African Journal of Emerging Issues
Peer reviewed | Double blind | Interdisciplinary

African Journal of Emerging Issues
(AJOEI)
Online ISSN: 2663 - 9335
Available at: https://ajoeijournals.org

PROCUREMENT

BEYOND THE SHELF: UNLOCKING SUPERMARKETS' PERFORMANCE WITH JIT AND VMI IN THE NORTH RIFT REGION, KENYA

[1*]Faith Jemutai Singoei

Master of Science in Procurement and Logistics, Jomo Kenyatta University of Agriculture and Technology, Kenya

[2]Dr. Erastus Kiswili Nyile, PhD

Murang'a University of Technology, Kenya

Publication Date: May 2025

ABSTRACT

Purpose of Study: This study examined the influence of two key inventory management practices—Just-in-Time (JIT) and Vendor Managed Inventory (VMI)—on the performance of supermarkets in the North Rift Region.

Problem Statement: Inventory management plays a critical role in ensuring the operational efficiency and financial success of supermarkets. With growing competition and evolving consumer expectations, supermarkets in Kenya's North Rift Region are increasingly seeking innovative inventory management strategies to enhance performance.

Methodology: A mixed-methods descriptive survey design was employed, targeting 58 supermarkets in the region. The units of observation included heads of procurement, stores, IT, and finance departments, with a purposive sample of 232 respondents. Data were collected using structured questionnaires and analyzed using SPSS.

Result: The findings revealed that both JIT and VMI practices significantly influence supermarket performance. JIT implementation led to improved operational efficiency by reducing storage costs, eliminating waste, and enhancing order fulfillment speed. VMI was found to strengthen vendor relationships, streamline inventory replenishment, and improve supply chain coordination, ultimately leading to enhanced customer satisfaction and reduced stockouts. Challenges such as mistrust in vendor decision-making and supplier delays were reported but were largely mitigated through improved data sharing and collaborative planning. The study concludes that supermarkets adopting JIT and VMI practices benefit from improved performance in terms of operational efficiency, cost control, and customer service.

Recommendation: It recommends investment in staff training, supplier collaboration, and technology adoption to support these practices. Policymakers are encouraged to develop supportive frameworks that facilitate real-time data integration and transparency in supply chain operations. Further research is suggested to explore the integration of emerging technologies such as artificial intelligence (AI) in inventory optimization.

Keywords: *Inventory Management, Just-in-Time (JIT), Vendor Managed Inventory (VMI), Supermarket Performance, Operational Efficiency, Supply Chain Management*

INTRODUCTION

Managing inventory continues to be a growing area of concern for many supermarkets due to the multitude of issues that arise from either an excess or shortage of inventory (Esrar, Zolfaghariania, & Yu, 2022). This is because inventory management represents a key success factor that shows how efficient a company is controlling its inventories (Ahmad, & Zabri, 2016). The adoption of systematic inventory management practices (IMPs) is a critical success factor for businesses in a retailing industry (Ahmad & Zabri, 2018). The current business climate of increasing competition implies that all companies need to be as efficient as possible at every level, which includes inventory management (Achieng, Paul & Mbura, 2018). According to Mutinda and Mwasiaji, (2018), the business world is encountering a radial pace of change, unexpected technological change and massive entries of new competitors. This according to Baron, Berman and Perry (2018), has necessitated managers of companies to understand how many units of their product are available for orders from different customers, hence the need for proper inventory management practices.

According to Achieng, Paul and Mbura (2018), many supermarkets have had a persistent problem in establishing the right inventory levels and they have thus turned to computerizing their systems so as to achieve a balance between responsiveness and efficiency. This is because businesses live in the age of the informed consumer, meaning that a retailer should be able to offer first class service in terms of the availability of its products, as consumers can very easily take their business elsewhere. Brigham and Ehrhard, (2015) aver that the primary goal of inventory management, therefore, is to have adequate quantities of high-quality inventory available to serve customer needs, while also minimizing the costs of carrying inventory. Syed, Nurul, Nabihah and Raja (2016) argues that inventory management is critical to retail performance, since inventory tops the list of valuable physical assets on nearly every merchant's balance sheet. Conversely, Libby, Libby and Short, (2014) contends that purchasing too many units of a slow-selling item will increase storage costs and interest costs on the short-term borrowings that finance the purchases. This accordingly may also lead to losses if the merchandise cannot be sold at the normal price.

In Kenya, supermarkets are experiencing persistent challenges in managing inventory effectively, leading to critical performance issues. Despite the growth of the retail sector, many supermarkets struggle to maintain optimal inventory levels, resulting in either excess stock or frequent stockouts, both of which impact profitability and customer satisfaction (Paul & Mbura, 2018). Excess inventory ties up capital and incurs additional storage costs, while shortages limit sales opportunities and reduce customer loyalty. As supermarkets compete in an increasingly dynamic market, compounded by new entrants and evolving consumer demands, the need for effective inventory management practices (IMPs) becomes paramount (Paul & Mbura, 2018). Models like Vendor Managed Inventory (VMI) and Just in Time (JIT) offer potential solutions to these inventory challenges by optimizing order quantities, reducing holding costs, and improving overall efficiency. However, the impact of these practices on the performance of supermarkets in this region remains under-researched in the supermarket context.

STATEMENT OF THE PROBLEM

The efficient management of inventory is a critical determinant of operational success and resource optimization in retail enterprises. In North Rift, Kenya, supermarkets face significant

challenges in their inventory management practices, impacting their overall performance and sustainability. According to a study by Njoroge and Kamau (2023), 68% of supermarkets in Kenya experience stockouts at least once a month, leading to lost sales and reduced customer satisfaction. Additionally, overstocking is a prevalent issue, with supermarkets reporting that approximately 25% of their inventory remains unsold beyond optimal periods, leading to financial strains (Mutunga & Otieno, 2022).

Despite the potential benefits of using advanced inventory management and control software, compliance and adoption of these practices remain inconsistent (Beurskens, 2024). Supermarkets can greatly benefit from implementing best practices to enhance transparency and efficiency in their operations. The inconsistent adherence to optimal inventory management practices poses risks of stockouts, overstocking, and financial mismanagement, which are detrimental to the supermarkets' financial health and customer satisfaction (Onikoyi, 2024). Studies indicate that ineffective inventory management contributes to up to 40% of operational inefficiencies in Kenyan supermarkets (Chebet & Kitheka, 2019).

Financial implications are a major concern for supermarkets in the North Rift region. A substantial portion of their budgets is allocated to procurement and inventory-related activities, yet poor inventory management leads to losses exceeding Ksh. 500 million annually in the retail sector (Muinde, 2022). Poor inventory management has been cited as one of the key reasons for the downfall of major retail chains such as Uchumi Supermarket and Nakumatt Supermarket (Chebet & Kitheka, 2019). These cases highlight the risks associated with accumulating excessive inventory, which ties up capital and deprives businesses of the necessary funds for other investments. This issue is not unique to large retail chains; supermarkets in the North Rift region also face similar risks, necessitating a critical examination of their inventory management practices to prevent financial distress and improve operational efficiency.

The challenges faced by supermarkets in the North Rift region are multifaceted. A survey by Kiprono and Langat (2023) found that 55% of supermarkets in the region rely on outdated inventory tracking methods, such as manual record-keeping, which leads to errors and inefficiencies. Inconsistent inventory practices across different branches or departments lead to operational bottlenecks. Technological integration remains inadequate, with many supermarkets relying on outdated or manual systems for inventory management. This lack of advanced inventory management software and technology results in poor tracking of stock levels, expiration dates, and reorder points, ultimately affecting customer satisfaction and sales. Furthermore, informational asymmetry due to the lack of accurate, real-time data on inventory exacerbates these issues, leading to overstocking or stockouts and impacting the overall efficiency and effectiveness of supermarket operations.

The disparity between the current state of inventory management practices in North Rift's supermarkets and the ideal scenario is stark. Discrepancies in methodologies, technology usage, and data utilization contribute to inefficiencies and reduced performance. While advanced inventory management systems offer solutions through real-time data, automated reorder processes, and improved overall efficiency, the adoption of such technologies is inconsistent. Studies by Wanyonyi et al. (2023) indicate that supermarkets that have integrated modern inventory management systems report a 30% reduction in stockout incidents and a 20% increase in profit margins. However, many supermarkets continue to rely on outdated practices, hindering their ability to achieve optimal performance and customer satisfaction.

Despite the growing body of research on inventory management, there remains a significant gap in literature focusing on how specific inventory management techniques impact supermarket performance in Kenya's North Rift region. Existing studies have largely focused

on general retail supply chain management without an in-depth analysis of local challenges and potential solutions. Therefore, this study aims to bridge the knowledge gap regarding the impact of inventory management techniques on the performance of supermarkets in North Rift region, Kenya.

RESEARCH OBJECTIVES

i. To examine the influence of Vendor Managed Inventory (VMI) on performance of Supermarkets in North Rift Region, Kenya.
ii. To assess the influence of Just in Time (JIT) on performance of Supermarkets in North Rift Region, Kenya.

THEORETICAL REVIEW

The Game Theory

The Game theory is the study of mathematical models of strategic interactions among rational agents. Game theory did not exist as a unique field until John von Neumann published the paper On the Theory of Games of Strategy in 1928. Von Neumann's original proof used Brouwer's fixed-point theorem on continuous mappings into compact convex sets, which became a standard method in game theory and mathematical economics.

In the context of inventory management procedures, game theory's premise is that it seeks to shed light on interactions between persons or organizations whose objectives are in opposition to, at odds with, or at least somewhat in competition with one another. For instance in the inventory management practices, it looks at the interest of the management, the suppliers and even the consumers whose interest are always worlds apart. Game theory therefore looks at interactive decision-making, where the outcome for each participant or "player" depends on the actions of all other players.

Non-cooperative solution deals with how rational individuals interact with one another in an effort to achieve their own goals (Abedrabboh, Pilz, Al-Fagih, Al-Fagih, Nebel, & Al-Fagih, 2021). The emphasis is on the strategies of players and the consequences of interaction on payoffs. The purpose is to make predictions on the outcome. The solution concepts that are commonly used are the Nash equilibrium. A Nash equilibrium according to Abedrabboh, Pilz, Al-Fagih, Al-Fagih, Nebel and Al-Fagih, (2021) recommends a strategy to each player that the player cannot improve upon unilaterally, that is, given that the other players follow the recommendation. This is because the other players are also rational. Thus, it is reasonable for each player to expect opponents to follow the recommendation as well. Existence of Nash equilibrium follows from similar arguments and all the difficulties with two person nonzero sum games show up as well. But there is a new phenomenon that must be taken into account, that of coalition formation (Anglano, Canonico, Castagno, Guazzone & Sereno, 2020). Subsets of players could form a "cartel" and act in unison to gain more than they could if they acted independently. This forms one essential aspect of the game here. This therefore according to Otero-Palencia, Amaya-Mier, Montoya-Torres and Jaller, (2020) requires having binding contracts, using correlated mixed strategies, and transferable utility (so that the gain could be shared between the colluders in some way that all agree to).

Game Theory (GT) has been widely used for studying the inventory management, and detailed literature review studies on GT applications in Supply Chain Management (SCM) have been published. In their review, Cachon and Netessine (2006) highlight the various GT related concepts and techniques used in supply chain analysis. Leng and Parlar (2005) cover a broad scope and examine the use of game theoretic analysis in different SCM application areas such as inventory management, production and pricing competition, capacity decisions, service quality, advertising, and new product introduction. More recently, Govindan, Popiuc, and

Diabat (2013) reviewed literature related to coordination contracts used in managing the forward and the reverse SC and presented a comprehensive classification of these contracts. Jørgensen and Zaccour (2014) reviewed GT models used in analyzing the cooperative advertising between Supply Chain members.

In the competitive newsboy model, substitution often takes place between different products sold by different retailers when the products have stochastic demands (Gupta, Ivanov & Choi, 2021). In such a situation, each retailer's profit depends not only on her own order quantity but also on her competitors' order. In other words, if a customer finds the shelves empty at the first firm she visits, she does not necessarily give up but may travel to another firm in order to satisfy her demand. The actual substitution between any two retailers takes place according to a substitution rate that depends on their products and other factors such as location. Game theory was therefore used to solve such inventory management issues to help curb inefficiencies. This is because when we go from games in extensive forms to normal forms, we abstract some details and only look at strategies to obtain.

Transaction Cost Theory

The fatherhood of "transaction costs" was attributed to Ronald Coase, who in his famous article The Nature of the Firm, in 1937, has built the judgment regarding the firm's existence without using, explicitly, the concept of "transaction costs" but that of "cost of using the price mechanism" (Coase, 1988; Demsetz, H. 1988). Coase substantiates his argument about the nature of the firm by emphasizing that organizing the production through the market channels (contracting by market) involves some costs. So, by creating an organization which has the responsibility for resources allocation, some expenditure can be avoided. Going forward, transaction cost theory is developed by Kenneth Arrow in 1969 and they define a transaction costs as "operating costs of the economic system." (Arrow, 1969) Later, Williamson in 1996, founder of the transaction cost economics, believes that "the study of governance include: identifying, explaining and combating all types of risky contracts" (Wieland, 2015).

According to Williamson (1986) that transaction costs arise every time a product or service is being transferred from one stage to another. It further states that the transaction costs related to the exchange of resources with the external environment could be reflected by environmental uncertainty, opportunism, risks, bounded rationality, core company assets. These factors will all potentially increase the external transaction costs, where it may become rather expensive for a retail enterprise to control these factors. Therefore, it may very well be more economical to maintain the activity in-house, so that the retailer will not use resources on e.g. contracts with suppliers, meetings and supervision. Therefore, if companies find one factor to be high, they might choose to not outsource or exchange resources with such a factor.

Transaction cost theory, which focuses on firm boundaries, seeks to address the question of when activities would take place inside the firm and when they would take place within the market (Williamson, 1991). More precisely, the theory forecasts the adoption of hybrid governance models (such as coalitions) or markets and hierarchies. Williamson, who received a Nobel Prize for his research on transaction costs, postulated that the transaction costs of an activity would determine whether or not it was internalized within a company. In general, he defined transactions as the transfer of products or services between interfaces, and he maintained that internalizing a transaction within a hierarchy was the right course of action when transaction costs were high. On the other hand, purchasing the good or service from the market was the recommended course of action when transaction costs were minimal. Three parameters were established to describe transactions: asset specificity, which refers to the extent of transaction-specific costs incurred, frequency, and uncertainty. The foundation of

transaction cost theory is opportunism, which is defined as self-interest combined with cunning, and bounded rationality.

Notwithstanding the tremendous impact of Transaction costs theory, its assumption has been subjected to multiple criticisms. For example, the assumption of resourcefulness has been criticized for ignoring that human actions influence organizational decisions and that not all decisions will be the same where the resources are the same. (Granovetter, 1985). Williamson responded by re-stating that in his model, opportunism or bounded rationality may differ from person to person much as personality or intelligence do, but when transaction costs change they do so because of changes in the environment, not in the person (Williamson, 1993). The way in which a supermarket is organized can determine its control over transactions, and hence costs. It is in the interests of management to internalize transactions as much as possible, to remove these costs and the resulting risks and uncertainties about prices and quality.

EMPIRICAL LITERATURE

Vendor Managed Inventory (VMI)

This is a new concept that has been popularized by the Bose Corporation. It is now widely used in the industry with encouraging results. Also known as continuous replenishment or supplier-managed inventory, VMI is one of the most widely discussed partnering initiatives for encouraging collaboration and information sharing among trading partners. Popularized in the late 1980s by Wal-Mart and Procter & Gamble, it was subsequently implemented by many other leading companies from different industries, such as GlaxoSmithKline, Electrolux Italia Nestle and Tesco Boeing and Alcoa (Panahifar, Byrne, Salam & Heavey, 2018). It is a supply chain initiative where the vendor decides on the appropriate inventory levels of each of the products and the appropriate inventory policies to maintain those levels.

Kwateng, Fokuoh & Tetteh (2022) carried out a study on the relationship between vendor managed inventory and operational performance. The scholars asserted that for the supply chain to be responsive in the age of globalization, the firms need to adopt strategies to enable them to meet the changing market needs. Thus, it is essential to adopt automatic replenishment programmes such as vendor-managed inventory (VMI). This study sought to examine the relationship between VMI and operational performance (OP) and the moderation roles of leadership and digitization in the mining sector. A quantitative approach was used, including primary data collected from industry players in the mining sector in Ghana. A total of 97 industry players were included in the study. Data gathered was analysed using SPSS and LISREL (8.5). The results indicate that VMI significantly affects OP. However, both digitization and leadership failed to moderate the relationship between VMI and OP. The study offers mining companies an understanding of VMI applications in their industry. The knowledge will stimulate and improve inventory management practices in the mining industry.

On their study on viable supply chain with vendor-managed inventory approach by considering block chain, risk and robustness, Lotfi, Rajabzadeh, Zamani and Rajabi, (2022) embedded Block chain Technology (BCT) to improve SC agility. To tackle risk and robustness, they suggested a new objective function with the weighted expected value, worst case, and Entropic Value at Risk for considering risk and robustness under different scenarios. Under this model, Mixed-Integer Linear Programming, and GAMS-Bonmin is utilized to solve their issue. The case study of this research was on the Pharmacy industry where they compared problems in the situation with BCT and without BCT. The results showed that the cost function of the main problem without BCT is greater than the same problem with BCT, and its gaps are 0.61%. Finally, the cost function increase by increasing the conservative coefficient and decreasing the resiliency coefficient. The cost function reduces by increasing the confidence level. The

scholars then changed the scale of the problem and defined problems. By increasing the scale of the problem, the solution time was found to increase.

In VMI, the supplier takes charge of the inventory management of products and manages the replenishment process based on the consumption pattern of the consumer. They use EDI or other inter-organizational software packages or place the supplier's representative at the customer's place. Therefore in VMI, the manufacturer is given the responsibility for monitoring and controlling inventory at the retailer's distribution centre and in some instances at the retail store level as well. Specific inventory targets are agreed and it is the responsibility of the manufacturer to ensure that suitable inventory is always available. Such arrangements depend on accurate and timely information, and suitable computerized systems have only become available in recent years.

The main advantage for the retailer lies in the reduction of the operating costs and also the delay in the payment for the products in question. For manufacturers, it is suggested that running a VMI system for a retailer provides the opportunity to develop a much closer and hopefully more binding relationship with the retailer as well as giving much better visibility of real demand. This can make the planning of production much easier and can lead to significant reductions in inventory holding right through the supply chain (Allan et al., 2019). Using the right technology, a firm would tend to offer better services to its customers as well as reducing the operational costs because in VMI systems, there will be real time sharing of information among the customers, the firm and the suppliers.

Vendor Managed Inventory is a streamlined approach to inventory management and order fulfillment whereby the vendor is fully responsible for the replenishment of inventory based on timely purchase order sales information to the buyers (retailer). This concept helps to increase the customer responsiveness by reducing the supply and demand gap thus giving the satisfaction to end customer by availing the desired product when needed (Kalyanam, 2019).

In VMI, the supplier takes charge of the inventory management of products and manages the replenishment process based on the consumption pattern of the consumer. They use EDI or other inter-organizational software packages or place the supplier's representative at the customer's place. Therefore in VMI, the manufacturer is given the responsibility for monitoring and controlling inventory at the retailer's distribution centre and in some instances at the retail store level as well. Specific inventory targets are agreed and it is the responsibility of the manufacturer to ensure that suitable inventory is always available. Such arrangements depend on accurate and timely information, and suitable computerized systems have only become available in recent years. The main advantage for the retailer lies in the reduction of the operating costs and also the delay in the payment for the products in question (Burcher, 2019).

For manufacturers, it is suggested that running a VMI system for a retailer provides the opportunity to develop a much closer and hopefully more binding relationship with the retailer as well as giving much better visibility of real demand. This can make the planning of production much easier and can lead to significant reductions in inventory holding right through the supply chain (Allan et al, 2019). Using the right technology a firm would tend to offer better services to its customers as well as reducing the operational costs because in VMI systems, there will be real time sharing of information among the customers, the firm and the suppliers (Boddy, 2019).

Supply chain partners must share their vision of demand, requirement and constraint to set the common objectives (Guillaume, 2018). Quality of buyer supplier trust and relationship, quality of ICT system and intensity of information sharing has positive impact on vendor managed

inventory implementation (Marloes et al 2018). Before implementing vendor managed inventory, it is important to analyze the level of uncertainty of customer demand because a high uncertainty in demand negatively influences the performance attained through vendor managed inventory. Upstream data transferred to supplier's i.e. current inventory level and accurate sales forecast is the most important factor for the successful implementation of vendor managed inventory (Astrid, 2019).

The common objectives which permit to build up a better collaboration between the partners and so to reach the main objectives which include speeding up the supply chain (Disney & Towill, 2018) and reducing the bullwhip effect (Achabal et al, 2018), It also gives benefits to retailer as manufacturer stock more to reduce risk of stock out which in turn reduces retailer holding and shortage cost and increases its profit.

Just-in-Time Inventory Management

According to Upadhye, Deshmukh, Garg and Sharma (2021) looked at just-in-time, the issues in its implementation in India. The study focused on Corrugated Packaging Industries. The study adopted a survey method and data was collected from primary sources. Data analysis was done with the help of regression analysis. It was revealed that JIT has positive influence on performance of the firm. Chaudhari and Patel (2018) conducted a study to determine the implementation of JIT in a manufacturing concern. This was an empirical review that was achieved by reviewing relevant material and literature on JIT. From the findings, it was established that JIT is one of the widely acknowledged and recognized systems and philosophies of enhancing manufacturing excellence.

According to Kaswan, Rathi and Singh (2019) looked at JIT and its influence on decision making in the health care context in India. The study was empirical in nature and the review of literature suggested that JIT has positive effect on performance of the firm. Filippini and Forza (2018) sought to determine how JIT system impacts on performance using a case of Indian firms. This was an empirical study and it documented positive relationship between JIT as a system of inventory management and performance of the firm.

According to McCauley, (2020) who conducted a study on critical elements relevant for implementing JIT management through the Information integration-based system. The study was done in cement industry in Pakistan. Survey responses were used to gather data from 400 operation managers in cement manufacturing firms. Questionnaires and interviews were used in collection of data. The findings indicated that JIT system of inventory management has a positive and significant influence on performance of the firm. It was shown that JIT system of inventory helps in minimization of defects while permitting continuous flow of operations in the firm. The study pointed out the need for increased commitment from the top management in implementation of JIT system.

According to Kariuki (2018) carried out a study to determine the influence of inventory management techniques on firms' performance. The study used a case of Laikipia County. The variables of the study included IT based system: JIT, VMI, and ERP system of managing inventories and techniques of forecasting demand. A descriptive design was used and a total of 60 staff from the county formed the population of interest. The study noted that all firms need to implement and embrace inventory management techniques in order to positively influence on their performance. The study noted in particular, JIT results into improved communication and relationship and lower costs hence improving efficiency.

Just-In-Time refers to a collection of practices that eliminate waste. These organization wide practices encompass the entire supply chain. The elements of JIT include shared product design with suppliers and customers, movement towards single sourcing proximate suppliers, reduced

machine set- up times and total preventive maintenance. Zhang (2018) noted that Chinese and Japanese companies employs just in time technique to strengthen relationship between supply chain network participants and thus business relationships in various Chinese firms extends beyond enterprise boundaries and seeks to organize entire business processes throughout a value chain of multiple organizational. It is an inventory strategy that is implemented to improve the return on investment of a business by reducing inventory and its associated carrying costs.

According to Hutchins (2021) also studied that the prime goal of Just In time Technique is the achievement of zero inventory, not just within the confines of a single organization but ultimately throughout the entire supply chain. It can was applied to the manufacturing process within any company as it is also being adapted within service organizations. According to Kaplan and Norton (2021) the elements of Just In time Technique include continuous improvement, eliminating the seven types of wastes among others. The widespread adoption of just-in-time (JIT) inventory principles undoubtedly makes production operations more efficient, cost effective and customer responsive. Company effectively implementing JIT principles have substantial competitive advantages over competitors that have not. The trick is figuring out how to apply JIT principles to gain competitive advantages in your specific industry and business situation. The basic premise of JIT is to have just the right amount of inventory, whether raw materials or finished goods, available to meet the demands of your production process and the demands of your end customers. No more, nor less. The closer you get to operating in a true JIT situation, the more responsive you are to your customers and the less capital you have tied up in raw materials and finished goods inventory. The less you spend to store and carry inventory, the less obsolescence you have to write off, and the better you can optimize your transportation and logistics operations. Ultimately, this all translates into saving your company real money (Silva, 2019).

According to Hay (2018), the logistics/transportation manager is tasked with getting raw materials in and finished goods out of the production process and seeks to optimize the transportation and distribution network. This manager focuses on the lowest cost and reliability of the logistics and transportation solutions. Since reliability is a requirement, lowest cost is the focus. It‘s fine if the purchasing team negotiates a delivered cost package deal with a supplier because it means lower cost, and the supplier is responsible for the reliability and performance of the carriers or transporters.

According to Likert (2018) manual perusal of the inventory levels on a daily basis is one of the ways to facilitate re-ordering under computerized system. Under this plan a printout is generated of all items in inventory and is examined by the inventory manager, who decided when and how much to order based on usage rates and expected future needs. ABC analysis and minimum and maximum meters of establishing inventory review plans are vital and they are useful for both manual and computerized systems.

Just-In-Time method of inventory management promotes making product only when necessary to fill orders, rather than making inventory in advance and storing it. This helps reduce carrying costs, which can include the interest on credit needed to build inventory. This can be a risky proposition if one part of your supply chain, such as your ability to get materials or labor, is interrupted. The firm might also have higher production and shipping costs if it waits until the last minute. This can be especially true if the firm waits to ship orders during a busy holiday season (Viana, 2018).

Under ideal conditions a company operating at just-in-time system would purchase only enough goods each day to meet that day’s needs. Moreover, the company would have no goods still in process at the end of the day, and all goods completed during the day would have been

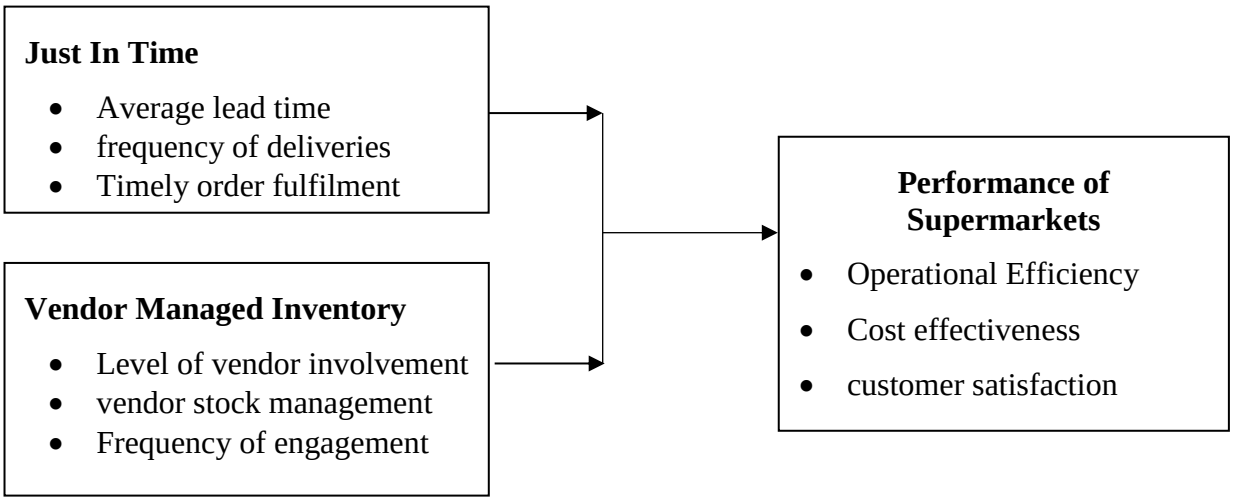
shipped immediately to customers. As this sequence suggests, "just in-time" means that raw materials are received just in time to go into production, manufacturing parts are completed just in time to be assembled into products, and products are completed just in time to be shipped to customers (Janat, 2018).

Although few companies have been able to reach this ideal, many companies have been able to reduce inventories only to a fraction of their previous level. The result has been a substantial reduction in ordering and warehousing costs, and much more efficient and effective operations. In a just in time environment, the flow of goods is controlled by a pull approach. Inventory control usually becomes one of the problems that bother small business managers. According to Adam (2018), inventory classification systems help allocate time and money in inventory management and allow firms to deal with multiple product lines and multitude of stock-keeping units (SKU) (Westbrook, 2019).

Under just in time system you don't produce anything, anywhere, for anybody unless they ask for it somewhere downstream (Bertolini, 2019). The just in time system can be contrasted to the push approach used in conventional manufacturing system (Bruce, 2018). In conventional system, when a workstation completes its work, the partially completed goods are pushed forward to the next work station regardless of whether that workstation is ready to receive them. The result is an unintentional stockpiling of partially completed goods that may not be completed for days or even weeks. This ties up funds and also results in operating inefficiencies. For one thing, it becomes very difficult to keep track of where everything is when so much is scattered all over the factory floor (Rizza, 2018).

CONCEPTUAL FRAMEWORK

The study proposed a framework that diagrammatically represent influence of inventory management practices which is composed vender managed inventory and J.I.T Inventory Management as independent variables and performance as dependent variable.



RESEARCH METHODOLOGY

Aggarwal and Ranganathan, (2019) define a research design as the systematic collection of data in a standard way from a population that can be identified. This study adopted a descriptive survey design with mixed approaches. The design was deemed appropriate because the study aims at describing inventory management practices and performance and to get in-depth analysis of by using both qualitative and quantitative methods. According to Orodho (2005),

descriptive Survey research designs are used in preliminary and explanatory studies to allow research to gather information, summarize and interpret for the purpose of clarification. It was therefore suitable for this study. This study design was also adopted because it is used in determining and reporting the way things are without any form of manipulation (Gay, 2006).

Sekaran and Bougie (2019), define population as all the fundamentals that rally the basis for inclusion in a study. According to Stratton (2021) a population frame is an objective list of the population from which the researcher can make his or her selection. In this study, the target population 58 supermarkets operating in North Rift region (Maina, 2024).

A sampling frame is a complete list or database representing the full population from which a sample is chosen for a research study. This frame includes all possible participants or elements eligible for selection (Stratton, 2021). By organizing individuals, households, organizations, or units, the frame provides a structured basis for sampling, helping researchers select a representative sample. Ensuring that the sampling frame is precise, current, and inclusive of all relevant units is essential to obtaining a truly representative sample, which in turn supports the validity and reliability of the study's findings for the target population. In the present study, the sampling frame was derived from respective lists of supermarkets in different towns in North Rift region deriving a total of 58 supermarkets.

Kombo and Tromp (2006) describe a sample as a collection of units chosen from the universe to represent it. It is therefore important to determine an appropriate sample size (Orodho & Kombo, 2002). In the present study due to the limited number of target population, a census approach was adopted. This entailed including the entire population in the study. The unit of analysis for the study was therefore all the 58 supermarkets listed.. The unit of observation was done through purposive sampling of 4 employees drawn the heads of procurement department, heads of stores departments, heads of IT departments and heads of accounting and Finance in these supermarkets. Each of these departments plays a critical role in the inventory management process, making them valuable sources of information for this study. The study focused on managerial staff because they are directly responsible for implementing and overseeing inventory management practices within supermarkets. Managers in procurement, supply chain, and store operations play a crucial role in decision-making regarding stock levels, replenishment strategies, and cost control.

The data was collected using structured questionnaires. Questionnaires were well-situated for this study because they are simple and can be conveniently administered to the study sample. The questions were designed in Likert scale form as they will require respondents to respond to a series of statements by indicating the degree to which they agree or disagree to the statements. According to Willits, Theodori and Luloff (2016), the Likert scale is more preferable in quantitative research since it is straight forward to comprehend. The Five- Point Likert scale questionnaires were appropriate for this study because it is a proven scale for social studies research and at the same time it uses a universal method to collect data thus easy to draw conclusion especially when working with quantitative data. The five-points ranged from strongly agree, agree, undecided, disagree and strongly disagree from 5 to 1 in that order.

A pilot study was conducted to evaluate the feasibility of the main study and assess the reliability and validity of the research instrument. It involved 23 respondents, representing 10% of the sample, from supermarkets in Kisumu, Kenya, aligning with the recommended threshold. Reliability was tested using Cronbach's Alpha, with a threshold of 0.7 set as the minimum acceptable value. Validity was assessed in three forms: content, construct, and face validity. Content validity was ensured through expert review and the Content Validity Index

(CVI), incorporating suggestions to refine clarity, structure, and relevance. Construct validity was addressed by aligning questionnaire sections with study objectives and conducting Confirmatory Factor Analysis (CFA), using a minimum factor loading threshold of 0.55. Face validity involved expert evaluation of item relevance and clarity, leading to further refinements. This comprehensive approach ensured the instrument's accuracy, clarity, and alignment with the study's conceptual framework and objectives.

The process of data analysis began with data cleaning done to check for missing values, none responses and non-conformities. The resulting cleaned questionnaires were then coded and fed into the SPSS version 27 software for screening and analysis. Quantitative data was analysed using descriptive statistical techniques; frequencies and percentages, means and standard deviations whereas inferential statistics included correlation and multiple regression analysis to help determine the relationship between the dependent and independent variables.

Multiple Regression Analysis was used to determine the influence of inventory management practices on performance. The regression model will be in the form:

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

Where Y represents organization performance

X_1 = Vendor Managed Inventory

X_2= Just in Time

β_0 = the intercept

ε = error term

RESEARCH FINDINGS AND DISCUSSIONS

Response Rate

Questionnaires were distributed to 232 respondents, out of which 186 were completed and returned, resulting in a response rate of 80.17%. Meanwhile, 46 questionnaires were not returned, accounting for 19.83% non-response. The response rate of 80.17% is considered very good according to Sekaran (2010), who states that a response rate above 70% is classified as very good. This high response rate facilitated the collection of sufficient data to draw conclusions applicable to the entire population.

Descriptive findings on vendor Managed Inventory

The study also sought to establish the adoption of vendor managed inventory practices and their effect on performance of supermarkets. Consequently, statements were posed to the respondents with a 5 likert scale. The respondents were requested to indicate their level of agreement ranging from 5 strongly agree to 1 strongly disagree. The responses are summarized in table 2.

Table 2: Descriptive Statistics for vendor managed inventory practices

Statement	Mean	SD
The supermarket currently engages in Vendor Managed Inventory (VMI) practices with any of its suppliers	4.640	.481
VMI has impacted on my supermarket's inventory turnover and reduction of excess stock	4.565	.863
Adoption of VMI has influenced my supermarket's ability to maintain optimal stock levels and meet customer demand	4.591	.731
Adoption of VMI has improved cash flow management and working capital utilization of my supermarket	4.468	.913

I consider VMI a strategic advantage for my supermarket in terms of financial outcomes	4.457	.877
Vendor Managed Inventory (VMI) implementation has led to a reduction in stockouts and improved customer satisfaction	4.629	.776
Supplier relationships and performance have been positively impacted by VMI implementation.	4.425	.790
VMI has streamlined inventory management processes within the organization.	4.220	1.294

The analysis of descriptive statistics for Vendor Managed Inventory (VMI) practices indicated that supermarkets in the North Rift region largely embraced VMI with strong positive outcomes. The highest agreement was on the current engagement in VMI practices with suppliers, with a mean score of 4.640 and a low standard deviation (SD = 0.481), suggesting consistent adoption. Respondents reported that VMI led to a reduction in stockouts and improved customer satisfaction (mean = 4.629, SD = 0.776), as well as enhanced inventory turnover and reduced excess stock (mean = 4.565, SD = 0.863).

VMI was also seen to support optimal stock levels and customer demand fulfillment (mean = 4.591, SD = 0.731). Its implementation reportedly improved cash flow and utilization of working capital (mean = 4.468, SD = 0.913) and was perceived as a strategic financial advantage (mean = 4.457, SD = 0.877). Supplier relationships and performance were also positively affected (mean = 4.425, SD = 0.790). Although VMI was generally seen as streamlining inventory processes, this item had the lowest mean (4.220) and the highest variability (SD = 1.294), indicating mixed experiences. Overall, the results suggested that VMI had a significant and mostly consistent positive influence on supermarket operations and performance.

The findings are in line with existing literature. For instance, Kwateng, Fokuoh & Tetteh (2022) carried out a study on the relationship between vendor managed inventory and operational performance. The scholars asserted that for the supply chain to be responsive in the age of globalization, the firms need to adopt strategies to enable them to meet the changing market needs. Thus, it is essential to adopt automatic replenishment programmes such as vendor-managed inventory (VMI). On their study on viable supply chain with vendor-managed inventory approach by considering block chain, risk and robustness, Lotfi, Rajabzadeh, Zamani and Rajabi, (2022) embedded Block chain Technology (BCT) to improve SC agility. They found significant improvement in performance due to adoption of VMI. For manufacturers, it is suggested that running a VMI system for a retailer provides the opportunity to develop a much closer and hopefully more binding relationship with the retailer as well as giving much better visibility of real demand.

Descriptive findings on Just in Time inventory

The study sought to establish the adoption of JIT inventory management practices and their effect on performance of supermarkets. Consequently, statements were posed to the respondents with a 5 likert scale. The respondents were requested to indicate their level of agreement ranging from 5 strongly agree to 1 strongly disagree. The responses are summarized in table 3 ~~below~~.

Table 3: Descriptive statistics for Just in time inventory management practices

Statement	Mean	SD
My supermarket practices Just-In-Time inventory management to reduce inventory levels	4.522	.501
Implementation of JIT inventory management has improved inventory turnover and reduced excess stock	4.258	1.129
JIT inventory management has improved my supermarket 's ability to respond to fluctuating customer demands and seasonal variations	4.446	.882
My supermarket minimizes potential risks associated with JIT inventory management to ensure continued financial stability	4.220	1.172
I consider JIT inventory management a strategic advantage for my supermarket in terms of financial outcomes	4.344	.992
JIT has optimized inventory levels, leading to reduced waste and improved cost-efficiency.	4.349	.959
JIT Inventory Management has transformed the supermarket's service delivery, making them more agile and responsive.	4.232	1.140
Implementation of JIT has streamlined production processes, resulting in faster throughput times	4.317	1.168

The descriptive statistics for Just-in-Time (JIT) inventory management practices revealed that supermarkets in the North Rift region generally adopted JIT principles with favorable outcomes. The highest agreement was observed in the statement that supermarkets practiced JIT to reduce inventory levels (mean = 4.522, SD = 0.501), indicating widespread and consistent implementation. Respondents noted that JIT improved their ability to respond to fluctuating customer demands and seasonal variations (mean = 4.446, SD = 0.882), and that it optimized inventory levels by reducing waste and enhancing cost-efficiency (mean = 4.349, SD = 0.959). The implementation of JIT was perceived as a strategic financial advantage (mean = 4.344, SD = 0.992), with several supermarkets reporting improvements in service delivery and responsiveness (mean = 4.232, SD = 1.140). Faster throughput times as a result of streamlined production processes were also acknowledged (mean = 4.317, SD = 1.168). However, managing risks associated with JIT to ensure financial stability scored slightly lower (mean = 4.220, SD = 1.172), suggesting varying experiences among supermarkets.

Although JIT practices were linked to improved inventory turnover and reduced excess stock (mean = 4.258, SD = 1.129), the higher standard deviations indicated that the benefits were not uniformly realized. Overall, JIT contributed positively to operational efficiency and responsiveness.

The findings support the existing literature. Upadhye, Deshmukh, Garg and Sharma (2021) looked at just-in-time, the issues in its implementation in India. The study focused on Corrugated Packaging Industries. The study revealed that JIT has positive influence on performance of the firm. Chaudhari and Patel (2018) conducted a study to determine the implementation of JIT in a manufacturing concern. This was an empirical review that was achieved by reviewing relevant material and literature on JIT. From the findings, it was established that JIT is one of the widely acknowledged and recognized systems and philosophies of enhancing manufacturing excellence. Filippini and Forza (2018) sought to determine how JIT system impacts on performance using a case of Indian firms. This was an empirical study and it documented positive relationship between JIT as a system of inventory management and performance of the firm.

CORRELATION ANALYSIS

Table 4 presents the correlation matrix of the study variables, illustrating the relationships between independent variables and performance. According to Bryman and Bell (2015), correlation analysis is a valuable tool for examining the relationships between variables and identifying multicollinearity. If correlation values are far from 1 or -1, it indicates that the variables are sufficiently distinct and not multicollinear (Tabachnick & Fidell, 2019). Additionally, correlation coefficients measure the strength and direction of linear relationships between variables, enabling researchers to interpret the nature of these associations (Creswell & Creswell, 2018). The Pearson Product-Moment Correlation, which ranges from -1 to +1, was used in this study to determine the relationships among the variables.

Table 4: Correlation analysis

		Vendor Managed Inventory	Just in Time	Performance
Vendor Managed Inventory	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	186		
Just in Time	Pearson Correlation	.329**	1	
	Sig. (2-tailed)	.000		
	N	186	186	
	Sig. (2-tailed)	.000	.000	
	N	186	186	
Performance	Pearson Correlation	.344**	.488**	1
	Sig. (2-tailed)	.001	.000	
	N	186	186	186

Vendor Managed Inventory (VMI) also showed a significant positive correlation with performance ($r = .344$, $p < .001$). This finding suggests that VMI contributes to improved performance by fostering strong supplier relationships and reducing the risk of stockouts. VMI allows supermarkets to align inventory management responsibilities with suppliers, leading to better efficiency and cost savings. The moderate strength of this relationship implies that while VMI is impactful, it may need to be supplemented by other practices for optimal results.

Just-In-Time (JIT) inventory management emerged as the strongest predictor of performance, with a significant positive correlation ($r = .488$, $p < .001$). This indicates that JIT practices, which focus on reducing waste and maintaining lean inventory levels, have a significant influence on enhancing organizational performance. The strong relationship underscores the importance of timely procurement and the ability to respond to fluctuating customer demands, as these factors contribute directly to cost-efficiency and customer satisfaction. JIT's strong impact may reflect its alignment with modern efficiency-driven operational strategies.

REGRESSION ANALYSIS

A multiple linear regression was conducted in order to determine the influence VMI and JIT on the performance of supermarkets in North-Rift Region of Kenya. The regression was done using the ordinary least squares method. The results of the regression analysis are presented on tables 5, 6 and 7 below.

The model summary in Table 5 below indicates that the regression model effectively explains the relationship between the independent variables (VMI and JIT) and the performance of supermarkets. The R-value of 0.780 demonstrates a strong positive correlation, while the R Square value of 0.609 indicates that 60.9% of the variation in supermarket performance is explained by the inventory management practices. The remaining variation can be explained by other variables not addressed in the study.

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.780[a]	.609	.605	.606

a. Predictors: (Constant), VMI, JIT

The ANOVA results in Table 6 assess the overall significance of the regression model. The F-statistic of 142.568 is highly significant ($p < 0.05$), confirming that the combined effect of VMI and JIT practices on performance is statistically significant. This implies that the predictors collectively have a strong and meaningful influence on the dependent variable, validating the model's effectiveness.

Table 6: ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	104.701	2	52.351	142.568	.000[b]
	Residual	67.197	183	.367		
	Total	171.898	185			

a. Dependent Variable: Performance

b. Predictors: (Constant), VMI, JIT

Finally, Table 7 below shows the regression coefficients. All the independent variables are regressed against the dependent variable.

Table 7: regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.367	1.316		4.079	.000
	VMI	1.856	.144	.637	12.886	.000
	JIT	2.104	.159	.703	13.224	.000

a. Dependent Variable: Performance of Supermarkets

The resulting table 7 above gives the results for the regression coefficient for the multiple linear equation model used; All coefficients are statistically significant at $p = 0.000$, indicating that VMI and JIT independently and collectively have a meaningful impact on supermarket performance. The positive coefficients further affirm that all variables contribute positively to

performance. The coefficient for VMI is 1.856, showing that a unit increase in VMI implementation leads to a 1.856-unit improvement in performance, assuming other variables remain constant. The coefficient for JIT is 2.104, indicating that a unit increase in JIT practices results in a 2.104-unit increase in supermarket performance. JIT's strong contribution underscores its ability to reduce excess inventory and improve operational efficiency by aligning production with demand.

CONCLUSION

Effective inventory management is critical for enhancing organizational performance, particularly in retail environments such as supermarkets. By employing structured inventory practices, organizations can minimize operational inefficiencies, reduce costs, and enhance customer satisfaction. This study sought to explore the relationship between inventory management practices and the performance of supermarkets, specifically focusing on Vendor Managed Inventory (VMI) and Just-In-Time (JIT) inventory management practices. Regarding Vendor Managed Inventory practices, the findings revealed a significant positive relationship between VMI and performance. VMI enables supermarkets to streamline supplier relationships, reduce stockouts, and maintain optimal inventory levels. These benefits translate into enhanced efficiency and cost savings, emphasizing the value of collaborative inventory management approaches in driving performance improvements. The second objective focused on the adoption of Just-In-Time inventory practices and their effect on performance. JIT demonstrated the strongest positive correlation with performance. This finding highlights the significant role JIT plays in reducing waste, improving responsiveness to customer demands, and enhancing cost-efficiency. Supermarkets adopting JIT can better manage fluctuating demands and seasonal variations, making it a highly impactful inventory management strategy.

RECOMMENDATIONS

Supermarkets are encouraged to strengthen partnerships with suppliers to fully adopt VMI practices. By sharing inventory and sales data with suppliers, supermarkets can reduce stockouts and improve supply chain efficiency. Training programs for both internal staff and suppliers should be implemented to ensure a seamless transition to VMI, fostering long-term relationships and mutual benefits.

Moreover, given the strong positive correlation between JIT and performance, supermarkets should prioritize the adoption of JIT practices to enhance cost-efficiency and responsiveness to customer demand. This involves developing reliable supply chain networks and improving communication with suppliers to ensure timely delivery of goods. To mitigate the risks associated with JIT, such as stockouts due to supply disruptions, supermarkets should establish contingency plans and maintain minimal buffer stock for critical items.

REFERENCES

Abedrabboh, K., Pilz, M., Al-Fagih, Z., Al-Fagih, O. S., Nebel, J. C., & Al-Fagih, L. (2021). Game theory to enhance stock management of personal protective equipment (PPE) during the COVID-19 outbreak. *PLOS ONE, 16*(2), e0246110.

Achieng, J. B. O., Paul, S. N., & Mbura, L. K. (2018). Influence of inventory management practices on performance of retail outlets in Nairobi City County. *International Academic Journal of Procurement and Supply Chain Management, 3*(1), 18–43.

Ahmad, K., & Zabri, S. M. (2016). Inventory management practices among Malaysian micro retailing enterprises. *Journal of Business and Retail Management Research, 11*(1).

Ahmad, K., & Zabri, S. M. (2018). The mediating effect of knowledge of inventory management in the relationship between inventory management practices and performance: The case of micro retailing enterprises. *Journal of Business and Retail Management Research, 12*(2).

Anglano, C., Canonico, M., Castagno, P., Guazzone, M., & Sereno, M. (2020). Profit-aware coalition formation in fog computing providers: A game-theoretic approach. *Concurrency and Computation: Practice and Experience, 32*(21), e5220.

Asana, I. M. D. P., Radhitya, M. L., Widiartha, K. K., Santika, P. P., & Wiguna, I. K. A. G. (2020, February). Inventory control using ABC and min-max analysis on retail management information system. In *Journal of Physics: Conference Series* (Vol. 1469, No. 1, p. 012097). IOP Publishing.

Asempapa, C. E. (2022). Post Pandemic Recovery: A Reflection of Online Shopping Behaviour of Ghanaian Residents.

Atnafu, D., & Balda, A. (2018). The impact of inventory management practice on firms' competitiveness and organizational performance: Empirical evidence from micro and small enterprises in Ethiopia. *Cogent Business & Management*, *5*(1), 1503219.

Brigham, E. F., & Ehrhardt, M. C. (2015). *Financial management: Theory & practice* (15th ed.). Cengage Learning.

Chebet, E., & Kitheka, S. (2019). Effects of inventory management system on firm performance – an empirical study. *International Journal of Innovative Science and Research Technology, 4*(9), 34–242.

de Martini, F. (2021). Supply chains and disruptive events: An inventory management system perspective.

DE, S. K., & Mahata, G. C. (2019). A comprehensive study of an economic order quantity model under fuzzy monsoon demand. *Sādhanā*, *44*(4), 89.

Esrar, H., Zolfagharinia, H., & Yu, H. (2022). Inventory management practices at a big-box retailer: A case study. *Benchmarking: An International Journal, 30*(7), 2458–2485.

Goshime, Y., Kitaw, D., & Jilcha, K. (2019). Lean manufacturing as a vehicle for improving productivity and customer satisfaction: A literature review on metals and engineering industries. *International Journal of Lean Six Sigma, 10*(2), 691-714.

Gujarati, D. N., & Porter, D. C. (2021). *Basic econometrics* (6th Ed.). McGraw-Hill Education.

Gupta, V., Ivanov, D., & Choi, T. M. (2021). Competitive pricing of substitute products under supply disruption. *Omega, 101*, 102279.

Gupta, V., Ivanov, D., & Choi, T. M. (2021). Competitive pricing of substitute products under supply disruption. *Omega*, *101*, 102279.

Kwateng, K. O., Fokuoh, B., & Tetteh, F. K. (2022). The relationship between vendors managed inventory and operational performance. *Modern Supply Chain Research and Applications*, *4*(3), 202–222.

Lotfi, R., Rajabzadeh, M., Zamani, A., & Rajabi, M. S. (2022). Viable supply chain with vendor-managed inventory approach by considering blockchain, risk and robustness. *Annals of Operations Research*, 1–20.

McCauley, M. (2020). Just-in-time inventory: does it fit into all supply chains?.

Micheni, F. K. (2021). *Factors Affecting The Choice Of Mobile Lending Platforms Among Small And Medium Enterprises In Tharaka Nithi County In Kenya* (Doctoral dissertation, Kca University).

Mikki, S. N., & Sharma, S. (2022). Evolution of Activity Based Costing (ABC)-A Bibliometric Analysis. *Journal of Business Thought*, 57-70.

Modares, A., Farimani, N. M., & Emroozi, V. B. (2023). A vendor-managed inventory model based on optimal retailers selection and reliability of supply chain. *Journal of Industrial and Management Optimization*, *19*(5), 3075-3106.

Muinde, M. N. (2022). *Contract management on procurement performance in public universities in Kenya* (Doctoral dissertation, JKUAT-COHRED).

Nunnaly, J. C. (1978). *Psychometric Theory* (2nd ed.). New York: Mc Graw-Hill.

Nwafor, M. E., & Onya, O. V. (2019). Road transportation service in Nigeria: Problems and prospects. *Advance Journal of Economics and Marketing Research*, *4*(3).

Obasan, K. A, (2011). Information and Communication Technology and Banks Profitability in Nigeria, Australian *Journal of Business and Management Research*, 1(4), 102-107

Onikoyi, I. A., Babafemi, E. A., Ojo, S. O. L. O. M. O. N., & Aje, C. O. (2017). Effect of Inventory Management Practices on Organization performance of Larfage Wapco Plc. Nigeria. *European journal of business and management*, *9*(2222-1905).

Osborne, J. W., & Waters, E. B. (2020). Four assumptions of multiple regression that researchers should always test. *Multiple Linear Regression Viewpoints*, *16*(1), 1-6.

Otero-Palencia, C., Amaya-Mier, R., Montoya-Torres, J. R., & Jaller, M. (2020). Collaborative inventory replenishment: discussions and insights of a cost-effective alternative for noncompetitive small-and medium-sized enterprises. In *Supply chain management and logistics in emerging markets* (pp. 215-234). Emerald Publishing Limited.

Panahifar, F., Byrne, P. J., Salam, M. A., & Heavey, C. (2018). Supply chain collaboration and firm's performance: The critical role of information sharing and trust. *Journal of Enterprise Information Management, 31*(3), 358–379.

Riza, M., Purba, H. H., & Mukhlisin. (2018). The implementation of economic order quantity for reducing inventory cost. *Research in Logistics & Production*, *8*(3), 207-216.

Ru, J. (2024). Retailer-vs. Vendor-managed inventory in the presence of consumer response to retail stockouts. *International Journal of Production Research*, 1-19.

Rukiya, A. M., & Kibet, Y. (2019). Effect of inventory management on customer satisfaction in public institutions of higher learning in Kenya. *International Academic Journal of Procurement and Supply Chain Management*, *3*(1), 198-216.

Upadhye, N., Deshmukh, S. G., Garg, D., & Sharma, S. (2021). Just-in-time issues in implementation in India: A study on corrugated packaging industries. *International Journal of Supply Chain Management*, *10*(4), 88–99.

Williamson, O. E. (1991). Comparative economic organization: The analysis of discrete structural alternatives. *Administrative Science Quarterly*, *36*(2), 269–296.

Yang, J., Xie, H., Yu, G., & Liu, M. (2021). Achieving a just–in–time supply chain: The role of supply chain intelligence. *International journal of production economics*, *231*, 107878.

Yang, K., Tu, J., & Chen, T. (2019). Homoscedasticity: An overlooked critical assumption for linear regression. *General psychiatry*, *32*(5).

Ye, Y., Suleiman, M. A., & Huo, B. (2022). Impact of just-in-time (JIT) on supply chain disruption risk: the moderating role of supply chain centralization. *Industrial Management & Data Systems*, *122*(7), 1665-1685.

Yedida C. K., and Ulkhaq, M. M., (2017). Perencanaan Kebutuhan Persediaan Material Bahan Baku Pada CV Endhigra Prima dengan Metode Min-Max Ind Eng Online J.