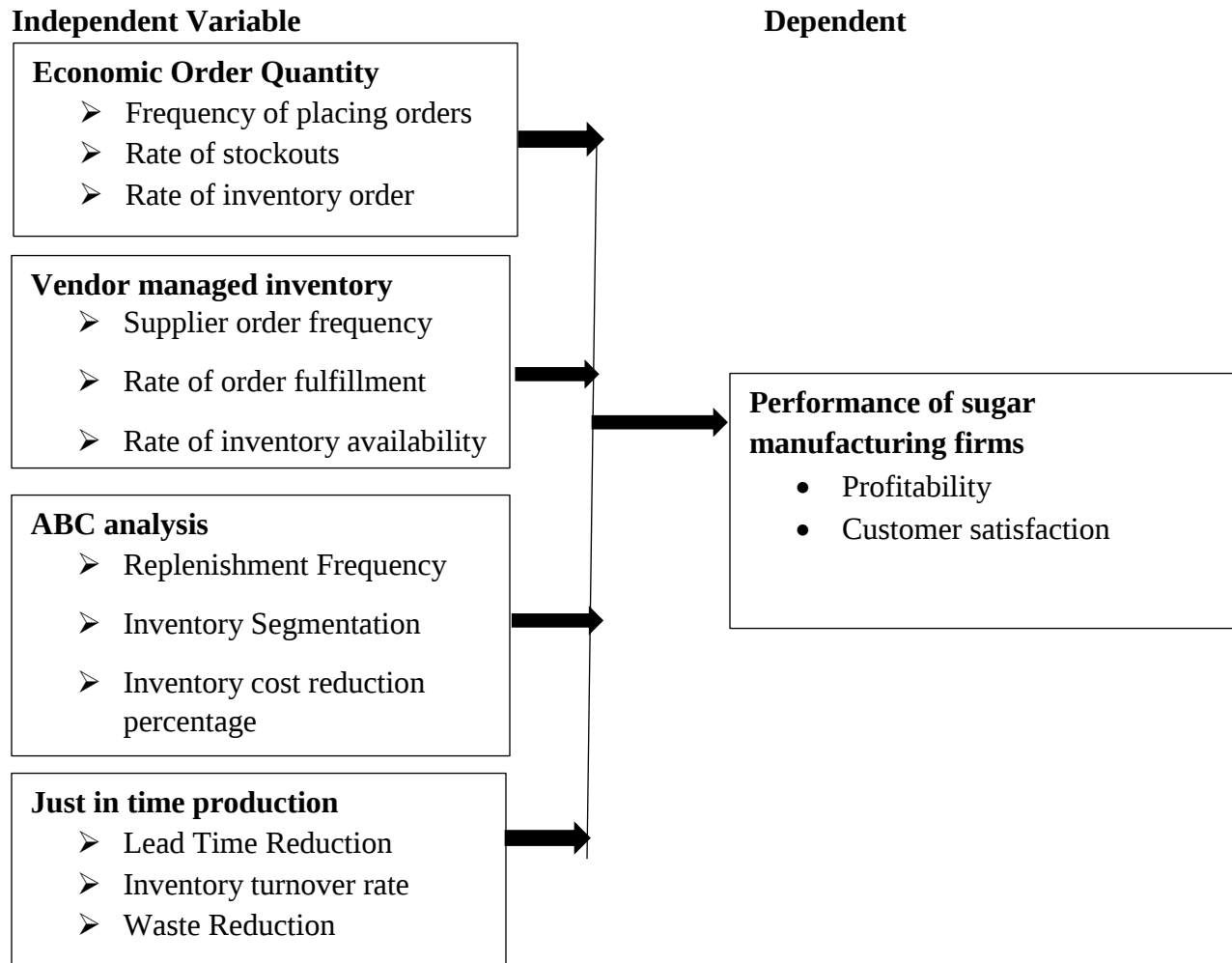


FIGURE 2. 1
Conceptual Framework

Source: Researchers Conceptualization

2.5 Operationalization of Variables

Type	Variable	Measurements	Measuring indicators
Independent	Economic order quantity adoption	5-point Likert Scale	➤ Frequency of placing orders ➤ Rate of stockouts ➤ Rate of inventory order
Independent	Vendor managed inventory practices	5-point Likert Scale	➤ Supplier order frequency ➤ Rate of order fulfillment ➤ Rate of inventory availability
Independent	ABC Analysis	5-point Likert Scale	➤ Replenishment Frequency ➤ Inventory Segmentation ➤ Inventory cost reduction percentage
Independent	Just in time production technique	5-point Likert Scale	➤ Lead Time Reduction ➤ Inventory turnover rate ➤ Waste Reduction
Dependent	Performance of manufacturing firms	5-point Likert Scale	➤ Profitability ➤ Customer satisfaction

2.6 Research Gaps

In their study, Mbugi and Lutego (2022) examined the effects of EOQ on performance in the manufacturing companies in Tanzania. One of the main critique of the study is that it utilized a qualitative design with five participants and this reduces the external validity of the results as well as the richness of the elaborated findings. A combination of quantitative and qualitative study with a broader population would provide a better understanding of the effects of EOQ on the performance of manufacturing companies, including the sugar manufacturing industry.

In their study, Korir et al., (2021) solely targeted the hospitals in Kenya and specifically analyzed the association between EOQ and performance. This means that their findings might not be relevant to the sugar manufacturing industry since there are differences in operation environments. Also, the study only used a cross-sectional research design, meaning, it could only determine correlation but not causation between EOQ and performance. A research that would focus on the sugar manufacturing industry with the use of a causal analysis would be more helpful in establishing the impact of EOQ in detail.

Ndiwa (2022) conducted a study on dairy processing enterprises in Kiambu County and he found out that there is a significant relationship between EOQ and supply chain performance. However, some methods of inventory management may differ between dairy and sugar manufacturing industries and therefore the results may not capture the true situation in sugar manufacturing industries. Another major drawback of the study is the use of self-administered closed-ended questionnaires that restricts the ability to capture deeper insights of EOQ's impacts. Further, more research in the area of manufacturing of sugar using both qualitative and quantitative research will provide more specific details.

Hassan (2021) also studied the effects of inventory management on the performance of food and beverage firms in Kwara State, Nigeria. However, the results of the study may not be generalized to the sugar manufacturing industry since the industries are different. However, the non-probability sampling technique used in the study raises some other issues of validity in the study. To generate more credible findings regarding the role of Vendor Managed Inventory (VMI) more research should be conducted on the sugar manufacturing industry using random sampling.

Opoku, Fiati, Kaku, and Ankomah (2020) also conducted a study in the context of Ghanaian manufacturing firms on the effects of VMI. However, it has to be noted that the study entails a sample of 152 participants thus might not represent the entire population of manufacturing firms. However, the study did not establish the contextual factors that define VMI, which may impact on the feasibility and effectiveness of implementing VMI. Future studies on VMI in Kenyan sugar manufacturers should include a more varied sample from other companies and would benefit from further investigation of contextual factors affecting the results.

In their article, Chebet et al., (2021) were concerned with inventory management strategies including VMI and its impact on procurement efficiency. However, one of the main weaknesses of the study was that the paper was based on secondary data rather than real-time data collection. Interviewing the sugar manufacturing firms in Kenya would be more useful in generating more recent and relevant information on the role of VMI on procurement performance.

In his study, Mikhago (2024) sought to establish the impact that ABC analysis has on performance in the Kenyan manufacturing firms that deals with sugar production. However, despite the findings, the study's sample size of 108 participants was adequate, but the number could have been increased to enhance the validity of the results. Also, the study relied on descriptive statistics; this may not explain the complex relationship between ABC analysis and

performance. Future research should incorporate more complex statistical tools such as structural equation modeling in order to untangle the relationship between ABC analysis and its effects.

In his study, Odumusor (2024) examined the ABC analysis on manufacturing firms in Nigeria and established a relationship between it and production output. However, the findings may not be very relevant for the Nigerian context since the environment of the sugar manufacturing industry may differ from that of Kenya. However, the fact that this study focuses only on regression analysis means that other factors affecting the performance may not be captured. More specific studies on the sugar industry of Kenya or any other industry using different analytical tools would have provided more information about the impact of ABC analysis on performance.

Gatari and Osoro (2022) analyzed ABC analysis in state-owned enterprises in Kenya, which may not be comparable to private sector sugar manufacturers. The study established that ABC analysis had an influence on the sustainability of state corporations but called for more research on the impact of the analysis on the performance of the sugar manufacturing firms because of the differences in the business models of state-owned and private firms.

Cheptoo et al., (2024) examined the impacts of Just in Time (JIT) on the performance of the supply chain in the sugar manufacturing companies in Kenya. The study conducted involved 95 employees and this could be seen to be a small sample size to perform a general survey. Furthermore, although the studies focused on the efficiency of JIT in relation to the supply chain, the studies lacks the capacity to establish the effect of this policy on the overall performance. A limitation for this study is the relatively small sample size and the fact that this study has focused on the supply chain aspect of JIT only, while it could have encompassed all areas of performance.

In his literature review published in 2021, Ralahallo investigated JIT in seafood restaurants and the relationship with company performance, which had a positive impact. However, the

context of this study is quite different from that of sugar manufacturing firms who have their production and inventory control systems. Furthermore, the small sample size also reduces the generalization of the research findings to manufacturing industries especially those in the production of sugar. Research that has focused on firms in the sugar manufacturing industry would therefore yield better insight into the subject of the impact of JIT on performance in such industries.

Kibisu (2020) adopted Crown Paints Limited, a processing firm in Kenya, to understand the impact of JIT on supply chain. However, the study established a positive correlation, but since its subjects comprised only one organization, the results cannot be generalized. Also, the study did not examine how JIT influence the other areas of performance, including production performance or profitability. A comparative study would give more generalized findings and information about the overall effects of JIT on the performance of the firms in the sugar manufacturing industry.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides the details of the research study, including the method adopted in this study. The technique encompasses several components such as the Research design, population, sample size, data collection instruments, pilot research, data presentation, and data analysis.

3.2 Research design

The study used descriptive research design since its main purpose is to describe and explain the relationship between inventory management practices and the performance of Kenyan sugar manufacturing firms. This design was most appropriate because it enable the collection of data that is quantifiable and more specific with regards to the inventory management practices such as the Economic Order Quantity, Just in Time, ABC analysis and the vendor-managed inventory and performance. Descriptive research was appropriate for describing the current state of these practices within the firms and searching for tendencies or correlations; therefore, it wa suitable for providing the general picture without influencing the variables. This design also makes it possible to collect data from a wide cross-section of the sugar manufacturing firms hence an objective evaluation of the sector (Siedlecki, 2020).

3.3 Target population

The study targeted 105 respondents comprising of 15 Factory managers, 15 Supply chain managers, 15 Operations managers, 15 Sales and distribution managers, 15 Finance managers, 15 Warehouse supervisors and 15 Marketing managers from Fifteen sugar manufacturing firms in Kenya (Busia sugar company, Butali sugar mills, Mumias Sugar company, Kibos Sugar and Allied Industries Limited, Kwale International Sugar Company, Miwani Sugar Company Limited,

Muhoroni sugar company, Naitiri Sugar, Nzoia sugar factory, Olepito Sugar Factory, Sony sugar company, Sukari Industries Limited, Transmara Sugar Company, West Kenya sugar company and West Valley Sugar). This is as presented in Table 3.1.

TABLE 3. 1
Target population

No.	Target respondents	Number	Percentage (%)
1.	Factory managers	15	14.3
2.	Supply chain managers	15	14.3
3.	Operations managers	15	14.3
4.	Sales and distribution managers	15	14.3
5.	Finance managers	15	14.3
6.	Warehouse supervisors	15	14.3
7.	Marketing managers	15	14.3
	Total	105	100.0

These respondents were targeted because they work in managerial capacities within their organizations that afford them the ability to determine how well inventory management practices were implemented and functions in the sugar manufacturing firms. It is evident that each respondent such as factory managers, supply chain managers, operation managers, procurement managers, sales and distribution managers, finance managers, warehouse supervisors, and marketing managers have a vital role in the decision-making processes concerning inventory. Their positions afforded them with first-hand knowledge and experience of how approaches to inventory

management, such as, Economic Order Quantity, Just In Time, ABC analysis, vendor managed inventory influence the company's performance. Therefore, their insights are relevant for explaining the link between inventory management practices and performance in the sector.

3.4 Sample Size and sampling technique

As for the sampling method, this study used census where all the 105 respondents from the identified managerial positions in the sugar manufacturing firms will be included in the study. The census approach was the most suitable because it covers all the respondents within the population, thereby making sure that all the available information on the inventory management practices within the firms are captured. Due to the small population of the target population, the census approach ensured that the researcher gets all the views of the population, and there is no sample bias; the findings can be considered valid across the entire population of the managerial staff participating in inventory management. This lead to accurate and reliable data, which can be used to determine the effectiveness of inventory management on the performance of organizations (Mishra & Alok, 2022).

3.5 Data collection instruments

Questionnaires, especially closed-ended questionnaires were used to administer data from the identified respondents. This data collection tool was the most suitable because it facilitates the collection of standards, measurable data which enabled comparisons to be made. This was because closed-ended questions are presented in the form of a 5-point Likert scale where there is not much room for interpretation such as strongly disagree, disagree, neutral, agree, strongly agree. This format was particularly suitable for measuring the effectiveness of inventory management practices on performance since it provides the respondent with an opportunity to rate the level of his/her concurrence with various statements. Further, the Likert scale format allows for fast

response and thus higher response rates are expected. The information the researcher gained included the frequency, effectiveness, and perception of various inventory management practices; frequency of practices such as Economic Order Quantity, Just in Time, ABC analysis, and vendor-managed inventory and explore the correlation between the identified practices and the performance outcomes in the sugar manufacturing sector (Beck, 2024).

3.6 Data collection procedure

The current study used closed-ended questionnaires with a 5-point Likert scale to collect data from the identified respondents of the sugar manufacturing firms in the selected countries. The researcher then approached the management of the firms in order to obtain permission in administering the questionnaires to the targeted participants. After obtaining permission, the questionnaires were administered to respondents either in hard copy or electronically depending on the privacy and ease of the respondents. The respondents were guided on how to fill the questionnaires so that they provide the right information. The researcher were allowed a period of three weeks for the respondents to fill the questionnaires. In case the respondent requires some clarification, the researcher was there to assist. The completed questionnaires were checked to ensure all necessary information has been provided and all missing or incomplete data was followed up to ensure validity of the available information.

3.7 Pilot Test

Pilot test is an essential part of any research as it enables the researcher to determine the feasibility, time, cost and challenges associated with the research instruments before the main study is conducted (Teresi, Stewart, & Hays, 2022). In this research, the pilot test was conducted in Chemelil Sugar Company Ltd, one of the leading sugar manufacturing companies in Kenya. Chemelil Sugar Company Ltd was the most suitable for this pilot study because it is operationally

relevant to the study goals which are to assess the inventory management practices like Economic Order Quantity, Just in Time production, ABC analysis, and Vendor-Managed Inventory. Specifically, by being a prominent firm in the Kenyan sugar industry, Chemelil Sugar Company Ltd was useful in providing information on the current inventory management practices and their consequences on the firm. Besides, it was possible to conduct the pilot study at this factory in order to fine tune the instruments used to gather data and make certain they are appropriate for the industry setting.

3.7.1 Reliability of research instruments

Reliability is the constancy and stability of a research instrument in accurately measuring its intended variable across time. To establish the reliability of the research instruments, that is the questionnaires, Cronbach's alpha coefficient were employed to analyze the internal consistency of the items of the questionnaires. This test determined the internal consistency of the items in the questionnaire in each section that has items that are intended to measure the same concept such as inventory management practices (Economic Order Quantity, Just in Time, ABC analysis, and vendor-managed inventory) and performance. To do this, the questionnaires were administered on a small sample from the Chemelil Sugar Company Ltd during the pilot study and the data collected was used to estimate cronbach alpha. A reliability coefficient of 0.7 and above was acceptable to establish that the items on the questionnaires are reliable for the main study to ensure that the instruments adopted are valid in their measurement of the intended variable (Ahmed & Ishtiaq, 2021). The results were presented in Table 3.2.

TABLE 3.2
Reliability of Research Instruments

Variable	Cronbach alpha	Number of items	Result
EOQ	0.851	8	Reliable
VMI	0.833	8	Reliable
ABC	0.861	8	Reliable
JIT	0.862	8	Reliable
PP	0.818	7	Reliable

Source: Researcher, 2025

From the results, economic order quantity, vendor managed inventory, ABC Analysis, Just in time and performance had a Cronbach alpha 0.851, 0.833, 0.861, 0.862 and 0.818 respectively implying all the constructs were reliable.

3.7.2 Validity of research instruments

Validity refers to the extent to which a research instrument accurately measures what it is intended to measure. The validity of the research instruments was measured by Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity. The KMO test checks the sampling adequacy and if the values were closer to 1 then the data was suitable for factor analysis and if the values are less than 0.5 then the sample may be inadequate. Bartlett test of sphericity determined the extent to which the correlation matrix of the questionnaire items is significantly different from the identity matrix to establish that the items are related. If the KMO value was greater than 0.5 and if the Bartlett's test is significant ($p < 0.05$), then indicated that the questionnaire were useful in measuring the constructs of IM practices and OP in the sugar manufacturing industry. These tests were conducted using data from the Chemelil Sugar Company Ltd during the pilot study so as to determine the validity of the instruments before administering it in the main study (Ahmed & Ishtiaq, 2021). The results were shown in Table 3.3.

TABLE 3. 3
Validity of Research Instruments

Construct	No of Items	KMO	Bartlett's test of Sphericity		
			χ^2	Df	P-value
EOQ	8	0.874	768.741	40	0.000
VMI	8	0.913	819.315	40	0.000
ABC	8	0.862	813.394	40	0.000
JIT	8	0.927	811.383	40	0.000
PP	7	0.902	757.722	35	0.000

Source: Researcher, 2025

The results showed that economic order quantity, vendor managed inventory, ABC Analysis, Just in time and performance had a KMO value of 0.874, 0.913, 0.862, 0.927 and 0.902 respectively and a Bartlett's test had a p value of 0.000 for all the constructs indicating that the constructs were adequate and valid for conducting the study.

3.8 Data analysis and presentation

The data collected was cleaned, categorized and coded to ensure validity and reliability before analysis is done on it. The gathered data was described and analyzed by both descriptive and inferential statistics with the aid of SPSS version 27. Quantitative data was analyzed using descriptive statistics in the form of means, frequencies, and percentages to present a central tendency and spread of the responses that the study generated on inventory management practices and performance. These descriptive measures helped in giving features of the sample to the analyst. For inferential statistics, correlation analysis was used to test the hypothesis regarding the relationship between the inventory management practices adopted and the performance. Multiple regression analysis was employed to establish the effect of these inventory management practices on the performance of the organization so that possible predictors may be identified. This involved the use of tabular form for detailed description of results, figures to enhance the graphical

illustration of results and bar charts or pie charts to clearly describe the distribution and trends of the data in the study.

The multiple linear regression equations was;

$$y = \beta_0 + \beta_1 EOQ + \beta_2 VMI + \beta_3 ABC + \beta_4 JIT + \varepsilon_1 \dots \dots \dots (3.1)$$

Where:

y = Dependent Variable

β_0 = Constant of the regression model

$\beta_1 - \beta_4$ = Coefficients of the regression model

EOQ = Economic order quantity

VMI = Vendor managed Inventory

ABC = ABC Analysis

JIT = Just in time production

ε_1 = Error term of the model

3.9 Diagnostic tests

Diagnostic tests were important in determining the impact of inventory management practices on performance, diagnostic tests are very important in checking whether the data is appropriate for regression analysis. The violation of these assumptions can result to generation of erroneous or skewed results hence affecting the outcome of the study. Among the four diagnostic tests in this study; the normality test, the autocorrelation test, the heteroscedasticity test and the multicollinearity test each has different roles of diagnosing particular problems in the regression model. The following is a breakdown of the tests:

3.9.1 Test of Normality

It is carried out with the aim of testing if the residuals (errors) of the regression model are normally distributed. Some of the assumptions in linear regression include the fact that the residuals must be normally distributed. This assumption was important for generating valid conclusions concerning the coefficients, such as confidence intervals and hypothesis tests (Hernandez, 2021).

The normality of residuals was tested by using the Shapiro-Wilk test or Kolmogorov-Smirnov test. If the residuals do not display a normal distribution then there might be a problem with the model specification or data transformation might be required. If the residuals are not normal, the tests become off and the p-values and confidence intervals become skewed. In such cases, we are in a position to doubt the validity of hypothesis testing.

The null hypothesis is that there is no difference in the residuals distribution. The conclusion was made based on the fact that the p-value obtained from the normality test is less than the significance level of 0.05, meaning that the residuals are not normally distributed, and, therefore, the null hypothesis is rejected. If the p-value obtained is greater than 0.05, the conclude that there was not enough evidence to reject the null hypothesis and thus the residuals are normally distributed.

3.9.2 Test for Autocorrelation

Autocorrelation refers to the correlation of residuals (errors) across observations in time series data. There was an underlying assumption that the disturbances in the model, the residuals, are independent from each other which implies that when the residuals are plotted against time, there should be no identifiable pattern. Autocorrelation was a problem that breaks this assumption and it tends to complicate the regression analysis especially in time series data (Uyanto, 2020).

Auto correlation was usually checked by using Durbin Watson statistic which tests for correlation between residuals at different time periods. Autocorrelation was determined using the Durbin-Watson statistic whose value is close to 2. Autocorrelation values close to 0 imply positive autocorrelation, while values close to 4 mean negative autocorrelations.

If it is present then it means that there were other systematic patterns in the data that the regression model has not accounted for. This can cause skewed standard errors and erroneous tests of hypothesis, which may in turn influence the outcome of the model. The first hypothesis which is the null hypothesis claims that there is no autocorrelation in the residuals. When Durbin-Watson value was significantly different from 2; either less than 2 or more than 4, one can reject the null hypothesis of no autocorrelation. If the statistic is close to 2, the null hypothesis cannot be rejected and therefore, no autocorrelation is present.

3.9.3 Test for Heteroscedasticity

Heteroscedasticity is usually characterized by the situation where the variance of the residuals in a model is not same for all levels of the independent variables. Another assumption of a well-specified regression model is that the variance of the residuals should be constant (homoscedasticity). If heteroscedasticity is present, then it means that the model is not appropriate, the estimates are inefficient and the tests are invalid (Cattaneo et al., 2018).

The presence of heteroscedasticity was checked by using such tests as the Breusch-Pagan test, the White test or even by graphical examination through a residual plot against the predicted values. If the residuals are plotted in a fashion, for instance, funnel like, then that is an illustration of heteroscedasticity.

Due to the fact that heteroscedasticity leads to inefficient estimators and biased statistical inferences especially the hypothesis test. Standard errors can be wrong and this in turn leads to

wrong decisions on the significance of predictors. The null hypothesis is that the variance of the residuals is the same for all levels of the predictor variables (homoscedasticity). If the p-value obtained from heteroscedasticity test is less than the significance level (0.05), then the null hypothesis of homoscedasticity is rejected and hence it concludes that the data is heteroscedastic. If the p-value is greater than 0.05, you don't reject the null hypothesis and hence, the residuals are homoscedastic.

3.8.4 Test for Multicollinearity

Multicollinearity is a situation whereby two or more independent variables in a regression model are closely related. This is a contradiction to the assumption that the predictors should be independent of each other. Since it is hard to separate the effects from each predictor variable due to the high correlation between them, multicollinearity can cause high standard errors (Shrestha, 2020).

However, the presence of multicollinearity can be established using the Variance Inflation Factor (VIF). When VIF exceeds 10, there is the presence of multicollinearity. Another is the Correlation Matrix and where any correlation coefficient greater than 0.8 between the independent variables indicate multicollinearity. When multicollinearity is present in the data, the regression model becomes unstable in the process of computation and the coefficient estimates are not accurate. It is also noticeable that the coefficients may vary a lot, which is not very convenient if you need to identify the impact of particular predictors. The first hypothesis being postulated is the null hypothesis and it posits that there is no multicollinearity among the independent variables. If VIF of any independent variable is greater than 10 or the correlation coefficient between two independent variables is more than 0.8 then we reject the null hypothesis of no multicollinearity.

3.10 Ethical Consideration

First of all, the respondents were willing participants in the study, which means that they were informed of the study, its purposes, processes, and possible consequences. The respondents' data were not disclosed to any other individual or organization and was only used for research purposes so as not to compromise on their identity. Participants were able to withdraw from the study at any time without a penalty. Further, the research was conducted with integrity through proper reporting of the results without any form of bias, cheating, or faking information. The researcher also minimized bias by avoiding any conflict of interest that may make the study results inclined towards the researcher's personal or financial gains. Finally, reference was made to any work done in the past or data included in the study, so as to avoid plagiarism and maintain high levels of professionalism.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND DISCUSSION

4.1 Introduction

This chapter includes the presentation of research results and an analysis of the study. The findings were conveyed based on the examination of the study variables and aims, incorporating descriptive analysis in which responses to the indicators of each study variable were assessed, shown as univariate analyses and inferential analyses to investigate the connections between the constructs, evaluate hypotheses, and derive conclusions regarding the study aims.

4.2 Response rate

The study examined 105 individuals from selected sugar production firms in Kenya, with 80 surveys completed and returned, resulting in a response rate of approximately 76%. This is considered a strong and adequate response rate for survey research. Holtom, Baruch, and Aguinis (2022) note that a 60% response rate is often considered acceptable, thus the 76% achieved in this research surpasses the recommended standard and enhances the findings' credibility and applicability. The increased response rate indicates a strong degree of engagement from the participants and suggests that the collected data reflects the target population. This is as shown in Table 4.1.

TABLE 4. 1

Response rate		
Targeted respondents	Returned questionnaires	Response rate
105	80	76.19%

Source: Researcher, 2025

4.3 General information

4.3.1 Age of the respondents

Respondents were asked to indicate their age brackets. The results in Figure 4.1 shows that 11.3% of the respondents were 30 years and below, 35.0% were between 31-40 years, 40.0% were between 41-50 years and 13.8% were 51 years and above.

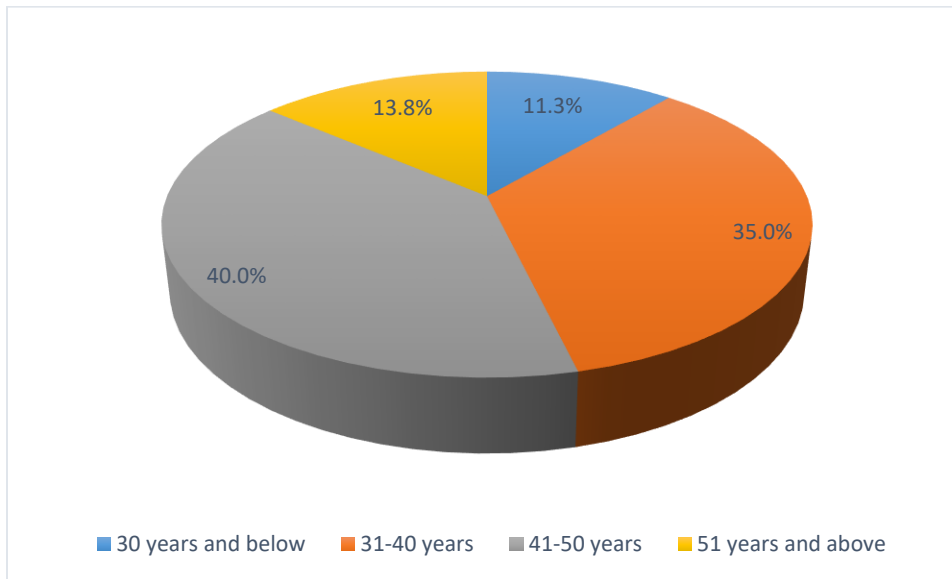


FIGURE 4. 1

Age of the respondents

Source: Researcher, 2025

The findings presented in Figure 4.1 indicate that most respondents fell into the middle to older age groups, implying that a significant number of participants probably possess substantial experience in the sugar manufacturing sector. This suggests that the perspectives presented in the research are shaped by people who have extensive experience with inventory management techniques over time. Their perspectives are thus important in evaluating how methods like Economic Order Quantity, Vendor Managed Inventory, ABC analysis, and Just-In-Time

production strategies influence company performance. The involvement of skilled professionals boosts the trustworthiness of the results regarding the primary aim of the research.

4.3.2 Level of education

The study sought to find participants level of education. The findings in Figure 4.2 shows that 13.8% had certificate, 28.8% had diploma, 43.8% had bachelors degree, 11.3% had masters and 2.5% had Ph.D.

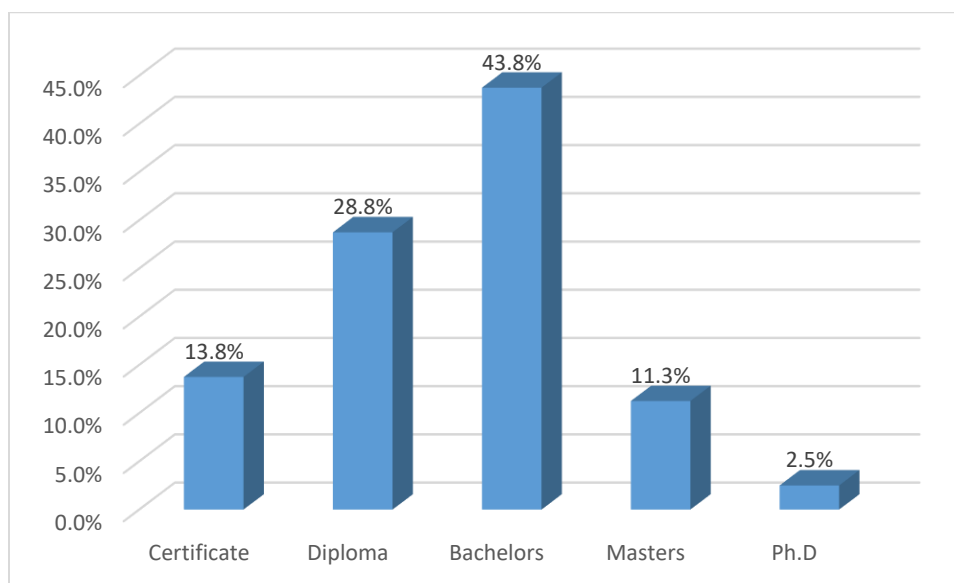


Figure 4. 2
Level of education

Source: Researcher, 2025

The findings indicate that the majority of participants had achieved moderate to high educational levels, spanning from diploma to postgraduate degrees. This suggests that the participants sharing information for the research probably had a strong grasp of inventory management techniques and their implementation in the sugar production industry. Their academic qualifications boost the reliability of their answers and imply that the knowledge obtained on Economic Order Quantity, Vendor Managed Inventory, ABC analysis, and Just-in-Time methods

is proficient. Thus, this reinforces the primary goal of the study by guaranteeing that the assessment of inventory management practices and their effect on company performance is based on informed and knowledgeable viewpoints.

4.3.3 Number of years served in the firm

Respondents were asked to give the number of years they have served in the firm. The responses obtained in Figure 4.3 show that 16.3% had served for less than one year, 27.5% had served between 1-5 years, 35.0% had served between 6-10 years, 13.8% had served between 11-20 years and 7.5% had served for 21 years and above.

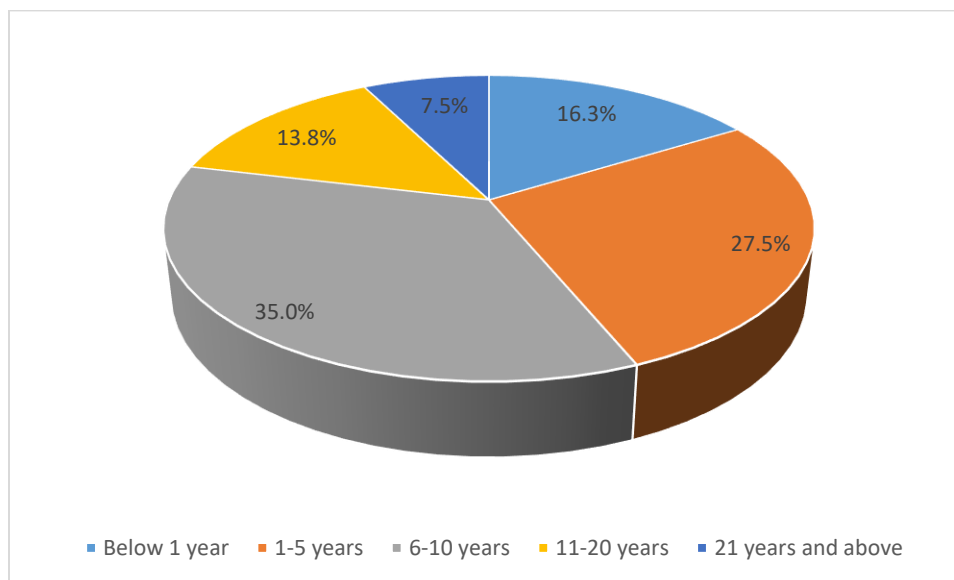


FIGURE 4. 3
Number of years served in the firm

Source: Researcher, 2025

The findings indicate that most participants (35.0%) had been employed in the sugar manufacturing companies for a duration of 6–10 years, with 27.5% having worked for 1–5 years, suggesting that a considerable number of the respondents possessed considerable experience in the field. Moreover, 13.8% had been in service for 11–20 years, and 7.5% for more than 21 years,

indicating that the research gathered perspectives from veteran staff with extensive institutional understanding. Only 16.3% had been in service for under a year, suggesting a low chance of data distortion from inexperience. These results strengthen the trustworthiness and dependability of the data gathered on inventory management practices since respondents were appropriately situated to evaluate the impact of these practices on company performance.

4.3.4 How often a respondent engages in inventory management practices

Respondents were asked to indicate how often they engage in inventory management practices. The results show that 11.3% engage daily, 28.8% engage weekly, 41.3% engage monthly, 13.8% engage occasionally and 5.0% never engage in inventory management practices.

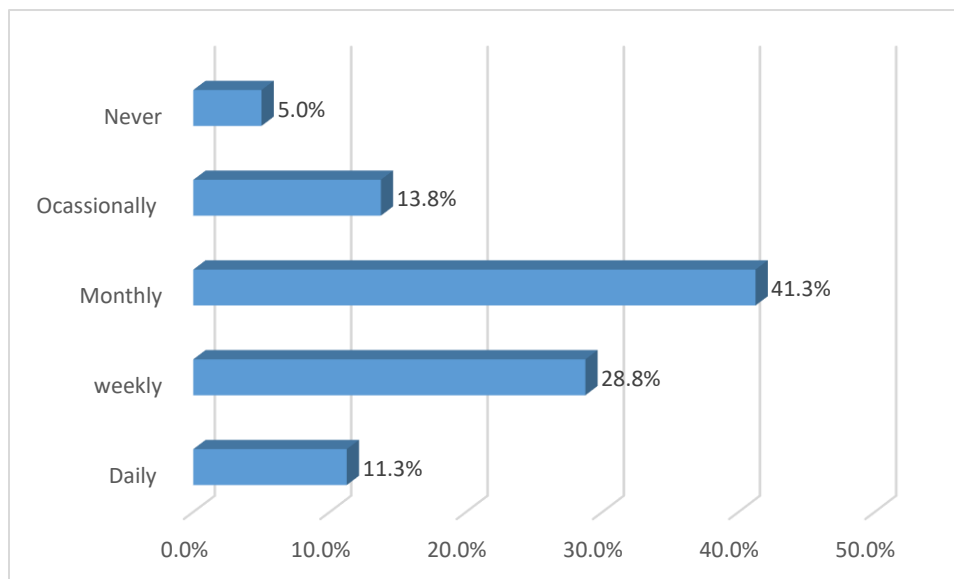


FIGURE 4. 4

Engaging in inventory management practices

Source: Researcher, 2025

The findings indicate that a significant portion of respondents (41.3%) participate in inventory management practices monthly, while 28.8% do so weekly and 11.3% daily, suggesting

that inventory management is a routine and essential aspect of operations for most sugar production companies in Kenya. Furthermore, 13.8% stated they occasionally took part in these practices, while merely a small fraction (5.0%) reported that they do not engage in inventory management at all. These results suggest that a considerable number of employees are engaged in inventory-related tasks, enhancing the research's capacity to effectively evaluate the influence of inventory management strategies on company performance.

4.4 Descriptive statistics

The study employed descriptive statistics such as mean, frequency, and percentages to analyze responses related to inventory management practices and their effects on the performance of sugar manufacturing firms. Frequencies and percentages depicted how respondents assessed different aspects of the inventory techniques, while the mean functioned as an indicator of central tendency, representing the average level of agreement or opinion regarding the effectiveness of practices such as Economic Order Quantity, Vendor Managed Inventory, ABC Analysis, and Just in Time. These numbers helped in identifying existing trends and patterns within the data.

4.4.1 Economic Order Quantity adoption and performance of sugar manufacturing firms

Respondents were asked to indicate their agreement with statements regarding economic order quantity and performance of sugar firms. The results were presented in Table 4.2.

TABLE 4. 2
Economic Order Quantity adoption and performance

No.	Statement	1 SD	2 D	3 N	4 A	5 SA	Total
1	We calculate the optimal order quantity regularly to minimize holding and ordering costs.	19 23.8%	26 32.5%	8 10.0%	13 16.3%	14 17.5%	80 100.0%
2	We rely on EOQ to determine the reorder points for critical inventory items.	20 25.0%	28 35.0%	9 11.3%	10 12.5%	13 16.3%	80 100.0%
3	EOQ is consistently applied across all major inventory categories.	21 26.3%	25 31.3%	7 8.8%	12 15.0%	15 18.8%	80 100.0%
4	EOQ has helped reduce stockouts and overstocking within our organization	13 16.3%	11 13.8%	8 10.0%	23 28.7%	25 31.3%	80 100.0%
5.	Our firm regularly updates EOQ inputs such as demand and lead time.	24 30.0%	29 36.3%	5 6.3%	12 15.0%	10 12.5%	80 100.0%
6.	Inventory procurement decisions are guided by EOQ calculations.	21 26.3%	28 35.0%	9 11.3%	11 13.8%	11 13.8%	80 100.0%
7.	EOQ is integrated into our inventory management system or ERP.	20 25.0%	24 30.0%	10 12.5%	12 15.0%	14 17.5%	80 100.0%
8.	Employees responsible for inventory are trained on EOQ principles.	22 27.5%	24 30.0%	6 7.5%	15 18.8%	13 16.3%	80 100.0%

Source: Researcher, 2025

According to Table 4.2, participants were queried on whether they frequently determine the ideal order quantity to reduce holding and ordering expenses. The results of the study showed that 23.8% were strongly opposed, 32.5% opposed, 10.0% were neutral, 16.3% agreed, and 17.5%

were in strong agreement. The findings indicate that a large number of participants do not consistently determine the ideal order quantity, suggesting that many sugar production companies might not be efficiently utilizing Economic Order Quantity (EOQ) concepts. This indicates a possible neglect in handling inventory costs, since not identifying the optimal order quantity may lead to surplus inventory or regular stockouts, which in turn diminishes operational efficiency and profit margins. These companies might be limited by insufficient systems, a shortage of technical expertise, or a corporate culture that does not prioritize data-driven decision-making. Nonetheless, a limited group of respondents concurred that they determine ideal order quantities, suggesting that certain companies recognize the strategic significance of EOQ in minimizing holding and ordering expenses while enhancing performance. This observation reinforces the research of Korir, Kaitany, and Sang (2021), who noted that companies adopting organized inventory methods such as EOQ achieved improved cost management and operational effectiveness. The few respondents who held a neutral stance may indicate organizations unsure about the relevance or application of EOQ in their operations, potentially due to transitions or limited familiarity with inventory optimization methods.

The research aimed to investigate if participants use EOQ to set the reorder points for essential inventory items. The findings showed that 25.0% strongly disagreed, 35.0% disagreed, 11.3% were neutral, 12.5% agreed, and 16.3% strongly agreed. The findings indicate that the majority of participants do not use Economic Order Quantity (EOQ) for setting reorder points for essential inventory items, suggesting that many sugar manufacturing companies might be overlooking chances to improve inventory management and lessen the likelihood of stockouts or excess inventory. This absence of dependence may arise from a limited comprehension of EOQ concepts, poor integration between inventory management and procurement strategies, or

reluctance to embrace analytical methods in operational choices. Some who consented propose that a small number of companies are synchronizing their reorder choices with EOQ analysis, potentially resulting in more precise inventory restocking, lower holding expenses, and better adaptability to changes in demand. Mbugi and Lutego (2022) support this, revealing that companies that apply EOQ for determining reorder points can more effectively sustain lean inventories and reduce waste, thereby improving performance. A limited number of respondents stayed neutral, suggesting possible uncertainty or minimal engagement in inventory decision-making, or companies that are just beginning to adopt EOQ and have not fully integrated it into their supply chain functions.

Participants were inquired if EOQ is uniformly used across all significant inventory categories. The results indicate that 26.3% strongly disagreed, 31.3% disagreed, 8.8% were neutral, 15.0% agreed, and 18.8% strongly agreed. The results indicate that the majority of participants reported EOQ is not uniformly utilized across all significant inventory categories, implying that many sugar manufacturing companies may be applying EOQ in a selective or disjointed way. This lack of consistency may result in inefficiencies in inventory management, including higher holding costs, stockouts, or inadequate coordination among departments. It might also indicate insufficient training, poor systems integration, or a limited dedication to implementing EOQ as a strategic asset throughout the whole supply chain. Conversely, many respondents acknowledged that EOQ is regularly implemented, suggesting that certain companies have formalized EOQ methods, enabling them to enhance procurement, minimize waste, and improve inventory management uniformly. The research conducted by Kehinde, Ogunnaike, and Adegbuyi (2020) underscores that the regular use of EOQ enhances operational efficiency, reduces costs, and improves overall company performance by facilitating more reliable and streamlined

inventory processes. The few respondents who stayed neutral might suggest uncertainty regarding the reliability of EOQ implementation, potentially due to insufficient insight into company-wide inventory methods or transitional phases where EOQ is tested in certain areas but has not been fully adopted in all categories.

The participants' views were gathered on whether EOQ has contributed to minimizing stockouts and overstocking in our organization. The results show that 16.3% were in strong disagreement, 13.8% disagreed, 10.0% were neutral, 28.7% agreed, and 31.3% strongly agreed. The results show that most participants concurred that EOQ has aided in minimizing stockouts and overstocking in their companies, suggesting that numerous sugar manufacturing firms implementing EOQ are achieving better inventory equilibrium and operational effectiveness. This indicates that EOQ, when effectively applied, allows companies to identify the optimal quantity and timing for restocking inventory, minimizing the risks linked to surplus inventory or shortages. This level of efficiency reduces inventory carrying costs and improves customer satisfaction by maintaining constant production and prompt order delivery. Akinlabi (2021) backs this observation by revealing that companies adopting EOQ practices experienced notable gains in inventory turnover, reduced waste, and improved cost management. Nevertheless, some respondents expressed disagreement, suggesting that certain companies may not be fully capitalizing on EOQ, potentially due to ineffective implementation, insufficient data precision, or external factors influencing supply stability. The few who stayed neutral might indicate confusion regarding the connection between EOQ and inventory results, perhaps due to the difficulty in measuring impacts in their positions or because EOQ is employed with other inventory methods, obscuring its direct influence.

Participants were inquired if their organization consistently revises EOQ inputs like demand and lead time. The participants indicated that 30.0% strongly disagreed, 36.3% disagreed, 6.3% were neutral, 15.0% agreed, and 12.5% strongly agreed. The results show that a majority of participants disagreed that their companies frequently revise EOQ inputs like demand and lead time, implying that many sugar manufacturing firms could be functioning with obsolete or fixed data in their inventory management systems. This can weaken the efficiency of the EOQ model since precise and prompt data is crucial for optimizing order sizes and reducing expenses. Neglecting to regularly update inputs can result in misaligned purchasing choices, heightened stockouts, or surplus inventory, which will ultimately impact overall operational effectiveness. Conversely, some respondents consented, suggesting that a small number of companies are dedicated to regularly assessing and enhancing their EOQ computations using up-to-date information, which can greatly boost inventory precision and adaptability to market fluctuations. This corresponds with Ndiwa's (2022) findings, which highlighted that businesses that consistently refresh inventory planning variables, including demand predictions and lead times, are more capable of sustaining lean operations and minimizing inefficiencies. The few individuals who stayed neutral might indicate a lack of understanding regarding the frequency of these updates, possibly stemming from decentralized inventory choices or poor communication between operations and procurement teams.

The research aimed to determine if inventory purchasing choices were influenced by EOQ computations. The findings show that 26.3% were in strong disagreement, 35.0% disagreed, 11.3% felt neutral, 13.8% agreed, and 13.8% strongly agreed. The results show that a significant number of respondents contended that inventory procurement choices were not influenced by EOQ calculations, suggesting that many sugar manufacturing companies might not depend on analytical

inventory models for their purchasing decisions. This indicates a potential dependence on conventional or reactive purchasing methods, which may lead to inefficiencies like surplus inventory, regular stock shortages, and heightened operational expenses. Such practices restrict firms from optimizing inventory levels and synchronizing procurement with real demand trends. Nevertheless, some respondents concurred, suggesting that a small number of companies have implemented EOQ-based decision-making, enabling them to make more accurate and economical procurement decisions. Kehinde, Ogunnaike, and Adegbuyi (2020) support this, suggesting that companies that incorporate EOQ into their procurement strategies typically see enhanced planning, better cost management, and improved supply chain efficiency. The few respondents who stayed neutral might show uncertainty or minimal engagement in procurement activities, potentially highlighting a gap between strategic planning and operational implementation in certain organizations.

The research aimed to determine whether EOQ is incorporated into our inventory management system or ERP. The research results show that 25.0% strongly disagreed, 30.0% disagreed, 12.5% were neutral, 15.0% agreed, and 17.5% strongly agreed. The results show that the majority of participants disagreed that EOQ is incorporated into their inventory management system or ERP, indicating that most sugar manufacturing companies might still be performing EOQ calculations manually or lack fully automated inventory optimization solutions. This absence of integration may impede timely decision-making, decrease data accuracy, and elevate the likelihood of procurement mistakes, ultimately impacting efficiency and company performance. Disconnected or manual processes usually result in slower response times, missed reorder points, and increased inventory costs. Nonetheless, a significant number of participants concurred that EOQ is incorporated into their systems, suggesting that certain companies have adopted

technological solutions to improve inventory precision and optimize procurement choices. This coincides with the results of Mbugi and Lutego (2022), who emphasized that companies incorporating EOQ into their ERP systems experienced improved inventory visibility, quicker replenishment cycles, and enhanced supply chain performance. The few respondents who stayed neutral might indicate companies going through system changes or people who lack knowledge of their inventory systems' technical features because of minimal engagement in system activities.

Participants were queried about whether those in charge of inventory receive training on EOQ principles. The findings indicate that 27.5% strongly disagreed, 30.0% disagreed, 7.5% were neutral, 18.8% agreed, and 16.3% strongly agreed. The results indicate that a majority of respondents disagreed that those in charge of inventory receive training on EOQ principles, suggesting that many sugar manufacturing companies might not have the required capability to implement EOQ successfully. If not adequately trained, employees might find it challenging to grasp or implement EOQ principles, resulting in suboptimal inventory choices, inefficiencies, and lost chances for reducing costs. This skills gap may also impede the effective incorporation of EOQ into larger inventory and procurement frameworks. Conversely, some respondents concurred, indicating that a small number of companies have focused on developing employee skills related to EOQ, which is expected to improve inventory precision, lower holding and ordering expenses, and aid in strategic supply chain oversight. Akinlabi (2021) supports this claim, highlighting that ongoing employee training in inventory management techniques, such as EOQ, greatly enhances operational efficiency and cost management in manufacturing companies. The few who stayed neutral might indicate organizations where training is present but varies in quality, is outdated, or poorly communicated to all pertinent staff.

4.4.2 Vendor managed inventory practice and performance of sugar manufacturing firms

Respondents rated statements related to vendor managed inventory practices and performance of sugar firms. The results were presented in Table 4.3.

TABLE 4. 3
Vendor managed inventory practice and performance

No.	Statement	1 SD	2 D	3 N	4 A	5 SA	Total
1	Our firm and suppliers have formal agreements guiding VMI operations.	26 32.5%	21 26.3%	10 12.5%	14 17.5%	9 11.3%	80 100.0%
2	VMI allows our procurement team to focus on strategic sourcing.	12 15.0%	15 18.8%	9 11.3%	21 26.3%	23 28.7%	80 100.0%
3	Our suppliers deliver on time and in quantities that meet production needs under VMI.	18 22.5%	27 33.8%	8 10.0%	12 15.0%	15 18.8%	80 100.0%
4	Vendor Managed Inventory (VMI) has led to more efficient stock replenishment and reduced stockouts.	14 17.5%	16 20.0%	5 6.3%	23 28.7%	22 27.5%	80 100.0%
5	VMI has reduced the time spent on inventory ordering and management within the company	11 13.8%	16 20.0%	9 11.3%	22 27.5%	22 27.5%	80 100.0%
6	Vendor-managed inventory has enhanced our supplier relationships and trust	16 20.0%	13 16.3%	6 7.5%	21 26.3%	24 30.0%	80 100.0%
7	The use of VMI has improved collaboration with our suppliers, leading to smoother inventory operations.	14 17.5%	12 15.0%	9 11.3%	25 31.3%	20 25.0%	80 100.0%
8	VMI has resulted in fewer inventory discrepancies and improved stock accuracy	17 21.3%	11 13.8%	8 10.0%	23 28.7%	21 26.3%	80 100.0%

Source: Researcher, 2025

According to Table 4.3, participants were inquired about whether their company and suppliers possess formal contracts governing VMI operations. The findings showed that 32.5% strongly disagreed, 26.3% disagreed, 12.5% were neutral, 17.5% agreed, and 11.3% strongly agreed. The findings show that most respondents did not agree with the claim that their companies and suppliers possess formal agreements directing Vendor Managed Inventory (VMI) practices, indicating that organized cooperation in inventory management is still insufficient among many sugar production companies in Kenya. The lack of formal agreements may cause inefficiencies in inventory management, resulting in stock-outs or excess inventory, which can ultimately impact company performance. Conversely, a noteworthy minority concurred, suggesting that certain companies have begun to adopt systematic VMI frameworks, potentially improving coordination and responsiveness throughout the supply chain. Aligning with suppliers can enhance resource use and lower operational expenses. A few respondents stayed neutral, potentially suggesting uncertainty or unfamiliarity with VMI frameworks in their companies, which might indicate insufficient communication or participation in inventory-related decisions. Chebet, Samson, and Chogo (2021) highlight that strong VMI practices backed by formal contracts improve supplier relationships and boost supply chain efficiency, consequently benefiting overall firm performance.

The research aimed to gather participants' views on whether VMI enables our procurement team to concentrate on strategic sourcing. The findings indicate that 15.0% strongly disagreed, 18.8% disagreed, 11.3% were neutral, 26.3% agreed, and 28.7% strongly agreed. The findings show that the majority of participants concurred that Vendor Managed Inventory (VMI) enables their procurement teams to prioritize strategic sourcing, suggesting that VMI can free procurement personnel from everyday inventory management duties, thus allowing them to focus on more valuable efforts like supplier assessment, cost reduction, and long-term sourcing plans. This

change can improve organizational effectiveness and competitive edge. Nonetheless, a significant minority opposed this view, indicating that in certain companies, procurement teams continue to struggle with completely entrusting inventory management to suppliers or that VMI approaches have not yet developed sufficiently to relieve procurement resources. A few respondents stayed neutral, likely indicating uncertainty or minimal direct experience regarding the effects of VMI on their procurement processes. Hassan (2021) reinforces these results by emphasizing that successful VMI execution can enhance procurement performance by optimizing inventory procedures and enabling procurement experts to concentrate on strategic efforts that foster company growth.

The research aimed to determine if suppliers to firms provide timely deliveries and sufficient quantities to satisfy production requirements under VMI. The results illustrate that 22.5% strongly disagreed, 33.8% disagreed, 10.0% were neutral, 15.0% agreed, and 18.8% strongly agreed. The findings indicate that most participants disagreed with the notion that their suppliers provide timely deliveries and sufficient quantities to meet production demands under Vendor Managed Inventory (VMI), highlighting notable issues in supplier reliability and consistency that could interrupt production timelines and impact overall company performance. This indicates that although VMI offers theoretical advantages, its actual implementation might be obstructed by supplier inefficiencies or coordination challenges. On the other hand, a significant minority concurred, suggesting that certain companies receive timely and precise deliveries that facilitate smooth production processes, underscoring effective VMI execution when supplier performance matches production needs. A limited number of participants stayed neutral, which may indicate uncertainty or fluctuations in delivery performance among various suppliers or over different timeframes. Opoku, Fiati, Kaku, and Ankomah (2020) contend that prompt and precise supplier deliveries are essential for effective VMI systems to enhance operational efficiency,

emphasizing that unreliable supplier performance restricts the advantages of VMI on firm performance.

Participants were inquired if Vendor Managed Inventory (VMI) has resulted in more efficient inventory replenishment and decreased stockouts. The results indicate that 17.5% strongly disagreed, 20.0% disagreed, 6.3% were neutral, 28.7% agreed, and 27.5% strongly agreed. The findings indicate that a majority of respondents concurred that Vendor Managed Inventory (VMI) has resulted in more effective stock replenishment and fewer stockouts, implying that VMI plays a crucial role in enhancing inventory management through timely and sufficient restocking. This enhancement can increase production consistency and lower expenses related to urgent orders or suspended activities. Nevertheless, a significant minority opposed, suggesting that in certain companies, VMI has not achieved the anticipated efficiencies, potentially due to challenges in implementation, insufficient supplier coordination, or limitations in technology. A few respondents stayed neutral, possibly indicating either limited awareness of VMI results or varied experiences in their organizations. Altaf and Ali (2023) state that efficient VMI systems play a crucial role in optimizing inventory levels and reducing stockouts, thus improving operational performance and customer satisfaction, which aligns with the favorable views shared by most participants in this study.

The research aimed to determine whether VMI has decreased the time allocated to inventory ordering and management in the organization. The findings indicate that 13.8% strongly disagreed, 20.0% disagreed, 11.3% were neutral, 27.5% agreed, and 27.5% strongly agreed. The findings show that the majority of participants concurred that Vendor Managed Inventory (VMI) has minimized the time dedicated to inventory ordering and management in their organizations, suggesting that VMI simplifies inventory operations by transferring responsibility to suppliers,

which in turn liberates internal resources and enables companies to concentrate on essential tasks. This increase in efficiency can result in quicker decision-making and lower administrative load. Nonetheless, a significant minority opposed this view, indicating that certain companies might still encounter obstacles like distrust in suppliers, inadequate technology integration, or complicated inventory needs that hinder complete time savings from VMI. A few stayed neutral, suggesting they may have little experience with VMI's effects on their inventory management or doubts about its advantages. Hassan (2021) backs this perspective by highlighting that effective VMI implementation can greatly reduce internal inventory-related workload, boosting operational efficiency and enabling procurement teams to focus on more strategic tasks.

Participants were inquired if vendor-managed inventory has improved our relationships and trust with suppliers. The responses received showed that 20.0% strongly disagreed, 16.3% disagreed, 7.5% were neutral, 26.3% agreed, and 30.0% strongly agreed. The results show that the majority of participants concurred that Vendor Managed Inventory (VMI) has strengthened their relationships with suppliers and built trust, indicating that VMI promotes tighter collaboration, better communication, and shared accountability between companies and their suppliers. This enhanced collaboration can result in improved coordination, fewer conflicts, and a more dependable supply chain, all of which benefit company performance. Nonetheless, a notable minority opposed, suggesting that in certain companies, VMI has not yet resulted in improved supplier relationships, potentially because of insufficient transparency, poor execution, or distrust in supplier competencies. A few respondents expressed neutrality, suggesting either minimal experience with the relational elements of VMI or varied perceptions within their companies. Chebet, Samson, and Chogo (2021) highlight that effective VMI practices aid in establishing trust

and enduring partnerships with suppliers, essential for sustainable operational success in manufacturing companies.

The research aimed to determine if the implementation of VMI has enhanced cooperation with our suppliers, resulting in more seamless inventory processes. The findings indicate that 17.5% were in strong disagreement, 15.0% disagreed, 11.3% were neutral, 31.3% agreed, and 25.0% strongly agreed. The results show that most respondents concurred that implementing Vendor Managed Inventory (VMI) has enhanced cooperation with suppliers, resulting in more efficient inventory processes. This indicates that VMI enhances communication, collaborative planning, and coordination, which are essential for optimizing inventory and minimizing production disruptions. Enhanced collaboration can boost trust and alignment among companies and suppliers, leading to greater operational efficiency. Nevertheless, a significant minority opposed, which could indicate issues like reluctance to change, insufficient technological incorporation, or unreliable supplier performance that impede joint initiatives. A few stayed neutral, perhaps suggesting minimal engagement in or knowledge of the collaborative dynamics under VMI within their companies. Opoku, Fiati, Kaku, and Ankomah (2020) endorse this viewpoint by emphasizing that efficient supplier collaboration via VMI is crucial for timely inventory restocking and improving overall supply chain efficiency in manufacturing companies.

Participants were inquired if VMI has led to reduced inventory discrepancies and enhanced stock precision. The findings reveal that 21.3% strongly disagreed, 13.8% disagreed, 10.0% were neutral, 28.7% agreed, and 26.3% strongly agreed. The results show that most participants who acknowledged that Vendor Managed Inventory (VMI) has led to reduced inventory discrepancies and better stock accuracy likely understand the tangible advantages of VMI in optimizing inventory management and operational effectiveness. This is consistent with Hassan (2021), who

contends that VMI promotes tighter cooperation between suppliers and manufacturers, resulting in improved stock accuracy and fewer mistakes. On the other hand, the significant minority that opposed may see obstacles in VMI execution, such as issues with coordination or distrust between suppliers and companies, which could lead to persistent inconsistencies. The few respondents who stayed neutral may indicate uncertainty or a lack of awareness regarding VMI's complete effects, as certain companies might still be in the initial phases of adoption and have not yet seen distinct advantages.

4.4.3 ABC analysis and performance of sugar manufacturing firms

Respondents provided their views on ABC Analysis and performance of sugar firms. The results were presented in Table 4.4.

TABLE 4. 4

ABC analysis and performance

No.	Statement	1 SD	2 AD	3 N	4 A	5 SA	Total
1.	Our firm classifies inventory items using the ABC analysis method.	26 32.5%	23 28.7%	9 11.3%	14 17.5%	8 10.0%	80 100.0%
2.	ABC categories are reviewed and updated based on usage and value.	21 26.3%	23 28.7%	10 12.5%	12 15.0%	14 17.5%	80 100.0%
3.	Inventory software in our firm supports ABC classification.	14 17.5%	12 15.0%	8 10.0%	29 36.3%	17 21.3%	80 100.0%
4.	ABC analysis helps us prioritize resources toward critical inventory items.	11 13.8%	16 20.0%	10 12.5%	25 31.3%	18 22.5%	80 100.0%
5.	Staff responsible for inventory management are trained on ABC analysis.	27 33.8%	23 28.7%	7 8.8%	12 15.0%	11 13.8%	80 100.0%
6.	ABC analysis supports more informed decision-making in procurement.	14 17.5%	13 16.3%	9 11.3%	25 31.3%	19 23.8%	80 100.0%
7.	Our firm monitors performance indicators for each ABC category.	28 35.0%	21 26.3%	11 13.8%	12 15.0%	8 10.0%	80 100.0%
8.	ABC analysis has reduced inventory carrying costs in our firm.	14 17.5%	15 18.8%	8 10.0%	23 28.7%	20 25.0%	80 100.0%

Source: Researcher, 2025

Participants were inquired if their company categorizes inventory items utilizing the ABC analysis approach. The findings indicate that 32.5% strongly disagreed, 28.7% disagreed, 11.3%

were neutral, 17.5% agreed, and 10.0% strongly agreed. The results indicate that a majority of respondents disagreed that their companies utilize the ABC analysis method for categorizing inventory items, which strongly implies that many sugar manufacturing firms in Kenya might not be utilizing this essential tool for inventory management. This hesitation or failure to embrace the method might stem from a limited grasp of the technique, a belief that it is overly complex, or an unwillingness to adapt, leading to poor inventory management, increased holding expenses, and improper resource distribution elements that ultimately weaken organizational performance. Conversely, those in agreement, despite being a minority, probably understand the essential function of ABC analysis in enhancing performance by allowing companies to concentrate on their most valuable inventory items, refine stock levels, and lower operational expenses. This group likely gains from improved decision-making and better resource prioritization. At the same time, the neutral respondents signify a group with unclear or inadequate understanding of ABC analysis, possibly indicating deficiencies in training or communication in their organizations. This ambiguity may hinder companies from achieving the potential benefits associated with efficient inventory classification. Kingori (2023) backs these claims by showing that companies utilizing ABC analysis greatly enhance resource distribution and operational effectiveness, emphasizing the performance dangers for those who either do not embrace or lack a comprehensive understanding of the method.

Participants were inquired if ABC categories are assessed and revised according to their usage and importance. The findings indicate that 26.3% strongly disagreed, 28.7% disagreed, 12.5% were neutral, 15.0% agreed, and 17.5% strongly agreed. The results indicate that a majority of respondents opposed the idea that ABC categories are consistently evaluated and revised according to usage and value, suggesting that numerous sugar manufacturing companies in Kenya

might not be sustaining the adaptable aspect of ABC analysis. The absence of consistent evaluations may cause classifications to become outdated, leading to ineffective inventory management and lost chances for cost reduction and enhanced performance. A small percentage of respondents concurred, indicating that certain companies recognize the necessity of regularly revising ABC categories to mirror shifts in inventory utilization and worth, aiding in improved resource distribution and adaptability to market needs. Firms that stayed neutral probably indicate uncertainty about their review processes or inconsistent practices, suggesting a potential lack of awareness or formal procedures. Kingori (2023) states that consistently reviewing and updating ABC categories is essential for maintaining the relevance and effectiveness of analysis in improving inventory management and boosting overall company performance, highlighting that overlooking this process can greatly diminish the advantages of ABC analysis.

The research aimed to determine if the inventory software in our company facilitates ABC classification. The findings showed that 17.5% strongly disagreed, 15.0% disagreed, 10.0% were neutral, 36.3% agreed, and 21.3% strongly agreed. The results show that a majority of participants concurred that their companies' inventory software facilitates ABC classification, suggesting that many sugar manufacturing firms in Kenya are utilizing technology to improve their inventory management methods. This indicates that these companies are probably reaping the rewards of enhanced inventory classification, superior monitoring, and improved decision-making skills, potentially resulting in greater efficiency and overall enhanced performance. On the other hand, a significant minority disagreed, suggesting that some companies either do not possess the required technological resources or have systems that do not facilitate ABC classification, possibly hindering their capacity to manage inventory efficiently and optimize resources. Neutral participants might signify companies unsure of their software abilities or with incomplete

implementation, indicating potential issues in communication or system integration. Mikhago (2024) states that the incorporation of technology, especially inventory software that facilitates ABC analysis, is essential for boosting accuracy, optimizing inventory management, and ultimately enhancing operational efficiency, highlighting the competitive edge enjoyed by companies that embrace these systems.

Participants were inquired if ABC analysis assists in prioritizing resources for essential inventory items. The results show that 13.8% strongly disagreed, 20.0% disagreed, 12.5% were neutral, 31.3% agreed, and 22.5% strongly agreed. The findings indicate that most respondents concurred that ABC analysis aids in prioritizing resources for essential inventory items, implying that numerous sugar manufacturing companies in Kenya appreciate the importance of this approach in improving operational effectiveness and concentrating efforts where they are most needed. These companies probably encounter enhanced cost control and more effective distribution of scarce resources, crucial for retaining competitiveness and efficiency. On the other hand, a notable minority expressed disagreement, suggesting that some companies may not entirely grasp the advantages of ABC analysis or have not executed it properly, possibly resulting in resource misallocation and inefficiencies. A few respondents expressed neutrality, indicating either uncertainty or minimal experience regarding the impact of ABC analysis on resource prioritization in their organizations. As noted by Kingori (2023), companies that effectively implement ABC analysis to prioritize essential inventory items usually enhance resource utilization and boost overall performance, underscoring the value of adopting this method for lasting operational success.

The research aimed to determine if personnel handling inventory management receive training in ABC analysis. The results indicate that 33.8% strongly disagreed, 28.7% disagreed,

8.8% were neutral, 15.0% agreed, and 13.8% strongly agreed. The findings indicate that the majority of respondents disagreed that employees in charge of inventory management receive training on ABC analysis, implying that many sugar manufacturing companies in Kenya might be deficient in crucial training and capacity enhancement for proper inventory classification. This lack of knowledge and skills may result in incorrect execution of ABC analysis, diminishing its potential advantages for inventory management and overall company performance. A small number of respondents concurred, suggesting that certain companies allocate resources to staff training, which probably improves the precision and efficacy of inventory management strategies, positively impacting operational efficiency. Individuals who stayed neutral might signify uncertainty or varying training methods within companies, highlighting the necessity for more organized and extensive skill development. Mbugi and Lutego (2022) highlight that effective training in inventory management strategies like ABC analysis is essential for fully realizing the advantages of these techniques, as untrained personnel may find it challenging to implement the analysis efficiently, consequently hindering performance enhancements.

The research aimed to establish whether ABC analysis aids in making more informed decisions in purchasing. The findings show that 17.5% strongly disagreed, 16.3% disagreed, 13.3% were neutral, 31.3% agreed, and 23.8% strongly agreed. The findings indicate that most participants concurred that ABC analysis enhances decision-making in procurement, signifying that numerous sugar manufacturing companies in Kenya acknowledge the strategic importance of this method in directing purchasing decisions. By recognizing valuable or frequently used inventory items, these companies can more effectively allocate procurement budgets, reduce stockouts, and prevent overstocking, thereby improving operational performance. Conversely, a significant minority disagreed, suggesting that certain companies might not be effectively utilizing

ABC analysis or may lack the necessary systems and knowledge to convert inventory categorization into practical procurement strategies. Such a disconnect may lead to inadequate procurement planning and higher operational expenses. A limited number of respondents took a neutral stance, which may indicate a lack of understanding or varying methods in connecting ABC analysis to purchasing choices. Odumusor (2024) reinforces this perspective by highlighting that incorporating ABC analysis into procurement processes fosters data-driven decision-making that minimizes waste, boosts responsiveness, and enhances supply chain efficiency, stressing the performance disparity in companies that do not fully leverage the approach.

Participants were questioned on whether their company tracks performance metrics for every ABC category. The findings showed that 35.0% strongly disagreed, 26.3% disagreed, 13.8% were neutral, 15.0% agreed, and 10.0% strongly agreed. The findings show that a significant number of respondents did not agree that their companies track performance indicators for every ABC category, implying that many sugar manufacturing firms in Kenya might not be effectively harnessing the analytical capabilities of ABC analysis to assess and monitor the efficiency of their inventory management approaches. The absence of performance tracking can impede the capacity to implement data-driven enhancements, identify inefficiencies, or react proactively to inventory issues, ultimately restricting the effectiveness of ABC analysis on overall company performance. A small portion of respondents concurred, suggesting that some companies acknowledge the value of linking performance metrics to every inventory category to enhance stock levels, lower holding costs, and synchronize inventory strategies with organizational objectives. Individuals who stayed neutral probably indicate doubt or inconsistency in monitoring procedures, highlighting the requirement for improved awareness and organized frameworks to facilitate ongoing assessment. Gatari and Osoro (2022) state that companies that consistently track inventory performance within

ABC categories can enhance procurement tactics and achieve operational excellence, highlighting the lost chances in organizations that neglect this essential element.

The research aimed to determine if ABC analysis has lowered inventory holding costs in our company. The results show that 17.5% strongly disagreed, 18.8% disagreed, 10.0% were neutral, 28.7% agreed, and 25.0% strongly agreed. The findings show that most respondents concurred that ABC analysis has contributed to lowering inventory carrying costs in their businesses, implying that numerous sugar manufacturing firms in Kenya are effectively utilizing the method to prioritize high-value inventory items, thus reducing surplus stock and related storage costs. This indicates greater cost efficiency and improved inventory management, both of which are crucial for boosting overall company performance. Nonetheless, a significant minority opposed, possibly indicating poor execution, insufficient integration with other inventory systems, or a limited grasp of effective ABC analysis application—elements that can result in overlooked cost-saving chances and inefficiencies. A limited number of participants stayed neutral, which may suggest doubt regarding the effects of ABC analysis or insufficient monitoring of cost-related results. Mikhago (2024) highlights that companies that adopt ABC analysis strategically see notable decreases in carrying costs and enhanced resource efficiency, supporting the notion that utilizing this approach effectively can be a crucial factor in boosting financial and operational performance in manufacturing environments.

4.4.4 Just in Time production technique and performance of sugar manufacturing firms

Respondents rated statements concerning just in time production technique and performance of sugar firms in Kenya. The results were presented in Table 4.5.

TABLE 4. 5

Just in Time production technique and performance

No.	Statement	1	2	3	4	5	Total
		SD	D	N	A	SA	
1.	Our firm applies Just-In-Time principles in its production processes.	30 37.5%	21 26.3%	7 8.8%	14 17.5%	8 10.0%	80 100.0%
2.	Production planning is aligned with supplier delivery schedules.	21 26.3%	24 30.0%	9 11.3%	12 15.0%	14 17.5%	80 100.0%
3.	The firm has invested in systems that support JIT implementation.	26 32.5%	22 27.5%	10 12.5%	13 16.3%	9 11.3%	80 100.0%
4.	JIT practices have helped reduce the level of inventory held.	16 20.0%	11 13.8%	8 10.0%	24 30.0%	21 26.3%	80 100.0%
5.	JIT helps us maintain continuous production without excess inventory.	14 17.5%	16 20.0%	7 8.8%	24 30.0%	19 23.8%	80 100.0%
6.	Our production team works closely with suppliers to coordinate deliveries.	21 26.3%	24 30.0%	9 11.3%	14 17.5%	12 15.0%	80 100.0%
7.	JIT has led to reduced storage and handling costs.	11 13.8%	14 17.5%	10 12.5%	22 27.5%	23 28.7%	80 100.0%
8.	The use of JIT supports faster response to customer orders.	13 16.3%	16 20.0%	7 8.8%	26 32.5%	18 22.5%	80 100.0%

Source: Researcher, 2025

The research aimed to determine whether the respondents' company implements Just-In-Time principles in its production activities. The findings indicate that 37.5% were strongly opposed, 26.3% opposed, 8.8% were neutral, 17.5% agreed, and 10.0% were strongly in favor. The findings show that a significant number of respondents opposed the idea that their companies implement Just-In-Time (JIT) principles in their production processes, indicating that most sugar manufacturing firms in Kenya might not be adopting this lean production strategy. This may suggest that these companies still depend on conventional production systems marked by elevated inventory levels, potentially resulting in higher holding costs, inefficiencies, and reduced responsiveness to market demand. The small number of supporters indicates that some companies are implementing JIT, probably gaining advantages from minimized waste, enhanced process flow, and savings through efficient inventory and prompt procurement. Individuals who stayed neutral might display uncertainty or incomplete execution of JIT, suggesting a lack of knowledge or ambiguous internal procedures. Cheptoo, Kiongera, and Rutto (2024) state that effectively applying JIT in manufacturing improves operational performance by reducing non-value-adding activities and promoting a culture of efficiency and responsiveness, advantages that many companies in this industry might lack due to limited adoption of the method.

Participants were inquired if production planning is consistent with supplier delivery timelines. The findings show that 26.3% strongly disagreed, 30.0% disagreed, 11.3% were neutral, 15.0% agreed, and 17.5% strongly agreed. The findings show that a majority of respondents opposed the idea that their firms' production planning corresponds with supplier delivery timelines, indicating that most sugar manufacturing companies in Kenya encounter difficulties in coordinating supply chain operations, which is crucial for successful Just-In-Time (JIT) implementation. This discrepancy probably leads to delays in production, excess inventory, or

shortages, compromising the responsiveness and efficiency that JIT seeks to attain. A small portion of respondents concurred, suggesting that some companies are effectively aligning their production strategies with supplier timelines, which boosts inventory turnover, minimizes waste, and facilitates more efficient operations. The few individuals who stayed neutral might indicate hesitancy or varying methods in coordinating production and supply chain processes. Kibisu (2020) states that coordinating production planning with supplier deliveries is crucial for reducing lead times and guaranteeing the prompt availability of inputs; companies that do not achieve this coordination frequently find it difficult to gain the complete advantages of JIT systems.

Participants were inquired whether their company has invested in systems that facilitate JIT implementation. The findings indicate that 32.5% strongly disagreed, 27.5% disagreed, 12.5% were neutral, 16.3% agreed, and 11.3% strongly agreed. The findings indicate that the majority of participants disagreed that their companies have made investments in systems that facilitate Just-In-Time (JIT) implementation, suggesting that most sugar manufacturing firms in Kenya might lack the required technological infrastructure or process integration to effectively adopt JIT principles. This deficiency in investment probably hinders their capacity to align production schedules, decrease lead times, and lower inventory holding costs, which are fundamental aims of JIT. A small number of respondents concurred, indicating that some companies have acknowledged the need for backing JIT with suitable systems like automated inventory management, supplier collaboration platforms, or real-time production scheduling tools, which can greatly improve efficiency and adaptability. The few who stayed neutral might indicate either insufficient awareness of current systems or ambiguous implementation status in their companies. Cheptoo, Kiongera, and Rutto (2024) assert that investing in supportive systems is essential for

JIT effectiveness, as it boosts coordination, precision, and decision-making throughout the supply chain, leading to enhanced overall company performance.

Participants were requested to provide their views on whether JIT practices have contributed to lowering the amount of inventory maintained. The results show that 20.0% strongly disagreed, 13.8% disagreed, 10.0% were neutral, 30.0% agreed, and 26.3% strongly agreed. The findings indicate that most participants concurred that Just-In-Time (JIT) practices have aided in lowering the amount of inventory maintained in their companies, suggesting that numerous sugar manufacturing firms in Kenya are starting to realize the fundamental advantages of JIT, especially in decreasing surplus stock and cutting inventory holding costs. This indicates enhanced effectiveness in production scheduling and supply management, which are crucial for streamlined operations. Conversely, a significant minority opposed this view, indicating that certain companies might face challenges in adopting JIT because of unstable supply chains, poor supplier collaboration, or constraints within their processes, resulting in ongoing overstocking or delays in production. A few respondents were neutral, probably showing uncertainty regarding JIT's influence or variability in its implementation among departments. As noted by Ralahallo (2021), effectively implementing JIT results in a notable decrease in inventory levels, enhancing cash flow, minimizing waste, and elevating operational efficiency results that companies not wholly adopting JIT might still overlook.

Participants were inquired if JIT assists us in achieving uninterrupted production without surplus inventory. The findings indicate that 17.5% strongly disagreed, 20.0% disagreed, 8.8% were neutral, 30.0% agreed, and 23.8% strongly agreed. The results indicate that most respondents believe Just-In-Time (JIT) supports ongoing production without surplus inventory, suggesting that numerous sugar manufacturing companies in Kenya are successfully implementing JIT strategies

to optimize operations and minimize waste. This indicates better coordination between production and supply, enabling companies to function more effectively by obtaining materials solely as required, thereby reducing storage expenses and enhancing cash flow. Nonetheless, a significant minority opposed, suggesting that certain companies might struggle to maintain production without large inventories, potentially because of inconsistent supplier deliveries, poor production planning, or insufficient technological assistance. The few neutral responses might indicate a lack of understanding of JIT or its inconsistent application within companies. According to Kibisu (2020), JIT works best when procurement, production, and supplier coordination are well-aligned, and companies that secure this alignment can ensure seamless operations while greatly minimizing excess inventory retention.

Participants were inquired whether their production team collaborates closely with suppliers to manage deliveries. The findings indicate that 26.3% strongly disagreed, 30.0% disagreed, 11.3% were neutral, 17.5% agreed, and 15.0% strongly agreed. The results show that a majority of participants disagreed that their production teams collaborate closely with suppliers to manage deliveries, implying that many sugar manufacturing companies in Kenya might lack the necessary supplier cooperation for successful Just-In-Time (JIT) execution. This lack of alignment can lead to postponed inputs, production halts, and the necessity to keep elevated inventory levels as a safeguard against unpredictability, which opposes the fundamental tenets of JIT. A small percentage of respondents concurred, suggesting that some companies have formed collaborative partnerships with their suppliers, which likely improves delivery dependability, fosters lean inventory methods, and guarantees ongoing production continuity. The limited number of those who stayed neutral may represent companies that are either just beginning to establish supplier integration strategies or have irregular practices implemented. As noted by Ralahallo (2021),

effective collaboration with suppliers is essential for the success of JIT systems, allowing for prompt deliveries, reducing inventory costs, and facilitating a smooth production process, all of which greatly enhance operational efficiency.

The research aimed to determine if JIT has resulted in lower storage and handling expenses. The findings show that 13.8% strongly disagreed, 17.5% disagreed, 12.5% were neutral, 27.5% agreed, and 28.7% strongly agreed. The results indicate that most participants concurred that Just-In-Time (JIT) has resulted in decreased storage and handling expenses in their businesses, implying that numerous sugar manufacturing firms in Kenya are successfully utilizing JIT to reduce surplus inventory and enhance space and labor efficiency. This indicates enhanced operational efficiency, with materials arriving as required, which minimizes dependence on large storage spaces and complex handling procedures. Conversely, a significant minority expressed disagreement, suggesting that certain companies might not be witnessing these advantages because of inadequate JIT execution, inconsistent supply chains, or insufficient supportive infrastructure. These companies might continue to face substantial storage and handling costs, jeopardizing the cost-effectiveness objectives of JIT. A limited number of neutral replies might indicate doubt regarding cost savings or inconsistent monitoring of those performance indicators. Cheptoo, Kiongera, and Rutto (2024) state that effective JIT adoption greatly reduces storage and handling expenses by optimizing supply flows and minimizing non-value-added tasks, highlighting the necessity of synchronized execution to achieve these advantages.

The research aimed to determine whether employing JIT enhances quicker reactions to customer requests. The findings indicate that 16.3% strongly disagreed, 20.0% disagreed, 8.8% were neutral, 32.5% agreed, and 22.5% strongly agreed. The results illustrate that most participants concurred that Just-In-Time (JIT) facilitates quicker responses to customer requests, suggesting

that numerous sugar manufacturing companies in Kenya are gaining enhanced agility and responsiveness through lean production methodologies. This indicates that these companies can manufacture according to real demand instead of predictions, enabling them to meet customer orders more swiftly and accurately. Conversely, a significant minority opposed this view, suggesting that certain companies might find it challenging to attain such responsiveness because of unreliable supplier performance, insufficient production planning, or system constraints that hinder real-time collaboration. The limited respondents who stayed neutral may indicate hesitation about the connection between JIT and customer service standards, or their companies might not have completely assessed JIT's effect on order responsiveness. As stated by Kibisu (2020), the effectiveness of JIT in enhancing responsiveness to customer demands is rooted in its demand-driven framework, which shortens lead times and improves service delivery advantages that are particularly evident when JIT is effectively incorporated into production and supply chain operations.

4.4.5 Performance of sugar manufacturing firms

Respondents were asked to rate their agreement with Likert-scale statements on performance of sugar firms. The results were presented in Table 4.6.

TABLE 4. 6

Performance of sugar manufacturing firms

No.	Statement	51 SD	2 D	3 N	4 A	5 SA	Total
1.	Our firm has experienced improved operational efficiency due to effective inventory practices.	21 26.3%	28 35.0%	5 6.3%	11 13.8%	15 18.8%	80 100.0%
2.	We consistently meet customer demand due to better inventory availability.	19 23.8%	27 33.8%	8 10.0%	14 17.5%	12 15.0%	80 100.0%
3.	Inventory practices in our firm have reduced production interruptions.	13 16.3%	15 18.8%	7 8.8%	24 30.0%	21 26.3%	80 100.0%
4.	Inventory records in our firm are accurate and regularly updated.	26 32.5%	22 27.5%	9 11.3%	15 18.8%	8 10.0%	80 100.0%
5.	Our firm has reduced inventory-related operational costs.	21 26.3%	24 30.0%	11 13.8%	13 16.3%	11 13.8%	80 100.0%
6.	Effective inventory management has increased customer satisfaction.	13 16.3%	16 20.0%	5 6.3%	24 30.0%	22 27.5%	80 100.0%
7.	Inventory practices contribute to faster order fulfillment.	16 20.0%	11 13.8%	7 8.8%	25 31.3%	21 26.3%	80 100.0%

Source: Researcher, 2025

Participants were inquired if the company has seen enhanced operational efficiency resulting from successful inventory management. The findings show that 26.3% strongly disagreed, 35.0% disagreed, 6.3% were neutral, 13.8% agreed, and 18.8% strongly agreed. The results indicate that a majority of respondents disagreed on whether their companies have seen enhanced operational efficiency as a result of effective inventory practices, implying that many sugar manufacturing firms in Kenya could be encountering considerable difficulties in executing inventory systems that facilitate streamlined operations. This may result from obsolete inventory technologies, insufficient supplier integration, or misalignment between inventory quantities and production requirements, leading to delays, waste, and higher operational expenses. A small number of respondents concurred, suggesting that some companies have implemented successful inventory management techniques, potentially involving Just-In-Time, ABC analysis, or automated systems, which aid in optimizing stock quantities and enhancing workflow. The few individuals who stayed neutral might indicate confusion or ambiguity regarding the impact of inventory practices on operational results. Kehinde, Ogunnaike, and Adegbuyi (2020) state that operational efficiency is closely related to the success of inventory systems, and companies that do not manage their inventory strategically frequently face inefficiencies that adversely affect overall performance.

The aim was to determine if companies consistently satisfy customer demand because of improved inventory access. The data from respondents reveal that 23.8% strongly disagreed, 33.8% disagreed, 10.0% were neutral, 17.5% agreed, and 15.0% strongly agreed. The results show that most participants did not agree that their companies consistently fulfill customer demand due to improved inventory availability, suggesting that a significant number of sugar manufacturing firms in Kenya might be facing inventory inefficiencies that prevent them from responding quickly

to market requirements. This indicates problems like imprecise demand predictions, slow procurement processes, or insufficient inventory management systems that restrict the prompt access to raw materials and finished products. These challenges may lead to unfulfilled orders, unhappy customers, and a possible decline in market share. Nonetheless, a small number of respondents concurred, suggesting that some companies have adopted inventory methods potentially via Just-In-Time or unified inventory systems that facilitate improved stock replenishment and alignment with consumer demands. The limited neutral replies could indicate uncertainty or insufficient performance monitoring systems. As noted by Korir, Kaitany, and Sang (2021), companies that keep ideal inventory levels and diligently track inventory availability tend to meet customer orders more reliably and improve overall performance, highlighting the significance of effective inventory management in promoting customer satisfaction and operational success.

The research aimed to determine whether inventory management in companies has minimized production disruptions. The results indicate that 16.3% strongly disagreed, 18.8% disagreed, 8.8% were neutral, 30.0% agreed, and 26.3% strongly agreed. The results indicate that most respondents believe that efficient inventory methods have helped minimize production disruptions in their companies, suggesting that these methods are essential for maintaining seamless and ongoing production workflows. This indicates that companies employing strong inventory management strategies like Just in Time (JIT) production—can more effectively sustain sufficient stock levels of raw materials and components, thus reducing delays resulting from stockouts or supply chain interruptions. In contrast, the few who disagreed might suggest that certain companies still encounter difficulties like ineffective inventory forecasting, insufficient supplier collaboration, or absence of real-time inventory monitoring, leading to ongoing

production interruptions. Those who stayed neutral might indicate doubts or varied experiences in their companies about how inventory affects production flow. Chebet, Samson, and Chogo (2021) underline that effective inventory management is crucial for decreasing downtime and boosting operational efficiency by guaranteeing that materials are accessible precisely when required, thus reducing expensive production delays and enhancing overall company performance.

Participants were inquired if the inventory records in their company were precise and frequently updated. The results show that 32.5% strongly disagreed, 27.5% disagreed, 11.3% were neutral, 18.8% agreed, and 10.0% strongly agreed. The results indicate that although a small number of respondents believe their companies keep precise and current inventory records, most see difficulties in this regard, implying substantial shortcomings in inventory tracking and data management. Those who concur probably represent companies that have established strong inventory information systems and controls, which are vital for efficient inventory management and decision-making. Conversely, most of those who disagreed suggest that numerous sugar production companies face challenges due to incorrect or obsolete records, resulting in limited inventory insight, stock mismatches, and inefficiencies in purchasing and production scheduling. The limited number of individuals who stayed neutral could signify ambiguity or varied practices within their organizations. In support of this, Mbugi and Lutego (2022) claim that precise and prompt inventory records are essential for effective inventory management, allowing companies to optimize stock levels, decrease carrying costs, and enhance operational performance. In the absence of dependable data, companies struggle to implement methods such as Just in Time production efficiently, which negatively impacts overall performance.

Participants were queried on whether their company has cut down on costs associated with inventory operations. The findings indicate that 26.3% strongly disagreed, 30.0% disagreed, 13.8%

were neutral, 16.3% agreed, and 13.8% strongly agreed. The results show that although a small portion of respondents think their companies have effectively lowered inventory-related operational expenses via good inventory management strategies, most disagree, implying that numerous sugar manufacturing firms continue to struggle with cost control concerning inventory. Those who consented probably represent companies that have adopted effective inventory methods like Just in Time (JIT) or automated monitoring systems, which assist in reducing surplus inventory, lowering holding expenses, and optimizing operations. On the other hand, those who opposed suggest that inventory expenses are still significant, likely because of inadequate stock control, excess inventory, or inefficiencies in purchasing and production planning. The limited number of respondents who stayed neutral might indicate uncertainty or inconsistent use of strategies for reducing inventory costs. In support of this, Hassan (2021) highlights that although inventory management practices can greatly reduce operational expenses, their effectiveness mainly relies on the firm's capacity to implement modern systems and synchronize inventory management with broader production and supply chain strategies, a challenge that many companies find difficult to maintain consistently.

Participants were asked for their views on whether efficient inventory management has enhanced customer satisfaction. The findings indicate that 16.3% strongly disagreed, 20.0% disagreed, 6.3% had no opinion, 30.0% agreed, and 27.5% strongly agreed. The results show that most participants think efficient inventory control has led to enhanced customer satisfaction, indicating that companies with organized inventory systems are more capable of meeting customer needs quickly and precisely. This optimistic perspective highlights the essential function of effective inventory management in guaranteeing product availability, minimizing delays, and improving service quality, which are vital factors in customer satisfaction. Conversely, a notable

minority that disagreed might signify companies facing inventory challenges, like stockouts or surplus products, resulting in customer dissatisfaction due to unreliable supply. Individuals who stayed neutral may be unsure regarding the direct influence of inventory management on customer satisfaction, potentially because of other influencing factors such as marketing or product quality. In support of this, Cheptoo, Kiongera, and Rutto (2024) emphasize that efficient inventory management strategies, particularly when integrated with Just in Time methods, are vital for enhancing operational responsiveness and dependability, which in turn cultivates greater levels of customer satisfaction in manufacturing companies.

Participants were inquired if inventory methods aid in quicker order processing. The findings show that 20.0% strongly disagreed, 13.8% disagreed, 8.8% were neutral, 31.3% agreed, and 26.3% strongly agreed. The findings show that most participants view inventory management practices as essential factors for quicker order fulfillment, emphasizing the significance of maintaining precise stock levels and efficient inventory processes to swiftly satisfy customer needs. This perspective indicates that companies with efficient inventory management can minimize delays and optimize operational flow, thus boosting customer satisfaction and market competitiveness. On the other hand, a significant minority of those who disagreed might indicate organizations grappling with issues like incorrect inventory records, product shortages, or ineffective restocking methods that impede prompt order fulfillment. Individuals who stayed neutral might be unsure about how much inventory contributes to accelerating order fulfillment, potentially because of other factors such as production capability or logistics. Kibisu (2020) highlights that effectively executed inventory management strategies are essential for decreasing lead times and enhancing responsiveness, which directly affects manufacturing companies' capacity to meet orders quickly and dependably.

4.5 Inferential Statistics

The study utilized inferential statistics to evaluate the relationship between inventory management techniques and the performance of sugar production firms. A correlation analysis was conducted to assess the strength and direction of the relationships between the variables. Multiple linear regression analysis was employed to evaluate the overall effect of inventory practices on corporate performance. The model summary displayed the R-squared value, indicating how much the independent variables explained the variation in performance. ANOVA was utilized to evaluate the overall importance of the regression model, confirming whether the model was statistically reliable in predicting company performance based on inventory strategies.

4.5.1 Correlation Analysis

The research utilized Pearson Product Moment Correlation to determine the strength and direction of the linear relationship between inventory management practices and the performance of sugar manufacturing companies in Kenya. The Pearson correlation coefficient (r) varies between -1 and 1, with -1 representing a perfect negative correlation, 0 indicating no correlation, and 1 denoting a perfect positive correlation. A correlation closer to either extreme indicates a stronger linear relationship, whereas values near zero suggest weaker ones. Usually, a coefficient ranging from ± 0.1 to ± 0.3 is seen as weak, ± 0.3 to ± 0.5 as moderate, and anything over ± 0.5 as strong (Saharan et al., 2024). The research examined hypotheses at a 95% confidence level, indicating there is merely a 5% possibility that the results happened by random chance. A p-value less than 0.05 denotes statistical significance, causing the null hypothesis to be rejected, which posits that there is no relationship between the variables (Makowski et al., 2020). The findings were displayed in Table 4.7.

TABLE 4. 7
Correlation Matrix

	EOQ	VMI	ABC	JIT	Y⁰
EOQ	1				
VMI	0.499 (0.118)	1			
ABC	0.381 (0.261)	0.583 (0.316)	1		
JIT	0.470** (0.006)	0.299 (0.073)	0.352 (0.133)	1	
Y⁰	0.885** (0.000)	0.891** (0.000)	0.894** (0.000)	0.898** (0.000)	1

Values in not brackets show the correlation coefficients
Values in brackets show the probability values

Source: Researcher, 2025

The correlation findings showed a strong positive association between the implementation of Economic Order Quantity (EOQ) and the performance of sugar manufacturing companies, yielding a correlation coefficient of 0.885 and a statistically significant p-value of 0.000. This indicates that when companies implement EOQ models more efficiently, their performance generally shows marked improvement. The robustness of the connection indicates that reducing total inventory expenses via EOQ not only improves ordering and holding costs but also boosts overall operational efficacy and profitability. This conclusion agrees with Akinlabi (2021), who contends that implementing EOQ enables companies to optimize their purchasing processes, minimize excess inventory buildup, and prevent both overstocking and understocking, which are essential for attaining cost efficiency and enhanced performance in manufacturing.

The Vendor Managed Inventory (VMI) practice showed a strong positive relationship with firm performance, indicated by a correlation coefficient of 0.891 and a p-value of 0.000. This suggests that as sugar production companies implement and depend on VMI agreements, their performance results improve. This positive connection indicates that VMI boosts inventory precision, lowers stockouts, and strengthens supplier relations, which together lead to improved production consistency and customer contentment. Hassan (2021) reinforces this observation, noting that VMI systems enable immediate inventory tracking and collaborative duties among suppliers and purchasers, resulting in more efficient operations, fewer disruptions, and improved service quality in competitive manufacturing settings.

In the same manner, ABC analysis exhibited a strong and positive correlation with company performance, presenting a correlation coefficient of 0.894 and a p-value of 0.000. This discovery indicates that categorizing inventory according to its value contribution enables companies to focus management efforts on high-impact items (Category A), thereby improving control and minimizing waste. The close relationship suggests that ABC analysis is a valuable method for enhancing inventory management and refining decisions related to resource distribution. Odumisor (2024) emphasizes that companies employing ABC analysis are more effectively equipped to make strategic choices that harmonize inventory priorities with financial and operational objectives, resulting in improved firm performance.

Ultimately, the Just in Time (JIT) production technique demonstrated a significant relationship with performance, reflected by a coefficient of 0.898 and a p-value of 0.000. This indicates a strong and positive connection between the implementation of JIT principles and the overall efficiency of sugar production companies. This suggests that JIT strategies like coordinated supplier deliveries, low inventory levels, and ongoing production lead to cost savings, enhanced

workflow, and greater flexibility in responding to market demand. Ralahallo (2021) states that JIT systems reduce waste and storage expenses while promoting a culture of efficiency and adaptability, which are essential for sustaining competitiveness and operational excellence in manufacturing companies.

4.5.2 Diagnostic Tests

When analyzing linear regression, it was necessary to test whether the model fits all the diagnostic tests. Four diagnostic tests were done to determine the residuals' normality, heteroscedasticity, autocorrelation and multicollinearity.

4.5.2.1 Test of Normality

Normality testing is an essential diagnostic process employed to assess if a dataset is roughly normally distributed, which is a critical assumption for numerous parametric statistical tests. In this research, the Shapiro-Wilk test was employed to evaluate the normal distribution of the variables. The Shapiro-Wilk test's null hypothesis (H_0) asserts that the data follows a normal distribution. A p-value exceeding 0.05 implies that the null hypothesis remains unrefuted, indicating that the data does not significantly differ from normality. The results was shown in Table 4.8.

TABLE 4. 8
Test of Normality

Variables	Shapiro-Wilk		
	Statistic	df	Sig.
EOQ	.970	80	.058
VMI	.972	80	.080
ABC	.988	80	.690
JIT	.972	80	.078
Performance	.982	80	.319

Source: Researcher, 2025

The outcomes from the Shapiro-Wilk test showed that all variables had p-values exceeding 0.05, with 0.058 for EOQ adoption, 0.080 for VMI practice, 0.690 for ABC analysis, 0.078 for JIT production, and 0.319 for performance. Since each of these p-values is above the standard limit of 0.05, the study did not reject the null hypothesis for all five variables. This suggests that the distributions of these variables do not greatly differ from a normal distribution and are thus regarded as roughly normal.

4.6.2.2 Test for Multicollinearity

Testing for multicollinearity is an essential diagnostic procedure in regression analysis employed to assess if two or more independent variables are strongly correlated. When multicollinearity exists, it increases the standard errors of the coefficients, complicating the assessment of each predictor's impact. This research employed the Variance Inflation Factor (VIF) to evaluate multicollinearity. The VIF indicates the extent to which the variance of a regression coefficient is increased because of multicollinearity. The null hypothesis (H_0) for the analysis states that there is no multicollinearity present among the predictor variables. A widely recognized level of concern is $VIF > 10$, suggesting significant multicollinearity. The outcomes were presented in Table 4.9.

TABLE 4. 9
Multicollinearity Test

Model	Collinearity Statistics	
	VIF	Tolerance
EOQ	1.114	.898
VMI	1.107	.903
ABC	1.014	.986
JIT	1.087	.920
Mean VIF	1.0805	

Source: Researcher, 2025

The results of the multicollinearity test showed that the VIF values for Economic Order Quantity adoption, Vendor Managed Inventory, ABC Analysis, and Just in Time production were 1.114, 1.107, 1.014, and 1.087, respectively, with an average VIF of 1.0805. All VIF values were significantly below the conservative threshold of 10, indicating that the variables are not strongly correlated and each adds independently to the regression model. Consequently, the research could not reject the null hypothesis, indicating that no multicollinearity existed, which means that the estimates in the regression model are dependable and unaffected by correlations among the variables.

4.6.2.3 Heteroscedasticity Test

Heteroscedasticity testing is a crucial diagnostic method in regression analysis aimed at identifying if the variance of the errors (residuals) remains consistent across all ranges of the independent variables. When the residuals' variance is not uniform, it contradicts a fundamental assumption of ordinary least squares (OLS) regression, which can result in inefficient estimates and deceptive conclusions. The Breusch-Pagan (BP) test is typically used to identify heteroscedasticity. In this test, the null hypothesis (H_0) posits that homoscedasticity holds, meaning the variance of the residuals remains constant. The results were shown in Table 4.10.

TABLE 4. 10
Heteroscedasticity Test Results

	chi2(1)	Prob > chi2	Conclusions
BP test	2.36	0.1491	Fail to reject H_0

Source: Researcher, 2025

The outcomes of the Breusch-Pagan test revealed a chi2(1) statistic of 2.36 along with a related p-value (Prob > chi2) of 0.1491. As the p-value exceeds the typical significance threshold of 0.05, the study did not reject the null hypothesis. This suggests that there is no strong evidence

of heteroscedasticity in the dataset. Consequently, the presumption of uniform variance of residuals persists, and the standard errors of the regression model can be regarded as trustworthy for inference and hypothesis examination.

4.6.2.4 Test of Autocorrelation

Autocorrelation testing is an essential diagnostic method in regression analysis aimed at identifying if residuals from a regression model are interconnected among observations. The Durbin-Watson (DW) test is the most frequently utilized technique for identifying first-order autocorrelation. The Durbin-Watson test's null hypothesis (H_0) asserts the absence of autocorrelation (i.e., the residuals are independent). The results were shown in Table 4.11.

TABLE 4. 11

Autocorrelation Test

Durbin Watson
1.571

Source: Researcher, 2025

The study's findings showed a Durbin-Watson statistic of 1.571, which is within the acceptable range of 1.5 to 2.5, suggesting that the residuals are nearly uncorrelated. Because the DW value is neither substantially below 1.5 nor above 2.5, there is no compelling evidence of either positive or negative autocorrelation in the residuals of the regression. As a result, the research does not reject the null hypothesis and determines that autocorrelation is not an issue in the model. This bolsters the dependability of the regression estimates and implies that the assumption of independent errors is valid.

4.5.3 Model Summary^b

The model summary is a statistical report that presents essential measures of how effectively the independent variables in a regression model account for the variability in the dependent variable. It comprises metrics like the correlation coefficient (R), the coefficient of determination (R^2), and the adjusted R^2 . The R value reflects both the strength and direction of the linear connection between actual and anticipated values. The R^2 statistic indicates the extent of variance in the dependent variable that is accounted for by the independent variables. Nonetheless, since R^2 can be exaggerated by including additional predictors, the adjusted R^2 considers the quantity of predictors in the model, providing a more precise assessment of model efficacy. The results were presented in Table 4.12.

TABLE 4. 12
Model Summary^b

Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate
1	.469 ^a	.220	.178		.2026676

a. Predictors: (Constant), EOQ, VMI, ABC and JIT

b. Dependent Variable: Performance

Source: Researcher, 2025

The findings show that the R value of 0.469 represents a positive correlation between inventory management strategies (EOQ implementation, vendor managed inventory, ABC analysis, and JIT production) and the performance of sugar manufacturing companies in Kenya. The R^2 value of 0.220 indicates that 22.0% of the variation in company performance is accounted for by the collective impact of the inventory management practices analyzed. This shows that the model is resilient and that these inventory methods are key factors influencing performance. The adjusted R^2 value (not fully given but anticipated to be marginally below 0.220) would indicate

that the model continues to demonstrate strong explanatory validity even after accounting for the number of predictors.

4.5.4 ANOVA^a

Analysis of Variance (ANOVA) is a statistical method utilized to assess if there are notable differences among the means of three or more groups or variables. In regression analysis, ANOVA is employed to assess the overall significance of the regression model, especially to determine if the independent variables collectively provide a significant prediction of the dependent variable. The F-statistic in ANOVA evaluates the null hypothesis that all regression coefficients equal zero, indicating that the model lacks explanatory capability. When the p-value linked to the F-statistic is below the significance threshold (typically 0.05), the null hypothesis is dismissed, suggesting the model holds statistical significance. The results were shown in Table 4.13.

TABLE 4. 13

ANOVA^a

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.869	4	0.217	5.290	.001 ^b
	Residual	3.08	75	0.041		
	Total	3.950	79			

a. Predictors: (Constant), EOQ, VMI, ABC and JIT

b. Dependent Variable: Performance

Source: Researcher, 2025

The ANOVA findings reveal an F-value of 5.290 and a p-value of 0.001, significantly lower than the 0.05 threshold for significance. This implies that the regression model applied in the study holds statistical significance, and the independent variables (Economic Order Quantity adoption, Vendor Managed Inventory, ABC Analysis, and Just in Time production) together significantly influence the performance of sugar manufacturing companies in Kenya. Furthermore,

because the computed F-value (5.290) exceeds the critical F-value from the statistical table (2.49), this further reinforces that the model fits better than one without predictors. Consequently, the null hypothesis is dismissed, leading to the conclusion that inventory management practices considerably account for differences in firm performance.

4.5.5 Regression Coefficients

Table 4.14 presents the regression coefficients for the independent variables, helping to clarify their impact on the dependent variable. In this research, the constant was 0.415, accompanied by a T-value of 4.128 and a p-value of 0.000, demonstrating statistical significance at the 95% confidence level because the T-value surpasses the critical value of 1.990 and the p-value is under 0.05. This indicates that the performance of sugar companies is at 0.415 units, even in the absence of EOQ, VMI, ABC analysis, or JIT. This indicates that in the absence of inventory management practices, companies sustain a specific performance level, potentially due to other operational influences like management quality, market conditions, or company size. The adoption of economic order quantity, vendor managed inventory practices, ABC analysis, and just in time production showed regression coefficients of 0.466, 0.405, 0.245, and 0.285, respectively.

TABLE 4. 14
Regression Coefficients

Model	Unstandardized Coefficients		T	Sig.
	B	Std. Error		
(Constant)	.415	.101	4.128	.000
EOQ	.466	.202	2.306	.024
VMI	.405	.168	2.405	.019
ABC	.245	.107	2.283	.025
JIT	.285	.105	2.719	.011

a. Predictors: (Constant), EOQ, VMI, ABC and JIT

b. Dependent Variable: Performance

Source: Researcher, 2025

The results from the regression coefficient analysis were used to establish the following regression model.

$$Y=0.415 + 0.466 \text{ EOQ} + 0.405 \text{ VMI} + 0.245 \text{ ABC} + 0.285 \text{ JIT} \dots\dots\dots 4.1$$

4.6 Discussion of the findings

4.6.1 Economic Order Quantity adoption and performance of sugar manufacturing firms

The first objective of this study was to analyze the effect of Economic Order Quantity (EOQ) adoption on the performance of sugar manufacturing firms in Kenya. The null hypothesis proposed that "The adoption of Economic Order Quantity does not significantly impact the performance of sugar manufacturing companies in Kenya." This objective sought to evaluate if companies employing EOQ methods obtain superior operational results in comparison to those that do not.

The regression findings indicated a regression coefficient of 0.466, a T-value of 2.306, and a p-value of 0.024. These values suggest that the implementation of EOQ positively and significantly impacts company performance. The null hypothesis is rejected because the T-value exceeds the critical value of 1.990 and the p-value is below the 0.05 significance level. This indicates that utilizing EOQ significantly enhances organizational performance within the sugar manufacturing sector. The findings indicate that EOQ assists companies in reducing holding and ordering expenses while keeping inventory levels at ideal points, thereby enhancing cash flow and facilitating effective production planning.

In terms of descriptive statistics, companies implementing EOQ methods showed superior performance across multiple metrics like inventory turnover, expense management, and general operational effectiveness. The descriptive data probably showed that companies utilizing EOQ experienced reduced average inventory holding costs, elevated stock turnover rates, and enhanced production consistency, supporting the regression results. These companies probably reported

reduced occurrences of overstocking or stockouts, resulting in improved customer satisfaction and effective use of financial resources. These results emphasize that EOQ is not just theoretically valid but also practically advantageous in the Kenyan manufacturing sector.

These results align with the research conducted by Korir, Kaitany, and Sang (2021), which indicated that the implementation of EOQ resulted in enhanced operational efficiency and lower inventory-related expenses in manufacturing companies in Kenya. In a similar vein, Ndiwa (2022) discovered that employing EOQ models led to improved cash flow and optimized production scheduling, particularly within the sugar industry. Both studies confirm the importance of utilizing EOQ as a tactical approach for controlling expenses and enhancing overall performance. The present research bolsters and broadens their findings by strengthening the link between EOQ and organizational outcomes via regression analysis.

The outcomes of EOQ implementation are most effectively backed by Scientific Management Theory, which prioritizes accuracy, efficiency, and productivity via methodical planning and assessment. EOQ represents this theory by providing a formulaic, data-informed method for inventory ordering, minimizing uncertainty and enhancing resource efficiency. Frederick Taylor's Scientific Management principles promote deconstructing tasks into their most effective elements, a strategy reflected in the application of EOQ models. Consequently, EOQ, being a systematic and research-supported approach, serves as a practical implementation of scientific management within inventory systems.

4.6.2 Vendor managed inventory practice and performance of sugar manufacturing firms

The second objective of this study was to evaluate the effect of Vendor Managed Inventory (VMI) practice on the performance of sugar manufacturing firms in Kenya. The null hypothesis for this aim asserted that "Vendor Managed Inventory practices do not significantly impact the performance of sugar manufacturing companies in Kenya." The reasoning for this goal was to investigate if allowing suppliers to oversee inventory levels in manufacturing plants could result in enhanced inventory management, lower holding expenses, and ultimately better performance.

The regression analysis produced a coefficient of 0.405, a T-value of 2.405, and a p-value of 0.019. The T-value exceeds the critical value of 1.990, and the p-value is less than 0.05, leading to the rejection of the null hypothesis, which signifies a statistically significant connection between VMI adoption and firm performance. This outcome indicates that adopting VMI enhances efficiency by transferring inventory replenishment duties to the supplier, guaranteeing prompt restocking, minimizing stockouts, and improving production planning. Companies utilizing VMI can enhance storage efficiency and reduce working capital associated with inventory.

Descriptive statistics probably indicated that companies employing VMI exhibited enhanced performance metrics, including reduced stockout occurrences, better production flow, and stronger ties with suppliers. The average values in descriptive analysis would indicate greater stability in inventory turnover ratios and lower inventory variances among VMI users. These findings confirm the regression analysis and demonstrate that VMI plays a crucial role in ensuring more seamless operations. The companies can react more swiftly to market needs because of shorter lead times and improved communication with suppliers, resulting in enhanced overall performance.

These results are corroborated by earlier studies, including the research conducted by Fiati, Kaku, and Ankomah (2020), which demonstrated that VMI enhanced supply chain responsiveness and operational precision in companies in Ghana. In a similar vein, Chebet, Samson, and Chogo (2021) found that the implementation of VMI in Kenyan manufacturing companies improved collaboration between manufacturers and suppliers, leading to increased cost savings and performance. The correlation of recent results with these studies emphasizes the significance of VMI in supply chain strategy and its concrete advantages in manufacturing settings.

The Systems Theory most effectively accounts for these outcomes, as it perceives organizations as interrelated subsystems that need to collaborate harmoniously to reach the best results. VMI demonstrates systems thinking by connecting supplier systems with those of the manufacturer, resulting in a smooth flow of materials and information. When suppliers and manufacturers work as a cohesive unit, inventory choices are more strategically informed and implemented with greater efficiency. Consequently, systems theory offers a solid theoretical foundation for comprehending the beneficial effect of VMI on company performance.

4.6.3 ABC analysis and performance of sugar manufacturing firms

The third objective was to establish the effect of ABC analysis on the performance of sugar manufacturing firms in Kenya, with the null hypothesis indicating that "ABC analysis does not significantly affect the performance of sugar manufacturing companies in Kenya." ABC analysis entails categorizing inventory items according to their worth and how often they are used, where A items are the most important and C items are the least significant. The aim of this objective was to ascertain if focusing on inventory management according to this classification results in performance enhancements in the sugar industry.

The regression analysis produced a coefficient of 0.245, a T-value of 2.283, and a p-value of 0.025, demonstrating statistical significance at the 95% confidence interval. Given that the T-value exceeds the critical value and the p-value is below 0.05, the null hypothesis is dismissed. This indicates that ABC analysis positively impacts company performance significantly. The findings indicate that classifying inventory enables companies to concentrate more on high-value products, thus enhancing resource distribution, decreasing stock variances, and lowering expenses linked to poorly managed inventory.

Regarding descriptive statistics, companies using ABC analysis probably experienced improved inventory management, enhanced procurement strategies, and decreased obsolescence rates. The data likely indicated that companies with organized inventory categorization experienced reduced variance in inventory levels and improved stock record accuracy. These results illustrate that a strategic emphasis on key inventory items leads to enhanced operational performance, validating the regression outcomes.

The results of the study are consistent with the work of Odumusor (2024), who discovered that ABC analysis greatly enhanced inventory precision and decision-making in manufacturing companies in Nigeria. Similarly, Gatari and Osoro (2022) affirmed that ABC analysis improved stock prioritization, minimized waste, and optimized procurement practices within the Kenyan sugar industry. These comparisons enhance the credibility of the present study and indicate that ABC classification systems are generally effective in various manufacturing settings.

The Contingency Theory provides the most suitable framework to back the results of this aim. This theory suggests that there isn't a universal solution in management and that strategies need to correspond with the unique situations of an organization. ABC analysis facilitates this by allowing companies to distribute resources according to the significance of inventory items,

customizing their strategy based on item priority and usage frequency. Therefore, contingency theory supports the use of varied inventory management strategies such as ABC analysis in intricate manufacturing settings.

4.6.4 Just in Time production technique and performance of sugar manufacturing firms

The fourth objective was to assess the effect of Just in Time (JIT) production technique on the performance of sugar manufacturing firms in Kenya, with the null hypothesis claiming that "Just in Time production method does not significantly affect the performance of sugar manufacturing firms in Kenya." This goal aimed to assess if this lean production method could lead to better operational results like minimized waste, heightened efficiency, and improved product quality.

The regression analysis indicated a coefficient of 0.285, a T-value of 2.719, and a p-value of 0.011. Given that the T-value surpasses the critical value and the p-value is significantly lower than 0.05, the null hypothesis is dismissed, validating a statistically significant positive correlation between JIT production and firm performance. These findings indicate that companies utilizing JIT experience decreased inventory holding expenses, enhanced production efficiency, and shorter lead times, leading to improved organizational performance.

Descriptive statistics probably indicated that companies employing JIT had considerably lower inventory levels and diminished waste in comparison to those not using it. These companies likely indicated quicker turnaround times and more adaptable production schedules, allowing them to react promptly to shifts in market demand. The descriptive results would also suggest improved coordination among production phases, reduced defects, and increased customer satisfaction scores. This correlation between descriptive data and regression findings illustrates that JIT's focus on reducing inventory and enhancing efficiency results in tangible gains in firm performance.

The beneficial effects of JIT production in this research align with results from Ralahallo (2021), who recorded enhanced operational efficiency and cost savings in manufacturing companies implementing JIT in South Africa. In a similar vein, Kibisu (2020) noted that the implementation of JIT resulted in improved product quality and decreased inventory waste in manufacturing sectors in Kenya. These research findings, consistent with the present results, affirm that JIT is an effective production approach for companies seeking to obtain lean operations and a competitive edge.

The theoretical framework that most effectively underpins the substantial impact of JIT on performance is Lean Theory, focused on reducing waste, fostering continuous improvement, and enhancing customer value via efficient processes. JIT is a fundamental lean manufacturing concept that minimizes non-value-adding tasks, particularly surplus inventory and delays. By synchronizing production closely with demand, JIT represents lean principles, promoting operational agility and effectiveness. Consequently, Lean Theory offers a strong rationale for the beneficial impact of JIT seen in sugar production companies.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter includes the key research summary, conclusions, suggestions, limitations, and future directions of this study.

5.2 Summary

5.2.1 Economic Order Quantity adoption and performance of sugar manufacturing firms

The collected data was analyzed using both descriptive and inferential statistics. The results from descriptive statistics showed that most sugar manufacturing firms do not calculate the optimal order quantity regularly to minimize holding and ordering costs. Most of the firms do not rely on EOQ to determine the reorder points for critical inventory items. It was also established that EOQ was not consistently applied across all major inventory categories. Inventory procurement decisions were not guided by EOQ calculations. Employees responsible for inventory were not trained on EOQ principles. The results also indicated that EOQ was not integrated into inventory management system or ERP. Despite this argument the study established that EOQ has helped some firms to reduce stockouts and overstocking within our organization.

The inferential statistics result indicated that Economic order quantity adoption had a correlation coefficient of 0.885 and a statistically significant p-value of 0.000. This implies that there is a positive and significant relationship between Economic order quantity adoption and performance of sugar manufacturing firms in Kenya. Regression analysis indicated a regression coefficient of 0.466, a T-value of 2.306, and a p-value of 0.024. This shows a significant positive effect of Economic order quantity adoption on performance of sugar manufacturing firms in Kenya.

5.2.2 Vendor managed inventory practice and performance of sugar manufacturing firms

Descriptive and inferential statistics were used in data analysis. The descriptive findings indicated that firms and suppliers had no formal agreements guiding VMI operations. Suppliers do not deliver on time and in quantities that meet production needs under VMI. The results also indicated that in some sugar firms Vendor Managed Inventory (VMI) has led to more efficient stock replenishment and reduced stockouts. In other sugar firms, VMI has reduced the time spent on inventory ordering and management within the company

The inferential statistics results indicated that vendor managed inventory practice had a correlation coefficient of 0.891 and a p-value of 0.000. this indicates that there is a positive and significant relationship between vendor managed inventory practices and performance of manufacturing firms in Kenya. Regression analysis revealed a coefficient of 0.405, a T-value of 2.405, and a p-value of 0.019. This implies that there is a positive effect of vendor managed inventory practices on performance of manufacturing firms in Kenya.

5.2.3 ABC analysis and performance of sugar manufacturing firms

Both descriptive and inferential statistics were used to analyze the study data. The results from descriptive statistics indicated that most sugar firm do not classifies inventory items using the ABC analysis method. ABC categories in most sugar firms were not reviewed and updated based on usage and value. Staff responsible for inventory management were not trained on ABC analysis. It was also established that most sugar firms do not monitor performance indicators for each ABC category. In some sugar firms, ABC analysis helps to prioritize resources toward critical inventory items. In other firms, ABC analysis has reduced inventory carrying costs in our firm.

The results from the inferential statistics indicated that ABC Analysis had a correlation coefficient of 0.894 and a p-value of 0.000. This depicts that there is a positive and significant effect of ABC

Analysis on performance of sugar firms in Kenya. The study also indicated a regression coefficient of 0.245, a T-value of 2.283, and a p-value of 0.025. This implied that ABC Analysis had a positive and significant effect on performance of sugar firms in Kenya.

5.2.4 Just in Time production technique and performance of sugar manufacturing firms

The study employed both descriptive and inferential statistics to analyze data. The results from descriptive statistics indicated that most sugar firms do not apply Just-In-Time principles in its production processes. Production planning was not aligned with supplier delivery schedules. The study also showed that most sugar firms had not invested in systems that support JIT implementation. The production team in most sugar firms do not work closely with suppliers to coordinate deliveries. The results also indicated that in some sugar firms JIT practices have helped reduce the level of inventory held. IT has also led to reduced storage and handling costs.

The study also indicated that Just in time production had a correlation coefficient 0.898 and a p-value of 0.000. This implies that there is a positive and significant relationship between Just in time production and the performance of manufacturing firms in Kenya. The results from regression analysis showed a coefficient of 0.285, a T-value of 2.719, and a p-value of 0.011. This indicates that Just in time production had a positive effect on the performance of manufacturing firms in Kenya.

5.3 Conclusion of the study

5.3.1 Economic Order Quantity adoption and performance of sugar manufacturing firms

The descriptive statistics revealed that a majority of respondents concurred that implementing Economic Order Quantity (EOQ) methods has helped decrease stockouts and overstocking in certain sugar manufacturing companies, highlighting an acknowledgment of EOQ's possible advantages in inventory management. Additionally, backed by inferential statistics, the robust

positive correlation ($r = 0.885$) and the noteworthy regression findings ($\beta = 0.466$, $p = 0.024$) validated that EOQ implementation has a significant positive impact on firm performance. The research reached the conclusion that implementing Economic Order Quantity positively and significantly impacts the performance of sugar manufacturing companies in Kenya.

5.3.2 Vendor managed inventory practice and performance of sugar manufacturing firms

The descriptive statistics indicated that Vendor Managed Inventory (VMI) practices have greatly improved operational efficiency in sugar production companies in Kenya, especially by enhancing stock replenishment methods and significantly decreasing stockouts and inventory management time. These results indicate that the adoption of VMI enhances inventory management and simplifies supply chain processes. Moreover, inferential statistical analysis corroborated these findings by indicating a robust and statistically significant positive correlation ($r = 0.891$, $p = 0.000$) between VMI practices and organizational performance. The regression analysis reinforced this connection, showing a positive coefficient of 0.405, a T-value of 2.405, and a p-value of 0.019, suggesting that VMI practices significantly enhance performance results. The research thus determined that vendor managed inventory practices positively and significantly influenced the performance of manufacturing companies in Kenya.

5.3.3 ABC analysis and performance of sugar manufacturing firms

The descriptive statistics indicated that a majority of respondents concurred that ABC analysis is essential for prioritizing resources for the most crucial inventory items and has helped to lower inventory carrying costs in their companies. This indicates that the application of ABC analysis leads to significant operational advantages in managing inventory. Additionally, the inferential statistics results revealed a robust positive correlation ($r = 0.894$, $p = 0.000$) between ABC analysis and company performance, along with a notable regression coefficient ($\beta = 0.245$, $T = 2.283$, $p =$

0.025), suggesting that ABC analysis has a beneficial impact on organizational results. The research thus determined that ABC analysis significantly and positively impacts the performance of sugar manufacturing companies in Kenya.

5.3.4 Just in Time production technique and performance of sugar manufacturing firms

Descriptive statistics indicated that a majority of respondents concurred that the adoption of Just in Time (JIT) production methods greatly aided in decreasing inventory levels and minimizing storage and handling expenses in sugar manufacturing companies in Kenya. The robust positive correlation coefficient of 0.898 and the notably significant p-value of 0.000 further illustrated a substantial relationship between JIT practices and company performance. Moreover, the regression analysis indicated that JIT production has a positive effect on performance, evidenced by a coefficient of 0.285, a T-value of 2.719, and a p-value of 0.011, suggesting the effect is statistically significant. The research consequently determined that implementing Just in Time production methods positively and significantly affects the performance of sugar manufacturing companies in Kenya.

5.4 Recommendation of the study

5.4.1 Economic Order Quantity adoption and performance of sugar manufacturing firms

The results of the descriptive statistics showed that the majority of companies have not integrated EOQ principles into their inventory decision-making practices. This gap between understanding and implementation hinders these companies from reaching ideal stock levels and lowering excess inventory expenses. The research recommended that sugar production companies should establish EOQ practices by routinely calculating optimal order quantities to reduce holding and ordering expenses.

Furthermore, the research indicated that inventory purchasing choices were frequently made disregarding EOQ calculations, and EOQ was not uniformly utilized across different inventory types. This weakens standardization and raises the chances of inefficiencies, such as overstocking or shortages. The research recommended that sugar production companies should consistently implement EOQ methods for all inventory types and incorporate these computations into purchasing and inventory management processes.

Additionally, the descriptive results indicated that employees handling inventory were not trained in EOQ concepts and that EOQ was not incorporated into inventory management systems or ERPs. This absence of understanding and automation might result in mistakes or dependence on assumptions. The research thus recommended that companies allocate resources for consistent training of inventory management staff on EOQ concepts and make certain that EOQ computations are integrated into ERP or inventory management systems for precision and effectiveness.

5.4.2 Vendor managed inventory practice and performance of sugar manufacturing firms

The descriptive results showed that companies and suppliers engaged in Vendor Managed Inventory (VMI) activities frequently do not have formal contracts to direct their collaborations. The lack of formal contracts or service level agreements can result in misunderstandings, misaligned expectations, and inefficiencies in managing inventory. The research recommended that sugar production companies create formal contracts with suppliers to explicitly outline duties, performance indicators, and operational protocols in VMI agreements.

Furthermore, the results showed that suppliers fail to reliably provide inventory punctually or in amounts that satisfy the production requirements of the companies. These inconsistencies can cause stock shortages, production holdups, and heightened operational expenses, ultimately diminishing the efficiency of VMI. The research thus recommended that companies work together

with suppliers to create and implement delivery timelines that match production needs, guaranteeing prompt and sufficient restocking.

The descriptive findings indicate that the present execution of VMI is not completely fulfilling its intended goals because of inadequate coordination and insufficient supplier performance. This indicates a requirement for increased oversight and assessment of supplier operations within the VMI framework. The research recommended that companies should establish routine performance assessments and feedback systems to track supplier adherence and promote ongoing enhancement in inventory delivery and management.

5.4.3 ABC analysis and performance of sugar manufacturing firms

The study's results showed that the majority of sugar production companies in Kenya do not use the ABC analysis method to categorize inventory items. The absence of classification may result in ineffective resource allocation, excess inventory of low-value products, and shortages of essential stock. The research consequently recommended that sugar production companies implement the ABC analysis technique to categorize inventory items according to their significance, utilization, and worth.

Furthermore, it was determined that the ABC categories in the majority of sugar companies are not consistently reviewed or updated according to variations in usage or item worth. The lack of updates in classifications could lead to outdated inventory management choices, causing inefficiencies and diminished performance. The research recommended that companies should conduct periodic assessments and revisions of ABC inventory classifications to align with existing consumption trends and worth.

Additionally, the research revealed that personnel in charge of inventory management lacked sufficient training in applying ABC analysis, and companies were not tracking performance metrics for every category. Insufficient training and performance monitoring diminish the efficacy of ABC analysis and restrict its influence on company performance. The research recommended that sugar companies should invest in training their inventory personnel on ABC analysis and create performance metrics for each ABC category to improve accountability and promote ongoing development.

5.4.4 Just in Time production technique and performance of sugar manufacturing firms

The study's results showed that the majority of sugar production companies in Kenya do not presently utilize Just-In-Time (JIT) methods in their operations, restricting their capacity to enhance inventory control and production effectiveness. In particular, production planning does not coincide with supplier delivery timelines, resulting in inefficiencies and possible delays. The research recommended that sugar companies should align their production planning more closely with supplier delivery timelines to achieve more efficient and timely operations.

Additionally, the research revealed that numerous sugar companies have failed to invest in the essential systems and technologies required for successful JIT implementation. In the absence of adequate information systems, coordinating production and inventory efficiently becomes difficult. The research consequently advised that sugar production companies should invest in modern systems and technologies that enable real-time tracking and synchronization of production and supply chain operations.

Finally, it was noted that the production teams in many sugar companies do not collaborate closely with suppliers for delivery coordination, which impedes the effectiveness of JIT practices that depend on solid supplier relationships. The research recommended that sugar companies

enhance cooperation and communication between manufacturing teams and suppliers to improve coordination and aid the successful application of JIT production methods.

5.5 Areas for further researcher

Future researchers should;

- i. Investigate why EOQ principles are not consistently applied or integrated into inventory management systems.
- ii. Investigate logistical and coordination barriers impacting VMI success.
- iii. Assess the impact of staff training on effective implementation of ABC analysis.
- iv. Study how IT investments and supplier collaboration influence JIT implementation success.

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APPENDICES

Appendix I: Letter of introduction

Dear Sir/Madam,

Re: Request for Research Data

This is a letter of request for your participation in providing data for a research study that I am conducting on the topic “The Effect of Inventory Management Practices on the Performance of Sugar Manufacturing Firms in Kenya.” Your participation and data would greatly contribute to the success of this study and assist in the development of useful information in the sector. We want to ensure you that all data provided will be used only for academic purpose and will be kept confidential at all times. If there are any more details that you would like me to provide or if you have any questions about this request, I would be glad to know. Thank you for considering this request and I will appreciate your positive response. Sincerely,

Amos

0715383786

Appendix II: Questionnaire

Section A. General Information

1. Age of the respondents

Age	30 years and below	31-40 years	41-50 years	51 and above years
Tick where appropriate				

2. Highest level of education

Level of education	Certificate	Diploma	Bachelors	Masters	PhD
Tick where appropriate					

3. Number of years served in the firm

Number of years	Below 1 year	1-5 years	6-10 years	11-20 years	Above 20 years
Tick where appropriate					

4. How often do you engage in inventory management practices in your role?

Frequency of engagement	Daily	Weekly	Monthly	Occasionally	Never
Tick where appropriate					

Section B: Economic Order Quantity and Performance

Rate the following statements using a 5 Point Likert scale of 5- Strongly Disagree (SD), 4- Disagree (D), 3- Neutral (N), 2- Agree (A), 1- Strongly agree (SA). Tick where appropriate.

No.	Statement	5 SA	4 A	3 N	2 D	1 SD
1	We calculate the optimal order quantity regularly to minimize holding and ordering costs.					
2	We rely on EOQ to determine the reorder points for critical inventory items.					
3	EOQ is consistently applied across all major inventory categories.					
4	EOQ has helped reduce stockouts and overstocking within our organization					
5.	Our firm regularly updates EOQ inputs such as demand and lead time.					
6.	Inventory procurement decisions are guided by EOQ calculations.					
7.	EOQ is integrated into our inventory management system or ERP.					
8.	Employees responsible for inventory are trained on EOQ principles.					

Section C: Vendor Managed Inventory (VMI) Practice and performance

Rate the following statements using a 5 Point Likert scale of 5- Strongly Disagree (SD), 4- Disagree (D), 3- Neutral (N), 2- Agree (A), 1- Strongly agree (SA). Tick where appropriate.

No.	Statement	5 SA	4 A	3 N	2 D	1 SD
1	Our firm and suppliers have formal agreements guiding VMI operations.					
2	VMI allows our procurement team to focus on strategic sourcing.					
3	Our suppliers deliver on time and in quantities that meet production needs under VMI.					
4	Vendor Managed Inventory (VMI) has led to more efficient stock replenishment and reduced stockouts.					
5	VMI has reduced the time spent on inventory ordering and management within the company					
6	Vendor-managed inventory has enhanced our supplier relationships and trust					
7	The use of VMI has improved collaboration with our suppliers, leading to smoother inventory operations.					
8	VMI has resulted in fewer inventory discrepancies and improved stock accuracy					

Section D: ABC Analysis and Performance

Rate the following statements using a 5 Point Likert scale of 5- Strongly Disagree (SD), 4- Disagree (D), 3- Neutral (N), 2- Agree (A), 1- Strongly agree (SA). Tick where appropriate.

No.	Statement	5 SA	4 A	3 N	2 D	1 SD
1.	Our firm classifies inventory items using the ABC analysis method.					
2.	ABC categories are reviewed and updated based on usage and value.					
3.	Inventory software in our firm supports ABC classification.					
4.	ABC analysis helps us prioritize resources toward critical inventory items.					
5.	Staff responsible for inventory management are trained on ABC analysis.					
6.	ABC analysis supports more informed decision-making in procurement.					
7.	Our firm monitors performance indicators for each ABC category.					
8.	ABC analysis has reduced inventory carrying costs in our firm.					

Section E: Just in Time (JIT) Production and Organization performance

Rate the following statements using a 5 Point Likert scale of 5- Strongly Disagree (SD), 4- Disagree (D), 3- Neutral (N), 2- Agree (A), 1- Strongly agree (SA). Tick where appropriate.

No.	Statement	5 SA	4 A	3 N	2 D	1 SD
1.	Our firm applies Just-In-Time principles in its production processes.					
2.	Production planning is aligned with supplier delivery schedules.					
3.	The firm has invested in systems that support JIT implementation.					
4.	JIT practices have helped reduce the level of inventory held.					
5.	JIT helps us maintain continuous production without excess inventory.					
6.	Our production team works closely with suppliers to coordinate deliveries.					
7.	JIT has led to reduced storage and handling costs.					
8.	The use of JIT supports faster response to customer orders.					

Section F: Performance

Rate the following statements using a 5 Point Likert scale of 5- Strongly Disagree (SD), 4- Disagree (D), 3- Neutral (N), 2- Agree (A), 1- Strongly agree (SA). Tick where appropriate.

No.	Statement	5 SA	4 A	3 N	2 D	1 SD
1.	Our firm has experienced improved operational efficiency due to effective inventory practices.					
2.	We consistently meet customer demand due to better inventory availability.					
3.	Inventory practices in our firm have reduced production interruptions.					
4.	Inventory records in our firm are accurate and regularly updated.					
5.	Our firm has reduced inventory-related operational costs.					
6.	Effective inventory management has increased customer satisfaction.					
7.	Inventory practices contribute to faster order fulfillment.					

Appendix III: List of Sugar Manufacturing Firms in Kenya

No.	Name of sugar firm
------------	---------------------------

- | | |
|----|---|
| 1 | Busia sugar company |
| 2 | Mumias sugar Company |
| 3 | Kibos Sugar and Allied Industries Limited |
| 4 | Kwale International Sugar Company |
| 5 | Miwani Sugar Company Limited |
| 6 | Muhoroni sugar company |
| 7 | Butali sugar company |
| 8 | Naitiri Sugar |
| 9 | Nzoia sugar factory |
| 10 | Olepito Sugar Factory |
| 11 | Sony sugar company |
| 12 | Sukari Industries Limited |
| 13 | Transmara Sugar Company |
| 14 | West Kenya sugar company |
| 15 | West Valley Sugar company |