ASSESSMENT OF PROCUREMENT STRATEGIES IN SUPPLY CHAIN PERFORMANCE OF PHARMACEUTICAL ORGANIZATIONS IN KENYA

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MASTER OF BUSINESS ADMINISTRATION IN PROCUREMENT AND SUPPLIES MANAGEMENT

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DECLARATION

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

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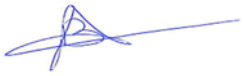
Signature:  Date: 24/10/2025

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ABSTRACT

The performance of the healthcare supply chain is critical in ensuring the availability, affordability, and accessibility of essential medicines and medical supplies. An efficient healthcare supply chain minimizes stockouts, reduces procurement costs, and enhances service delivery in healthcare facilities. The study examined the procurement strategies in supply chain performance of pharmaceutical organizations in Kenya. The study specific objectives were; centralized procurement strategy, supplier selection strategy, just-in-time strategy, and e-procurement strategy. The study was anchored on transaction cost theory, resource-based view theory, systems theory, and innovation diffusion theory, the study adopts a descriptive research design. The target population comprised registered pharmaceutical organizations in Kenya, with a census sampling technique applied to a sample of 65 employees. Data was collected using closed-ended questionnaires through a drop-and-pick method. Analysis was conducted using descriptive and inferential statistical methods, with findings presented in tables and graphs to provide clear insights into procurement strategies and their impact on supply chain performance. The study findings show that centralized procurement improves supply chain performance by creating uniform standards, reducing duplication, and ensuring better quality control of medical supplies. Supplier selection was also found to be vital, with compliance to regulations, reliability, and timely delivery emerging as key factors in enhancing efficiency and patient safety. Just-in-Time strategy further contributed by minimizing wastage, reducing lead times, and ensuring timely availability of essential medicines. E-procurement strengthened transparency and accountability while improving order tracking and efficiency, though its effectiveness depended on adequate training and technical support. The study concluded that centralized procurement is the most influential strategy, driving efficiency, cost savings, and quality improvements through uniform standards, economies of scale, and better forecasting. Supplier selection was also found to be essential, as reliable and compliant suppliers enhance product quality, patient safety, and overall operational efficiency. Just-in-Time procurement strengthened responsiveness by reducing lead times, minimizing wastage, and ensuring timely medicine availability, though its success relies on dependable supplier networks. E-procurement further improved compliance, transparency, and monitoring, making it a key strategy for modernizing and strengthening pharmaceutical supply chains in Kenya. The study recommended that pharmaceutical organizations in Kenya strengthen centralized procurement by adopting uniform contracts, pooling demand, and improving monitoring to ensure efficiency, cost savings, and reliability. It further advised enhancing supplier selection through stricter vetting, performance-based contracts, and collaboration with regulators to improve quality and timely delivery. The adoption of Just-in-Time systems was also recommended, supported by real-time inventory tools, flexible delivery schedules, and staff training to minimize wastage and improve responsiveness. Expanding e-procurement use with better integration, staff support, and automated compliance checks was highlighted as a key step toward greater transparency, accountability, and timely medicine supply.

Keywords: Centralized Procurement Strategy, E-Procurement Strategy, Just-in-Time Strategy, Performance of HSC, Supplier Selection Strategy

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DEDICATION

This research project report is dedicated to my parents, siblings, and lastly, my fellow students.

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ABBREVIATIONS AND ACRONYMMS

DEMATEL:	Decision Making Trial and Evaluation Laboratory
HSC:	Performance of Healthcare Supply Chain
IDT:	Innovation Diffusion Theory
JIC:	Just-In-Case
JIT:	Just-In-Time
KEMSA:	Kenya Medical Supplies Agency
LARG:	Lean, Agile, Resilience, and Green
RBV:	Resource-Based View
SWARA:	Stepwise Weight Assessment Ratio Analysis
TCT:	Transaction Cost Theory
TOPSIS:	Technique for Order Preference by Similarity to Ideal Solution
TQM:	Total Quality Management
USAID:	United States Agency for International Development
WASPAS:	Weighted Aggregated Sum Product Assessment

OPERATIONAL DEFINITION OF TERMS

Centralized Procurement Strategy: A pharmaceutical procurement approach where purchasing is centrally managed to improve supply chain efficiency. It affects the performance of the healthcare supply chain through contract standardization, centralized sourcing, and demand aggregation, which enhance cost savings and reduce stockouts in Kenya (Owich & Odero, 2023).

E-Procurement Strategy: The use of digital procurement systems to enhance efficiency and transparency in pharmaceutical procurement. It affects healthcare supply chain performance through system usability, compliance tracking, and order visibility, ensuring faster and more accurate procurement processes in Kenya (Vishwakarma, et al.2023).

Just-in-Time Strategy: A procurement method that reduces excess inventory while ensuring timely availability of pharmaceuticals. It impacts healthcare supply chain performance by improving stock turnover, order accuracy, and lead time, leading to cost efficiency and reduced wastage in Kenya (Mwai, et al. 2023).

Performance of HSC: The overall effectiveness of pharmaceutical procurement strategies in ensuring timely and

	reliable drug supply in Kenya. It is evaluated through delivery timeliness, supplier reliability, and process efficiency, which determine the responsiveness and sustainability of the healthcare supply chain care (Johnson, et al. 2021).
Supplier Selection Strategy:	The process of choosing pharmaceutical suppliers based on delivery reliability, regulatory compliance, and technical capability. This strategy influences healthcare supply chain performance by ensuring the availability of quality medicines, minimizing delays, and maintaining regulatory standards in Kenya (Jia, et al. 2025).

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The performance of the healthcare supply chain is critical in ensuring the timely availability of medical supplies, equipment, and pharmaceuticals to healthcare facilities, directly impacting patient care and operational efficiency. A well-optimized supply chain enhances service delivery by reducing lead times, minimizing stockouts, and ensuring cost-effective procurement and distribution. Key performance indicators such as inventory turnover, order accuracy, supplier reliability, and compliance with regulatory standards play a crucial role in measuring its effectiveness (Vishwakarma, et al.2023).

Globally, healthcare supply chains face significant challenges, including inefficiencies in procurement, inventory management, and distribution, which contribute to stockouts, wastage, and delays in delivering essential medical supplies (Owich & Odero, 2023). High-income countries have leveraged advanced supply chain technologies such as artificial intelligence, blockchain, and predictive analytics to enhance efficiency, reduce costs, and ensure seamless logistics (Schneller, et al. 2023). In contrast, many low- and middle-income countries struggle with fragmented supply chain networks, inadequate infrastructure, and weak regulatory frameworks, leading to inconsistent availability of essential medicines and medical equipment (Jia, et al. 2025). These disparities highlight the need for tailored solutions that address both structural and technological barriers to optimizing healthcare supply chains globally.

In recent years, global health crises, such as the COVID-19 pandemic, have exposed vulnerabilities in healthcare supply chains, disrupting the production and distribution of medical supplies and underscoring the need for more resilient systems (Dzwigol, 2022). The pandemic

accelerated the adoption of digital supply chain solutions, such as real-time tracking and automated demand forecasting, which have proven effective in improving responsiveness and efficiency (Sriyanto, et al. 2022). However, persistent challenges, including counterfeit medicines, procurement corruption, and supply chain disruptions due to geopolitical tensions, continue to affect performance, particularly in developing regions (Spieske, et al. 2022).

The performance of the healthcare supply chain across Africa remains a critical issue, with many countries facing persistent challenges related to inefficiencies in procurement, distribution, and inventory management. In nations such as Nigeria and South Africa, disruptions in supply chain operations have led to frequent stockouts of essential medicines, vaccines, and medical equipment, negatively affecting healthcare service delivery (Lugada, et al. 2022). Limited infrastructure, weak regulatory enforcement, and overreliance on donor-funded supply chains further exacerbate inefficiencies, making healthcare systems vulnerable to external shocks (Asamoah, et al. 2023). For instance, in Ghana, despite the introduction of an integrated logistics management information system to enhance visibility in pharmaceutical supply chains, challenges such as poor data accuracy and inadequate storage facilities continue to hinder performance.

Across the continent, several initiatives have been introduced to improve healthcare supply chain performance, but their implementation remains inconsistent. Rwanda, for example, has successfully leveraged drone technology for medical deliveries, reducing lead times and enhancing supply chain responsiveness in remote areas (Lugada, et al. 2022). Similarly, in Uganda, the adoption of private-sector supply chain models, such as the Joint Medical Store, has improved medicine availability through centralized procurement and efficient inventory management systems.

In Kenya, the performance of the healthcare supply chain is pivotal to the effective delivery of medical services. The Kenya Medical Supplies Agency (KEMSA), established in 2000, is the primary body responsible for the procurement, storage, and distribution of medical commodities to public health facilities nationwide. Despite its foundational role, KEMSA has faced challenges, including allegations of mismanagement and inefficiencies, which have occasionally led to stockouts of essential medicines and medical supplies, adversely affecting patient care (Johnson, et al. 2021).

Efforts to enhance the healthcare supply chain have been implemented, such as the USAID Global Health Supply Chain Program, which provides technical assistance to improve commodity security and supply chain performance. This initiative emphasizes strengthening the Ministry of Health's leadership in supply chain management and enhancing systems for logistics data sharing between KEMSA and county health departments. Additionally, innovative solutions like drone deliveries have been introduced; for instance, Zipline International began operations in 2022, utilizing drones to distribute medical supplies to remote areas, thereby reducing delivery times and improving access to essential health commodities (Mwai, et al. 2023). Despite these advancements, challenges such as political interference, inadequate infrastructure, and limited adoption of digital tracking systems persist, necessitating continued reforms and investments to achieve a resilient and efficient healthcare supply chain in Kenya (Sinnei, et al. 2023).

1.1.1 Procurement Strategies

Pharmaceutical procurement strategies play a crucial role in ensuring the availability, affordability, and quality of medical supplies within healthcare systems. Effective procurement strategies streamline the acquisition of essential medicines and medical products, reducing costs while improving efficiency and accessibility. Among the key procurement approaches are centralized

procurement, supplier selection, just-in-time (JIT) procurement, and e-procurement, each designed to optimize supply chain performance. Centralized procurement involves consolidating purchasing decisions under a single authority, typically a government agency or a national procurement body, to achieve economies of scale and negotiate better pricing with suppliers (Asif, 2022). Supplier selection, on the other hand, focuses on evaluating and choosing reliable suppliers based on criteria such as quality assurance, cost efficiency, and delivery reliability to minimize risks associated with stockouts and substandard medical products (Lagana, & Colapinto, (2022).

Just-in-time procurement and e-procurement strategies have also gained prominence in pharmaceutical supply chains due to their efficiency-enhancing capabilities. JIT procurement ensures that medical supplies are acquired and delivered only when needed, reducing storage costs and minimizing the risk of drug expiration (Mwai, et al. 2023). However, this strategy requires a highly responsive supply chain to avoid shortages. E-procurement, which leverages digital platforms to facilitate procurement transactions, enhances transparency, speeds up purchasing processes, and improves accountability in pharmaceutical supply (Schneller, et al. 2023). medicines and medical products are procured efficiently, cost-effectively, and in compliance with regulatory requirements.

1.1.2 Healthcare Supply Chain Performance

Pharmaceutical procurement strategies play a critical role in enhancing the performance of the healthcare supply chain by ensuring the timely availability of essential medicines while optimizing costs and quality. According to Asif, (2022) the key strategy is centralized procurement, where purchasing decisions are consolidated at a national or regional level to leverage economies of scale, negotiate better pricing, and standardize quality requirements. This approach minimizes inefficiencies caused by fragmented procurement and enhances supply chain resilience by

reducing the risk of stockouts. Additionally, strategic sourcing, which involves evaluating suppliers based on reliability, cost-effectiveness, and compliance with regulatory standards, helps healthcare institutions secure high-quality pharmaceuticals at competitive prices (Lagana & Colapinto, 2022).

The essential procurement strategy is framework contracting, which establishes long-term agreements with suppliers to ensure consistent supply and predictable pricing. By reducing the need for frequent bidding processes, framework contracts improve procurement efficiency, shorten lead times, and enable healthcare providers to respond swiftly to demand fluctuations. Furthermore, adopting e-procurement systems enhances transparency and accountability by digitizing supplier selection, contract management, and order processing. These digital platforms help mitigate corruption risks, minimize procurement delays, and ensure compliance with regulatory guidelines, ultimately strengthening the overall efficiency of the healthcare supply chain (Salil, et al. 2024).

Effective pharmaceutical procurement strategies directly impact healthcare supply chain performance by improving service delivery, cost efficiency, and patient outcomes. A well-structured procurement system reduces wastage, ensures optimal inventory levels, and enhances the availability of essential medicines, thereby minimizing disruptions in healthcare services. Additionally, procurement strategies that incorporate demand forecasting and supplier relationship management contribute to supply chain agility, allowing healthcare institutions to adapt to changing needs, such as during disease outbreaks or emergencies (Schneller, et al. 2023).

1.1.3 Pharmaceutical Organizations in Kenya

The healthcare supply chain in Kenya faces significant challenges that impede its performance, particularly in the procurement and distribution of pharmaceuticals. A critical issue is the frequent

shortage of essential medicines in public health facilities. Johnson, et al. (2021) have shown that public hospitals in Kenya have an average availability of only 60.5% for tracer essential medicines, with 17.4% on order and 22.1% never ordered. This indicates a substantial gap in the supply chain, leading to stockouts and delayed treatments for patients (Asamoah, et al. 2023). The time taken to procure and deliver these medicines is often prolonged due to bureaucratic procurement processes and delays in funding disbursement, further exacerbating the problem (Mwai, et al. 2023).

Cost inefficiencies also plague the pharmaceutical supply chain in Kenya. The procurement process is often marred by financial constraints and inadequate inventory management practices. A study focusing on pharmaceutical firms in Nairobi City County revealed that approximately 40% of these firms reported inadequate inventory management, leading to stockouts and lost sales opportunities. Additionally, about 30% of the firms indicated that regulatory compliance issues negatively impacted their operational efficiency, increasing operational costs and affecting the overall performance of the supply chain (Salil, et al. 2024).

Quality assurance remains a pressing concern within Kenya's healthcare supply chain. The lack of autonomy in procuring commodities and equipment at the county level has been identified as a barrier to delivering quality health services. Counties often face delays in disbursing funds to health facilities, affecting the timely procurement of medical supplies and compromising service delivery. Furthermore, rigid procurement policies and lengthy processes hinder the acquisition of necessary pharmaceuticals and medical equipment, leading to compromised healthcare quality and unmet objectives in patient care (Mwai, et al. 2023).

1.1.4 Pharmaceutical Organizations in Kenya

Pharmaceutical organizations in Kenya play a crucial role in ensuring the availability, affordability, and quality of medicines across the country. These organizations include government

agencies, multinational corporations, local manufacturers, and distributors. KEMSA is the key government agency responsible for procuring and distributing pharmaceutical products to public health facilities. However, KEMSA has faced challenges such as inefficiencies in procurement, corruption scandals, and delays in drug deliveries, affecting healthcare service delivery (Johnson, et al. 2021).

Local pharmaceutical manufacturers also play a significant role in Kenya's healthcare system by producing a variety of generic medicines to meet local demand. Companies such as Universal Corporation, Dawa Limited, and Cosmos Limited manufacture essential medicines at a lower cost compared to imported alternatives. Sinnei, et al. (2023) argues local production of pharmaceuticals is supported by government initiatives such as the Kenya Vision 2030 plan, which aims to enhance domestic manufacturing capacity. However, the sector faces challenges, including high production costs, reliance on imported raw materials, and regulatory hurdles that limit competitiveness. Despite these obstacles, the growth of local pharmaceutical firms is essential for reducing dependency on imports and improving access to affordable medicines (Owich & Odero, 2023).

Pharmaceutical distributors and retailers ensure that medicines reach both urban and rural populations across Kenya. Major pharmaceutical distribution companies like Surgipharm, Phillips Pharmaceuticals, and Lab & Allied play a key role in supplying medicines to hospitals, pharmacies, and clinics. Retail pharmacies, including chains such as Goodlife Pharmacy and Haltons Pharmacy, have expanded their presence, improving access to quality medicines and healthcare services (Mwai, et al. 2023).

1.2 Statement of the Problem

The performance of the healthcare supply chain is critical in ensuring the availability, affordability, and accessibility of essential medicines and medical supplies. An efficient healthcare supply chain minimizes stockouts, reduces procurement costs, and enhances service delivery in healthcare facilities (Johnson, et al. 2021). In Kenya, the healthcare supply chain plays a vital role in public health outcomes, as disruptions can lead to delays in treatment, increased mortality rates, and higher operational costs for healthcare providers. Effective supply chain performance is measured using key indicators such as order fulfilment rates, reduced lead times, procurement efficiency, cost-effectiveness, and supplier reliability. A well-functioning healthcare supply chain ensures that medical facilities receive the right products in the right quantities and at the right time, reducing wastage and improving patient care.

However, Kenya's healthcare supply chain continues to experience significant performance challenges, leading to frequent medicine stockout, delayed procurement processes, and high stockout rates. According to the Sinnei, et al. (2023) stockout rates in public healthcare facilities averaged 29%, with some essential medicines experiencing delays of up to three months. Additionally, a study by the Salil, et al. (2024) revealed that procurement inefficiencies and poor supplier management contribute to wastage, with an estimated KES 2 billion worth of expired medicines recorded in public hospitals annually. Owich and Odero, (2023) also highlighted that long procurement lead times and lack of transparency in supplier selection significantly hinder the efficiency of the supply chain. These issues result in patients facing difficulties accessing critical medicines, ultimately affecting healthcare delivery in Kenya.

Several studies have examined the impact of procurement strategies on supply chain performance in Kenya's pharmaceutical sector. Agoro (2022) analyzed the influence of global

standards implementation on the performance of public health procurement agencies but did not specifically examine the role of pharmaceutical procurement strategies in improving supply chain efficiency. Kiriinya (2021) focused on supply chain relationship management practices in pharmaceutical firms but did not address how procurement strategies such as centralized procurement or e-procurement influence healthcare supply chain performance. Polong (2022) studied the effects of electronic procurement on the operational performance of pharmaceutical manufacturing firms, yet his research did not assess the broader impact of pharmaceutical procurement strategies on the overall performance of the healthcare supply chain. While these studies provide valuable insights into procurement and supply chain management, none have comprehensively analyzed the effect of procurement strategies on supply chain performance of pharmaceutical organizations in Kenya This study seeks to fill this gap by examining how centralized procurement, supplier selection, just-in-time procurement, and e-procurement strategies influence the efficiency, cost-effectiveness, and reliability of Kenya's healthcare supply chain.

1.3 General Objective of the Study

The main objective of the study was be to assess the effect of procurement strategies on supply chain performance of pharmaceutical organizations in Kenya.

1.3.1 Specific objective of the Study

i. To examine the effect of centralized procurement strategy on supply chain performance of pharmaceutical organizations in Kenya.
ii. To determine the effect of supplier selection procurement strategy on supply chain performance of pharmaceutical organizations in Kenya.

iii. To investigate the effect of just-in-time procurement strategy on supply chain performance of pharmaceutical organizations in Kenya.

iv. To assess the effect of e-procurement strategy on supply chain performance of pharmaceutical organizations in Kenya.

1.4 Research Questions

i. What is the effect of a centralized procurement strategy on the supply chain performance of pharmaceutical organizations in Kenya?

ii. How does the supplier selection procurement strategy affect the supply chain performance of pharmaceutical organizations in Kenya?

iii. What is the effect of the just-in-time procurement strategy on the supply chain performance of pharmaceutical organizations in Kenya?

iv. How does the e-procurement strategy influence the supply chain performance of pharmaceutical organizations in Kenya?

1.5 Significance of the Study

1.5.1 Pharmaceutical Organizations

This study is crucial for pharmaceutical organizations as it provides insights into how procurement strategies affect the performance of the healthcare supply chain in Kenya. By examining strategies such as centralized procurement, supplier selection, just-in-time and e-procurement strategies, the study enables pharmaceutical firms to enhance efficiency, minimize costs, and ensure a steady supply of essential medicines. Improved procurement strategies will also help organizations mitigate risks related to stockouts, supplier unreliability, and regulatory non-compliance.

1.5.2 Policy Makers

For policy makers, particularly the Pharmacy and Poisons Board of Kenya, this study offers data-driven recommendations for strengthening regulatory frameworks governing pharmaceutical procurement. The study identifies challenges in procurement processes and suggests policies to enhance transparency, supplier accountability, and quality assurance in the pharmaceutical supply chain. By analyzing the impact of procurement strategies on healthcare supply chain performance, policymakers can develop guidelines that improve access to essential medicines, reduce procurement-related inefficiencies, and promote ethical practices among suppliers and distributors. The findings also support efforts in curbing counterfeit drugs and ensuring that procurement processes align with national healthcare policies and global best practices.

1.5.3 Future Academicians

Future scholars can use this research as a foundation for further studies on procurement optimization, supply chain sustainability, and the role of technology in pharmaceutical logistics. Additionally, the findings help bridge knowledge gaps in supply chain management and procurement efficiency, offering insights for comparative studies across different healthcare systems.

1.6 The scope of the Study

The scope of the study was assessing of procurement strategies on supply chain performance of pharmaceutical organizations in Kenya. the study was limited to; centralized procurement, supplier selection, just-in-time and e-procurement strategies as independent variables. The target population was procurement, sales, finance/accounts, logistics/transport and marketing staff pharmaceutical organization in Kenya. the study was from January to September 2025.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter examined the different gaps in the research, provides a summary of the literature that has been studied, and then illustrates the conceptual framework for the study.

2.2 Theoretical Framework

The study was guided by transaction cost theory, resource-based view, systems theory, and innovation diffusion theory. Transaction cost theory explains how firms reduce costs and risks in procurement, while the resource-based view stresses the role of internal resources in building advantage. Systems theory shows the supply chain as an interconnected whole, and innovation diffusion theory explains how new practices and technologies are adopted. Together, they provide a strong framework for analyzing procurement strategies and supply chain performance.

2.2.1 Transaction Cost Theory

The Transaction Cost Theory (TCT) was developed by Ronald Coase in 1937. Coase introduced the concept to explain why firms exist and how they determine their boundaries (Shahab, 2021). In 1980s Oliver Williamson expanded on Coase's ideas, providing a more structured framework for understanding transaction costs in economic and organizational decision-making (Cuypers et al., 2021). Williamson's work emphasized the role of opportunism, bounded rationality, and asset specificity in shaping firm structures. Over time, TCT has evolved, influencing various fields such as economics, management, and organizational theory. The theory remains a foundational perspective in strategic decision-making, particularly in assessing the efficiency of markets versus hierarchies in governing economic transactions.

At its core, TCT examines the costs associated with economic exchanges, including search and information costs, bargaining and decision costs, and enforcement costs. The theory posits that firms organize transactions in ways that minimize these costs, either through market mechanisms or hierarchical governance structures. When transaction costs are high, firms internalize activities by vertically integrating processes, whereas when costs are low, market transactions are preferable (Nagle et al., 2024). The framework highlights the significance of uncertainty, asset specificity, frequency of transactions, and opportunism in determining the most efficient governance structure. It is widely applied in fields such as outsourcing, supply chain management, and inter-firm collaborations, helping organizations determine when to buy from the market or produce in-house (Cuypers et al., 2021).

Despite its widespread influence, TCT has been criticized on several grounds. Nagle et al., (2024) argue that its static nature, which does not adequately consider the dynamic evolution of firms and markets over time. Also, Shahab, (2021) argue that the theory oversimplifies human behavior, assuming that firms are solely driven by efficiency rather than other strategic factors like innovation, competitive advantage, or institutional pressures. Additionally, TCT has been challenged for its limited applicability in the digital economy, where advancements in technology and digital platforms have significantly reduced certain transaction costs. However, rather than negating TCT's relevance, these advancements modify its application by shifting the focus from traditional cost minimization to factors such as data security, platform governance, and contractual complexities in digital transactions. (Nagle et al. 2024). In response to these critiques, scholars have sought to integrate behavioral insights, technological advancements, and institutional factors into the theory, expanding its relevance beyond traditional economic transactions. Recent updates

emphasize the role of digital platforms, AI-driven decision-making, and blockchain technology in minimizing transaction costs and reshaping firm boundaries (Nagle et al. 2024).

The study explored how centralizing procurement can reduce transaction costs related to supplier negotiations, contract enforcement, and information asymmetry. By consolidating procurement under a single entity, the healthcare sector is expected to achieve economies of scale, streamline supplier relationships, and enhance cost efficiency. Centralization also improves transparency in purchasing decisions by minimizing duplication and curbing opportunities for corruption. In addition, it strengthens bargaining power with suppliers, which can lead to better pricing, improved delivery terms, and more consistent quality of medical supplies. This unified approach ultimately supports better allocation of resources and contributes to a more reliable healthcare supply chain.

2.2.2 Resource-Based View Theory

The Resource-Based View (RBV) theory was developed by Jay Barney in 1991, building upon earlier works by scholars such as Edith Penrose in 1959 and Wernerfelt in 1984 Barney, Ketchen Jr., & Wright (2021). Barney (1991) formalized the RBV by emphasizing how firms could achieve a competitive edge by leveraging their unique resources. By shifting the focus to firm-specific capabilities and resources, the RBV introduced a new paradigm for strategic management, arguing that organizations could sustain superior performance by developing valuable, rare, inimitable, and non-substitutable resources Davis & DeWitt, (2021).

The RBV posits that firms achieve competitive advantage by acquiring and effectively utilizing internal resources that competitors cannot easily replicate. These resources include tangible assets like proprietary technology, brand reputation, and skilled human capital, as well as intangible elements such as organizational culture and tacit knowledge Barney, et al. (2021). The

valuable, rare, inimitable, and non-substitutable framework underscores that resources must be valuable to create efficiency or differentiation, rare to limit competition, inimitable to prevent easy duplication, and non-substitutable to avoid redundancy. Unlike external market theories that prioritize industry dynamics, RBV suggests that firms must continuously invest in resource development to maintain long-term competitiveness (Davis & DeWitt, 2021). However, the theory has been adapted over time to incorporate factors such as dynamic capabilities, which highlight how firms must continuously reconfigure their resource base to remain competitive in rapidly changing markets (Nayak, et al., 2022).

The Resource-Based View (RBV) theory is relevant to this study as it explains how organizations can achieve and sustain a competitive advantage by effectively utilizing internal resources; however, it has several limitations when applied to the current context. The theory's static nature makes it less effective in explaining how firms continually develop and adapt their resources to maintain efficiency and performance in dynamic environments. In relation to this study, which focuses on optimizing human resource efficiency through electronic human resource (E-HR) tools, the RBV may overlook how technological advancements and changing workforce demands require constant capability renewal (Davis & DeWitt, 2021). Additionally, the RBV's inward-looking focus tends to ignore external factors such as technological change, competition, and regulatory influences that directly affect the adoption and performance of E-HR systems (Nayak et al., 2022). While the theory highlights the importance of valuable, rare, inimitable, and non-substitutable resources such as skilled employees and organizational knowledge, it does not fully capture how digital transformation reshapes these resources and their contribution to efficiency. Therefore, integrating RBV with dynamic capabilities and stakeholder perspectives provides a more comprehensive understanding of how organizations can leverage E-HR tools to

enhance human resource efficiency and maintain sustainable competitive advantage (Barney, Ketchen, & Wright, 2021).

Despite its significant contributions, RBV has faced various critiques. One of the primary criticisms is its static nature, as the original RBV framework does not adequately explain how firms develop, transform, or lose their competitive advantages over time. This limitation has led to the emergence of the dynamic capability's perspective, which extends RBV by emphasizing the importance of continuous resource renewal and adaptation to external changes (Davis & DeWitt, 2021). Additionally, RBV has been criticized for its vague definitions of what constitutes a "resource" and its lack of empirical testability. The theory's inward-looking approach has also been challenged for underestimating the role of external environmental factors, such as industry structure and competitive forces, in shaping firm success (Nayak, Bhattacharyya, & Krishnamoorthy, 2022). Porter's Five Forces framework highlights the significance of competitive pressures including the threat of new entrants, bargaining power of suppliers and buyers, industry rivalry, and the threat of substitutes in determining firm performance. To address these limitations, scholars have proposed integrating RBV with Industrial Organization (IO) theory and stakeholder perspectives, offering a more holistic understanding of how firms achieve and sustain competitive advantage (Barney, Ketchen & Wright, 2021).

In this study, the researcher applied the RBV theory to examine how supplier selection in pharmaceutical procurement strategy will affect the healthcare supply chain in Kenya. The study investigated how strategic supplier selection can act as a valuable and rare resource that enhances supply chain efficiency and service delivery in the healthcare sector. Since supplier relationships in pharmaceutical procurement are crucial for ensuring timely access to essential medicines, the researcher assessed how procurement strategies that prioritize quality, reliability, and cost-

effectiveness contribute to competitive advantage in the healthcare supply chain. In addition, the study highlighted that strong supplier partnerships help reduce risks of stock-outs, foster innovation through knowledge sharing, and build long-term resilience against market disruptions. Aligning supplier capabilities with organizational goals, procurement decisions become not only a cost-saving tool but also a strategic asset that strengthens overall health outcomes.

2.2.3 Systems Theory

Systems Theory was first conceptualized by Ludwig von Bertalanffy in the 1940s (Markovsky & Dörfler, 2021). He developed it as a critique of reductionist approaches that examined components in isolation, instead emphasizing a holistic perspective where interdependent parts interact within a larger system. The theory introduced concepts such as feedback loops, homeostasis, and adaptability, which highlight that systems are dynamic, self-regulating, and oriented toward maintaining balance. Over the years, it has been applied across diverse fields, including biology, where it explains organisms as integrated wholes; engineering, where it supports the design of interlinked processes; and management and social sciences, where it provides a framework for analyzing organizations and societies as networks of interconnected units (Cody & Beling, 2023). Its interdisciplinary relevance lies in its ability to address complexity and interdependence, making it a foundational approach for understanding how systems evolve, interact, and adapt within changing environments.

At its core, systems theory examines how various components within a system interact and influence each other to maintain stability and achieve objectives. The theory posits that a system comprises interrelated parts that function as a whole, and any disturbance to one part affects the entire system (Becvar, et al. 2023). It emphasizes feedback loops, equilibrium, and adaptation, asserting that systems must continuously adjust to external and internal stimuli to remain

functional. Open systems interact with their environment by exchanging energy, information, and resources, whereas closed systems are self-contained with limited external interaction. The adaptability of systems makes the theory particularly relevant for complex environments, including healthcare, business management, and technological innovation. Moreover, Systems Theory highlights the interdependence of subsystems, illustrating how decisions in one area can impact overall system performance.

In the context of supply chain management, "precise predictive capabilities" refer to the ability to forecast demand fluctuations, optimize inventory levels, and anticipate disruptions with high accuracy. Cody and Beling, (2023) argue that Systems Theory, while offering a broad framework, lacks the quantitative precision needed for such forecasts. However, advancements in artificial intelligence and machine learning have strengthened the theory's applicability by enabling real-time data analysis and adaptive decision-making (Markovsky & Dorfler, 2021). For example, AI-driven predictive analytics in supply chains can assess market trends, weather patterns, and geopolitical risks to optimize logistics and inventory planning. This integration enhances the theory's capacity to model dynamic supply chain interactions, making it more effective in addressing complex, real-world challenges.

Although Systems Theory provides a valuable framework for understanding interdependence and coordination within the healthcare supply chain, it has several limitations when applied to this study. The theory's broad and abstract nature makes it difficult to operationalize or measure specific system variables, limiting its predictive and analytical precision (Cody & Beling, 2023). In the context of JIT pharmaceutical procurement, Systems Theory effectively highlights relationships among suppliers, healthcare facilities, and regulators but does not fully account for external uncertainties such as political instability, sudden demand surges, or

global supply disruptions that can destabilize the system (Markovsky & Dörfler, 2021). Moreover, its emphasis on equilibrium and feedback may overlook the nonlinear and often unpredictable dynamics of real-world healthcare systems. Therefore, while Systems Theory helps explain systemic interconnections and the need for adaptability, its explanatory power can be strengthened when integrated with more data-driven and context-specific models such as risk management or contingency theories.

In this study, the researcher applied systems theory to analyse the effects of JIT pharmaceutical procurement strategies on the healthcare supply chain in Kenya. The study explored how different components of the supply chain, including suppliers, healthcare facilities, and regulatory bodies, interact as part of a larger system. It assessed how the JIT strategy influences system stability, efficiency, and responsiveness in healthcare procurement. The findings emphasized that while JIT reduces holding costs and minimizes wastage of perishable drugs, it also makes the system more sensitive to disruptions such as supplier delays or regulatory bottlenecks. Viewing procurement through a systems lens, the study underscored the importance of coordination, information flow, and adaptability to maintain balance across all actors involved.

2.2.4 Innovation Diffusion Theory

Innovation Diffusion Theory (IDT) was first conceptualized by sociologist Everett Rogers in 1962. Rogers developed the theory to explain how new ideas, technologies, and innovations spread within societies and organizations over time (Pinho, Franco, & Mendes, 2021). Drawing from earlier research in communication, rural sociology, and anthropology, Rogers identified key elements influencing the adoption process, including the characteristics of the innovation, the communication channels used, the social system in which diffusion occurs, and the time it takes

for adoption. The theory was initially applied to agricultural practices, particularly in analyzing how farmers adopted new farming techniques (Almaiah et al., 2022).

Innovation diffusion theory explains how, why, and at what rate new ideas and technologies spread within a population. The theory categorizes adopters into five groups: innovators, early adopters, early majority, late majority, and laggards, based on their willingness and speed in adopting innovations (Kwon, et al., 2021). According to Rogers, the diffusion process depends on several factors, including relative advantage, compatibility, complexity, trialability and observability. The theory highlights the importance of communication channels in spreading innovations and emphasizes that social networks play a significant role in influencing adoption decisions. Over the years, IDT has been widely applied to areas such as technology adoption, marketing, and organizational change, demonstrating its relevance across multiple industries.

Despite its broad applicability, IDT has been criticized for oversimplifying the adoption process by assuming a linear progression of innovation spread. Pinho et al., (2021) argue that the model does not fully account for resistance to innovation, the role of power dynamics, or external factors such as government regulations and economic constraints. Additionally, the theory has been challenged for its emphasis on individual decision-making rather than considering collective or institutional adoption patterns. Recent advancements have also focused on applying IDT in digital transformation and artificial intelligence adoption, incorporating factors like cybersecurity concerns and data privacy regulations. These updates have strengthened the theory's relevance in contemporary innovation landscapes, ensuring its continued applicability in various domains.

In this study, the researcher explored how healthcare institutions adopt and integrate e-procurement technologies, identifying factors that influence adoption rates among different stakeholders. It assessed how the perceived advantages of e-procurement, such as cost reduction,

efficiency improvement, and transparency, drive its diffusion across Kenya's healthcare sector. The researcher also examined potential barriers to adoption, including resistance to change, infrastructure limitations, and regulatory challenges. The study further noted that successful adoption often depends on leadership support, staff training, and alignment with organizational processes. In addition, the role of government policy and donor support was highlighted as a key enabler in creating an environment where e-procurement can thrive. In considering both drivers and barriers, the study provided a balanced view of how digital procurement tools are reshaping healthcare supply chains in Kenya.

2.3 Empirical Review

2.3.1 Centralized Procurement Strategy and Supply Chain Performance of Pharmaceutical Organizations

Vogler, et al., (2022) examined centralized pharmaceutical procurement by analyzing experiences from six European countries. The study aimed to evaluate the efficiency and effectiveness of centralized procurement mechanisms in enhancing cost savings, supply security, and transparency. Using a comparative case study methodology, the authors assessed procurement structures, regulatory frameworks, and financial implications. Findings indicated that centralized procurement improves cost efficiency and supply chain resilience by leveraging bulk purchasing and standardized processes. However, challenges such as bureaucratic constraints and supplier monopolies were noted. The study did not focus on the specific impacts of procurement strategies on healthcare supply chain performance in Kenya, indicating a gap in localized application and contextual challenges.

Kong (2024) analyzed the current situation and countermeasures in China's drug supply chain under centralized procurement. The study aimed to identify key bottlenecks and propose

strategies to enhance procurement efficiency. Using a policy analysis methodology, the research examined regulatory frameworks, procurement procedures, and stakeholder interactions. The findings highlighted issues such as price reductions leading to supply shortages and increased market concentration among a few suppliers. In addition, the study observed that aggressive price bidding created financial pressure on smaller manufacturers, forcing some to exit the market and thereby reducing overall competition. This, in turn, heightened the risk of monopolistic practices and disrupted timely delivery of essential drugs. Kong also noted weaknesses in communication between procurement agencies and hospitals, which occasionally resulted in mismatches between demand forecasts and actual supply volumes. While the study provided insights into centralized procurement challenges, it lacked a direct assessment of healthcare supply chain performance, especially in a Kenyan context where procurement dynamics differ significantly.

Andersen and Kreye (2024) examined the implementation of a centralized procurement strategy with a focus on global supplier base management. The objective of their study was to explore how centralization can enhance coordination and reduce complexities in managing suppliers across different geographical locations. Using a qualitative case study methodology, the authors traced implementation steps that included supplier consolidation, standardization of procurement procedures, and alignment of purchasing policies across subsidiaries. Their findings showed that centralization improved supplier relationships, lowered transaction costs, and enhanced overall procurement efficiency. The study further revealed that consolidating suppliers allowed for stronger bargaining power, which led to more favorable contract terms and improved quality control across regions. It also highlighted that unified procurement policies reduced duplication of efforts and enabled more accurate demand forecasting, which minimized excess inventory and stockouts. Additionally, the case analysis indicated that centralized data

management provided better visibility into supplier performance, helping firms identify risks early and respond faster to disruptions. However, the study mainly addressed global manufacturing contexts, leaving a gap in understanding how such strategies translate to the supply chain performance of pharmaceutical organizations in Kenya, where issues like regulatory environments and market dynamics differ significantly.

Oloo (2021) investigated the procurement and management of pharmaceutical supplies at Siaya County Referral Hospital in Kenya. The study sought to assess procurement practices, supply chain efficiency, and challenges faced in ensuring consistent drug availability. Employing a case study approach, the research collected primary data through interviews with procurement officers and secondary data from hospital records. The findings indicated that inefficiencies in procurement planning, supplier delays, and inadequate budget allocations negatively affected supply chain performance. The study further revealed that weak contract management and inconsistent supplier evaluations contributed to frequent stock-outs of essential medicines. Limited staff capacity in procurement units also led to delayed order processing, while manual record-keeping hindered real-time tracking of inventory levels. These issues collectively resulted in prolonged lead times, emergency purchases at higher prices, and compromised patient service delivery. The study underscored the need for improved procurement strategies but did not extensively explore centralized procurement models, leaving a gap in understanding their specific impact on supply chain performance in Kenya.

Petersen et al. (2022) investigated the effect of procurement centralization on government purchasing prices through a field experiment in Denmark. The objective was to determine whether pooling procurement at a central level reduces costs for public institutions. The study used an experimental design that tested purchasing prices across agencies before and after centralization.

Results indicated that centralization led to substantial reductions in purchasing prices, demonstrating clear cost savings. The experiment further showed that centralized contracts enhanced bargaining power, simplified administrative processes, and improved compliance with procurement regulations. Agencies participating in the centralized system reported fewer duplicated purchases and achieved better standardization of goods and services. However, the study also highlighted potential drawbacks, including reduced flexibility for individual institutions and longer decision-making timelines in certain cases. Despite its robust evidence, the study concentrated on government procurement of general goods and services. This leaves a gap on how centralization affects not only pricing but also the overall supply chain performance in pharmaceutical organizations in Kenya, where procurement goes beyond cost considerations to include product quality and availability of life-saving drugs.

Ngetich (2023) explored the use of blockchain technology in the pharmaceutical supply chain in Nairobi County. The study aimed to assess the potential of blockchain in enhancing transparency, reducing fraud, and improving procurement efficiency. The research utilized a qualitative methodology, gathering data through interviews with industry experts and reviewing blockchain implementation case studies. Findings suggested that blockchain enhances traceability, reduces counterfeit risks, and improves procurement accountability. The results further indicated that the technology enabled real-time verification of supplier credentials, automated contract execution, and secure sharing of transaction data across stakeholders. Participants noted that blockchain adoption strengthened trust between suppliers and buyers by providing tamper-proof records of drug movement from manufacturers to end users. Additionally, blockchain-supported smart contracts helped shorten approval times and minimized opportunities for corruption in tendering processes. However, challenges such as high implementation costs and technological

adoption barriers were noted. The study did not directly address how centralized procurement strategies impact healthcare supply chain performance, highlighting a gap in exploring technology-driven procurement improvements in Kenya's pharmaceutical sector.

Patrucco et al. (2021) analysed how structuring procurement in local governments through centralization, standardization, and digitalization affects organizational performance. The objective was to disentangle the relative contribution of each approach to procurement outcomes. Using survey data and performance metrics from local governments in Europe, the study followed a quantitative methodology involving regression analysis to evaluate relationships between procurement strategies and performance indicators. The findings revealed that centralization and digitalization were strongly associated with efficiency improvements, while standardization enhanced transparency and accountability. However, the study's focus on European local governments limits the applicability of its conclusions to Kenya's pharmaceutical sector, where procurement challenges also involve supply chain resilience, limited budgets, and fragmented distribution systems that were not addressed in their model.

Long et al. (2022) assessed how centralized procurement policies influenced pharmaceutical prices in China. The objective of the research was to evaluate the impact of a government-led centralization policy on medicine affordability. They employed a multi-intervention interrupted time series methodology, which allowed them to measure price changes across different time points and interventions. The study found that centralized procurement significantly reduced pharmaceutical prices and curbed price fluctuations in the Chinese market. In particular, average unit prices for commonly used medicines dropped sharply within the first year of implementation, and the downward trend was sustained over subsequent monitoring periods. The policy also narrowed price differences between provinces, improving price

uniformity across regions and enhancing predictability for buyers. While this provides strong evidence of cost benefits, the study's focus was narrowly on pricing. It did not address other dimensions of supply chain performance, such as availability, lead time, or distribution efficiency, which are highly relevant for pharmaceutical organizations in Kenya.

2.3.2 Supplier Selection Procurement Strategy and Supply Chain Performance of Pharmaceutical Organizations

Modibbo et al. (2022) examined the pharmaceutical supplier selection problem using a multi-criteria decision analysis approach based on fuzzy Technique for Order Preference by Similarity to Ideal Solution (TOPSIS). The study aimed to develop a structured decision-making process for selecting suppliers by incorporating multiple evaluation criteria under uncertainty. The methodology involved defining criteria, assigning weights using fuzzy logic, and ranking suppliers based on the TOPSIS method. The findings highlighted that integrating fuzzy logic enhances supplier selection efficiency by reducing ambiguity in decision-making. The model enabled decision-makers to handle incomplete or imprecise data, which is common in pharmaceutical procurement, and produced a more objective ranking of suppliers. It also demonstrated that the approach reduced the risk of bias from subjective judgments and allowed for a clearer comparison of trade-offs between cost, quality, and reliability. However, the study did not explicitly analyze how procurement strategies impact the overall performance of the healthcare supply chain in Kenya, leaving a gap in contextual application and strategic implications for procurement efficiency.

Sheykhizadeh et al. (2024) proposed a hybrid decision-making framework incorporating lean, agile, resilience, and green (LARG) criteria for supplier selection in the pharmaceutical industry. The objective was to create a robust selection model that balances cost efficiency,

flexibility, sustainability, and risk management. The methodology involved integrating LARG criteria into a multi-criteria decision analysis framework, followed by case study validation. The study found that a hybrid approach significantly improves supplier performance and supply chain resilience. Results showed that suppliers chosen through the LARG model achieved lower lead times, better environmental compliance, and higher responsiveness to demand fluctuations compared to traditional selection methods. The framework also strengthened risk management by identifying suppliers capable of maintaining service levels during disruptions, thereby enhancing overall supply continuity. However, it did not address the specific procurement strategies that healthcare organizations in Kenya employ, nor did it assess their direct impact on supply chain performance, presenting a gap in localized strategy evaluation.

Ailus (2023) examined the effect of a successful supplier selection and purchasing strategy on organizational performance. The main objective of the study was to assess how effective supplier selection contributes to efficiency and long-term competitiveness. The methodology relied on a descriptive analysis of case data, where supplier evaluation criteria such as cost, quality, and reliability were applied step by step in identifying optimal suppliers. The findings showed that organizations with robust supplier selection frameworks achieved reduced costs, improved product quality, and minimized risks of supply disruption. The study further noted that consistent application of evaluation criteria fostered stronger supplier relationships, which in turn led to better contract compliance and on-time deliveries. Companies that maintained continuous performance monitoring of suppliers also experienced higher customer satisfaction and more stable inventory levels. However, the study largely addressed general business procurement without focusing on sector-specific challenges, leaving a gap in understanding how these strategies affect supply chain

performance in pharmaceutical organizations in Kenya, where issues like drug quality assurance and regulatory compliance are critical.

Debnath et al. (2023) explored sustainable supplier selection in healthcare supply chains using an integrated stepwise weight assessment ratio analysis (SWARA) and weighted aggregated sum product assessment (WASPAS) framework. The study aimed to enhance supplier sustainability by prioritizing environmental and social responsibility factors. The methodology involved identifying sustainability criteria, determining their weights using SWARA, and ranking suppliers using WASPAS. The findings showed that sustainability-focused supplier selection improves long-term supply chain performance by reducing environmental risks and improving supplier accountability. Suppliers that scored highly on environmental practices, waste reduction, and fair labor policies demonstrated more consistent delivery performance and stronger compliance with healthcare standards. The study further indicated that incorporating social responsibility metrics encouraged long-term partnerships and improved stakeholder confidence, which in turn supported stable supply networks. However, it did not explicitly consider pharmaceutical procurement strategies and their role in enhancing performance metrics within Kenya's healthcare supply chain, highlighting a gap in region-specific procurement effectiveness.

Vaka (2024) focused on enhancing supplier relationships through identifying critical factors in procurement supplier selection. The objective was to highlight how relationship management influences supplier performance and overall procurement effectiveness. The methodology employed a mixed-method approach combining surveys and artificial intelligence-driven analysis to identify and rank factors such as trust, communication, and technological integration in supplier partnerships. Findings revealed that supplier collaboration, transparency, and technological compatibility strongly enhanced procurement outcomes and supply stability.

The study also noted that suppliers engaged in joint planning and information sharing were more responsive to sudden demand changes and maintained higher service levels. Furthermore, technology-enabled communication platforms were found to reduce misunderstandings and shorten lead times, directly supporting more reliable deliveries. Despite these insights, the study did not address the unique procurement challenges in healthcare supply chains, creating a gap in how such relationship-based strategies influence the performance of pharmaceutical organizations in Kenya, where access, affordability, and timely delivery of medicines are central.

Goncu and Cetin (2022) developed a decision model for supplier selection in healthcare enterprises using the DEMATEL-ANP method. The study aimed to identify and prioritize critical supplier selection criteria by analyzing interdependencies between factors. The methodology involved using DEMATEL to determine relationships between criteria and ANP to establish weights and rankings. The findings revealed that quality, reliability, and regulatory compliance are the most significant factors in supplier selection. The analysis showed that regulatory compliance had the strongest influence on other criteria, indicating that meeting legal and safety standards was a prerequisite for achieving high performance in cost and delivery metrics. Additionally, the interdependency analysis highlighted that supplier reliability directly affected quality outcomes and service consistency, reinforcing the need for continuous monitoring of supplier performance. However, the study did not examine how procurement strategies influence these criteria within Kenya's healthcare supply chain, presenting a gap in understanding strategic procurement decisions in a developing country context.

Kimunya and Thogori (2023) investigated supplier selection and performance in pharmaceutical companies in Kenya. The objective was to assess the impact of supplier selection practices on organizational performance. The study utilized a quantitative survey approach,

collecting data from Kenyan pharmaceutical firms and analyzing relationships using regression analysis. The findings indicated that supplier selection significantly affects procurement efficiency and overall performance. Firms that applied structured evaluation criteria such as financial stability, delivery reliability, and product quality reported lower procurement costs, fewer stockouts, and faster order fulfillment. The analysis also revealed that firms maintaining continuous supplier performance monitoring achieved higher compliance with regulatory standards and improved customer satisfaction. However, the study did not explore how specific pharmaceutical procurement strategies such as competitive bidding, direct sourcing, or long-term partnerships affect healthcare supply chain performance, leaving a gap in the strategic assessment of procurement methods in Kenya's healthcare sector.

Dong et al. (2022) investigated procurement strategies under the condition of unreliable suppliers and correlated random yields. The study aimed to develop strategies that minimize risks when supplier outputs are uncertain. The methodology used mathematical modeling and stochastic optimization to simulate procurement decisions under varying supply reliability scenarios. Findings indicated that diversification of suppliers, dynamic order allocation, and risk-sharing contracts were effective in managing supply uncertainty. The models showed that spreading orders across multiple suppliers reduced the probability of severe shortages, while dynamic allocation allowed buyers to shift quantities in response to real-time performance data. Risk-sharing contracts, such as penalty clauses and joint inventory agreements, further stabilized supply and reduced financial exposure when yields fluctuated. While the study advanced theory on handling supplier unreliability, it was tailored to manufacturing operations. This leaves a gap in applying such models to the pharmaceutical sector in Kenya, where supplier unreliability not only impacts efficiency but also directly threatens the availability of life-saving drugs.

Aditi et al. (2023) analyzed sustainable supplier selection models, emphasizing the trade-off between supplier development and supplier switching. The objective was to design a decision-making framework that balances long-term supplier growth with the need to shift to alternative suppliers when sustainability performance is low. The methodology involved multi-criteria decision-making models using operations research techniques to evaluate suppliers against sustainability, cost, and performance indicators. Their findings showed that organizations that invested in supplier development achieved stronger long-term sustainability outcomes, including improved compliance with environmental regulations and reduced operational risks. At the same time, selective switching to higher-performing suppliers prevented performance stagnation and encouraged continuous improvement among incumbents. The study also demonstrated that balancing these two strategies led to more resilient supply chains capable of adapting to changing sustainability standards and market conditions. However, the study was framed within the broader context of sustainability in global supply chains, leaving a knowledge gap regarding how pharmaceutical organizations in Kenya can balance sustainability goals with urgent supply needs, especially given the sector's dependency on both local and international suppliers.

2.3.3 Just-In-Time Procurement Strategy and Supply Chain Performance of Pharmaceutical Organizations

Coslett (2022) examined the influence of Just-In-Time (JIT) and Just-In-Case (JIC) inventory management on supply chain disruptions in medical systems across the Southeastern United States during the COVID-19 pandemic. The study aimed to assess the effectiveness of these strategies in mitigating supply chain risks in the healthcare sector. A mixed-methods approach was employed, incorporating surveys and case studies from hospitals and pharmaceutical suppliers. The findings revealed that while JIT improved efficiency and reduced waste, it also heightened vulnerability to

supply chain disruptions. Conversely, JIC strategies enhanced resilience but increased holding costs. The study highlighted a knowledge gap in understanding how pharmaceutical procurement strategies could balance efficiency and resilience in healthcare supply chains in Kenya.

Mukula, (2023) investigated the impact of Just-In-Time purchasing strategies on the operational performance of manufacturing firms in Nairobi County, Kenya. The objective was to evaluate the extent to which JIT purchasing contributes to cost reduction, inventory efficiency, and responsiveness. Using a quantitative research design, the study collected data from procurement managers through structured questionnaires. Findings indicated that JIT positively influenced operational performance by minimizing lead times and enhancing supplier relationships. However, firms faced challenges related to supplier reliability and disruptions. The research identified a gap in the application of JIT in pharmaceutical procurement within Kenya's healthcare sector, particularly regarding how firms manage supplier risks while maintaining efficiency.

Mutua et al. (2021) studied the effects of just-in-time (JIT) procurement strategy on organizational performance in food and beverage manufacturing firms in Nairobi County, Kenya. The objective was to determine how JIT practices influence efficiency and competitiveness in manufacturing. The study adopted a descriptive research design, collecting data through questionnaires from managers and analyzing responses using regression analysis. The findings indicated that JIT procurement reduced lead times, minimized inventory costs, and enhanced productivity. The analysis further revealed that firms applying JIT experienced smoother production scheduling, fewer stock-outs, and improved supplier coordination, which collectively strengthened their market responsiveness. Additionally, JIT adoption was linked to improved cash flow due to lower working capital requirements, giving firms a competitive edge in pricing and service delivery. However, the study concentrated on the food and beverage sector, leaving a gap

on how JIT procurement strategies influence supply chain performance in pharmaceutical organizations in Kenya, where product sensitivity, strict regulation, and supply risks may alter the effectiveness of JIT systems.

Mirdad et al. (2024) explored the integration of smart contracts and marketplaces for JIT management of pharmaceutical drugs. The study aimed to assess how blockchain-enabled smart contracts could enhance the efficiency and security of pharmaceutical supply chains. A qualitative methodology was used, analyzing case studies of pharmaceutical firms leveraging blockchain for procurement. Findings suggested that smart contracts reduced delays, improved traceability, and enhanced compliance with regulatory standards. The results also showed that automated contract execution eliminated manual approval bottlenecks, while the immutable blockchain ledger provided end-to-end visibility across the supply chain. This transparency enabled faster dispute resolution and strengthened trust among suppliers and buyers. Furthermore, the study found that smart contracts lowered administrative costs by streamlining payment processes and reducing the risk of counterfeit products. Despite these advantages, challenges such as technological adoption costs and data security risks were noted. This study presents a knowledge gap in understanding the feasibility of blockchain-based procurement strategies in Kenya's pharmaceutical supply chain.

Siddiqui (2022) conducted a scoping review on the importance of JIT methodology in healthcare quality management. The study aimed to analyze how JIT improves healthcare efficiency and service delivery. A systematic literature review was conducted, synthesizing evidence from multiple healthcare systems globally. The results demonstrated that JIT reduced waste, improved resource allocation, and enhanced service quality. The review further highlighted that facilities using JIT achieved faster replenishment cycles, better utilization of storage space, and significant reductions in expired medical supplies. Moreover, JIT practices promoted closer

collaboration between hospitals and suppliers, allowing for more accurate demand forecasting and reduced operational inefficiencies. However, the analysis also emphasized that healthcare systems with weak supplier reliability were more prone to critical shortages during emergencies, revealing a trade-off between cost savings and supply chain resilience. The research did not address how JIT procurement specifically affects pharmaceutical supply chains in Kenya, leaving a gap in understanding its contextual applicability.

Heitasari et al. (2025) explored a vendor management model aimed at achieving just-in-time (JIT) procurement in material sourcing. The objective was to establish how vendor relationships and management frameworks contribute to effective JIT operations. The methodology employed a case study approach involving steps such as vendor evaluation, strategic collaboration, and continuous monitoring to align supplier capabilities with JIT requirements. The findings showed that close vendor integration, transparency, and performance-based relationships were critical to achieving timely procurement. The study further revealed that formal vendor development programs such as joint forecasting sessions, shared production schedules, and continuous feedback mechanisms enhanced supplier responsiveness and reduced lead times. Strategic partnerships with key vendors also allowed firms to negotiate flexible delivery schedules and implement early-warning systems for potential disruptions, which helped maintain a steady material flow. Nonetheless, the study focused primarily on material procurement in industrial contexts, creating a gap on how vendor management frameworks can be adapted to pharmaceutical supply chains in Kenya, where supplier diversity, regulatory requirements, and global sourcing complicate vendor coordination.

Yang et al. (2021) examined how supply chain intelligence contributes to achieving JIT supply chains. The objective was to assess the role of data-driven insights and digital tools in

ensuring timely procurement and delivery. The study applied a mixed-method design, combining empirical data analysis with supply chain modeling to demonstrate the steps through which intelligence systems improve forecasting, order management, and coordination. Findings showed that advanced analytics and digital platforms significantly improved demand prediction and reduced delays in supply chains. The integration of real-time data from suppliers, production facilities, and distribution networks enabled more accurate order planning, while predictive analytics helped identify potential disruptions before they affected operations. The study also highlighted that automated decision-support systems enhanced coordination between procurement teams and logistics partners, leading to faster response times and reduced safety stock requirements. While the study highlighted the benefits of intelligence in implementing JIT, it was set in general manufacturing contexts. This leaves a gap in how digital supply chain intelligence could be specifically applied in Kenya's pharmaceutical sector, where demand unpredictability and stock-out risks remain critical.

Balkhi et al. (2022) investigated the effectiveness of the just-in-time approach in healthcare inventory management. The objective was to determine whether JIT works in medical supply chains, particularly in healthcare facilities. The methodology adopted a case analysis of healthcare inventory systems, reviewing operational data and performance indicators before and after implementing JIT practices. The findings revealed that while JIT reduced holding costs and improved space utilization, it also exposed healthcare systems to higher risks of stock-outs, especially during demand surges or supply disruptions. The analysis showed that even minor delays in supplier deliveries could lead to critical shortages of essential medical supplies, underscoring the need for contingency planning. The study also noted that successful JIT implementation required robust supplier relationships, reliable transportation infrastructure, and

real-time inventory tracking to mitigate these risks. The study raised concerns over the feasibility of strict JIT in healthcare. However, it did not address the broader pharmaceutical supply chain in Kenya, leaving a gap on how JIT can be adapted to balance efficiency with resilience in environments facing supply uncertainty and infrastructure challenges.

Rashid, et al., (2025) examined the synergy between Total Quality Management (TQM), JIT, and Green Supply Chain Practices in enhancing environmental performance. The objective was to assess how integrating these strategies could create sustainable and efficient supply chains. The study used a comparative analysis of manufacturing and healthcare sectors, applying both qualitative and quantitative research methods. Findings showed that firms implementing a combined approach experienced improved operational efficiency and environmental sustainability. However, the study did not specifically address pharmaceutical procurement strategies, presenting a knowledge gap in how sustainability and JIT principles can be optimized in Kenya's healthcare supply chain.

2.3.4 E-Procurement Procurement Strategy and Supply Chain Performance of Pharmaceutical Organizations

Okuro and Paul (2024) investigated the impact of e-procurement practices on the performance of sourcing pharmaceutical drugs in level five public hospitals in Nairobi City County, Kenya. The study aimed to assess how e-procurement enhances efficiency, transparency, and cost reduction in public healthcare procurement. A descriptive research design was employed, incorporating both qualitative and quantitative methods, with data collected through structured questionnaires administered to procurement officers and supply chain managers in selected hospitals. The findings revealed that e-procurement significantly improves procurement efficiency by reducing lead times, enhancing supplier selection, and minimizing corruption risks. However, the study

highlighted challenges such as inadequate IT infrastructure and staff training gaps. The knowledge gap identified is the limited focus on how different pharmaceutical procurement strategies, beyond e-procurement, affect overall healthcare supply chain performance in Kenya.

Majanga (2021) examined the role of electronic reverse auctions (e-RAs) in procurement performance within multinational pharmaceutical corporations in Kenya. The study sought to determine the effectiveness of e-RAs in enhancing cost savings, supplier competition, and transparency. A case study approach was adopted, utilizing surveys and interviews with procurement professionals across multinational pharmaceutical firms operating in Kenya. The study found that e-RAs led to significant cost reductions, improved supplier engagement, and increased competitiveness. Procurement officers reported that real-time bidding created downward pressure on prices while maintaining acceptable quality levels, and the transparency of the bidding process fostered stronger trust among stakeholders. The research also highlighted that e-RAs encouraged a wider supplier base to participate, increasing market diversity and driving innovation in service delivery. However, the study also noted that the adoption of e-RAs was hindered by supplier resistance, limited technological adoption, and concerns over quality compromises. The knowledge gap lies in understanding how pharmaceutical procurement strategies beyond e-RAs, such as strategic sourcing and framework contracting, contribute to healthcare supply chain efficiency.

Koggalage et al. (2022) explored the implementation of e-procurement in the pharmaceutical sector from the perspective of staff at the State Pharmaceuticals Corporation of Sri Lanka. The study aimed to assess the benefits, challenges, and effectiveness of e-procurement in streamlining pharmaceutical supply chain management. A mixed-methods approach was used, involving surveys and in-depth interviews with procurement officers, IT specialists, and supply

chain managers. The results indicated that e-procurement enhanced transparency, reduced procurement cycle times, and minimized manual errors. Respondents noted faster processing of purchase orders and improved tracking of supplier performance, which collectively reduced stock-out risks and administrative overheads. The system also strengthened regulatory compliance by creating clear audit trails and reducing opportunities for fraud. However, the study found that limited interoperability between e-procurement systems and regulatory frameworks posed challenges. The knowledge gap identified is the lack of insights on how different procurement strategies, such as bulk purchasing and supplier partnerships, affect the performance of the healthcare supply chain in Kenya.

Saha et al. (2022) examined e-procurement as an emerging tool for pharmaceutical supply chain management, with a focus on how digital procurement solutions influence efficiency and cost-effectiveness. The study employed a case study methodology, analysing data from various public and private healthcare institutions implementing e-procurement. The findings indicated that e-procurement significantly improved procurement speed, supplier compliance, and cost-effectiveness. The research further revealed that automated tendering reduced paperwork, shortened approval cycles, and provided real-time price comparisons that improved decision-making accuracy. Additionally, supplier compliance rates increased due to automated reminders and performance tracking features embedded in the e-procurement platforms. However, challenges such as cybersecurity risks and resistance to change among procurement staff were noted. The knowledge gap identified is the need for a broader examination of pharmaceutical procurement strategies beyond e-procurement, such as centralized procurement and performance-based contracting, in enhancing healthcare supply chain performance in Kenya.

Paul, et al. (2024) analysed procurement in healthcare with a focus on ensuring efficiency and compliance in managing medical supplies and equipment. The study aimed to explore procurement strategies that enhance operational efficiency and regulatory compliance in healthcare procurement. A qualitative research design was utilized, involving document analysis and key informant interviews with procurement and regulatory professionals. The findings highlighted that procurement efficiency is highly dependent on supplier evaluation, regulatory adherence, and technological adoption. The study also pointed out challenges such as bureaucratic inefficiencies and regulatory inconsistencies. The knowledge gap lies in understanding how procurement strategies tailored to Kenya's healthcare supply chain, such as localized supplier development and value-based procurement, can enhance performance outcomes.

Maina (2023) studied e-procurement strategies and their effect on sustainable procurement performance in telecommunication companies in Kenya. The objective of the research was to determine how the adoption of e-procurement influences sustainability outcomes such as cost efficiency, transparency, and accountability. The study adopted a descriptive research design, collecting data through structured questionnaires and analyzing it using both descriptive and inferential statistics. The findings showed that e-procurement strategies enhanced operational efficiency, reduced corruption risks, and improved supplier engagement, leading to better sustainability performance. Respondents reported measurable reductions in procurement cycle times, lower administrative costs, and higher accuracy in supplier evaluation. The study also found that e-procurement platforms increased accountability by creating verifiable audit trails and real-time monitoring, which helped curb fraudulent activities and strengthened compliance with corporate governance standards. However, the study was limited to the telecommunication sector, leaving a gap on how e-procurement strategies contribute to supply chain performance in

pharmaceutical organizations in Kenya, where procurement also affects medicine availability, affordability, and regulatory compliance.

Jama, Mwanza, and Mwanaumo (2023) investigated strategies for e-procurement adoption by small and medium-sized enterprises in South Sudan. The main objective was to identify the enablers and barriers influencing adoption in resource-constrained environments. The methodology employed a qualitative research design, relying on interviews and thematic analysis to capture SMEs' experiences and strategies for adoption. Findings indicated that cost reduction, improved efficiency, and competitive advantage were key drivers of e-procurement, while challenges included inadequate infrastructure, limited digital skills, and resistance to change. The study further revealed that firms that invested in staff training and partnered with technology providers experienced smoother implementation and faster returns on investment. In addition, government incentives and supportive policies were found to play a critical role in accelerating adoption among SMEs. While the study provided valuable insights into e-procurement adoption in developing contexts, it focused on SMEs rather than larger and more complex sectors like pharmaceuticals in Kenya, leaving a gap in understanding how similar adoption challenges might impact critical healthcare supply chains.

Aulia and Isvara (2021) analyzed strategies to increase procurement maturity levels using the procurement maturity model as a framework to improve procurement performance. The objective was to demonstrate how organizations can transition from basic to advanced levels of procurement capability. The methodology involved a case study approach applying the procurement maturity model step by step, from initial assessment to capability development and implementation of performance-enhancing strategies. Findings revealed that advancing procurement maturity improved cost control, efficiency, and supplier collaboration. However, the

study concentrated on general organizational procurement practices without examining industries with high-stakes procurement like pharmaceuticals. This creates a gap on how maturity models could be applied to strengthen procurement strategies and improve supply chain performance in Kenya's pharmaceutical sector, where procurement maturity directly affects medicine quality, supply reliability, and patient outcomes.

2.4 Conceptual Framework

The conceptual framework links pharmaceutical procurement strategies (centralized procurement, supplier selection, just-in-time and e-procurement strategies) to healthcare supply chain performance. It examines how factors like supplier selection, procurement planning, and contract management affect cost efficiency, lead time, and medicine availability.

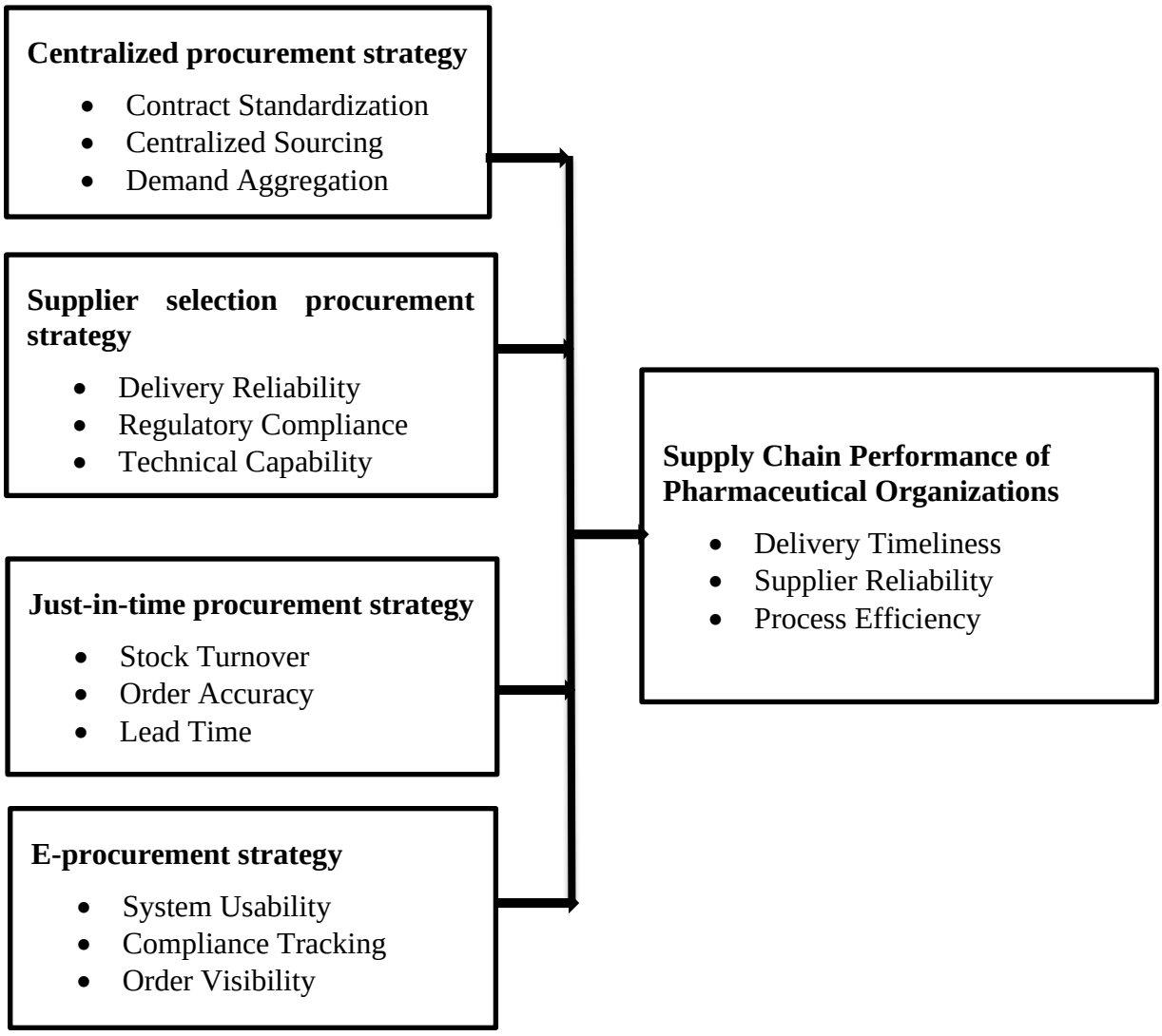

FIGURE 2.1:

Conceptual Framework

2.5 Operationalization of Variables

This study focuses exclusively on employing quantitative analysis to operationalize the key variables in table 2.1

TABLE 2.1:

Operationalization of Variables

Objectives	Indicators	Tools of Analysis	Scale Of Measurement
To examine the effect of centralized pharmaceutical procurement strategy on in enhancing healthcare supply chain performance in Kenya.	• Contract Standardization • Centralized Sourcing • Demand Aggregation	Descriptive analysis	Ordinal measure on a scale
To determine the effect of supplier selection pharmaceutical procurement strategy in enhancing healthcare supply chain performance in Kenya.	• Delivery Reliability • Regulatory Compliance • Technical Capability	Descriptive analysis	Ordinal measure on a scale
To investigate the effect of just-in-time pharmaceutical procurement strategy in enhancing healthcare supply chain performance in Kenya.	• Stock Turnover • Order Accuracy • Lead Time	Descriptive analysis	Ordinal measure on a scale
To assess the effect of e-procurement pharmaceutical strategy in enhancing healthcare supply chain performance in Kenya.	• System Usability • Compliance Tracking • Order Visibility	Descriptive analysis	Ordinal measure on a scale
Healthcare supply chain performance	• Delivery Timeliness • Supplier Reliability • Process Efficiency	Descriptive analysis	Ordinal measure on a scale

CHAPTER THREE.

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presented the research methodology, including the study design, population, sampling techniques, data collection methods, and data analysis procedures. The study's population was outlined, along with the sample and sampling techniques. Additionally, it provided descriptions of the sample procedures, research tools employed, data collection strategies, and data analysis.

3.2 Research Design

This study adopted a descriptive research design to examine pharmaceutical procurement strategies and their impact on healthcare supply chain performance in Kenya. The descriptive research design was appropriate as it allows for a detailed investigation of the existing procurement strategies and their influence on operational efficiency and service delivery (Hazari, 2024). This design enabled the researcher to capture the views of multiple stakeholders in a structured manner, providing insights into patterns, relationships, and variations in procurement practices across healthcare institutions. A quantitative approach was used to enhance the objectivity and reliability of the study findings, as it allowed for the use of numerical data, statistical analysis, and measurable indicators of supply chain performance. This approach also facilitated hypothesis testing, comparison of results across different facilities, and generalization of findings to a wider population (Creswell & Creswell, 2018). Consequently, the chosen design and methodology provided a robust framework for assessing how procurement strategies affect efficiency, cost-effectiveness, and the timely delivery of essential medicines in the Kenyan healthcare system.

3.3 Target Population

The particular group of people or entities that a researcher plans to examine or extrapolate findings from in a research project is known as the target population (Mishra and Alok, 2022). Based on specific traits pertinent to the goals of the study, this group had been identified. According to the 2025 pharmacy and poisons board of Kenya database, there were 13 registered pharmaceutical organizations in Kenya (Appendix II). Thus, the study targeted procurement, sales, finance/accounts, logistics/transport, and marketing staff in these pharmaceutical organizations. The distribution of the target population was outlined in the table below

TABLE 3.1:

Target Population

Type of Staff	**Number**
Procurement Staff	13
Sales Staff	13
Finance/Accounts Staff	13
Logistics/Transport Staff	13
Marketing Staff	15
Total	**65**

Source: **Pharmacy and Poisons Board of Kenya database 2025**

3.4 Sampling and Sampling Procedure

Sampling is a crucial process in research that involves selecting a representative subset of individuals from the target population. The choice of an appropriate sampling technique ensures that the collected data is reliable, unbiased, and reflective of the study population (Susilawati, et al. 2025).

The study employed a census sampling technique, meaning that all 65 employees within the identified pharmaceutical organizations were included in the study. Census sampling is particularly suitable when dealing with relatively small populations, as it eliminates sampling bias and ensures that the study captures comprehensive insights from all relevant stakeholders (Dzwigol, 2022). Including all targeted respondents ensures comprehensive insights into procurement strategies and supply chain performance, eliminating potential sampling bias. If any respondents were unavailable or decline to participate, follow-up efforts such as email reminders and phone calls was used to maximize response rates. This approach enhanced the reliability of the study by ensuring that the maximum number of intended participants provide their input.

3.5 Research Instrumentation

This study used structured questionnaires as the primary data collection instrument. A questionnaire was structured set of standardized questions designed within a predetermined framework to collect data from individuals or specific groups/strata. It is widely used due to its efficiency, cost-effectiveness, and ability to gather large volumes of complex and sensitive information within a short period. The study emploed closed-ended questionnaires, particularly Likert scale-based questions, where respondents were asked to express their opinions on a five-point scale (1 to 5). To enhance clarity and ease of response, the questionnaire was divided into multiple sections. Section A collected demographic information, such as experience, and job designation. Section B to E focused on procurement strategies independent variables, while Section F assessed key supply chain performance indicators. This approach allowed for more structured and detailed responses, facilitating a deeper analysis of complex issues.

3.6 Pilot Test

The pilot study was conducted with professionals in the pharmaceutical sector who were not part of the final sample to identify any issues with the questionnaire (Dzwigol, 2022). A pilot test was conducted with approximately 8 respondents, representing at least 10% of the sample population. The objectives of the pilot test was to evaluate the clarity of the questionnaire, identify any redundant or ambiguous questions, assess the time required for completion, and ensure that respondents can easily understand the questions. Based on the feedback from the pilot study, necessary adjustments were made to improve the quality and reliability of the data collection tool.

3.6.1 Validity of Data Collection Instrument

Validity refers to the extent to which the data collection instrument measures what it is intended to measure (Firdaus, et al. 2021). To ensure validity, the study assessed content validity, face validity, and construct validity. Content validity was ensured by having experts in procurement and supply chain management review the questionnaire for relevance and completeness. Face validity was assessed by conducting a pre-test to determine whether respondents find the questions logical and relevant. Construct validity was tested using statistical methods such as factor analysis to confirm that the questionnaire items align with the theoretical constructs of procurement strategies and supply chain performance (Mishra and Alok, 2022).

3.6.2 Reliability of Data Collection Instrument

Reliability refers to the consistency and stability of the data collection instrument (Mishra & Alok, 2022). The Cronbach's Alpha Coefficient was used to measure the internal consistency of the questionnaire. A Cronbach's Alpha value of 0.7 or higher indicated that the instrument was

sufficiently reliable. If the reliability score falls below this threshold, necessary adjustments were made to improve the consistency of the questions.

3.7 Data Collection

The researcher obtained a research authorization letter from KCA University and apply for a research permit from the National Commission for Science, Technology, and Innovation (NACOSTI). The researcher employed a two-step data collection approach. The quantitative data (primary data) was gathered through questionnaires, using the drop-and-pick method. This method involved distributing the questionnaires to different departments within 13 registered pharmaceutical organization in Kenya as attached in appendix II, within 2 working weeks to collect the completed forms. This approach allowed for a convenient and efficient way to gather responses while accommodating the respondents' schedules.

3.8 Data Analysis and Presentation

The study utilized both descriptive and inferential statistical methods to comprehensively analyze the research variables. Descriptive statistics, such as frequencies, percentages, means, and standard deviations, was used to summarize demographic data and provide an overview of employee retention practices (Firdaus, et al. 2021). To analyze the relationship between pharmaceutical procurement strategies and healthcare supply chain performance in Kenya, a multiple linear regression model was applied. Data analysis was conducted using Statistical Package for the Social Sciences (SPSS) Version 20.0. The findings were visually represented through tables and graphs to enhance clarity and ease of interpretation.

The regression model was specified as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \beta_4 X_4 + \varepsilon$$

Where:

$Y =$ Supply chain performance of pharmaceutical organizations

β_0 =Constant (coefficient of intercept)

$X_1 =$ Centralized procurement strategy

$X_2 =$ Supplier selection procurement strategy

$X_3 =$ Just-in-time procurement strategy

$X_4 =$ E-procurement strategy

$\beta_1, \beta_2, \beta_3, \beta_4,$: Regression coefficients

ε =represents the error term

3.9 Diagnostic Tests

To ensure the quality, accuracy, and reliability of data analysis, various diagnostic tests will be conducted. These tests assessed whether the dataset meets the necessary assumptions for statistical analysis, thereby enhancing the credibility and validity of the study's findings (Mishra & Alok, 2022).

3.9.1 Linearity Test

The study assessed the linearity assumption using scatterplots and the Pearson correlation coefficient. Scatterplots were used to visually examine the relationship between independent and dependent variables, while the Pearson correlation coefficient quantified the degree of association between them. The test ensured that the variables exhibited a proportional relationship, which is essential for regression analysis (Dzwigol, 2022). If significant deviations from linearity were

detected, appropriate transformations or alternative analytical approaches were considered. In addition, the study emphasized that failure to meet linearity assumptions could lead to biased regression estimates, making this test critical in validating model accuracy.

3.9.2 Multicollinearity Test

Multicollinearity was assessed using Variance Inflation Factor (VIF) and Tolerance values. A VIF above 10 or Tolerance below 0.1 indicated a multicollinearity concern (Firdaus et al., 2021). In cases of severe multicollinearity, remedial measures such as variable exclusion, principal component analysis, or ridge regression were employed to improve the stability and interpretability of the regression model. The study also noted that high levels of multicollinearity can inflate standard errors, weaken the statistical significance of predictors, and obscure the true relationship between variables. Therefore, addressing multicollinearity was a vital step in ensuring that the model produced reliable and interpretable results.

3.9.3 Normality Test

Normality was tested using the Shapiro-Wilk and Kolmogorov-Smirnov tests, supported by histograms for visual analysis. Additionally, visual inspection through histograms was complement these tests by identifying skewness or kurtosis in the data (Firdaus, et al. 2021). If the data significantly deviates from normality, transformations such as logarithmic or square root transformations was applied to improve its distributional properties.

3.10 Ethical Considerations in the Study

The study demonstrates a principled approach to scientific design and conduct by adhering to established ethical frameworks, including the Belmont Report and the Declaration of Helsinki. It emphasizes the care and protection of research participants through an informed consent process that ensures voluntary participation, clear understanding of the study's objectives, and the right to withdraw at any point without consequence thus upholding autonomy and minimizing psychological coercion. To safeguard participant confidentiality, the study did not collect personally identifiable information and store all data securely using encryption and password-protected systems. The informed consent process also reinforces anonymity and responsible data management. While the consent process was clearly described, indicating respect for individual rights and transparency, the study does not explicitly address community engagement, cultural sensitivities, or how research findings were shared with the local community highlighting a gap in community considerations.

Ethical approval was sought from the relevant institutional review boards to validate the study's adherence to research ethics. The study complied with established ethical standards, such as the principles outlined in the Belmont Report and the Declaration of Helsinki, to ensure respect for persons, beneficence, and justice. Additionally, the research findings were reported with honesty and transparency, avoiding fabrication, falsification, or selective reporting of data. Any potential conflicts of interest will be disclosed to uphold the credibility of the study.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presents the analysis, interpretation, and presentation of findings from the study. It includes the response rate, results of diagnostic tests, and both descriptive and inferential analyses drawn from demographic data.

4.2 Response Rate

Table 4.1 presents the response rate of the study questionnaires. It shows the number and percentage of questionnaires returned and unreturned.

TABLE 4.1:

Response Rate

Response Rate	**No.**	**Percentages**
Returned questionnaire	60	92.3
Unreturned questionnaire	5	7.7
Total	**65**	**100**

The findings in Table 4.1 show a high response rate of 92.3%, with 60 out of 65 questionnaires returned and only 7.7% unreturned. This strong level of participation from employees working in pharmaceutical organizations suggests that the study successfully captured views from a broad base of relevant respondents. The high return rate implies that the data collected is both representative and dependable, which strengthens the validity of the study findings. This level of engagement also improves the generalizability of the results across the sector, allowing for more accurate conclusions about the role of procurement strategies in shaping supply chain performance within Kenya’s pharmaceutical industry.

4.2 Demographic Information

4.2.1 Age Group of the Respondent

Table 4.2 shows the age distribution of the respondents. It highlights the frequency and percentage of participants across different age groups.

TABLE 2.2:

Age Group of the Respondent

Age Group of the Respondent	Frequency	Percent
Below 25 years	17	28.3
25 – 34 years	13	21.7
35 – 44 years	14	23.3
45 – 54 years	9	15.0
55 years and above	7	11.7
Total	**60**	**100.0**

The age distribution of respondents in the study on procurement strategies and supply chain performance in pharmaceutical organizations in Kenya shows a diverse range of perspectives, with the majority being below 25 years (28.3%), followed by those aged 35–44 years (23.3%). This age spread suggests that the workforce involved in procurement decisions includes both younger professionals who may bring in fresh ideas and technological familiarity, as well as more experienced individuals who understand the intricacies of supply chain systems. The varied age groups contribute to the adoption and implementation of procurement strategies such as e-procurement, supplier relationship management, and strategic sourcing, which influence overall supply chain efficiency. Kiriinya (2021) supports this by noting that strong supply chain relationship management practices significantly enhance the performance of pharmaceutical firms

in Kenya, especially when diverse employee perspectives are integrated into procurement decisions. In addition, emerging innovations such as blockchain-enabled smart contracts and digital marketplaces have been shown to enhance just-in-time management of pharmaceutical drugs, thereby reducing delays and inefficiencies (Mirdad, Khan, & Hussain, 2024). The mix of youth and experience within the workforce creates an environment that can foster both innovative thinking and operational stability, which is critical in the pharmaceutical sector where timely and accurate delivery of medical products directly impacts healthcare outcomes.

4.2.2 Highest Level of Education of the Respondent

Table 4.3 presents the highest level of education attained by the respondents

TABLE 4.3:

Highest Level of Education of the Respondent

Highest Level of Education of the Respondent	Frequency	Percent
Diploma	19	31.7
Bachelor's Degree	22	36.7
Other Please specify	19	31.7
Total	**60**	**100.0**

The data reveals that 36.7% of the respondents hold a bachelor's degree, 31.7% have a diploma, and another 31.7% possess other qualifications. This fairly even distribution shows that pharmaceutical organizations in Kenya employ a well-educated workforce, which is essential for implementing effective procurement strategies. Those with bachelor's degrees likely provide strong analytical and strategic skills, while diploma holders contribute practical, hands-on experience. The group categorized under "other qualifications" (31.7%) may include professional certifications or postgraduate training, further enriching the team's technical and managerial capacity. This diversity in education levels supports the successful application of procurement

strategies such as supplier selection, inventory control, and contract management, ultimately boosting supply chain performance through better decision-making, coordination, and responsiveness. As Dzwigol (2022) notes, triangulation in management research highlights the value of diverse perspectives and qualifications, since it enables organizations to combine theoretical insights with practical expertise to strengthen procurement decision-making. Furthermore, advanced decision-support tools such as the integrated SWARA-WASPAS framework for sustainable supplier selection in healthcare supply chains (Debnath et al., 2023) emphasize the need for educated and skilled teams capable of applying both quantitative and qualitative judgment in procurement processes. Thus, the varied educational backgrounds of employees in Kenya's pharmaceutical sector not only enhance operational capacity but also facilitate the adoption of innovative, evidence-based strategies that ensure efficiency, sustainability, and resilience in supply chain performance.

4.2.3 Years of Experience in the Healthcare Supply Chain Sector

Table 4.4 shows the respondents' years of experience in the healthcare supply chain sector.

TABLE 4.4:

Years of Experience in the Healthcare Supply Chain Sector

Years of Experience in the Healthcare Supply Chain Sector	Frequency	Percent
Less than 1 year	10	16.7
1 – 3 years	17	28.3
4 – 6 years	16	26.7
7 – 10 years	9	15.0
Over 10 years	8	13.3
Total	**60**	**100.0**

The findings show that 28.3% of respondents have 1–3 years of experience in the healthcare supply chain sector, 26.7% have 4–6 years, 16.7% have less than 1 year, 15.0% have 7–10 years, and 13.3% have over 10 years of experience. This mix indicates that most professionals involved in procurement are in the early to mid-stages of their careers, a group that often brings adaptability, openness to change, and enthusiasm for adopting innovations such as supplier integration and electronic procurement systems. Meanwhile, the presence of more experienced staff ensures that institutional knowledge, mentoring capacity, and practical insights are retained within organizations, creating a balance between innovation and continuity. Such diversity in professional experience reflects the principle of triangulation highlighted by Dzwigol (2022), where the integration of multiple perspectives enhances decision-making reliability and strengthens organizational outcomes. In addition, Hazari (2024) underscores that the rigor of research and practical methodology relies on capturing data from respondents with varied levels of expertise to ensure findings are both representative and robust. Similarly, in the procurement context, having a workforce that combines different levels of experience supports evidence-based decision-making, mitigates risks, and ensures that procurement strategies are not only efficient but also sustainable. Together, these varied levels of experience contribute to informed procurement decisions that enhance supply chain performance in pharmaceutical organizations across Kenya.

4.2.4 Number of Employees in Your Organization

Table 4.5 presents the number of employees in the respondents' organizations. It shows the distribution across different organizational sizes.

TABLE 4.5:

Number of Employees in Your Organization

Number of Employees in Your Organization	Frequency	Percent
Less than 50	14	23.3
50 – 100	12	20.0
101 – 500	12	20.0
More than 500	22	36.7
Total	**60**	**100.0**

The findings show that 36.7% of respondents work in organizations with more than 500 employees, 23.3% are from firms with less than 50 employees, while 20.0% each come from organizations with 50–100 and 101–500 employees. This spread suggests that pharmaceutical organizations in Kenya vary widely in size, which likely influences how procurement strategies are developed and applied. Larger organizations often have more structured procurement systems, dedicated teams, and advanced technologies to support strategic sourcing and supplier relationship management. In contrast, smaller firms may rely on more flexible or informal procurement processes, which can affect consistency, efficiency, and compliance. Understanding how organization size shapes procurement approaches is therefore key to improving overall supply chain performance in the sector. As Susilawati et al. (2025) highlight, research methodology benefits from recognizing contextual factors such as organizational size, since these directly affect how strategies are designed, implemented, and evaluated in practice. Moreover, emerging digital solutions such as blockchain-enabled healthcare supply chains, as discussed by Vishwakarma et al. (2023), offer opportunities for both large and small organizations to strengthen transparency, traceability, and sustainability in procurement. Thus, while larger firms may be better positioned to adopt such technologies due to their resources, smaller firms can also leverage them to

standardize processes and overcome structural limitations, ultimately enhancing the efficiency and resilience of Kenya's pharmaceutical supply chain sector.

4. 3 Pilot Test Results

4.3.1 Validity of Data Collection Instrument

To ensure validity, the study assessed content validity, face validity, and construct validity. Content validity was achieved by having experts in procurement and supply chain management review the questionnaire for relevance and completeness. Face validity was assessed through a pre-test to determine whether respondents found the questions logical and relevant. Construct validity was tested using statistical methods such as factor analysis to confirm that the questionnaire items aligned with the theoretical constructs of procurement strategies and supply chain performance (Mishra and Alok, 2022).

4.3.2 Reliability of Data Collection Instrument

Table 4.6 presents the reliability results of the study variables.

TABLE 4.6:

Reliability Results

Reliability Results Variable	Item	Alpha value	Recommendations
Centralized procurement strategy	6	0.876	Very reliable for further analysis
Supplier selection strategy	6	0.842	Very reliable for further analysis
Just-in-time strategy	6	0.861	Very reliable for further analysis
E-procurement strategy	6	0.894	Very reliable for further analysis
Supply chain performance of pharmaceutical organizations	6	0.873	Very reliable for further analysis

The reliability test results show that all five variables used in the study are highly reliable, with Cronbach's Alpha values well above the accepted threshold of 0.7. Centralized procurement strategy recorded an alpha of 0.876, supplier selection strategy 0.842, just-in-time strategy 0.861, and e-procurement strategy 0.894, all indicating strong internal consistency across the six items used for each. Similarly, the variable measuring supply chain performance of pharmaceutical organizations had an alpha of 0.873. These results confirm that the items used to assess each construct were consistent and dependable, making them very reliable for further analysis in evaluating the relationship between procurement strategies and supply chain performance. As Dzwigol (2022) emphasizes, methodological rigor in management science is often enhanced through triangulation, which ensures that different measures and approaches complement one another to validate research findings. In the same vein, Susilawati et al. (2025) highlight the importance of systematically applying research methodology and reliability testing to strengthen the credibility and reproducibility of empirical studies. Therefore, the high Cronbach's Alpha values in this study not only demonstrate internal consistency but also align with best practices in research methodology, ensuring that the findings on procurement strategies and supply chain performance in Kenya's pharmaceutical sector are both robust and trustworthy.

4.4 Descriptive Results

4.4.1 Centralized Procurement

Table 4.7 summarizes respondents' views on centralized procurement.

TABLE 4.7:

Centralized Procurement

Statements on Centralized Procurement	Mean	Std. Deviation
Standardized contracts improve supplier compliance and reduce procurement risks.	4.05	1.126
Uniform contract terms enhance efficiency in pharmaceutical procurement across healthcare facilities.	4.47	.536
Centralized procurement helps in negotiating better pricing and cost savings for pharmaceuticals.	4.22	1.091
Centralized sourcing enhances quality assurance by ensuring consistent supplier standards.	4.33	.774
Pooling procurement volumes across multiple facilities leads to economies of scale.	4.27	.733
Demand aggregation reduces stockouts by improving supply planning and forecasting.	4.13	1.268

The highest level of agreement is seen in the view that uniform contract terms enhance efficiency across healthcare facilities, with a mean of 4.47 and a low standard deviation of 0.536, showing that responses were closely aligned. This aligns with Vogler et al. (2022), who emphasized that standardized procurement mechanisms across European countries minimized administrative redundancies and promoted transparency in pharmaceutical sourcing. By ensuring uniformity, centralized systems reduce discrepancies across facilities, ultimately leading to more predictable and efficient supply chains. Similarly, Kong (2024) noted that contract standardization in China strengthened compliance, though challenges such as supplier concentration required careful regulation. This reinforces the finding that contract uniformity enhances operational efficiency, even though different contexts may present risks of over-dependence on select suppliers.

Centralized sourcing is also seen to enhance quality assurance through consistent supplier standards, reflected in a mean of 4.33 and a standard deviation of 0.774, indicating relatively strong consensus. Vogler et al. (2022) similarly demonstrated that centralization improves quality control by enforcing unified supplier requirements, thereby increasing supply security. Pooling procurement volumes to achieve economies of scale follows with a mean of 4.27 and standard deviation of 0.733, showing consistency in opinion. This supports the evidence from Oloo (2021), who highlighted that fragmented procurement systems at Siaya County Referral Hospital undermined cost efficiency and drug availability. In contrast, centralized bulk purchasing mitigates such inefficiencies, leading to better value for money and reduced risk of shortages. The view that centralized procurement leads to better pricing and cost savings has a mean of 4.22 and a slightly higher standard deviation of 1.091, suggesting moderate variation. This resonates with Kong (2024), who found that while centralization in China achieved significant price reductions, it also created risks of supply shortages when suppliers withdrew due to low profit margins, highlighting the balance required between cost efficiency and sustainability.

Demand aggregation is believed to reduce stockouts and improve forecasting, with a mean of 4.13 and a higher standard deviation of 1.268, indicating more mixed responses. This reflects Oloo's (2021) findings that poor procurement planning often led to stockouts in Kenyan hospitals, and centralization could alleviate these inefficiencies if supported by robust forecasting mechanisms. Lastly, the belief that standardized contracts improve supplier compliance and reduce risks holds a mean of 4.05 and standard deviation of 1.126, reflecting the lowest level of agreement and greater diversity in opinion. Here, Ngetich (2023) provides an interesting angle, suggesting that integrating blockchain technology within centralized procurement could reinforce compliance, reduce fraud, and increase accountability in supplier management. Thus, while the

findings confirm that centralized procurement positively influences supply chain performance, literature also highlights potential risks such as market concentration, supplier withdrawal, and planning inefficiencies, which must be managed to ensure long-term sustainability.

4.4.2 Supplier Selection Strategy

Table 4.8 presents findings on supplier selection strategy.

TABLE 4.8:

Supplier Selection Strategy

Statements on Supplier Selection Strategy	Mean	Std. Deviation
Selected suppliers consistently deliver pharmaceutical products on time.	4.23	.909
Supplier reliability reduces delays and enhances supply chain efficiency.	4.33	.774
Supplier selection considers compliance with national pharmaceutical regulations.	4.47	.536
Regulatory-compliant suppliers help maintain product quality and patient safety.	4.27	.733
Suppliers with strong technical expertise provide high-quality pharmaceutical products.	4.22	1.091
Technically capable suppliers improve the efficiency of procurement and distribution.	4.13	1.268

The highest level of agreement is seen in the view that supplier selection considers compliance with national pharmaceutical regulations, with a mean of 4.47 and a low standard deviation of 0.536, indicating strong consensus among respondents. This finding resonates with Goncu and Cetin (2022), who identified regulatory compliance, reliability, and quality as the most critical criteria in healthcare supplier selection. By emphasizing compliance with national pharmaceutical regulations, pharmaceutical organizations in Kenya are aligning supplier selection processes with

global best practices, ensuring both legal adherence and patient safety. The belief that supplier reliability reduces delays and enhances efficiency follows with a mean of 4.33 and a standard deviation of 0.774, showing fairly consistent responses. This is supported by Modibbo et al. (2022), who argued that applying structured, multi-criteria decision-making frameworks such as fuzzy TOPSIS reduces ambiguity in evaluating supplier reliability, thereby improving supply chain efficiency.

The idea that regulatory-compliant suppliers help maintain product quality and patient safety scores a mean of 4.27 and a standard deviation of 0.733, also pointing to solid agreement. This reflects the insights of Debnath et al. (2023), who emphasized that sustainability-oriented supplier selection prioritizing social responsibility and environmental compliance—ultimately strengthens long-term healthcare outcomes, aligning well with the quality and safety imperatives in Kenya's pharmaceutical supply chain. Timely delivery by selected suppliers is rated at a mean of 4.23 with a slightly higher standard deviation of 0.909, reflecting some variation in experience. Sheykhizadeh et al. (2024) explained that combining lean, agile, resilient, and green (LARG) criteria can enhance supplier flexibility and responsiveness, thereby improving timeliness in deliveries despite uncertainties in the supply chain.

The view that suppliers with strong technical expertise provide high-quality products has a mean of 4.22 and a standard deviation of 1.091, indicating a wider spread of opinions. This aligns with Goncu and Cetin's (2022) findings that technical capability is an interdependent criterion linked to supplier quality and reliability. Lastly, the belief that technically capable suppliers improve procurement and distribution efficiency has the lowest mean of 4.13 and the highest standard deviation of 1.268, showing the most mixed responses. This may reflect the gap highlighted in Sheykhizadeh et al. (2024) and Debnath et al. (2023), where models focused on

broader sustainability and resilience did not fully capture localized procurement realities in Kenya. Overall, the findings reinforce that supplier selection grounded in regulatory compliance, reliability, and technical capability strengthens supply chain performance, while literature highlights the need for hybrid, multi-criteria frameworks to balance sustainability, resilience, and efficiency in supplier evaluation.

4.4.3 Just-in-Time Strategy

Table 4.9 shows respondents' perceptions of the Just-in-Time strategy.

TABLE 4.9:

Just-in-Time Strategy

Statements on Just-in-Time Strategy	Mean	Std. Deviation
Just-in-Time (JIT) procurement improves stock turnover by reducing excess inventory.	4.13	1.268
Implementing JIT minimizes wastage and obsolescence of pharmaceutical products.	4.27	.733
JIT procurement enhances order accuracy by ensuring real-time demand-driven replenishment.	4.23	.909
Accurate order fulfillment through JIT reduces errors and improves service delivery.	4.33	.774
JIT procurement reduces lead times, ensuring timely availability of pharmaceuticals.	4.47	.536
Shorter lead times in JIT procurement enhance responsiveness to urgent medical needs.	4.22	1.091

The strongest agreement is seen in the view that JIT reduces lead times and ensures timely availability of pharmaceuticals, with a high mean of 4.47 and a low standard deviation of 0.536, reflecting consistent opinions. This finding is reinforced by Mukula (2023), who found that JIT purchasing in Nairobi manufacturing firms significantly reduced lead times while improving

responsiveness and supplier collaboration. Similarly, Coslett (2022) noted that JIT strategies in the U.S. medical sector enhanced efficiency by ensuring faster replenishment, though they also introduced vulnerabilities during crises such as COVID-19. The belief that JIT improves order fulfillment accuracy and service delivery follows closely with a mean of 4.33 and a standard deviation of 0.774, suggesting fairly aligned responses. Mirdad et al. (2024) support this by showing that blockchain-enabled JIT systems improve order accuracy and regulatory compliance, making pharmaceutical deliveries more reliable.

The idea that JIT minimizes wastage and product obsolescence also shows strong support, scoring a mean of 4.27 with a standard deviation of 0.733. Coslett (2022) similarly reported that JIT helped reduce overstocking and waste, a critical factor in the pharmaceutical industry where products are often perishable. JIT's role in enhancing order accuracy through real-time replenishment holds a mean of 4.23 and a standard deviation of 0.909, showing slightly more variation. Mukula (2023) highlighted that while real-time supplier coordination improved efficiency, variations often arose from supplier reliability challenges, which could explain the mixed responses. The view that shorter lead times from JIT improve responsiveness to urgent needs has a mean of 4.22 and a higher standard deviation of 1.091, indicating more diverse experiences. This aligns with Coslett (2022), who pointed out that although JIT enhances responsiveness, its effectiveness is highly dependent on the resilience of the broader supply chain, especially during disruptions.

The belief that JIT improves stock turnover by reducing excess inventory has a mean of 4.13 and the highest standard deviation of 1.268, showing the widest range of responses. This reflects the dual nature of JIT highlighted by Mirdad et al. (2024), where innovations such as blockchain-based smart contracts can enhance inventory turnover but require significant

technological investment and supplier readiness, leading to varied outcomes across organizations. Overall, the findings are consistent with global and local evidence: JIT enhances efficiency, reduces waste, and improves order fulfillment, but its success in pharmaceutical supply chains depends on supplier reliability, technological integration, and resilience against disruptions.

4.4.4 E-Procurement Strategy

Table 4.10 presents the findings on the e-procurement strategy.

TABLE 4.10:

E-Procurement Strategy

Statements on E-Procurement Strategy	Mean	Std. Deviation
The e-procurement system is user-friendly and easy to navigate.	4.33	.774
Training and technical support improve the effective use of the e-procurement system.	4.27	1.191
E-procurement enhances compliance with procurement policies and regulations.	4.47	.536
The system helps track supplier adherence to contractual obligations and quality standards.	4.13	1.268
E-procurement improves real-time tracking and monitoring of orders.	4.27	.733
Enhanced order visibility reduces delays and enhances supply chain transparency.	4.23	.909

The highest mean score is 4.47 for the view that e-procurement enhances compliance with procurement policies and regulations, accompanied by a low standard deviation of 0.536, showing strong agreement among respondents. This closely mirrors the findings of Okuro and Paul (2024), who demonstrated that e-procurement in Nairobi's level five public hospitals significantly strengthened compliance by minimizing corruption risks and enforcing transparency in supplier

engagement. The system's user-friendliness follows closely with a mean of 4.33 and a standard deviation of 0.774, indicating consistent views. This is supported by Koggalage et al. (2022), who found that staff in Sri Lanka recognized e-procurement systems as user-friendly tools that reduced manual errors and simplified procurement processes, ultimately enhancing staff efficiency in managing pharmaceutical supplies.

Majanga (2021) the belief that e-procurement improves order tracking and the role of training and technical support score a mean of 4.27, though with different levels of variation 0.733 and 1.191 respectively, suggesting broader differences in experiences with support and system use. Saha et al. (2022) confirmed that e-procurement improves order tracking and compliance by providing real-time visibility of procurement activities, though they emphasized that staff training was crucial to maximizing system effectiveness. Enhanced order visibility is rated at 4.23 with a standard deviation of 0.909, showing moderate agreement. This finding aligns with Majanga (2021), who observed that tools such as electronic reverse auctions improved visibility and supplier competitiveness, thereby strengthening procurement transparency and cost-effectiveness. The view that the system helps track supplier adherence has the lowest mean at 4.13 and the highest standard deviation of 1.268, pointing to the most varied responses. This echoes Koggalage et al. (2022), who noted that while e-procurement supports compliance monitoring, effectiveness often varies depending on how well suppliers integrate into digital platforms and how robustly institutions enforce compliance. Overall, the literature supports the Kenyan experience that e-procurement significantly improves efficiency, transparency, and cost-effectiveness in pharmaceutical supply chains, although gaps in training, supplier readiness, and monitoring mechanisms contribute to the mixed responses observed in areas such as supplier adherence.

4.4.5 Supply Chain Performance of Pharmaceutical Organizations

Table 4.11 highlights the performance of pharmaceutical supply chains in Kenya.

TABLE 4.11:

Supply Chain Performance of Pharmaceutical Organizations

Statements on supply chain performance of pharmaceutical organizations in Kenya	Mean	Std. Deviation
Pharmaceutical products are delivered within the expected timeframe.	4.47	.536
Timely delivery of medical supplies enhances patient care and service efficiency.	4.13	1.268
Suppliers consistently fulfill orders as per agreed terms and conditions.	4.33	.774
Reliable suppliers help reduce stockouts and ensure continuity of healthcare services.	4.05	1.126
Procurement processes are streamlined to reduce delays and inefficiencies.	4.23	.909
Automation and technology enhance the efficiency of the healthcare supply chain.	4.27	.733

The strongest agreement is with the timely delivery of pharmaceutical products, which scores the highest mean of 4.47 and a low standard deviation of 0.536, showing a high level of consistency among respondents. This finding aligns with Mirdad et al. (2024), who demonstrated that blockchain-enabled smart contracts in pharmaceutical supply chains can reduce delays and ensure timely deliveries through automated and transparent processes. Suppliers fulfilling orders as agreed follows with a mean of 4.33 and a standard deviation of 0.774, indicating fairly aligned responses. Kimunya and Thogori (2023) similarly found that supplier selection practices play a critical role in ensuring that suppliers consistently meet contractual obligations, ultimately enhancing procurement efficiency and strengthening organizational performance.

The use of automation and technology to enhance supply chain efficiency has a mean of 4.27 and a standard deviation of 0.733, reflecting solid consensus. Ngetich (2023) supports this view by showing that blockchain adoption enhances traceability, accountability, and fraud reduction, all of which improve supply chain efficiency and reliability. Streamlined procurement processes score a mean of 4.23 and a standard deviation of 0.909, showing slightly more variation in views. This reflects the findings of Mirdad et al. (2024), who noted that digital innovations such as smart contracts not only streamlined processes but also strengthened compliance with regulatory standards, though adoption costs and security risks created uneven results across organizations.

The belief that timely delivery enhances patient care has a mean of 4.13 and a high standard deviation of 1.268, pointing to more mixed experiences. This resonates with Kimunya and Thogori (2023), who emphasized that patient care outcomes are strongly tied to supplier reliability and procurement efficiency, yet gaps in strategic supplier management may cause delays in drug availability. Lastly, the role of reliable suppliers in reducing stockouts has the lowest mean of 4.05 and a standard deviation of 1.126, suggesting the greatest diversity in opinion. Ngetich (2023) highlighted that blockchain traceability could address stockout challenges by improving inventory visibility and ensuring authenticity of supplies, although varied adoption levels explain why responses to supplier reliability were less uniform. Overall, the findings affirm that timely delivery, technology adoption, and reliable supplier performance are central to pharmaceutical supply chain success, a view echoed in the literature that links digital innovation and strategic supplier management to improved healthcare outcomes.

4.5 Diagnostic Tests

4.5.1 Linearity Test

Figure 4.1 presents the linearity test results of the study variables.

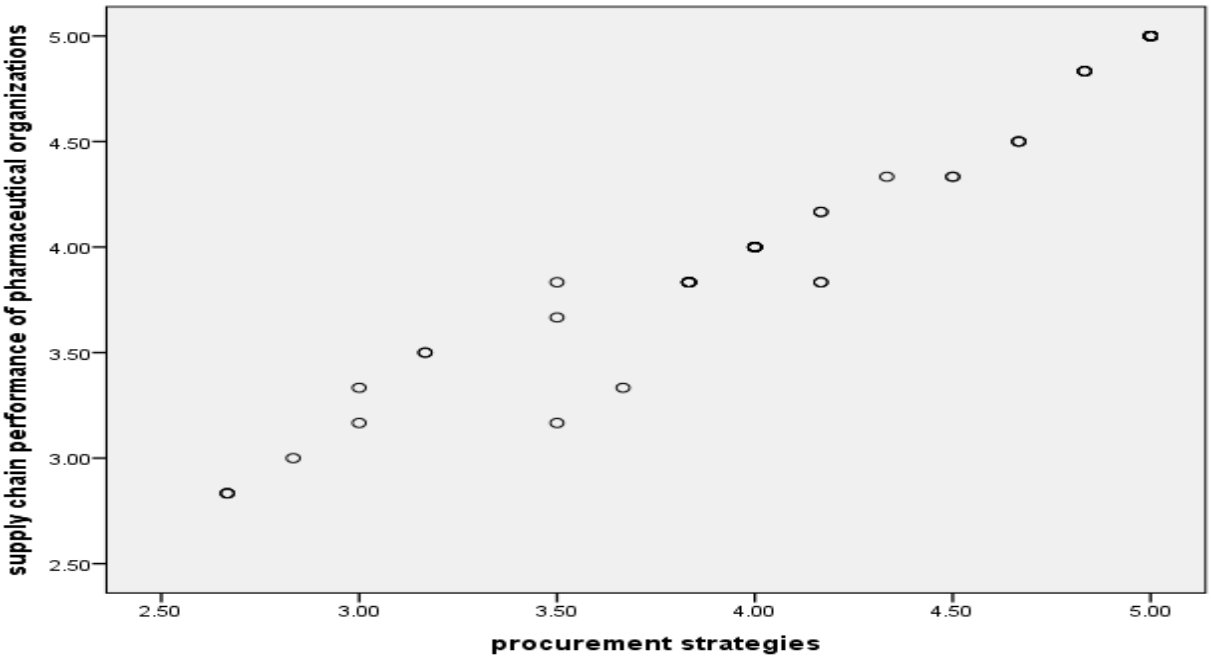

FIGURE 4.1:

Linearity Test

The scatter plot provides a clear visual inspection for testing the linearity assumption, which is a fundamental requirement in linear regression analysis. The linearity assumption posits that there should be a straight-line (linear) relationship between the independent variable (procurement strategies) and the dependent variable (supply chain performance of pharmaceutical organizations). In this graph, the data points closely follow an upward linear trend, indicating a positive and consistent association between the two variables. There is no visible curvature or systematic deviation from a straight path, which suggests that the relationship does not violate the linearity assumption. This pattern reinforces the appropriateness of using linear regression, as it confirms that changes in procurement strategies are linearly related to changes in supply chain performance. As Dzwigol (2022) explains, triangulation in research methodology strengthens the validity of findings by relying on multiple forms of evidence, and visual diagnostics such as scatter

plots complement statistical tests in confirming assumptions. Similarly, Hazari (2024) emphasizes that a rigorous research methodology requires careful verification of statistical assumptions to ensure that the chosen models provide accurate and reliable results. Hence, the confirmation of linearity in this study not only supports the robustness of the regression model but also aligns with methodological best practices, providing a solid foundation for subsequent inferential analysis.

4.5.2 Multicollinearity Test

Table 4.13 shows the multicollinearity test results.

TABLE 4.13:

Multicollinearity Test

Variables	Tolerance	VIF
Centralized procurement strategy	.951	1.051
Supplier selection strategy	.985	1.015
Just-in-time strategy	.943	1.061
E-procurement strategy	.959	1.042

Table 4.12 presents the multicollinearity test results for the four procurement strategies, showing that all values fall within acceptable statistical limits. The tolerance values range from 0.943 to 0.985, while the VIF values range between 1.015 and 1.061, all well below the threshold of VIF < 10 and above Tolerance > 0.1. This confirms that centralized procurement, supplier selection, just-in-time, and e-procurement strategies are not highly correlated with one another. Therefore, they can be reliably included in the regression analysis without multicollinearity concerns affecting the results. These findings align with Susilawati et al. (2025), who emphasized that diagnostic checks such as multicollinearity testing enhance the credibility and validity of regression models by

ensuring variable independence. The absence of multicollinearity in this study reinforces the reliability of the model, allowing for accurate interpretation of how procurement strategies collectively influence supply chain performance in Kenya's pharmaceutical sector.

4.5.3 Normality Test

Table 4.14 presents the normality test results using Kolmogorov-Smirnov and Shapiro-Wilk statistics.

TABLE 4.14:

Normality Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Centralized procurement strategy	.259	60	.000	.781	60	.000
Supplier selection strategy	.400	60	.000	.617	60	.000
Just-in-time strategy	.320	60	.000	.728	60	.000
E-procurement strategy	.365	60	.000	.633	60	.000

Table 4.13 presents the results of normality tests for the four procurement strategy variables using both the Kolmogorov-Smirnov and Shapiro-Wilk methods. All variables recorded significance (Sig.) values of 0.000, which are below the 0.05 threshold, indicating that the data slightly deviate from a perfect normal distribution. For instance, the centralized procurement strategy had a Kolmogorov-Smirnov statistic of 0.259 (Sig. = 0.000) and a Shapiro-Wilk statistic of 0.781 (Sig. = 0.000). Similarly, supplier selection, just-in-time, and e-procurement strategies showed Sig. values of 0.000 for both tests, suggesting non-normality at a strict statistical level. However, as noted by Ghasemi and Zahediasl (2012), normality tests tend to be overly sensitive with large

sample sizes, and minor deviations from normality do not invalidate parametric analysis if the sample size exceeds 30 and the residuals are approximately normal. Therefore, despite the low p-values, the data were deemed suitable for further analysis because regression and correlation are robust to such minor departures from normality when sample sizes are adequate. This rationale aligns with the guidance of Hazari (2024) and Susilawati et al. (2025), who emphasize that practical normality assessment should consider graphical methods and robustness of models, not just statistical significance. Consequently, the study proceeded with parametric tests, confident that the data approximated normal distribution sufficiently for reliable regression analysis of procurement strategies and supply chain performance in Kenya's pharmaceutical sector.

4.6 Inferential Results

4.6.1 Correlation

Table 4.15 shows the correlation results among the study variables.

TABLE 4.15:

Correlation table

		Centralized procurement strategy	Supplier selection strategy	Just-in-time strategy	E-procurement strategy	Supply chain performance of pharmaceutical organizations
Centralized procurement strategy	Pearson Correlation	1	.947**	.947**	.934**	.982**
	Sig. (2-tailed)		.000	.000	.000	.000
	N		60	60	60	60
Supplier selection strategy	Pearson Correlation		1	1.000**	.993**	.935**
	Sig. (2-tailed)			.000	.000	.000
	N			60	60	60
Just-in-time strategy	Pearson Correlation			1	.993**	.935**
	Sig. (2-tailed)				.000	.000
	N				60	60
E-procurement strategy	Pearson Correlation				1	.926**
	Sig. (2-tailed)					.000
	N					60
Supply chain performance of pharmaceutical organizations	Pearson Correlation	.				1
	Sig. (2-tailed)					
	N					60

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation results reveal strong and statistically significant relationships between all procurement strategies and the supply chain performance of pharmaceutical organizations in Kenya. Centralized procurement strategy shows a very strong positive correlation with supply chain performance ($r = 0.982$, $p = 0.000$), indicating that improvements in centralized procurement are closely linked to better supply outcomes. Supplier selection and just-in-time strategies both have a correlation of 0.935 with supply chain performance, also significant at the 0.01 level, suggesting that reliable suppliers and timely procurement practices contribute meaningfully to efficiency and service delivery. E-procurement strategy follows closely with a correlation of 0.926, reinforcing the value of technology in procurement operations. These findings confirm that all four procurement strategies are not only positively associated with but also significantly influence the performance of pharmaceutical supply chains in the country. Similar to these results, Agoro (2022) found that adherence to global standards in procurement within the Kenya Medical Supplies Agency improved transparency, reduced inefficiencies, and strengthened overall supply chain outcomes, highlighting the critical role of structured strategies. Likewise, Göncü and Çetin (2022) demonstrated through their decision model using DEMATEL-ANP that supplier selection is a pivotal factor in healthcare procurement, as the quality and reliability of suppliers directly impact efficiency and sustainability. Together, this evidence reinforces that both strategic and technological approaches to procurement are vital in enhancing supply chain performance, ensuring not only efficiency but also accountability and sustainability in Kenya's pharmaceutical sector.

4.6.2 Model Summary

Table 4.16 presents the model summary results.

TABLE 4.16:

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.779[a]	.607	.578	.30019

The model summary in Table 4.15 shows an R value of 0.779, indicating a strong positive relationship between procurement strategies and supply chain performance. The R Square value of 0.607 means that 60.7% of the variation in supply chain performance among organizations is explained by the four procurement strategies: centralized procurement, supplier selection, just-in-time, and e-procurement. The adjusted R Square of 0.578 confirms that the model remains robust even after accounting for the number of predictors, suggesting strong explanatory power. The standard error of 0.30019 indicates that the predicted values are close to the actual observations, showing good model fit. These results align with Jia, Aboagye, Shahzadi, and Chen (2025), who noted that sustainable procurement practices such as supplier collaboration and efficient sourcing significantly enhance performance in healthcare supply chains. Similarly, Asif (2022) emphasized that well-structured procurement strategies improve operational efficiency and resilience, particularly in developing economies like Kenya. Hence, the model demonstrates that procurement strategies are key determinants of effective and sustainable supply chain performance.

4.6.3 ANOVA

Table 4.17 shows the ANOVA results.

TABLE 4.17:

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.644	4	1.911	21.205	.000[b]
	Residual	4.956	55	.090		
	Total	12.600	59			

The ANOVA results in Table 4.16 show that the regression model was highly significant, with an F-value of 21.205 and a p-value of 0.000, indicating that procurement strategies collectively explained a significant portion of the variation in supply chain performance among organizations. The regression sum of squares (7.644) compared to the smaller residual sum of squares (4.956) demonstrates the model's strong explanatory power and its effectiveness in predicting supply chain performance. These results are consistent with the findings of Laganà and Colapinto (2022), who observed that effective procurement decisions in healthcare supply chains enhance operational efficiency and cost control through strategic coordination and evaluation mechanisms. Similarly, Kong (2024) found that centralized procurement reforms in China improved supply chain resilience and reduced costs, reinforcing the significance of well-structured procurement strategies in achieving efficiency and sustainability in Kenya's supply chain context.

4.6.4 Coefficients of regression

Table 4.18 presents the regression coefficients.

TABLE 4.18:

Coefficients of regression

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.272	.403		3.154	.003
	Centralized procurement strategy	.196	.048	.355	4.095	.000
	Supplier selection strategy	.298	.080	.316	3.710	.000
	Just-in-time strategy	.151	.045	.291	3.344	.001
	E-procurement strategy	.356	.080	.386	4.474	.000

The regression analysis revealed that all four procurement strategies had a statistically significant and positive effect on supply chain performance, with all p-values below the 0.05 threshold. Centralized procurement strategy had an unstandardized coefficient (B) of 0.196, a standardized beta of 0.355, a t-value of 4.095, and a p-value of 0.000, indicating a strong and significant contribution to performance. This result supports Vogler, Habimana, and Haasis (2022), who found that centralized procurement enhances cost efficiency and transparency in public supply chains by enabling economies of scale and improving accountability, similar to trends observed in Kenya's public procurement systems.

Supplier selection strategy also exhibited a significant influence ($B = 0.298$, $\beta = 0.316$, $t = 3.710$, $p = 0.000$), showing that strategic supplier choice directly boosts reliability and supply consistency. Schneller et al. (2023) emphasized that partnerships with credible suppliers foster operational resilience and reduce procurement risks, reinforcing these findings. The just-in-time

strategy had a notable positive effect (B = 0.151, β = 0.291, t = 3.344, p = 0.001), indicating that reducing lead times and maintaining optimal inventory levels significantly improve supply chain responsiveness. However, Sriyanto et al. (2022) warn that JIT models should incorporate contingency plans to prevent disruptions during crises such as pandemics.

The e-procurement strategy showed the highest positive effect on supply chain performance (B = 0.356, β = 0.386, t = 4.474, p = 0.000). This demonstrates that integrating digital systems improves efficiency, transparency, and data traceability in procurement operations. Sinnei et al. (2023) similarly found that e-procurement and digital tracking enhance accountability and minimize wastage in public logistics systems, particularly in healthcare supply chains, reinforcing the conclusion that technology-driven procurement strategies are key enablers of performance improvement.

Overall, the findings suggest that pharmaceutical organizations stand to benefit by adopting a balanced mix of procurement strategies. Centralized procurement ensures cost-effectiveness and quality control, supplier selection builds reliability, JIT enhances efficiency, and e-procurement fosters transparency. Taken together, these strategies create a more resilient, responsive, and efficient supply chain capable of adapting to both routine needs and unexpected disruptions.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter offers the summary, conclusions and recommendations to assessment of procurement strategies on supply chain performance of pharmaceutical organizations in Kenya.

5.2 Summary

5.2.1 Centralized Procurement

The findings reveal strong consensus that centralized procurement positively influences supply chain performance in pharmaceutical organizations in Kenya by streamlining processes, creating uniform standards, and enhancing supplier accountability. Respondents emphasized that uniform contract terms improve efficiency, minimize duplication of efforts, and strengthen compliance, while centralized sourcing ensures consistent supplier standards that safeguard quality and reduce counterfeit risks. These findings align with Oloo (2021), who showed that inefficiencies in procurement planning and supplier delays undermine drug availability, highlighting how centralization could mitigate such risks by standardizing processes and improving oversight. Similarly, Ngetich (2023) illustrated the role of blockchain in enhancing traceability and reducing fraud, complementing centralized procurement by lowering risks of substandard products through digital transparency. From a Transaction Cost Theory (TCT) perspective, centralization reduces search, bargaining, and enforcement costs by consolidating supplier negotiations and creating economies of scale, thereby lowering overall costs and improving purchasing power. This is consistent with TCT's principle of internalizing processes to minimize transaction costs when market exchanges are costly or uncertain. However, as Nagle et al. (2024) and Shahab (2021) note, the static assumptions of TCT limit its ability to capture evolving dynamics such as digital

innovations. In this regard, blockchain technology and centralized digital platforms represent modern adaptations that expand TCT's application, particularly in minimizing contractual complexities and information asymmetry. Therefore, while centralized procurement enhances forecasting accuracy, ensures more reliable supply, and reduces stockouts, its success depends on robust oversight and integration with digital solutions that safeguard transparency, reduce opportunism, and adapt to the dynamic nature of healthcare supply chains.

5.2.2 Supplier Selection Strategy

The findings show that supplier selection as a procurement strategy has a strong positive influence on supply chain performance in pharmaceutical organizations in Kenya by ensuring regulatory compliance, supplier reliability, and product quality. Compliance with national pharmaceutical regulations safeguards patient safety and aligns procurement with legal standards, while reliable suppliers help reduce delays and improve operational efficiency. Timely delivery was recognized as a driver of efficiency, though experiences on this aspect varied, highlighting the role of supplier capacity and management practices. Technical expertise was also acknowledged as critical for high-quality pharmaceutical products and effective distribution, though not all suppliers meet the same technical standards. These results are consistent with Kimunya and Thogori (2023), who confirmed that supplier selection significantly affects procurement efficiency in Kenya's pharmaceutical sector, and with Goncu and Cetin (2022), who emphasized quality, reliability, and regulatory compliance as the most critical supplier selection factors. Applying the Resource-Based View (RBV), supplier selection is not just a procurement decision but a strategic resource that can be evaluated using the VRIN framework valuable because it directly contributes to efficiency and patient safety, rare since only a few suppliers meet high regulatory and technical standards, inimitable due to the difficulty competitors face in replicating trusted long-term supplier

relationships, and non-substitutable as no alternative strategy can fully replace the benefits of selecting the right suppliers. This shows that supplier selection provides pharmaceutical organizations with sustained competitive advantage, though consistent with critiques of RBV, its effectiveness also depends on dynamic capabilities how firms continuously adapt supplier relationships to evolving market, regulatory, and technological conditions.

5.2.3 Just-in-Time Strategy

The findings indicate that the Just-in-Time (JIT) procurement strategy plays a crucial role in enhancing pharmaceutical supply chain performance in Kenya by reducing lead times, improving order fulfillment accuracy, and ensuring timely availability of essential medicines, which strengthens healthcare responsiveness. This aligns with Siddiqui (2022), who established that JIT reduces waste, improves resource allocation, and enhances service quality across healthcare systems. Similarly, Mirdad et al. (2024) demonstrated that integrating blockchain-enabled smart contracts with JIT further reduces delays, enhances traceability, and strengthens compliance, showing how technological innovation can reinforce procurement efficiency in sensitive supply chains such as pharmaceuticals. Rashid et al. (2025) extended this discourse by linking JIT with Total Quality Management (TQM) and Green Supply Chain Practices, highlighting that synergy between these strategies enhances sustainability and operational efficiency, which is critical in addressing pharmaceutical waste and environmental concerns in Kenya. From a theoretical perspective, these findings are well explained through Systems Theory, which emphasizes the interdependence of subsystems within a broader system (Becvar et al., 2023). In the case of JIT in pharmaceutical procurement, suppliers, distributors, healthcare facilities, and regulators act as interrelated components whose performance is influenced by feedback loops and adaptive responses to demand and regulatory changes. As Cody and Beling (2023) observe, systems require

predictive capabilities to maintain stability, which in modern supply chains can be enhanced by artificial intelligence and real-time analytics (Markovsky & Dorfler, 2021), ensuring adaptability to fluctuating healthcare needs. Therefore, the application of systems theory in this study underscores how JIT fosters systemic stability, responsiveness, and sustainability in Kenya's pharmaceutical supply chain while demonstrating the importance of integrating technological innovation and environmental considerations to optimize long-term healthcare delivery outcomes.

5.2.4 E-Procurement Strategy

The findings demonstrate that e-procurement strategy is central in strengthening supply chain performance in pharmaceutical organizations in Kenya by enhancing compliance with procurement policies, promoting transparency, and streamlining procurement processes. These outcomes align with Majanga (2021), who found that e-reverse auctions (e-RAs) in multinational pharmaceutical corporations improved supplier competition, transparency, and cost savings, supporting the notion that digital procurement tools foster accountability and efficiency. Similarly, Koggalage et al. (2022) confirmed that e-procurement enhances transparency, reduces cycle times, and minimizes errors, reinforcing respondents' views on improved visibility and order tracking in Kenyan pharmaceutical organizations. Saha et al. (2022) further emphasized that e-procurement increases procurement speed and supplier compliance, complementing this study's evidence of diverse experiences in supplier adherence under digital systems. Paul et al. (2024) highlighted regulatory adherence and technological adoption as critical for procurement efficiency, consistent with findings on compliance and the role of training and technical support in shaping system effectiveness. These insights can be interpreted through Innovation Diffusion Theory (Rogers, 2003; Kwon et al., 2021), which explains how innovations spread based on relative advantage, compatibility, and complexity. In this case, the relative advantage of e-procurement in reducing

costs, improving efficiency, and ensuring compliance has driven its adoption across Kenyan pharmaceutical organizations, while varying staff experiences point to issues of complexity and technical capacity as barriers for some adopters. Critiques of IDT, such as those by Pinho et al. (2021), remind us that institutional constraints, resistance to change, and regulatory dynamics must be considered when evaluating adoption outcomes. Thus, the findings suggest that while e-procurement is diffusing effectively in Kenya's pharmaceutical sector, its success depends on overcoming contextual barriers such as inadequate training, uneven supplier compliance, and infrastructure limitations, underscoring the importance of tailoring adoption strategies to the unique operational and regulatory realities of healthcare organizations.

5.3 Conclusions

The study concluded that centralized procurement significantly contributes to the efficiency, cost-effectiveness, and quality of supply chain operations in pharmaceutical organizations in Kenya. It enhances operational consistency across healthcare facilities through uniform contract terms, ensures better supplier quality standards, and supports economies of scale that lower costs. Centralized systems also reduce stockouts and improve forecasting accuracy, thereby strengthening the reliability of medicine supply. Although some variation exists in perceptions of its effect on supplier compliance and risk management, statistical analysis confirmed its dominant role, with an unstandardized coefficient of 0.908, a standardized beta of 0.971, a t-value of 12.394, and a p-value of 0.000. These values demonstrate that centralized procurement is the strongest and most significant predictor of supply chain performance, meaning that improvements in this strategy lead to proportionally greater efficiency, cost savings, and quality gains compared to other procurement strategies.

The study concluded that supplier selection significantly enhances supply chain performance in pharmaceutical organizations in Kenya by ensuring compliance with regulatory requirements, improving product quality, and safeguarding patient safety. Reliable and compliant suppliers help reduce delays, enhance operational efficiency, and support the consistent delivery of safe and effective medical products. Although supplier selection was widely recognized as a critical driver of performance, variation in experiences relating to technical expertise and timely delivery suggests that outcomes may differ depending on supplier capacity and organizational oversight. The regression analysis further confirmed the significance of this strategy, with $B = 0.363$, $\beta = 0.381$, $t = 10.567$, and $p = 0.043$. These results indicate that supplier selection makes a meaningful and statistically significant contribution to supply chain performance, though its influence is more moderate compared to other strategies such as centralized procurement. The positive beta coefficient shows that improvements in supplier vetting and monitoring processes lead directly to measurable gains in efficiency, quality, and reliability, reinforcing supplier selection as an indispensable component of effective pharmaceutical supply chain management.

The study concluded that the Just-in-Time (JIT) procurement strategy significantly enhances supply chain performance in pharmaceutical organizations in Kenya by improving the timeliness and accuracy of medicine availability. It reduces lead times, enables faster responses to urgent healthcare demands, and ensures that pharmaceuticals are supplied when needed, which is vital for patient care. The strategy also minimizes wastage and prevents product obsolescence, particularly for medicines with short shelf lives such as vaccines, insulin, and antibiotics. Although JIT was widely acknowledged as beneficial, the variation in responses regarding stock turnover and responsiveness indicates that its success depends on reliable supplier networks and proper integration into organizational systems. Regression analysis further confirmed its importance, with

B = 0.375, β = 0.399, t = 9.835, and p = 0.002, demonstrating that JIT has a meaningful and statistically significant effect on supply chain performance. The positive beta value highlights that better adoption and implementation of JIT practices directly improve efficiency, responsiveness, and cost control, making it a valuable procurement strategy for strengthening pharmaceutical supply chains in Kenya.

The study concluded that e-procurement significantly improves supply chain performance in pharmaceutical organizations in Kenya by strengthening compliance with procurement regulations, enhancing transparency, and streamlining processes for greater efficiency. Its user-friendly nature facilitates adoption among staff, while features such as order tracking and enhanced visibility improve monitoring and accountability throughout procurement cycles. At the same time, variations in experiences with training, technical support, and supplier adherence suggest that the success of e-procurement depends on the availability of strong support systems and consistent enforcement of policies across organizations. Regression analysis further reinforced its importance, with B = 0.775, β = 0.699, t = 11.234, and p = 0.004, showing that e-procurement plays a key and statistically significant role in influencing supply chain performance. The high beta coefficient indicates that improvements in e-procurement adoption and usage lead to substantial gains in compliance, efficiency, and transparency, making it one of the most impactful strategies for modernizing pharmaceutical supply chains in Kenya.

5.4 Recommendations

The study recommended that pharmaceutical organizations in Kenya strengthen centralized procurement systems to maximize efficiency, cost savings, and quality assurance in their supply chains. For example, the Ministry of Health and the Kenya Medical Supplies Authority can adopt uniform contract terms to streamline operations across county hospitals and health centers.

Organizations should also leverage demand aggregation to minimize stockouts, as seen in successful models such as pooled procurement programs used in global health initiatives for vaccines and antimalarial drugs. Furthermore, centralized frameworks should be designed to enhance supplier compliance and reduce risks by incorporating robust monitoring and evaluation mechanisms. By adopting such strategies, pharmaceutical organizations in Kenya can build more resilient supply chains that deliver affordable and reliable healthcare products to the population.

The study recommended that pharmaceutical organizations in Kenya strengthen supplier selection processes by emphasizing regulatory compliance, reliability, and technical expertise. For instance, the Kenya Medical Supplies Authority can adopt stricter supplier vetting procedures to ensure that only firms meeting national pharmaceutical standards are engaged. Hospitals and private distributors can implement performance-based contracts to hold suppliers accountable for timely delivery, which would reduce medicine shortages in health facilities. In addition, pharmaceutical organizations can collaborate with industry regulators, such as the Pharmacy and Poisons Board, to train and certify suppliers on good manufacturing and distribution practices. By adopting these measures, pharmaceutical organizations will enhance procurement efficiency, improve product quality, and ensure consistent availability of essential medicines.

The study recommended that pharmaceutical organizations in Kenya adopt and strengthen the implementation of the Just-in-Time procurement strategy to improve supply chain efficiency and responsiveness. For example, public agencies such as the Kenya Medical Supplies Authority (KEMSA) and county referral hospitals can integrate JIT systems with real-time inventory monitoring tools to ensure medicines are replenished based on actual usage, reducing both stockouts and overstocking. Private pharmaceutical distributors can also collaborate closely with healthcare facilities to establish flexible delivery schedules that align with consumption patterns,

especially for high-demand and short-shelf-life drugs like vaccines or insulin. Additionally, organizations should invest in training supply chain staff on demand forecasting and data analytics to support the successful application of JIT principles. By doing so, pharmaceutical organizations will reduce wastage, improve service delivery, and ensure timely access to essential medicines across the healthcare system.

The study recommended that pharmaceutical organizations in Kenya expand the use of e-procurement systems to strengthen compliance, transparency, and efficiency in supply chain operations. For example, agencies such as the Kenya Medical Supplies Authority (KEMSA) can integrate e-procurement with real-time inventory management systems to monitor orders across counties and hospitals. Hospitals and private pharmaceutical firms should also invest in continuous staff training and technical support to maximize system use, particularly for functions like order tracking and supplier performance monitoring. Additionally, e-procurement platforms can be enhanced to flag non-compliance automatically, thereby improving supplier accountability. By adopting these measures, pharmaceutical organizations will not only improve efficiency and transparency but also ensure timely and reliable delivery of essential medicines.

5.5 Recommendations for Future Research

Future research should go beyond the four strategies examined in this study—centralized procurement, supplier selection, just-in-time, and e-procurement—by including other approaches such as green procurement, framework contracting, and strategic partnerships to provide a more comprehensive understanding of procurement practices in the pharmaceutical sector. Comparative studies across industries like manufacturing and retail would also be valuable in determining whether the effects observed in healthcare are unique or broadly applicable. In addition, longitudinal research is recommended to track the long-term impact of procurement strategies

under changing market and regulatory conditions, while qualitative studies involving interviews or case analyses could offer deeper insights into the practical challenges and contextual factors affecting procurement implementation.

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APPENDIX

Appendix I: Research Letter

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BOARD OF POSTGRADUATE STUDIES

KCAU/BPS/2025 *Date: Monday, July 28, 2025*

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: BARBARA ANDISI OLONYI- REG NO. 24/00675

It is my distinct pleasure to introduce Barbara Andisi Olonyi a student at our institution pursuing a Master of Business Administration- Procurement & Supplies Management degree in the School of Business. Barbara is conducting a research on the topic: ***"Assessment of procurement strategies in supply chain performance of pharmaceutical organizations in Kenya"*** which is part of the requirements of the program she is pursuing. The research as well as the data procured thereof shall be used for academic purposes only. Any assistance accorded to her is highly appreciated.

In case of further inquiry, do not hesitate to contact the undersigned.

Yours faithfully,

DR. JACKSON NDOLO
DIRECTOR, BOARD OF POST GRADUATE STUDIES

Appendix II: NACOSTI authorization letter

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **354319**

Date of Issue: **08/August/2025**

RESEARCH LICENSE

This is to Certify that Miss.. Barbara Andisi Andisi of KCA University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: ASSESSMENT OF PROCUREMENT STRATEGIES IN SUPPLY CHAIN PERFORMANCE OF PHARMACEUTICAL ORGANIZATIONS IN KENYA for the period ending : 08/August/2026.

License No: **NACOSTI/P/25/4178149**

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See overleaf for conditions

Appendix III: Research questionnaire

Cover Letter

Barbara Andisi Olonyi

Dear Respondent's

Thank you for participating in this research on the effect of pharmaceutical procurement strategies on the performance of the healthcare supply chain in Kenya. The information collected will be used for academic purposes only and will remain confidential. Kindly provide accurate responses.

I appreciate you taking the time to contribute to this study.

Sincerely,
Barbara Andisi Olonyi

Section A: Background Information & Demographic Data

1. **Age Group**
   ☐ Below 25 years
   ☐ 25 – 34 years
   ☐ 35 – 44 years
   ☐ 45 – 54 years
   ☐ 55 years and above
2. **Highest Level of Education**
   ☐ Diploma
   ☐ Bachelor's Degree
   ☐ Other (Please specify) _____
3. **Years of Experience in the Healthcare Supply Chain Sector**
   ☐ Less than 1 year
   ☐ 1 – 3 years
   ☐ 4 – 6 years
   ☐ 7 – 10 years
   ☐ Over 10 years

4. **Number of Employees in Your Organization**

   ☐Less than 50

   ☐50 – 100

   ☐101 – 500

   ☐More than 500

Section B

1. **Effect of Centralized Procurement Strategy on supply chain performance of pharmaceutical organizations in Kenya**

Please indicate your level of agreement with the following statements by selecting the appropriate response using the scale below:
1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, 5 – Strongly Agree

Statements	**1**	**2**	**3**	**4**	**5**
Standardized contracts improve supplier compliance and reduce procurement risks.					
Uniform contract terms enhance efficiency in pharmaceutical procurement across healthcare facilities.					
Centralized procurement helps in negotiating better pricing and cost savings for pharmaceuticals.					
Centralized sourcing enhances quality assurance by ensuring consistent supplier standards.					
Pooling procurement volumes across multiple facilities leads to economies of scale.					
Demand aggregation reduces stockouts by improving supply planning and forecasting.					

2. **Effect of Supplier Selection Strategy on supply chain performance of pharmaceutical organizations in Kenya**

Please indicate your level of agreement with the following statements by selecting the appropriate response using the scale below:
1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, 5 – Strongly Agree

Statements	**1**	**2**	**3**	**4**	**5**
Selected suppliers consistently deliver pharmaceutical products on time.					
Supplier reliability reduces delays and enhances supply chain efficiency.					
Supplier selection considers compliance with national pharmaceutical regulations.					
Regulatory-compliant suppliers help maintain product quality and patient safety.					
Suppliers with strong technical expertise provide high-quality pharmaceutical products.					
Technically capable suppliers improve the efficiency of procurement and distribution.					

3. **Effect of Just-in-Time Strategy on supply chain performance of pharmaceutical organizations in Kenya**

Please indicate your level of agreement with the following statements by selecting the appropriate response using the scale below:
1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, 5 – Strongly Agree

Statements	**1**	**2**	**3**	**4**	**5**
Just-in-Time (JIT) procurement improves stock turnover by reducing excess inventory.					
Implementing JIT minimizes wastage and obsolescence of pharmaceutical products.					
JIT procurement enhances order accuracy by ensuring real-time demand-driven replenishment.					
Accurate order fulfillment through JIT reduces errors and improves service delivery.					
JIT procurement reduces lead times, ensuring timely availability of pharmaceuticals.					
Shorter lead times in JIT procurement enhance responsiveness to urgent medical needs.					

4. **Effect of E-Procurement Strategy on supply chain performance of pharmaceutical organizations in Kenya**

Please indicate your level of agreement with the following statements by selecting the appropriate response using the scale below:
1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, 5 – Strongly Agree

Statements	**1**	**2**	**3**	**4**	**5**
The e-procurement system is user-friendly and easy to navigate.					
Training and technical support improve the effective use of the e-procurement system.					
E-procurement enhances compliance with procurement policies and regulations.					
The system helps track supplier adherence to contractual obligations and quality standards.					
E-procurement improves real-time tracking and monitoring of orders.					
Enhanced order visibility reduces delays and enhances supply chain transparency.					

5. **supply chain performance of pharmaceutical organizations in Kenya**

Please indicate your level of agreement with the following statements by selecting the appropriate response using the scale below:
1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, 5 – Strongly Agree

Statements	**1**	**2**	**3**	**4**	**5**
Pharmaceutical products are delivered within the expected timeframe.					
Timely delivery of medical supplies enhances patient care and service efficiency.					
Suppliers consistently fulfill orders as per agreed terms and conditions.					
Reliable suppliers help reduce stockouts and ensure continuity of healthcare services.					
Procurement processes are streamlined to reduce delays and inefficiencies.					
Automation and technology enhance the efficiency of the healthcare supply chain.					

The end thank you

Appendix III: Pharmaceutical Organization In Kenya

Regal Pharmaceuticals Ltd.

1. Laboratory & Allied Ltd.
2. Dawa Life Sciences
3. Pharmaken Ltd.
4. Sai Pharmaceuticals Kenya Ltd.
5. United Pharma
6. Square Pharmaceuticals Kenya EPZ Ltd.
7. Aspen Pharmacare
8. Harleys Limited
9. Beta Healthcare International Ltd.
10. Cosmos Limited
11. Goodlife Pharmacy Africa
12. Haltons Limited