INVENTORY MANAGEMENT SYSTEMS AND PROFITABILITY OF SMALL AND MEDIUM MANUFACTURING FIRMS IN NAIROBI CITY COUNTY, KENYA

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ABSTRACT

Inventory management is a critical component of operational efficiency particularly in manufacturing sector' small and medium-sized enterprises (SMEs). In Kenya's Nairobi City County, many SMEs face challenges related to inadequate inventory management systems, which can significantly impact their profitability. Therefore, the present study sought to ascertain inventory management systems effects on profitability of Kenya's Nairobi County City small and medium manufacturing firms with specific objectives on establishing effects of lean inventory system, Economic Order Quantity system and Just in Time inventory system. Dynamic theory of profit, theory of constraints, Economic Order Quantity model, Innovation Diffusion and Just-In-Time model theory anchored the examination. Employing descriptive research, Nairobi's SMMEs as target population was categorized as follows; food and beverage production, textiles and fabrication, apparel, metal plastics. electronics. woodwork and The respondents were the 1333 owners of the firms. The study employed a stratified sampling design and purposive sampling method for respondents' selection where 308 forms the sample size. The research employed a questionnaire as its primary tool. The research systematically collected quantitative data which were analyzed using descriptive statistics, summarizing key features specifically mean and standard deviation which describe central tendency, variability, and distribution. Inferential statistics of correlation and regression analysis was adopted. The diagnostic tests comprised normality, multi-collinearity and

autocorrelation tests. Tables and figures presented findings clearly. The study found that there was a positive significant between establish relationship lean inventory system, economic order quantity system and just in time inventory system and Kenya's Nairobi City County SMME's profitability. The study concludes that lean inventory solutions significantly lower the expenses associated with obsolescence, insurance, and storage by reducing excess inventory. The economic order quantity system allows businesses to release capital that would typically be engaged in surplus inventory, facilitating reinvestment in growth opportunities or enhancements to profit margins. The just-in-time inventory system removes waste from production, allowing businesses to enhance product quality. The study recommends that companies should ensure proper process standardization by implementing clear and consistent procedures for inventory management, which helps enhance efficiency and minimize errors. The businesses ought to focus on reducing ordering expenses by making fewer, larger orders to lower the administrative costs linked to ordering and receiving inventory. The companies ought to perform precise forecasting to accurately anticipate demand, which assists in ensuring that supplies arrive on time, reducing delays and surplus inventory.

Keywords: Economic order quantity system, Inventory management system, just in time inventory system, Lean inventory system, Profitability.

INTRODUCTION

Profitability, a multifaceted endeavor that necessitates a well-rounded and comprehensive strategy encompassing various aspects of the business, each contributing to the overarching goal of enhancing financial performance (McDonald, 2019). Pattitoni, Petracci and Spisni (2022) observe it as an unmissable financial health and operational efficiency indicator, reflecting how a company's efficiency in utilizing resources to produce profit. Therefore, profitability is vital for firm's long-term sustainability. It facilitates reinvestment in the business, research and development, and expansion.

Inventory management systems facilitate streamlined operations by automating various operations, like order processing, stock tracking and inventory audit, reducing likelihood of human error, speeding order fulfillment and enhancing overall operational efficiency (Shah & Shin, 2019). Rogers, Schatzberg and Schatzberg (2020) observe that through inventory management systems, organizations make data-driven decisions, augment supply chains and position themselves for continued growth and profitability. Therefore, as businesses continue to navigate modern commerce complexities, investing in robust inventory management systems is paramount for long-term success.

Adoption of inventory management systems by Multinational Corporations (MNCs) has a profound impact on SMMEs profitability globally. For instance, Lenny Koh, Demirbag, Bayraktar, Tatoglu and Zaim (2019) observe that a small manufacturing firm in Germany that implemented an advanced inventory management system (IMS) was able to reduce its stockholding costs by 20%, allowing for better resource allocation and growth opportunities investment. Similarly, Panigrahi, Shrivastava and Nudurupati (2023) observe that a medium-sized textile manufacturer in India that partnered with a multinational clothing brand benefited from the latter's sophisticated inventory management practices. This partnership not only improved the SMME's operational efficiency but also enhanced its ability to meet the brand's stringent quality and delivery standards, ultimately leading to increased orders and higher profitability.

Marques, Gobbo, Fukunaga, Cerchione and Centobelli (2020) observe that a modest electronics producer based in Brazil efficiently used data analytics in business operations by recognizing leveraging data analytics potentiality. This was derived from its inventory management system to deeply comprehend consumer habits and market dynamics which enabled the company to identify and discern seasonal demand trends that significantly influenced its product sales throughout the year. According to Forte, Barros and Nakamura (2023), the electronics producer in Brazil made strategic adjustments to its production

schedules and inventory levels through tailoring its manufacturing processes to align with the anticipated demand fluctuations. For instance, during peak seasons, when consumer interest in electronics typically surged, the company ramped up production to ensure that it could meet the heightened demand. Conversely, during off-peak periods, the company scaled back its production to avoid overstocking and accumulating surplus inventory.

Muchaendepi et al. (2019) observe inventory management systems implementation by companies in Africa is crucial in enhancing SMMEs profitability. This is supported by Kasozi (2023) who presents a case study from South Africa revealing that a small electronics manufacturer used data from their inventory management system to detect slow-moving products necessitating acclimatization of marketing strategies, resulting in 20% increase in sales over a six-month period.

Anisere-Hameed and Bodunde (2021) highlights how a local food processing company in Nigeria adopted an IMS that enabled product shelf life tracking more effectively, resulting in a significant reduction in spoilage and an increase in overall profitability. Abdulrasheed et al. (2022) observe that IMS provide Nigeria's SMMEs with the tools stock levels optimization, making certain that they keep an adequate level of stock to satisfy customer needs without accumulating excess inventory. This balance is essential for minimizing holding costs and reducing waste, particularly in industries where perishable goods are involved.

Wainaina (2020) observe that textile manufacturers in Kenya have successfully effected an advanced IMS that was intricately synchronized with production scheduling processes. This strategic integration was pivotal in fostering enhanced coordination between the production line and inventory levels, leading to a series of significant operational improvements. Nyabwanga and Ojera (2022) observe that the improvements in inventory management and production scheduling by textile industry in Kenya has had a direct positive impact on customer satisfaction whereby clients began to receive their orders promptly and consistently, which enhanced their overall experience with the manufacturer. The ability to deliver products on time reinforced the industry's reputation for reliability and quality, ultimately leading to increased customer loyalty and repeat business.

Profitability of Small and Medium Manufacturing Firms

Profitability is a firm or corporation ability to turn profit in relation to its costs during a given time period and it's a vital financial health sign that shows a company's efficiency in generating revenue from existing resources (Asika, Chitom & Chelichi, 2017). According to Teece (2022), assessing an organization's profitability is a critical aspect of financial analysis that provides insights into its financial health and operational efficiency. Therefore, conducting periodic reviews of profitability metrics ensures organization agility and responsiveness to changes in the market or operational environment.

Drury and Tayles (2019) define profitability in terms of net income, emphasizing the bottom line as a key company's success indicator which underscores importance of generating sufficient revenue to cover all outlays, including interest payments, taxes and operating costs.

In this context, Profitability, as articulated by Du, Pan, and Zuo (2021), is deemed a direct indicator of an organization's capacity to efficiently manage its resources and generate value for its shareholders. Therefore, profitability is not merely a financial metric; it is a comprehensive reflection of an organization's operational efficiency, strategic effectiveness, and overall health in the marketplace.

Szymanski, Bharadwaj and Varadarajan (2020) view profitability from a strategic perspective, considering elements like market positioning, long-term sustainability and competitive advantage. In this view, according to James, Swinton and Thelen (2022), profitability should not be viewed solely as a static representation of present financial results but a fluid metric indicating a firm's capacity in adjusting to evolving market circumstances and to innovate in alignment with consumer needs. This interpretation emphasizes the importance of strategic planning and resource allocation in achieving sustained profitability over time.

Sarwar (2017) definition on profitability focuses on financial ratios, like return on equity (ROE) or return on assets (ROA) that offer highly nuanced comprehension of efficiency in profit generation from assets. According to Sarwar (2022), ratios allow for comparisons across different companies and industries, offering insights into relative performance and operational efficiency. In addition, by analyzing these metrics, stakeholders can assess how effectively a company is converting its investments into earnings, thereby gaining a clearer picture of its financial viability. Therefore, profitability paramount in shaping organization's long-term sustainability and success while simultaneously fulfilling shareholders expectations. Therefore, profitability was measured in terms of Return on Assets (ROA).

Inventory Management System

This is a vital framework for overseeing inventory-related aspects, including tracking, regulating, and managing quantities, orders, sales, and deliveries and it helps businesses understand their inventory dynamics, enabling informed decision-making (Beik & Buzby, 2019). According to Cleverley (2022), a key benefit of such a system is maintaining optimal stock levels, ensuring that companies have adequate level of stock to satisfy customer needs without accumulating excess inventory, incurring high holding costs. The system optimizes operations by automating tasks like order processing and inventory audits, reducing time and labor while enhancing accuracy. Therefore, the inventory management systems were measured in terms lean inventory, economic order quantity and just in time inventory systems.

Lean inventory system adoption can significantly enhance profitability for businesses by implementing a multifaceted technique that rivets on reducing waste, optimizing resource utilization and boosting overall operational efficiency (Hofer, Eroglu & Hofer, 2022). Camuffo and Poletto (2023), a lean inventory system enhances overall operational efficiency by fostering an unending betterment culture. Therefore, employees are encouraged to identify inefficiencies and suggest improvements, leading to a more engaged workforce and a more responsive organization.

Ndirangu (2020) observe that the Economic Order Quantity (EOQ) system is a fundamental inventory management tool that helps businesses determine the optimal order quantity that minimizes total inventory outlays, including ordering, holding and stock-out costs. Jiang, Zhao and Zhai (2023) observe that the EOQ model provides a data-driven approach to inventory management, enabling SMMEs to make informed decisions regarding purchasing and production schedules. Therefore, for SMMEs, effective inventory management is crucial for maintaining profitability and competitiveness in a dynamic market.

Mia (2020) observe Just-in-Time (JIT) inventory systems focus on producing and delivering products just as they are needed in production, rather than sustaining extensive inventory stockpiles. According Callen, Morel and Fader (2023), JIT systems streamline production processes, leading to shorter lead times and faster response to market changes. This agility allows SMMFs to adapt quickly to customer demands and market trends. Therefore, the collaborative nature of JIT fosters stronger relationships with suppliers, leading to better pricing, reliability, and quality of materials.

Small and Medium Manufacturing Firms

Nairobi SMEs encompass various manufacturing sectors, including food and beverages, textiles and apparel, metal fabrication, wood and furniture, and chemicals. This diversity helps to mitigate risks associated with market fluctuations. SMMEs are significant employers in Nairobi, providing jobs to a large segment of the population. They are particularly important for youth and women, contributing to poverty alleviation and economic empowerment. Many SMMEs are known for their innovation and adaptability to dynamic market conditions. They often leverage local resources and knowledge to offerings that meet the local market requirements. A substantial number of SMEs operate in the informal sector, which can limit their access to formal financing, markets, and government support. This informality can also affect their growth potential and sustainability.

Statement of Problem

Kenya's SMMEs are crucial for economic growth, substantially imparting Gross Domestic Product (GDP) and employment. SMMEs account for approximately 80% of total employment in Kenya, with a significant portion located in urban areas like Nairobi. However, studies indicate that the average profit margin for SMMEs in Nairobi is often below 10%, with many businesses operating at a loss or breaking even. Approximately 50% of SMMEs in Nairobi fail within the first three years of operation, often due to low profitability and inadequate financial management. A survey might reveal that a significant percentage of SMMEs generate less than KES 1 million (about USD 10,000) annually, limiting their ability to reinvest and grow. Many SMMEs struggle to access affordable financing. Interest rates on loans can exceed 14%, making it difficult for businesses to invest in growth.

Several research studies have been conducted regarding inventory management systems effects on profitability. For instance, Hussein and Makori (2018) investigated inventory management practices influence on Kenya's commercial state corporations performance and the inventory control includes cost minimization, profit maximization, avoidance of running out of stock and to prevent surplus stock that are unnecessary. However, a contextual gap is presented that since a case of Kenya electricity generating company. Ngugi, Kimutai and Kibet (2019) investigated IMS effects on Kenya's Eldoret Town manufacturing companies' performance, concluding that benefits are gained from IMS adoption. However, a contextual gap was presented in the examination being done in Eldoret Town, Kenya. Anisere-Hameed and Bodunde (2021) ascertained IMS impacts on the Nigeria's manufacturing companies' profitability. It was revealed that IMS significantly affects return on asset, investment, net operating margin, and net income in Nigeria identifying a contextual gap. Therefore, the present study purposes to ascertain IMS impacts on small and medium manufacturing firms' profitability in Kenya's Nairobi City County.

Objectives of the Study

The study sought to answer the following specific objectives:

- i. To explore lean inventory system effects on Kenya's Nairobi City County SMME's profitability.
- ii. To ascertain Economic Order Quantity system impacts on Kenya's Nairobi City County SMME's profitability.
- iii. To establish how Just in Time inventory system influences on Kenya's Nairobi City County SMME's profitability.

REVIEW OF LITERATURE

Theoretical Review

Dynamic Theory of Profit (DTP)

Developed by Joseph Schumpeter in the year 1911 who stated that profits arise not merely from the efficient allocation of resources but from radical innovations, encompassing innovative offerings, novel business methods, and visionary market approaches, can revolutionize existing markets and create uncharted opportunities for stakeholders.. Schumpeter's (1911) dynamic theory of profit posits that profits are not simply the result of efficient resource allocation or static market conditions. Instead, he argues that they emerge primarily from the activities of entrepreneurs who introduce groundbreaking innovations be it new products, novel production processes, or transformative business models. These innovations have the potential to disrupt existing markets, challenge established firms, and create entirely new opportunities for economic activity.

Ghemawat and Ricart (2019) observe that organizations can use dynamic profit theory to analyze how external factors such as economic trends, competitive actions, and regulatory changes impact profitability. By continuously monitoring these variables, businesses can adapt their strategies to optimize profit margins. According to Jacobides, Winter and Kassberger (2022), dynamic profit theory encourages organizations to be flexible in their business models. Therefore, companies can experiment with different pricing strategies, product offerings, and service delivery methods to find the most profitable combinations. This adaptability is crucial in industries characterized by rapid change.

DTP is pertinent in this review as it explains how efficient inventory management systems enable firms in maintaining competitiveness and profitability in a dynamic business landscape. For Nairobi City County SMMEs, inventory management is a crucial factor that influences their ability to maximize profits. Firms that adopt EOQ models can efficiently balance ordering and holding costs, ensuring they do not tie up excessive capital in stock while avoiding shortages that disrupt production. Similarly, JIT inventory systems help reduce storage costs and waste, enhancing overall efficiency. Lastly, lean inventory management ensures that firms eliminate inefficiencies and optimize resource utilization, leading to better financial performance.

However, the Dynamic Theory of Profit also highlights the risks associated with innovation and market changes. SMEs that fail to adopt flexible inventory management strategies may struggle with increased operational costs, inefficiencies, or disruptions due to supply chain uncertainties (Mwangi & Namusonge, 2020). Moreover, inventory mismanagement can lead to stock obsolescence, financial losses, and reduced competitiveness. The theory, therefore, supports the idea that profitability is not static but depends on firm's adaptability and implementation of efficient inventory systems.

However, the theory assumes that businesses have equal opportunities to adapt and innovate, but in practice, SMEs face structural challenges such as limited access to capital, inefficient infrastructure, and bureaucratic barriers (Mwangi & Namusonge, 2020). These constraints can hinder firms' ability to implement new inventory management systems and therefore affect profitability.

Theory of Constraints (TOC)

Developed Eliyahu M. Goldratt, in the year 1984 who presented a novel approach to managing organizations and improving their performance by focusing on the constraints that limit their ability to achieve goals. Goldratt (1984) posits that every organization has at least one constraint that hinders its overall performance. This constraint can be a physical resource, a policy, or a market limitation. In addition, emphasizes the importance of identifying and managing these constraints to optimize the entire system rather than merely improving individual components. Therefore, organizations can enhance their throughput, reduce inventory, and minimize operational costs.

Rahman (2020) observe that the TOC framework encourages continuous improvement and provides a systematic methodology for problem-solving. It has led to the development of several tools and techniques, such as the Five Focusing Steps, which guide organizations in identifying and addressing their constraints effectively. Overall, the contributions to management theory through TOC development have transformed the way businesses approach operational efficiency and strategic planning, making it a cornerstone of modern management practices.

TOC is momentous to this examination as it emphasizes the need to detect bottlenecks in production process. Therefore, for SMEs, this could involve recognizing which stages of

production are slowing down due to inadequate inventory management and be able to understand how to balance inventory levels to optimize production flow. In addition, TOC aligns well with JIT inventory practices, which aim to reduce waste and improve efficiency which can enable the SMEs implement JIT strategies to ensure that inventory is available when needed without overstocking, thus reducing holding costs and increasing cash flow.

However, the theory faces certain limitations. TOC assumes that firms operate within a single major constraint at a time, yet SMEs often face multiple simultaneous constraints, such as limited access to capital, inefficient supply chains, and fluctuating demand which makes it difficult to isolate inventory management as the primary bottleneck affecting profitability. Secondly, the theory assumes that constraints can always be identified and resolved using existing resources, but in reality, many manufacturing SMEs in Kenya lack the financial and technical capacity to implement advanced inventory management systems.

Economic Order Quantity Model

Introduced by Ford W. Harris in 1913, EOQ serves as a crucial principle in inventory and supply chain management fields. Its main aim is to identify the most ideal order quantity to reduce overall inventory expenses, encompassing ordering, holding and stock shortages costs. Harris (1913) indicates that the offers a mathematical structure that aids companies in identifying the ideal amount of inventory to purchase at any moment, which is crucial for achieving a balance between satisfying customer demand and reducing associated costs associated with ordering and storing that inventory.

Sana (2019) observe that the business environment is dynamic, and elements like demand fluctuations, ordering or holding costs changes and supplier reliability can impact the effectiveness of the EOQ model which necessitates the organizations to continuously monitor demand patterns and costs to ensure that the EOQ remains relevant and recalculate EOQ and reorder points (ROP) as necessary to reflect changes in the business environment. Chen, Deng and Wu (2022), report EOQ model as fundamental inventory management tool that helps organizations determine ideal order quantity that minimizes total inventory outlays.

However, EOQ has limitations. One key assumption is that demand and lead times are constant, which is often not the case due to market fluctuations. This variability may lead to shortages or surplus stock, reducing the model's effectiveness (Asadabadi, 2020). Additionally, Battini, Persona and Sgarbossa (2023) observe that the EOQ model does not consider bulk purchase discounts, which can significantly impact inventory costs. Ignoring these discounts may lead to suboptimal purchasing decisions. The model also overlooks changes in holding costs, which can vary based on factors like storage and insurance. As these costs fluctuate, the EOQ may become less relevant.

The EOQ model is relevant to the study because it identifies the optimal order quantity. This balance helps SMEs avoid excessive ordering frequency and high holding costs. Utilizing the EOQ model improves inventory turnover rates, ensuring products are sold quickly and reducing the risk of obsolescence. This optimal inventory management enhances cash flow and

profitability for SMEs. In addition, The EOQ model promotes improved demand forecasting through sales data and market trends examination of, helping SMEs avoid overstocking or stock-outs. This adaptability is crucial in Nairobi's dynamic market, positively impacting profitability.

Diffusion of Innovation Theory (DIT)

Described by Everett Rogers in 1995, DIT explains the process through which novel ideas, technologies and practices spread within communities and organizations. Rogers identified several key elements and concepts that help to understand how innovations are adopted and diffused over time which include; innovation, diffusion process, adopter categories. Rogers (1995) outlined various elements that affect speed at which an innovation is accepted. These include the extent to which the innovation is viewed as superior to existing alternative, its values alignment, previous experiences, potential users requirements, perceived ease or difficulty of comprehending and utilizing new innovation and possibility of testing it on a small scale prior to full implementation.

Miller (2018) observe that the diffusion of innovation theory explores how new ideas, practices, or technologies are adopted within organizations. It highlights that adoption is not uniform and varies among individuals and groups. Key factors influencing this process include the innovation's characteristics, communication channels, the social system, and individual attributes of potential adopters. According to Sahin (2020), the theory categorizes adopters into five groups: innovators, early adopters, early majority, late majority, and laggards, each with different attitudes toward change. Innovators are risk-takers, while laggards are more resistant and may need extra support to adopt new practices. Therefore, effective communication is essential for raising awareness and addressing concerns about innovations.

Since DIT explains how new ideas and technologies spread within organizations, it's pertinent in comprehending IMS adoption and impact on profitability. Benefits of IMS such as improved efficiency and reduced costs can drive adoption. Effective IMS can streamline operations, reduce excess stock, and lower holding costs, enabling SMEs to optimize inventory levels and enhance profitability. SMEs in Nairobi may find IMS compatible with their operational practices, especially if the systems can be tailored to local contexts.

However, this theory has several shortcomings. First, DOI assumes a linear and predictable adoption process, where firms transition from awareness to implementation in distinct stages. However, SMEs in Kenya may face irregular adoption patterns due to financial constraints, lack of technical expertise, or resistance to change. Secondly, DOI assumes that firms will adopt innovations based on their perceived benefits, but many SMEs prioritize short-term cost reduction over long-term efficiency, making them hesitant to invest in advanced inventory technologies

Just-In-Time Model Theory (JIT)

This is a Japanese-developed concept implemented by many firms since the early 1970s. It was perfected by Taiichi Ohno at Toyota as a method to enhance consumer satisfaction (Goddard,

1986). The JIT system ensures that inventory is received exclusively when required in the production process, thereby reducing waste and optimizing efficiency. Manufacturing SMEs in Nairobi City County face several challenges, including high inventory costs, inefficiencies in stock control, and fluctuating demand. By implementing the JIT inventory system, these firms can minimize holding costs, reduce waste, and streamline production processes. According to Ohno (1982), JIT ensures that appropriate materials are accessible at the correct moment, in the exact amount needed, and at the designated location, thus improving operational efficiency. JIT aligns well with Lean Inventory Management and EOQ by emphasizing minimal inventory levels and maximizing resource utilization. The integration of JIT within SMEs allows for a more agile and responsive supply chain, ultimately contributing to enhanced profitability.

JIT is highly relevant in Nairobi's manufacturing SMEs due to its potential to enhance operational efficiency. Firstly, cost reduction is a major advantage, as Pillai (2010) suggests that careful inventory management under JIT principles lowers operational costs by reducing excess stock. Secondly, JIT enhances quality control. According to Wafa and Yasin (1998), JIT improves product quality by eliminating defective products and wasteful processes. Moreover, JIT improves supply chain efficiency. Broyles et al. (2005) argue that JIT fosters a seamless procurement process that enhances supply chain responsiveness. Additionally, implementing JIT provides a competitive advantage. It enables SMEs to compete effectively in both local and global markets by reducing lead times and improving customer satisfaction. Lastly, JIT plays a crucial role in economic growth. As Gavrea et al. (2011) state, successful business operations contribute to national economic development, which is particularly important in the context of Nairobi's manufacturing sector.

Despite its advantages, JIT also presents challenges that SMEs in Nairobi City County should consider. One of the key limitations is supplier dependence. Since JIT relies on timely supplier deliveries, any delays can disrupt production (Ohno, 1982). Additionally, demand variability poses a challenge. Fluctuations in customer demand can make JIT implementation difficult, requiring firms to have flexible contingency plans (Wafa & Yasin, 1998). Furthermore, the high implementation costs can be a barrier. Transitioning to a JIT system may require significant investment in technology and staff training (Pillai, 2010). Another issue is the risk of stockouts. Since JIT minimizes inventory levels, any unexpected disruptions can lead to stockouts and halt production (Broyles et al., 2005). Lastly, JIT requires complex coordination. Effective implementation necessitates close coordination between suppliers, manufacturers, and distributors, which can be challenging for SMEs with limited resources (Gavrea et al., 2011).

The JIT inventory management model provides significant benefits for manufacturing SMEs in Nairobi City County by reducing costs, improving quality, and enhancing operational efficiency. However, its successful implementation requires overcoming challenges such as supplier reliability and demand fluctuations. By integrating JIT manufacturing SMEs can optimize their operations and drive long-term profitability.

Empirical Review

Lean Inventory System and Profitability

Singh, Atsegeba, and Melkamu (2023) explored lean management practices impacts on Horizon Addis Tire Manufacturing PLC organizational performance, focusing on the mediating role of operational performance. Using a cross-sectional survey with a selfadministered five-point Likert scale questionnaire, the research analyzed data through factor analysis, correlation, multiple regression, and fuzzy set qualitative comparative analyses to test four hypotheses. The fuzzy set analysis revealed that the top five models showed strong predictive capabilities for both the sub-sample and holdout sample. A comparison of predictive power from the multiple regression model and fuzzy set analysis confirmed alignment, highlighting the substantial predictive power of the models. However, a contextual gap was established in the focus on Horizon Addis Tire Manufacturing PLC.

Nnadi and Oko (2021) studied lean inventory management effects on Nigeria's River State oil and gas companies' performance, surveying 96 senior employees from 10 firms with a 79% response rate. Participants were picked from human resources, marketing and production departments. Using a Likert-type scale, the research found that JIT and total quality management practices significantly enhance productivity and delivery performance, accounting for about 72% and 67% of the variance in these areas, respectively. However, the study presents both conceptual gap and contextual because it was based on the performance of oil and gas companies in Rivers State, Nigeria.

Rono and Miroga (2019) evaluated lean inventory management techniques impacts on Kenya's Nairobi City manufacturing firms, using a descriptive research design. They analyzed data from 213 respondents out of a population of 455, employing both descriptive and inferential statistics, including regression analysis via SPSS. Four variables were revealed to significantly influence firm performance. The researchers recommended further studies to explore the effects of inventory management techniques on various sectors, including services, due to insufficient existing research. Nonetheless, the research reveals a theoretical gap as it concentrated solely on the performance of manufacturing companies.

Economic Order Quantity System and Profitability

Essien and Otu (2022) conducted a literature review on the assessment of EOQ and its organizational performance impacts. To facilitate thorough evaluation, the researchers employed the Critical Appraisal Skills Programme (CASP) tools checklist, which assisted in identifying and selecting appropriate articles for inclusion in the examination. Utilizing the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow chart, researchers determined that twenty (20) articles met the established inclusion and exclusion criteria set forth by CASP. The findings indicated a strong consensus among scholars regarding the correlation between EOQ and organizational performance, highlighting a substantial relationship. However, secondary data usage depicted a methodological gap.

Mikhago, Fozia, and Atieno (2021) studied EOQ impacts on Kenya's sugar manufacturing companies' performance using a correlational research design. The target population included 144 individuals, such as procurement and finance managers, from which 108 participants were randomly selected. Data were collected through questionnaires and financial statements, with validity assessed via expert and factor analysis, and reliability measured using Cronbach's alpha. Results were depicted in graphs and tables, showing that adopting economic order quantity positively and significantly affected organizational performance. However, employment of correlational research design depicted a methodological gap.

Ndiwa (2022) studied the relationship between IMS and Kenya's Kiambu County dairy processing companies supply chain performance. Using descriptive research, 300 accountants and CEOs from the top 100 medium-sized enterprises were the focus, selecting 171 participants through stratified random sampling. Data was collected via questionnaires and analyzed using quantitative and qualitative methods, with reliability, normality, and homoscedasticity tests conducted to validate the Pearson Product Moment Correlation Coefficient model. The findings revealed that Economic Order Quantity (EOQ) inventory measurement does not significantly affect the profitability of these enterprises. However, dairy processing companies in Kiambu County, Kenya.

Just in Time Inventory System and Profitability

Mazanai (2022) evaluated JIT impacts on South Africa's SMEs flexibility, quality and efficiency across various industries. Many SMEs were found not using JIT principles and identified obstacles to adoption, including unreliable supplier networks, insufficient capital, and a lack of awareness of immediate financial benefits. Additionally, the research revealed significant positive correlations between JIT implementation and improvements in cost efficiency, quality, and flexibility. However, a contextual gap was depicted as it examined South African SMEs across various industries.

Abdullah and Aziz (2021) studied the JIT manufacturing impacts on profit maximization. This study aimed to assess the adoption of JIT production among small enterprises in the Kurdistan region of Iraq and its effects on profits. A quantitative approach was used, employing a validated questionnaire survey. Results showed that small manufacturing firms in the region could enhance JIT benefits by overcoming challenges related to timely raw material supply without maintaining inventory. However, the study presents a contextual gap.

Eric and Makori (2019) examined JIT influence on Kenya's vehicle manufacturing performance. 400 employees was the target populace, from 100 (25%) respondents as sample size were selected. The study employed a primary data collection method, primarily utilizing direct questionnaires' administration. After processing and analysis, findings indicated that factors such as cost reduction, lead time, organizational policy and buyer-supplier relationships are paramount in effective JIT implementation, thereby boosting vehicle manufacturing firms' performance. However, the study examined performance of the firms from the year 2015 to 2018.

RESEARCH METHODOLOGY

Descriptive research design was utilized by this examination to provide a comprehensive overview of a phenomenon or population without manipulating variables. According to Cross (2017), descriptive research design is effective for gathering detailed information about natural characteristics, behaviors, or conditions. In addition, the design also supports various data collection methods, like observations, interviews and surveys, allowing a broad range of information. Therefore, by using a descriptive approach, the study seeks to clearly depict the present position of the research subject, informing future studies and contributing to existing knowledge. This is as advocated by Ishikawa et al., 2025 and Mankishi (2025) who explored profitability of Zambia's SMEs.

This is the specific group from which the researcher selected a sample for the study, and the results were extrapolated to this population (Dahabreh & Hernan, 2019). The target population was small and medium manufacturing firms in Nairobi City County, Kenya which was categorized as follows; food and beverage production, textiles and apparel, metal fabrication, plastics, woodwork and electronics. The respondents were the 1333 firm owners. The sample size for this study was determined using the Taro Yamane (1967) formula, a recognized method for calculating sample sizes when the population size is known. Therefore, 308 respondents representing 23.1% of total populace formed sampling size and was proportionately distributed. A questionnaire served as the principal data amassing tool in the study. This questionnaire was structured to gather information on each variable through closed-ended questions. It featured several sections: Section A focused gathered participant's demographic data. Section B addressed lean inventory system variable. Section C explored the economic order quantity system. Section D examined the Just in Time inventory, while Section F investigated the profitability. The closed-ended questions were presented in a Likert scale format, which is a widely used method for measuring attitudes, opinions, and perceptions. This allowed the researcher to quantify subjective responses, allowing for easier analysis and comparison of data.

Quantitative data was systematically collected and evaluated descriptively, summarizing central features specifically mean and standard deviation which describe central tendency, variability, and distribution. Inferential statistics of correlation and regression was adopted to draw conclusions and make predictions about a population based on a sample of data and allow in analyzing the relationships between variables, test hypotheses, and estimate population parameters.

The analysis utilized SPSS for data management and statistical analysis. SPSS features userfriendly interfaces and strong graphical capabilities for visualizing results, enhancing our ability to interpret and communicate findings. For clear finding's presentation, tables and figures were employed.

Multiple regression, a statistical approach used to model multiple independent variables influence on a dependent outcome, is structured as follows;

$$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \varepsilon$$

(Hanson, 2010)

Where: - β_0 – intercept

- $\beta_1 \dots \beta_3$ Coefficients
- X1-Lean inventory system
- $X_2-E conomic \ order \ quantity \ system$
- $X_3 Just \text{ in Time inventory system}$
- ϵ Error term

RESEARCH FINDINGS AND DISCUSSION

Response Rate

308 questionnaires distributed to participants selected from various companies was basis for response rate calculation. Table 4.1 depicts aggregated results of their responses. *Table 4.1: Response Rate*

Category	Frequency	Percentage
Questionnaires returned	287	93.2%
Questionnaires not returned	21	6.8%
Total	308	100

Source: Research Data (2025)

Table 4.1 depicts 93.2% response rate was attained, as 287 out of 308 distributed questionnaires were returned fully completed. The non-response rate stood at 6.8%, corresponding to 21 questionnaires that were not returned. According to Nulty (2021), at least 70% response rate is deemed acceptable for analysis. Therefore, this study proceeded with data analysis to derive findings in alignment with this guideline.

Descriptive Statistics Results

Percentages, mean (M) and standard deviation (SD) served as statistical parameters for presenting quantitative data. The sections that follow present the findings.

Inventory Management Systems

Table 4.2 Descriptive Statistics

Descriptive Statistics	Mean	Std Dev	
Lean Inventory system	4.21	1.066	
Economic Order Quantity systems	4.24	1.039	
Just In Time systems	4.25	1.066	

Source: Research Data (2025)

The finding for lean inventory systems were found to agree with Hofer, Eroglu and Hofer (2022) research observation that lean inventory system adoption can significantly enhance profitability for businesses by implementing a multifaceted technique that rivets on reducing waste, optimizing resource utilization and boosting overall operational efficiency.

Consequently, Economic Order Quantity systems were also found to concur with Jiang, Zhao and Zhai (2023) research observation that the EOQ model provides a data-driven approach to inventory management, enabling SMMEs to make informed decisions regarding purchasing and production schedules. Therefore, for SMMEs, effective inventory management is crucial for maintaining profitability and competitiveness in a dynamic market.

Just in time systems results agreed with Callen, Morel and Fader (2023) research observation that JIT systems streamline production processes, leading to shorter lead times and faster response to market changes. This agility allows SMMFs to adapt quickly to customer demands and market trends.

Profitability

The results on Returns on Assets (ROA) achieved from the year 2020 to 2024 are presented in Figure 4.1



Figure 4.1: Return on Assets

Source: Research Data (2025)

In year 2020, the Return on Assets (ROA) was noted to be 15.691 million. This figure saw a significant increase in 2021, reaching 26.794 million. However, in 2022, the ROA slightly decreased to 22.546 million. The trend reversed again in 2023, where it peaked at 31.03 million, before experiencing another decline to 28.99 million in 2024.

Inferential Statistics Results

Here, correlation and multiple regression analysis were used.

Correlation Analysis

The study employed correlation analysis to find connections between variables. Table 4.9 presents demonstrate the results.

		Lean inventory system	Economic order quantity	Just-in-time inventory	Profitability
Lean inventory system	Pearson Correlation	1			
	Sig. (2-tailed)				
	Ν	287			
Economic order quantity	Pearson Correlation	.204	1		
	Sig. (2-tailed)	.107			
	N	287	287		
Just-in-time inventory	Pearson Correlation	.119	.314	1	
	Sig. (2-tailed)	.0112	.107		
	N	287	287	287	
Project sustainability	Pearson Correlation	.774**	.805**	.796**	1
	Sig. (2-tailed)	.004	.003	.004	
	Ν	287	287	287	287

Table 4.3: Correlation Analysis

Source: Research Data (2025)

Findings in Table 4.3 puts forth lean inventory system, economic order quantity system, justin-time inventory system had a positive correlation with profitability as depicted by 0.774(p=0.004), 0.805(p=0.003) and 0.796(p=0.004) Pearson-R values respectively.

Regression Analysis

Table 4.4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate			
1	0.894	0.799	0.721	1.0021			
$\mathbf{C}_{\mathbf{r}}$							

Source: Research Data (2025)

Table 4.4 shows that the Adjusted R square value was 0.721, indicating that the lean inventory system, the economic order quantity system, and the just-in-time inventory system had a strong link with the profitability of small and medium manufacturing firms in Nairobi City County, Kenya. This indicates that independent variables studied explain about 72.1% variations on profitability of Kenya's Nairobi City County SMMEs with the remaining 27.7% described by factors not included in the model.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	319.875	3	106.625	111.343	0.003
	Residual	271.009	283	0.958		
	Total	590.884	286			

Table 4.5: Analysis of Variance

Source: Research Data (2025)

As Table 4.5 depicts, 0.003 significance value falls below the 0.05 threshold, while Table 4.11 presents ANOVA results, where Fcal (3, 286) = 111.343, p < 0.05, exceeds Ftab (3, 286) = 106.625, p < 0.05, confirming regression model's statistical validity.

Table 4.6: Coefficients

		Unstandardized		Standardized		
		Coefficients		Coefficients		
Model		В	Std. Error	Beta	t	Sig.
1	(Constant)	0.674	0.215		3.135	0.003
	Lean inventory system	0.744	0.306	0.0152	2.431	0.004
	Economic order quantity	0.796	0.294	0.0229	2.707	0.002
	Just-in-time inventory	0.765	0.225	0.0301	3.400	0.003
~						

Source: Research Data (2025)

As outlined in Table 4.6, the beta coefficients: lean inventory system, $\beta_1 = 0.0.0152$ (t = 0.2.431, p< 0.05); economic order quantity, $\beta_2 = 0.0229$ (t=62.707, p< 0.05) and just-in-time inventory $\beta_3 = 0.0301$ (t =3.400, p< 0.05). All coefficients are significant (p < 0.05). Thus, the equation predicting inventory management systems influence on profitability took the form; $Y = 0.674 + 0.744X_1 + 0.796X_2 + 0.765X_3$

Y = Profitability

 X_1 = Lean inventory system

 X_2 = Economic order quantity

 $X_3 =$ Just-in-time inventory system

Test of Hypotheses

HO1: Lean inventory system does not significantly affect Kenya's Nairobi City County SMME's profitability.

The study established a positive significant relationship effect between lean inventory system and Kenya's Nairobi City County SMME's profitability (β =0.0152, t=2.431, p=0.004). Consequently, the hypothesis that lean inventory system does not significantly affect Kenya's Nairobi City County SMME's profitability was rejected. Outcomes correspond to Rono and Miroga (2019) who concluded that lean inventory management techniques significantly positively affect Kenya's Nairobi City manufacturing firms' performance.

HO₂: Economic order quantity system does not substantially impact Kenya's Nairobi City County SMME's profitability.

The study established that economic order quantity system had a positive significant effect on Kenya's Nairobi City County SMME's profitability (β =0.0229, t=2.707, p=0.002). Therefore, the hypothesis that economic order quantity system does not significantly affect Kenya's Nairobi City County SMME's profitability was rejected. The finding agrees with Essien and

Otu (2022) research which indicated a strong consensus among scholars regarding the correlation between EOQ and organizational performance, highlighting a substantial relationship.

HO3: Just in time inventory system does not have significantly influence Kenya's Nairobi City County SMME's profitability

The study revealed that just-in-time system significantly positively affected on Kenya's Nairobi City County SMME's profitability (β =0.0301, t=34.00, p=0.003). Therefore, the hypothesis that economic just-in-time inventory system does not significantly affect Kenya's Nairobi City County SMME's profitability was rejected. The finding agree with Singh, Nnadi and Oko (2021) research observation that JIT and total quality management practices significantly enhance productivity and delivery performance, accounting for about 72% and 67% of the variance in these areas.

Conclusions of the Study

The examination gathered that lean inventory solutions significantly lower the expenses associated with obsolescence, insurance, and storage by reducing excess inventory. The lean approaches reduce the expenses related to altering production runs by optimizing production procedures and cutting setup times. Lean techniques reduce costs in various areas by optimizing the utilization of resources, such as labor and materials. The aim of lean methods is to lessen delays and disruptions by ensuring a continuous and seamless flow of information and materials across the supply chain.

The study concludes that the economic order quantity system allows businesses to release capital that would typically be engaged in surplus inventory, facilitating reinvestment in growth opportunities or enhancements to profit margins. The Economic Order Quantity (EOQ) model serves as fundamental aspect of inventory management, providing companies with a method to reduce the overall expenses linked to ordering and storing inventory. EOQ is vital for maintaining optimal stock level to meet customer needs while avoiding unnecessary holding expenses. EOQ dictates when and how much to order from suppliers, guaranteeing that materials are ready when necessary while minimizing capital investment in excess inventory. The study concludes that the just-in-time inventory system removes waste from production, allowing businesses to enhance product quality. The just-in-time inventory method lowers inventory costs while optimizing space utilization. Reducing inventory lowers the chances of obsolescence, damage, and spoilage, leading to considerable cost savings for small and medium-sized enterprises. JIT systems minimize the requirement for large initial investments in inventory, allowing capital to be available for other business requirements. JIT systems encourage a steady production flow by guaranteeing that materials are accessible when required, thereby enhancing overall productivity.

Recommendations of the Study

Companies are recommended to ensure proper process standardization by implementing clear and consistent procedures for inventory management, which helps enhance efficiency and minimize errors. Companies ought to visualize the movement of materials and information from suppliers to clients, aiding in pinpointing areas that need enhancement. This examination can identify constraints and inefficiencies that lead to surplus inventory or delays. The lean inventory demands robust collaborations with suppliers to guarantee dependable and prompt deliveries, which aid in optimizing inventory levels and minimizing lead times.

The study also recommends that the businesses ought to focus on reducing ordering expenses by making fewer, larger orders to lower the administrative costs linked to ordering and receiving inventory. Companies need to concentrate on reducing shortage costs to prevent stockouts by maintaining adequate inventory to satisfy demand, thereby avoiding lost sales and customer discontent. Companies ought to enhance cash flow since optimized inventory levels facilitate improved cash flow management, resulting in less capital being tied up in surplus inventory. Businesses ought to focus on boosting sales by maintaining sufficient inventory and preventing stockouts; this allows SMEs to enhance sales chances and elevate revenue.

The study recommends that the companies ought to perform precise forecasting to accurately anticipate demand, which assists in ensuring that supplies arrive on time, reducing delays and surplus inventory. Minimize inventory by prioritizing the maintenance of low inventory levels while ensuring production is not affected. The company needs to enhance inventory by regularly assessing and modifying stock levels to improve efficiency and reduce expenses. Businesses ought to conduct a cost analysis by examining all inventory associated costs, such as storage, material and insurance costs, to pinpoint opportunities for enhancement.

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