LOGISTICS MANAGEMENT PRACTICES AND SUPPLY CHAIN PERFORMANCE OF PHARMACEUTICAL MANUFACTURING COMPANIES IN KENYA

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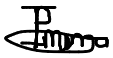
DECLARATION

This research project is my original work and has not been submitted to any other university for an academic award.

Sign:  Date: 21st July 2023

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DEDICATION

This project is dedicated to my late mum who was my greatest supporter and encourager throughout my studies. My lovely family who've always motivated me to be at my very best in everything.

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ABBREVIATIONS

BSC	Balanced Score Card
COVID 19	Corona Virus Disease 2019
GTP	Goods-To-Person
ICT	Information and Communications Technology
LMP	Logistics Management Practices
PLT	Pick-To-Light
SCP	Supply Chain Performance
ANOVA	Analysis of variance

ABSTRACT

The current globalized and interconnected business environment has made organizations to become increasingly dependent on well-organized supply chains, which involve sophisticated logistics, as they develop and expand locally, regionally, or internationally. Manufacturing firms encounter hurdles in today's operating environment, such as increase rivalry among enterprises, and adapting to changing client needs and thus require a supply chain that is effective. The research's main objective was to determine the influence of logistics management practices (LMPs) on supply chain performance (SCP) of pharmaceutical manufacturing companies in Kenya. The research's specific objectives were to determine the prevalent logistic management practices, determine the influence of LMPs on supply chain practices of pharmaceutical manufacturing companies in Kenya, and to explore the challenges experienced by pharmaceutical manufacturing companies in Kenya in adoption of LMPs. Transaction cost theory and network theory informed this research and the descriptive research methodology was adopted. The study population targeted in this research was the 37 companies engaged in pharmaceutical manufacturing. Primary data acquired through a questionnaire was used in the study. The gathered data was analyzed using regression and descriptive analysis. The research results determined that best practices in inventory management, transportation, logistics automation and packaging were prevalent in the pharmaceutical manufacturing companies. The study also found that transportation, inventory management, packaging and logistic automation substantially affected the various aspects of the supply chain management of pharmaceutical manufacturing companies. Further findings indicated that inadequate sensitization and training of staff regarding logistics management practices, failure to link logistics management practices with key performance indicators, and high risks in logistics pertaining to pharmaceutical products were the key challenges experienced. The recommendation provided by the research is that the management of pharmaceutical manufacturing companies should have refrigeration and "high-risk" product storage facilities. Besides, senior management should operationalize inventory and warehousing management systems to track replenishment points and reorder points, and also ensure that the warehouses are routinely cleaned and sanitized. Additionally, senior management of Kenyan pharmaceutical manufacturing enterprises should ensure

interconnectedness of their intranet and extranet in their logistics processes. Moreover, management of the pharmaceutical manufacturing companies should adhere to all rules pertaining to the shipment of pharmaceutical items. Lastly, the manufacturing firms should always follow carefully all pharmaceutical packaging rules and also enhance their packaging efficiency through automation.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The current globalized and interconnected business environment has made organizations to become increasingly dependent on well-organized supply chains, which involve sophisticated logistics, as they develop and expand locally, regionally, or internationally (Kim, Lee, & Hwang, 2020). Logistics play an important role in supply chain management as it is used to coordinate and organize the timely, efficient, reliable and safe transfer of materials and finished products. Providing value to customers' entails more than just quantity and quality, but it also encompasses the timely availability of the products. According to Muema and Achuora (2020), logistic management practices give a means of integrating supply chain operations in order to accomplish planned supply chain performance and a long-term competitive advantage.

Manufacturing firms encounter hurdles in today's operating environment, such as increased rivalry among enterprises, and adapting to changing client needs (Shang, 2019). This has encouraged businesses to look for methods to increase product and service quality, create a technologically favorable atmosphere and lower production costs to encourage the development of products that meet current expectations. According to Marchet, Melacini, Perotti, and Sassi (2018), manufacturing companies have benefited from boosting supply chain performance (SCP) to provide value to their clients. This is accomplished by leveraging the implementation of efficient LMP's in the businesses' supply chain operations.

The transaction cost theory by North (1992) and the network theory by Haakansson (1987) were used to anchor the study. The transaction cost theory (1992) proposes a traditional economic technique for determining an organization's boundaries and use efficiency as a primary inducement for enterprises to participate in inter-firm logistical collaborations. By cooperating with outside partners to offer logistical assistance, an organization may improve its supply chain performance and lower its overall operational expenses (North, 1992). Network theory, on the other hand, promotes inter-organizational relationships in logistics by emphasizing the importance of special relationships amongst diverse companies, the enhancement of trust through long-term, constructive and accommodating relationships, and mutual integration of systems and routines through exchange processes (Haakansson, 1987). The fundamental emphasis of network theory is on network connectivity, network density, and transaction costs. This theory was employed in the research to determine how the last logistics' connectedness, density, and transaction costs impact supply chain performance.

This research was conducted within the Kenyan pharmaceutical manufacturing industries. The industry is tasked with the production, extraction, purification, processing, and packaging of chemical compounds for use as human or animal pharmaceuticals and medical consumables. Ministry of Health (2020) indicates that the country has 37 pharmaceutical manufacturers who are immensely affected by regional and global changes such as the country's position in regional and international pharmaceutical commerce, the growth of local industry, accompanying technological discoveries, and global efforts to eliminate and manage diseases. Besides, the country's average revenue

per indigenous manufacturing firm is low as a result of high logistical and utility expenses. This coupled with over-reliance on global logistics and supply chains makes local pharmaceutical companies to be incapable of dealing with supply chain challenges that were brought about by the corona virus disease 2019 (COVID-19) outbreak (Ministry of Health, 2020). To remain competitive and efficient, Moosivand et al. (2019) indicated that pharmaceutical manufacturers should invest in efficient and dependable logistics to improve their supply chain performance and remain competitive both locally and globally.

1.1.1 Logistics Management Practices

Logistics is the entire process of controlling how resources are procured, stored, and delivered to the various stakeholders who can be external or internal to the organization (Marchet et al., 2018). Logistics management is charged with developing and executing strategies that, if implemented, will lead to improved performance in the supply chain and accomplishment of a long-term competitive advantage for the organization (Lai, Chu, Wang, & Fan, 2018). Logistics management practices (LMPs) has seen significant changes as a result of the strong rivalry, volatile economic climate, and technological advancements. Rapario (2019) posits that globalization and fierce supply chain rivalry have prompted manufacturers to seek out improved logistics practices and partnerships in order to stay competitive.

In business, especially manufacturing, logistics play a strategic function. Logistics management goes beyond transportation and inventory management to include one of the

most vital feature of manufacturing. According to Gimenez (2016), logistics in manufacturing comprises of the fundamental practices such as customer service requirement, plant location and raw material supply. In recent years, changes in the operating environment have made it necessary for organizations to strategically consider how logistics supports and interacts with others business functions (Lai et al., 2018). In a manufacturing organization, logistics may be the difference between success and failure. Kim et al. (2020) posit that a manufacturing entity must thus ensure that it effectively manages the five aspects of logistics which are material handling, storage, and warehousing, packaging, inventory management, transport and logistics automation.

In logistic management practices, material handling, storage, and warehousing allows the organization to provide a consistent stream of products (Hwang & Kim, 2019). Packaging and unitization ensure that products reach their customers in form and sizes that is required, while inventory management ensures availability of products while minimizing inventory holding, ordering, stock-out and transportation costs (Gebisa, 2019). Transportation is another crucial component of logistics that facilitate movement of products from the source to the required destination. Moreover, all of the logistics components need the element of automation to operate as initiators for different processes or operations (Kim et al., 2020). This study will focus on the components of logistics management which are transportation, inventory management and warehousing, packaging, and logistics automation.

1.1.2 Supply Chain Performance

Supply chain performance denotes the capacity of the entire delivery system in satisfying the needs of end-customers, such as on-time delivery, availability of products, and the required capacity and inventory to provide service and meet expectations in a responsive way (Chen et al., 2017). Supply chain performance transcends organizational borders since it encompasses subassemblies, components, basic materials, final products and distribution using a variety of channels to the final consumer (Sahay, 2013). It also transcends conventional organizational functions such as research and development, production, distribution, sales and marketing, and procurement. Networks for supply chain must constantly develop in order to succeed in the new interconnected business environment. To do so, an organization requires performance metrics or measurements that enable the company to ensure effectiveness and efficiency in the supply chain.

There are numerous supply chain performance measures that are specifically intended to monitor and improve supply chain performance improvements throughout the supply chain, determine the right metrics to apply, as well as determining flaws in the supply chain for corrective action (Hwang & Kim, 2019). In today's highly competitive corporate environment, Alam, Bagchi, Kim, Mitra, and Seabra (2014) observe that the use of supply chain metrics may be a significant hurdle to implementing successful integrated supply chain management practices. SCP should be measured using both the quantitative and qualitative measures. Product quality and customer satisfaction are typical qualitative measures, while quantitative measures include flexibility, lead time from order to when products are delivered, utilization of resources, delivery performance,

and reaction time of the supply chain (Gebisa, 2019). This study used use the quantitative measures of SCP which comprised of delivery performance, flexibility, supply chain reaction time, resource utilization and order –to- delivery lead time.

1.1.3 Pharmaceutical Manufacturing Companies in Kenya

The pharmaceutical manufacturing sector comprises of production, extraction, purification, processing, and packaging of chemical compounds for use as human or animal medications and accessories (Parmata, Sankara Rao, & Rajashekhar, 2016). The two main processes in pharmaceutical manufacturing are the blend of the medication and the active component (manufacture or primary processing) and the alteration of active drugs into products suitable for use by humans or secondary processing (Singh, Kumar, & Kumar, 2016). The manufacturing activities conducted by pharmaceutical manufacturers include introduction of functional groups, preparation of process intermediates, esterification and coupling, separation operations such as stripping and washing, and purification of the end product (Moosivand et al., 2019). Further, pharmaceutical manufacturers engage in granulation, tablet pressing, drying, printing, filling, coating, and packaging. Further, these manufacturers also engage in transporting the finished manufacturer products to warehouses or to suppliers.

In Kenya, there are 37 companies engaged in pharmaceutical manufacturing (Ministry of Health, 2020). Regional and worldwide developments, such as the country's position in regional and international pharmaceutical trade, the expansion of local industry, associated technology breakthroughs, and global attempts to eradicate and manage

illnesses, all have an impact on the pharmaceutical sector. Kenya offers competitive pharmaceutical incentives and a high ranking on the Ease of Doing Business index. However, Kenyan pharmaceutical manufacturers sell fewer items domestically and export more than their international counterparts. Further, the country experiences high cost of utilities (electricity and water) as well as packaging materials, but has lower costs of labour. This makes Kenya's average revenue per indigenous manufacturing business to be low (Ministry of Health, 2020). This is primarily owing to high transportation and utility costs, as well as the country's reliance on imported supplies.

The pharmaceutical value chain in Kenya is divided into three stages: input production, medication manufacture, and consumer distribution. In the five years leading up to 2019, the pharmaceutical manufacturing sector grew at a compound annual rate of 13% (Ministry of Health, 2020). Though Kenya has a well-developed health sector and pharmaceutical manufacturing industry, the sector is too reliant on the global logistics providers and supply chain. The pharmaceutical manufacturer' over-dependence on the global supply chain adversely affected it and precluded an efficient and quick response when the COVID-19 epidemic struck (Ministry of Health, 2020). Overdependence on the global logistics and supply chain exposes a country to the danger of disruptions or shortages. Pharmaceutical manufacturers should engage in efficient and reliable logistics to enhance their supply chain performance so that they can be competitive locally and internationally.

1.2 Research Problem

Organizations are becoming more reliant on well-organized supply chains that require complex logistics as they grow and expand locally, regionally, or globally in today's globalized and linked economic environment (Gebisa, 2019). Because logistics is used to coordinate and arrange the safe, timely, reliable, and efficient transportation of resources and completed goods, it plays a vital role in supply chain management. Logistics provide a way of integrating the various activities in the supply chain to accomplish intended SCP for the organization (Fernandes, Hassan, & Sridhar, 2022). In today's operational climate, organizations have profited from improving supply chain performance to provide value to their clients. According to Moosivand et al. (2019), this is done by using effective logistic management strategies in the supply chain activities. Logistics management is responsible for formulating and implementing strategies that, if executed, will enhance SCP and provide the company with a long-term competitive edge.

This study's context was the pharmaceutical manufacturing sector in Kenya which is affected by global efforts to eliminate and manage diseases, regional and global changes such as the country's position in regional and international pharmaceutical commerce, accompanying technological discoveries, and the growth of local industry (Tran et al., 2021). Though the pharmaceutical manufacturing industry grew at a compounded yearly rate of growth of 13% in the five years running up to 2019, according to the Ministry of Health (2020), the country has high utility, logistic and packing material prices, which adversely affects the capacity of the companies to provide services efficiently and remain competitive and sustainable. Tran et al. (2021) further noted that the pharmaceutical

manufacturing sector's over-dependence on global logistics and supply chains affected its service delivery and SCP throughout the COVID-19 pandemic. The role of logistics by pharmaceutical manufacturers in supply chain performance is hence critical since it can have implications for performance and competitiveness.

The logistics and supply chain performance field has attracted much research, but the available empirical studies have some gaps. A study in India by Gebisa (2019) determined that logistics practices, including transportation management, facility location, and use of information systems were vital for enhancing SCP. This research however, had a conceptual gap since it did not incorporate inventory management and warehousing management. The study by Muema and Achuora (2020), for example, investigated the influence of LMP's on SCP in manufacturing organizations in Kenya. The research results determined that supply chain performance was significantly influenced by transportation management, order processing management, inventory management, and warehouse management. This research, however, had a conceptual gap as it did not include packaging and logistics automation which are vital logistics components. Rapario (2019), on a study on cement manufacturers in Kenya established that warehousing management, information flow management and inventory management positively affected SCP. This research had a contextual gap since it only considered cement manufacturers and the findings may not be generalizable to pharmaceutical manufacturers. This research aimed to close these gaps by addressing the question, what is the impact of logistics on SCP of pharmaceutical manufacturing organizations in Kenya?

1.3 Objective of the Study

The main research objective was to determine the effect of logistic management practices on supply chain practices of pharmaceutical manufacturing firms in Kenya. The specific objectives of the research were;

i) To determine the prevalent logistic management practices of pharmaceutical manufacturing companies in Kenya.

ii) To determine the influence of logistic management practices on supply chain practices of pharmaceutical manufacturing companies in Kenya.

iii) To explore the challenges experienced by pharmaceutical manufacturing companies in Kenya in adoption of LMPs.

1.4 Value of the Study

The results of this study will provide evidence on the impact of LMPs on supply chain practices amongst pharmaceutical manufacturers in Kenya. These findings will be vital for policy makers in the ministry of Trade, Investment and Industry, Ministry of Health and the association of medical laboratory suppliers. The study findings will inform policy formation on approaches to promote logistics and supply chain practices amongst pharmaceutical manufacturers in Kenya. This is expected to lead to advancement of the pharmaceutical manufacturing industry and enhance the economic growth of the entire health industry and country at large by ensuring the service quality, improved performance and sustainability of pharmaceutical manufacturers. Thus, regulators and policymakers may use the results to develop logistics and supply chain policies in the pharmaceutical manufacturing sector. The outcome would be a better policy and regulatory framework, which would be beneficial to the growth of the industry.

The research results will also contribute to practice by emphasizing the need of integrating logistics as a vital supply chain component to enhance supply chain performance. This evidence will provide guidance to management of pharmaceutical manufacturing firms on the interventions needed to achieve or enhance their supply chain performance. Furthermore, the results will provide insights to senior executives in other industries about the need of incorporating effective logistics processes for improved supply chain performance.

Lastly, the findings will contribute to the theory as an addition to the available scholarly work relating to LMP's and SCP. In terms of theoretical contributions, the research will advance the arguments in logistics and supply chain theories and also test the applicability of these theories to the Kenyan pharmaceutical manufacturing sector. Furthermore, the research is a vital addition to the little academic empirical literature on logistics, and SCP in the pharmaceutical manufacturing sector in Kenya. Moreover, this research findings will be valuable to researchers as it recommends fields for further study which researchers can explore in future.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The literature review that lays the foundation for this study is discussed in this chapter and incorporates both hypothetical and pragmatic literature. The review of theories provides an overview of the two theories that acted as the footing of the research. Literature on logistic management practices, supply chain performances and challenges faced in adopting various logistics management practices are included in the chapter.

2.2 Theoretical Review

The discussion in this section relates to the transaction cost theory and network theories that were used in the study to elucidate LMPs and their influence on supply chain performance.

2.2.1 Transaction Cost Theory

North (1992) developed the transaction cost theory which provides a mainstream monetary methodology that prescribes the boundaries of a firm and utilizes efficiency as a core incentive that drives organizations to enter into logistics engagements with other supply chain partners. Halldorssonet et al. (2007) indicates that by cooperating with outside partners to provide enable the firm provide logistical services, an organization may improve its supply chain performance and lower its overall operational expenses. The key determinant of whether or not a firm's logistical undertakings will be inward is transaction expenses. When transaction costs are high, it makes sense to keep the

logistical management practices internal. On the contrary, it is preferable to acquire logistical services in the market due to low transaction costs (Chu & Wang, 2012).

Sahay (2013) postulate that organizations prefer to internalize those logistical operations that have good capabilities on compared to external suppliers, putting emphasis on the advantages of capabilities. Moreover, Muema and Achuora (2020) established that trust is another key factor that determines whether a firm will contract outside suppliers or logistics have the logistics operations inhouse. When the firm has trusted logistical services providers, it will contract out, but will seek to conduct the logistics inhouse if there are no trusted partners (Hwang & Kim, 2019). Besides, Lai et al. (2018) posit that organizations would use external logistics providers for operations where the organization has the skills or when external providers might supply services at a lower cost than if the company performed the activities itself. This theory was applied in this study to link outsourced or inhouse transport, warehousing, material handling logistical practices to SCP of pharmaceutical manufacturers.

2.2.2 Network Theory

The network theory by Haakansson (1987) links an enterprise's logistics management practices with that of its supply chain partners to achieve more through joint efforts compared to individual efforts. Network theory, according to Chen et al. (2017), promotes relationships amongst firms by emphasizing the importance of special relationships among diverse companies, the enhancement of trust by means of accommodating, sustainable and constructive relationships, and reciprocated integration

of systems and routines through interlinked logistical processes. The fundamental emphasis of network theory is on network density, network connectivity, and transaction costs (Gebisa, 2019). Low transaction costs are common in networks with high density and connectedness, and vice versa. This research employed this theory to determine how the logistic management practices such as packaging, information exchange and control are coordinated between the various supply chain partners and how this affects supply chain performance of pharmaceutical manufacturers.

Rapario (2019) observes that the ease with which a logistics network can effectively provide services to the firm may be connected to trust between the departments and partners, linkages in the practices and information exchange and control in the supply chain network. High trust, interconnectedness and coordination through information exchange is expected to enhance the effectiveness of the LMP's and hence enhance supply chain performance through enhanced delivery times and efficiency (Chen et al., 2017). Furthermore, through expanding connectedness in a logistic network tends to minimize average trip length and brings logistics partners closer together and makes them feel more connected (Kim et al., 2020). Furthermore, connection alters the way the logistics system interacts and operates with the design and administration systems. Hence, connection between departments or supply chain partners may improve the logistics providers' reaction times and efficiency in addressing the needs in the supply chain.

2.3 Logistics Management Practices

Logistic management practices are the processes and activities that are involved in ensuring that commodities are moved into a facility, appropriately kept, handled, packaged and transferred out. Logistics management practices are divided into two categories which are support and core practices (Hwang & Kim, 2019). The core activities include inventory management, customer service, information flow, and transportation, while the support activities comprise of packaging and warehousing among others. The first key activity is order processing which kicks off other activities in the logistics chain. Order processing describes the group of activities, quantity and time required in completing orders for services or products from customers, and it serves as the trigger for the flow of information flow in a logistics chain (Marchet et al., 2018).

Inventory management is another key aspect of logistics that needs to be effectively managed. Downstream and upstream inventory visibility is provided by inventory management practices in the supply chain system and logistics (Shang, 2019). The goal of adopting practices for management of inventory is to reduce stock-outs and inventory costs (Marchet et al., 2018). All inventory management practices in the firm must benefit the company reducing working capital needs and reducing operational costs. The lead time, stock cover, rate of stock turn, service time (safety stock), and stock outs in a particular period, are indicators to measure the effectiveness of the organization's inventory management practices.

Transportation is another aspect of logistics that an organization should focus on. As a critical strategic connection between companies or firms in a supply chain, transportation must be handled successfully in order to satisfy client deadlines and other shipping needs while staying under budget (Kim et al., 2020). Transportation in logistics refers to the movement of people, products and goods between manufacturing facilities, distribution centers, warehouses, consumers and terminals (Lai et al., 2018). The transportation system configuration should consider fleet size, outsourcing of some transportation activities, mode selection, route selection, and a fleet management system to optimize transportation.

With the advent of ICT, logistics automation has become a powerful tool for connecting one logistics operation to the next and making real-time data generated in one activity broadly accessible, within the company and external channels, suppliers, and consumers (Tran et al., 2021). Logistics automation must boost the logistics operations of the organization through planning, regulating, monitoring and coordinating the process of logistics if it is to be efficient and successful. According to Marchet et al. (2018), a successful information system for logistics includes the utilization of technology transfer, software and hardware. It is hence vital for the information system of the organization to be adapted to successfully assist logistics procedures and activities in order to progress communication between departments or supply chain partners.

Warehousing is another aspect of logistics where stock layout, space planning, configuration, and stock placement are all key aspects. Precise warehouse selection and

dispatching are essential for delivering products in the right amount and condition (Shang, 2019). Packaging is another key component in logistics and it is responsible for designing, storage, handling, loss and damage prevention (Muema & Achuora, 2020). Packaging should be conducted for safety, advertising, regulatory and branding needs. Effective packaging ensures that product arrive at the intended destination in good form and shape (Gimenez, 2016). Packaging is an integral logistics process that ensures that the product is ready for safe, effective and efficient transport, consumption, distribution, handling, recovery, reuse, retailing, and disposal to meet demand from end users.

Automation of logistics operations from order processing to automated shipment, logistics and inventory management may improve the efficiency of various logistics operations. Using warehouse automation technologies, for example, repetitious warehousing processes may be made easier. The organizations should consider technologies like goods-to-person (GTP), pick-to-light (PLT), and voice selection (Fernandes et al., 2022). This frees up time for the employees to concentrate on increasing sales and focusing on value adding activities (Hwang & Kim, 2019). Companies must remove inefficient supply chain operations and find ways to enhance container usage to assure the most efficient use of resources at the lowest possible cost.

2.4 Supply Chain Performance Measurement

SCP is the competence of the extended supply chain in fulfilling the demands of the final client that include timely delivery, availability of products, and all essential capacity and inventory to meet customer expectations (Rapario, 2019). There have been both

quantitative and qualitative measures of SCP that have been applied by different practitioners and scholars. The balanced score card (BSC) is one of the measurement systems that uses four viewpoints; customer, internal processes, financial, and growth and learning (Piotrowicz & Cuthbertson, 2015). Supply chain performance metrics are divided into many categories but quality, cost, and time, are the major aspects of supply chain performance measurements (Gebisa, 2019). Time indicators of supply chain performance include time to complete an order (internal process perspective), on-time deliveries (customer perspective), on-time receipts, and time taken to execute purchase orders.

Cost (financial perspective) is another essential supply chain performance statistic since it assesses the efficiency of the various components of the logistics system. Focusing on cost based measures is important as they enable organizations to improve on profitability by improving on practices that reduce costs. Inventory carrying costs is one cost indicator that determine the costs incurred to hold and handle products in the warehouse, from suppliers and to customers (Panayides, Borch, & Henk, 2018). Concerning quality (customer perspective), the indicators of supply chain performance that focusses on quality are vital for companies that are focused on enhancing satisfaction of the customers. Measures and indicators of delivery time are important for satisfying customers but improvements in quality of the product due to packaging and proper handling may considerably boost customer satisfaction. Singh et al. (2016) measures SCP in terms of financial performance, inventory costs, and cycle durations. Resource utilization, innovativeness, quality, flexibility, cost, trust and visibility are other supply

chain performance measures that have been used in studies (Alam et al., 2014). Muema and Achuora (2020) used a framework for supply chain performance indicators based balanced score card framework while Shang (2019) proposed four kinds of measures for developing a complete supply chain performance system system: relational (learning and growth perspective), strategic, operational, and economic measures.

2.5 Empirical Review and Knowledge Gaps

There various studies that have linked logistic management practices with various organizational outcomes such as operational performance, organizational performance, customer satisfaction and SCP. Ristovska et al. (2017) explored the influence of logistics management, such as warehousing, transportation, packaging, information management, and inventory on an organization's effectiveness and efficiency. This study used a sample of eighty participants from eighty different firms throughout Macedonia. The study findings established that to reduce the company's total expenses, logistics managers must focus on warehousing, storage, information management, inventory and transportation. However, this research had some contextual and conceptual gaps because it was carried out in Macedonia whose operating environment is different from of Kenya. The research also did not focus on strategic alliance and continuous logistics automation that will be considered in this study.

In Ethiopia, Chala and Kumar (2021) assessed how organizational performance was influenced by LMP's of a sugar manufacturer. Employees of the sugar factory who worked in material planning, facility management and inventory management were the

population studied. The information was gathered from secondary and primary sources. The results from the study revealed that warehouse, inventory, transportation management have a favorable and a substantial effect on organizational performance. The research, however, had a conceptual gap as it used organizational performance as the response variable whereas the current study uses supply chain performance as the response variable.

In Kenya, the study by Rapario (2019) assessed how logistic management practices affected supply chain management of cement manufacturing companies. The research focused on LMP's that encompassed management of information flow, inventory, transportation and store. The descriptive design was used on a population of six cement manufacturing companies. Data was gathered through a questionnaire survey that incorporated 72 managers from different departments engaged in logistics management. The study findings established that warehouse management, information flow management, and inventory management had a beneficial influence on cement manufacturing enterprises' SCP. However, this study had a contextual gap as it focused only on cement manufacturers and the findings may hence not be generalizable to pharmaceutical manufacturers.

Another study in Nairobi County, Kenya by Mwinzi (2018) explored the LMP's and their influence on SCP of manufacturing companies. The research selected a sample of 80 manufacturing companies in Nairobi County and gathered data from supply chain managers using structured questionnaires. The study findings determined that

transportation management, automation, and management of order processing had a significant impact on supply chain management. This study left conceptual and contextual gaps that the current research was focused on filling. First, the research included all manufacturing companies whereas the current study focused only on pharmaceutical manufacturers. Besides, the study did not consider warehouse management, packaging, and inventory management which were incorporated in the current research.

2.6 Conceptual Framework

Figure 2.1 below is a depiction of the conceptual framework of the research. Logistics management practices are the predictor variable, whereas supply chain management is the outcome variable.

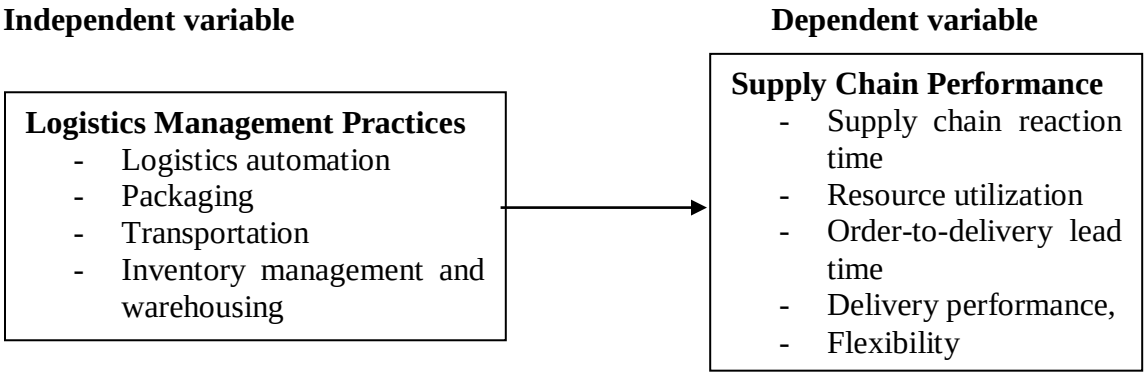

Figure 2.1: Conceptual Framework

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter explains and discusses the research methodology. The design applied in the research, research instruments, procedures, and techniques used are detailed in this chapter. Furthermore, the study population, sample size and sampling procedure are all covered in this chapter. In addition, the chapter presents the process that was adopted in gathering data, and in analysis of the data collected.

3.2 Research Design

This research used a descriptive research methodology to investigate the LMPs and the SCP of pharmaceutical manufacturing companies in Kenya. Saunders, Lewis, and Thornhill (2019) indicate that a descriptive research design enables collection of data to illustrate a circumstance, phenomena, or population in a methodical way. Further, Collis and Hussey (2018) note that it can be applied to establish association between variables. This research design was appropriate for this research since it aided the research to gather information about the LMP's and SCP of pharmaceutical manufacturing firms in Kenya. Moreover, the design aided the research to scrutinize the impact of logistic management practices on SCP of the targeted firms.

3.3 Study Population

The study population targeted in this research was the 37 organizations engaged in pharmaceutical manufacturing (Ministry of Health, 2020). The study analysis unit was the pharmaceutical manufacturing organizations whilst the units of observation were four management employees in the logistics (transportation, packaging, warehousing, inventory management) of the pharmaceutical manufacturing companies in Kenya. This led to 148 potential respondents from all the 37 companies targeted in the study. Easterby-Smith, Thorpe, Jackson, and Lowe (2019) indicate that a small population (below 200) does not warrant sampling and a study of the whole population should be considered. The research was hence a census of 148 potential respondents from all the 37 pharmaceutical manufacturing companies in Kenya.

3.4 Data Collection

This research depended on a questionnaire to gather data that was used. The questionnaire was administered to all the 148 selected managers in the 37 pharmaceutical manufacturing companies in Kenya. The questionnaires were electronically administered (goggle forms) for ease accessibility of the target study participants. The questionnaire was designed into four sections. The initial part targeted to collect wide-ranging information relating to the organizations and the study participants. The second section gathered information on LMP while the third section gathered data on SCP of the company. The final section gathered data on challenges faced while adopting the various logistic management practices. All the sections apart from the section on general information were designed on a five-point Likert scale.

3.5 Data Analysis

The procedure for analyzing data started with the sorting of the questionnaires in order to establish which ones were properly completed and should be analyzed. Raw data was then fed into the Statistical Package for Social Sciences (SPSS) which was utilized to generate the necessary inferential and descriptive statistics. The analysis of the gathered information was done by application of regression analysis and descriptive statistics. On the closed questions, descriptive statistics were utilized to determine the scope and kinds of logistics management practices employed by the pharmaceutical manufacturing companies in Kenya, as well as supply chain performance metrics. Besides, means and standard deviations were utilized to determine the key challenges facing logistics management and supply chain performance. Mean scores, percentages, frequency distributions and standard deviations were among the descriptive statistics employed. The impact of LMPs on SCP of pharmaceutical manufacturing organizations was examined using regression analysis. The regression models used were:

$$Y_1 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

$$Y_2 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

$$Y_3 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

$$Y_4 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

$$Y_5 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

In the models, 'Y_1' represents supply chain reaction time, 'Y_2' denotes resource utilization, 'Y_3' denotes order-to-delivery lead time, 'Y_4' represents delivery performance, while 'Y_5' represents flexibility. Besides, '$\beta 0$' represents the constants, 'X_1'

represents transportation management, 'X_2' represents logistics automation, 'X_3' represents warehousing and inventory management, 'X_4' represents packaging, ‘ε’ represents the error term in the regression model. Tables and pie charts were used to display the study's results.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

The fourth chapter incorporates the analysis of data, and the research results' discussion. The purpose of the research was to assess the influence of LMPs on SCP of Kenyan pharmaceutical manufacturing companies. Specifically, the research investigated the prevalent LMPs of pharmaceutical manufacturing organizations in Kenya, explored the effect of LMPs on SCP, and assessed the challenges experienced by pharmaceutical manufacturing firms in Kenya in execution of LMP's. The study targeted senior management employees of the manufacturing companies through a questionnaire survey. The results are provided in this chapter and they are presented through figures and tables.

4.2 Demographic Information

The focus of this section, which also contains wide ranging data from the study participants, is on the response rate of the research. The included findings in this section are analysis of the study participants' level of education, gender and the period in years the study participants had been employed in the manufacturing companies.

4.2.1 Response Rate

A questionnaire survey was used for the study, and 148 senior management employees in the logistics (transportation, packaging, warehousing, inventory management) departments of the manufacturers were administered with questionnaires. The study successfully covered 95 senior management employees which translate to a rate of

response of 64.2% (Figure 4.1). This was regarded as an adequate response rate after considering the stipulation by Saunders et al. (2019) that a 60% questionnaire survey rate of response is acceptable, provided effective sampling was utilized. This section provides results drawn from the analysis of the 95 completed questionnaires.

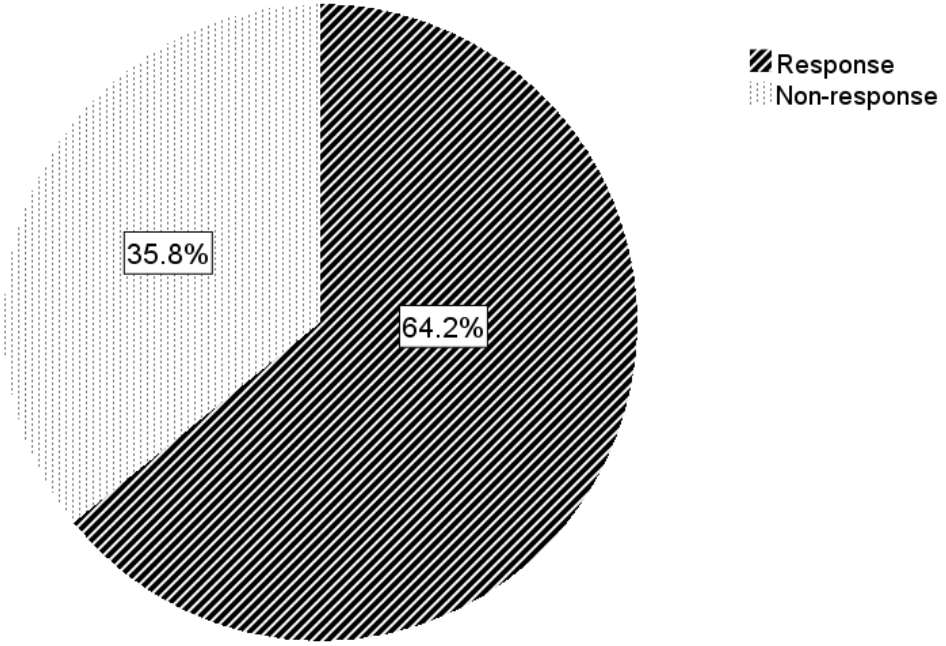

Figure 4.1: Response Rate

4.2.2 Respondent's demographic Information.

Demographic data was requested from the study participants in the questionnaire. This included information on respondents' gender, highest education level, and the number of years that study participants had been employed in the manufacturing companies.

4.2.2.1 Gender of the Research Participants

The gender of the research participants was investigated to establish the prevalent gender amongst senior management employees dealing with logistics in pharmaceutical manufacturing companies. Figure 4.2 provides a summary of the results.

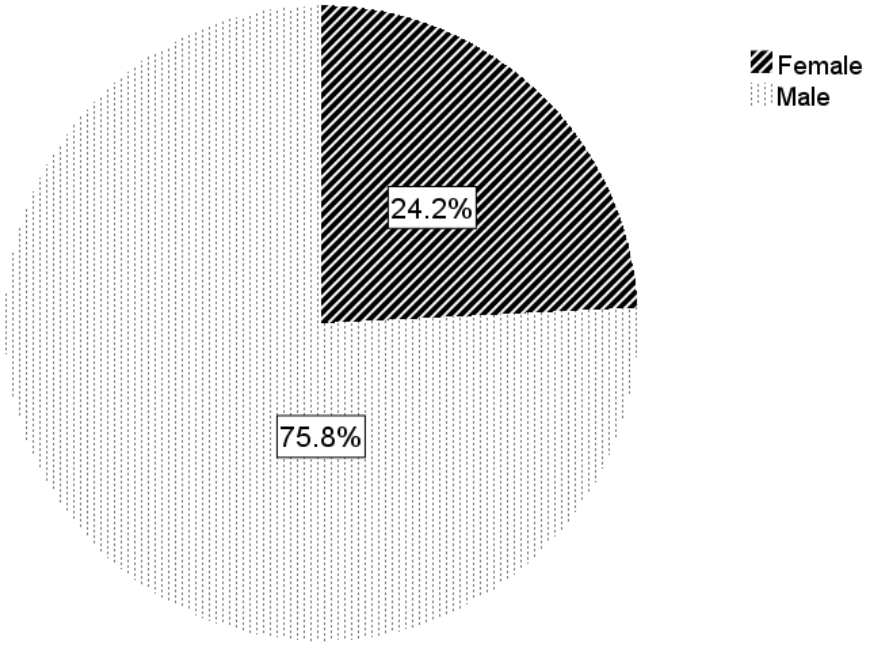

Figure 4.2: Gender of the Research Participants

Figure 4.2 presents the study findings which demonstrate that the most (75.8%) of the study participants were male with only 24.2% being female. This indicates that most senior management employees dealing with logistics in pharmaceutical manufacturing companies are male.

4.2.2.2 Education Level of Respondents

The research explored the highest education level acquired by the participants in the study. This was done to show the distribution of education amongst senior management

employees dealing with logistics in pharmaceutical manufacturing companies. Table 4.1 shows the study results.

Table 4.1: Education Level of Respondents

Education level	Frequency	Percent
College diploma	9	9.5
Undergraduate degree	49	51.6
Master's degree	35	36.8
PhD	2	2.1
Total	**95**	**100.0**

Table 4.1 The results provided demonstrate that the most of the study participants (51.6%) had undergraduate degrees while only 2.1% had PhDs. These findings indicate that most senior management employees dealing with logistics in pharmaceutical manufacturing companies have undergraduate degrees and higher levels of education qualifications.

4.2.2.3 Years Worked in the Organization

The research explored the period in years that the participants in the research had been employed in the pharmaceutical manufacturing companies. Table 4.2 presents the research findings.

Table 4.2: Years Worked in the Organization

Period in years	Frequency	Percent
Under 5	11	11.6
5 – 10	39	41.0
Over 10	45	47.4
Total	**95**	**100.0**

The study results displayed in Table 4.2 demonstrate that 47.4% of the respondents had been employees in the pharmaceutical manufacturing companies for over 10 years while

11.6% had been employed in the companies for a period below 5 years. These results demonstrate that most of the respondents had been in the pharmaceutical manufacturing companies for over five years, which may imply a high level of experience and knowledge regarding Logistic management practices and SCP.

4.3 Logistic management practices

The study investigated the four prevalent logistic management practices that influenced the SCP in pharmaceutical manufacturing companies in Kenya.

4.3.1 Transportation Management Practices

The study investigated the prevalence of transport management practices amongst the pharmaceutical manufacturing companies. This section provides descriptive analysis of transport management practices amongst the pharmaceutical manufacturing companies. Different transport management practices amongst the pharmaceutical manufacturing companies were given to the respondents, and they were requested to provide insights on how the practices were applied in their firms. On an ordinal scale, the statements were rated from a low of 1 (very low extent) and a high of 5 (very great extent). The study utilized means (M) and standard deviations (SD) in analysis and Table 4.4 displays the research findings.

Table 4.3: Transportation Management Practices

Statements on Transportation Management Practices	Mean	SD
The company transports its products in insulated or refrigerated trucks	3.95	1.079
The company tracks every shipment through all the stages of the transport process	4.36	1.111
The company strictly complies with all regulations relating to transportation of pharmaceutical products	4.46	1.419
The company has adopted satellite tracking and total visibility solutions for the transport fleet	3.71	.936
The company exercises due diligence when selecting third party transport partners	3.72	1.453

Study results presented in Table 4.3 demonstrate that study participants were of the view that the companies strictly complied with all regulations relating to transportation of pharmaceutical products to a great extent (M = 4.46, SD = 1.419). Besides, study participants felt that to a great extent, the company tracked every shipment through all the stages of the transport process (M = 4.36, SD = 1.111), transported their products in insulated or refrigerated trucks (M = 3.95, SD = 1.079) and exercised due diligence when selecting third party transport partners (M = 3.72, SD = 1.453), Additionally, study participants were of the view that the companies had to a great extent adopted satellite tracking and total visibility solutions for the transport fleet (M = 3.71, SD = 0.936). These study results indicate that the pharmaceutical manufacturing companies applied logistic management best practices to a great extent.

4.3.2 Warehousing and Inventory Management Practices

The research investigated the prevalence of warehousing and inventory management best practices amongst the pharmaceutical manufacturing companies. This section provides descriptive analysis of warehousing and inventory management practices amongst the pharmaceutical manufacturing companies. Respondents were requested to indicate how

the different warehousing and inventory management practices amongst the pharmaceutical manufacturing companies were adopted. On an ordinal scale, the statements were rated from a low of 1 (very low extent) and a high of 5 (very great extent). The study utilized means (M) and standard deviations (SD) in analysis and Table 4.4 provides the study results.

Table 4.4: Warehousing and Inventory Management Practices

Statements on inventory management practices	Mean	SD
The company has refrigeration and "High-risk" products storage facilities	4.60	.761
The firm has adopted inventory and warehousing management systems to track reorder points and replenishments	4.31	.895
The warehouses are cleaned and disinfected regularly	4.18	.781
Products are stored in a situation to enable First-to-Expire, First-Out distribution.	4.65	.686
All inbound and outbound products are inspected and recorded for temperatures, packing condition and spillage	3.86	.941

Table 4.4 presents the study findings which show that respondents felt that to a very great extent, products are stored in a situation to enable first-to-expire, first-out distribution (M = 4.65, SD = 0.686) and the firms have refrigeration and "High-risk" products storage facilities (M = 4.60, SD = 0.761). Research results also indicated that the respondents felt that to a great extent, the firms have adopted inventory and warehousing management systems to track reorder points and replenishments (M = 4.31, SD = 0.895), the warehouses are cleaned and disinfected regularly (M = 4.18, SD = 0.781) and that all inbound and outbound products are inspected and recorded for temperatures, packing condition and spillage (M = 3.86, SD = 0.941).

4.3.3 Packaging Practices

The research investigated the prevalence of optimal packaging practices were across pharmaceutical manufacturing firms. The procedures used by pharmaceutical manufacturing businesses for packaging are described and analyzed in this section. The respondents were given information on several packaging practices used by pharmaceutical manufacturing businesses, and they were asked to rate how widely these techniques were implemented in their organizations. On an ordinal scale, the statements were rated from a low of 1 (very low extent) and a high of 5 (very great extent). The study utilized means (M) and standard deviations (SD) in analysis and Table 4.5 provides the study results.

Table 4.5: Packaging Practices

Statements on Packaging Practices	Mean	SD
The company has improved packaging efficiency through automation	4.35	.694
The company has optimized the safety of its pharmaceutical products through good packaging	4.17	.871
The company strictly adheres to all pharmaceutical regulations regarding packaging	4.38	.776
The company always provides protective packaging for fragile products	4.36	.695
All labels on the packaging of the company's products are easily legible	3.71	.913

Table 4.5 presents the study results which demonstrate that the study participants were of the view that to a great extent, the company strictly adhere to all pharmaceutical regulations regarding packaging (M= 4.38, SD = 0.776) and that the companies always provide protective packaging for fragile products (M = 4.36, SD = 0.695). Besides, study participants felt that to a great extent, the companies had improved packaging efficiency through automation (M = 4.35, SD = 0.694), had optimized the safety of their

pharmaceutical products through good packaging (M = 4.17, SD = 0.871) and all labels on the packaging of the companies' products were easily legible (M = 3.71, 0.913).

4.4.4 Logistics Automation Practices

The study examined the prevalence of logistics automation best practices amongst the pharmaceutical manufacturing companies. This section provides descriptive analysis of logistics automation best practices amongst the pharmaceutical manufacturing companies. The study provided different logistics automation best practices amongst the pharmaceutical manufacturing companies and the study participants were requested to indicate the extent that the practices were applied in their firms. On an ordinal scale, the statements were rated from a low of 1 (very low extent) and a high of 5 (very great extent). The study utilized means (M) and standard deviations (SD) in analysis and Table 4.6 provides the study results.

Table 4.6: Logistics Automation Practices

Statements on Logistics Automation Practices	Mean	SD
The firm has adopted modern technology for information sharing and logistics integration with partners	3.99	.94**3**
The firm uses electronic data interchange (EDI) to coordinate various logistics processes	4.15	**.717**
Ordering system with key customers is fully automated and IT enabled	4.44	.815
The firm has interlinked its intranet and extranet in its logistics processes	4.25	.920
The firm has predictive analytics to produce forecasting models for pricing, optimal shipping frequency, demand, and optimal inventory levels	3.62	.881

Table 4.6 presents the study results which demonstrate that research participants indicated that to a great extent, ordering system with key customers were fully automated and IT enabled (M = 4.44, SD = 0.815), the firms had interlinked their intranet and

extranet in their logistics processes (M = 4.25, SD = 0.920) and the firms used electronic data interchange (EDI) to coordinate various logistics processes (M = 4.15, SD = 0.717). Additionally, study participants felt that to a great extent, the firms have adopted modern technology for information sharing and logistics integration with partners (M = 3.99, SD = 0.943) and they have predictive analytics to produce forecasting models for pricing, optimal shipping frequency, demand, and optimal inventory levels (M = 3.62, SD = 0.881).

4.4 Supply Chain Performance

The outcome variable in the research was supply chain performance of pharmaceutical manufacturing companies. To measure supply chain performance, study participants were requested to rate the statements provided concerning utilization of resources, reaction time of the supply chain, delivery performance, flexibility and the lead time from order to the delivery of products. On an ordinal scale, the statements were rated from a low of 1 and a high of 5 (very low extent to very great extent). The study utilized means (M) and standard deviations (SD) in analysis and Table 4.7 summarizes the research results.

Table 4.7: Supply Chain Performance

Statements on supply chain performance	Mean	SD
The supply chain reacts fast to changes in customer demand	3.86	.819
The supply chain reacts fast to changes in raw materials supply	3.94	.807
When there are disruptions in the supply chain, the firm adapts efficiently	4.01	.958
The company has been able to optimize use of resources in the supply chain	3.77	.922
The firm uses technology to optimize resource use in its supply chain	4.25	.752
The firm focuses on upskilling and outsourcing supply chain expertise	3.61	1.026
The organization has optimum order-to-delivery lead time compared to other pharmaceutical manufacturers	3.69	1.152
Customers of this firm are satisfied based on the time it takes to deliver their orders	3.91	.977
The company has very few complaints regarding delayed deliveries	4.17	.882
The company always has on-time delivery of its products to customers	4.24	.873
The company always delivers products accurately according to order	4.52	.628
The company has been able to optimize the average cost of delivery	3.86	.726
The company has high supply chain reaction time when disruptions occur	3.66	.981
The firm has the capacity to easily adjust production levels based on changes in demand	3.70	.845
The supply chain used data for use in future improvements	3.78	.839

Table 4.7 presents the research findings which demonstrate that the study participants indicated that to a very great extent, companies always delivers products accurately according to order (M = 4.52, SD = 0.628). Besides, indicated that all other statements provided applied to a great extent because the means were between 3.5 and 4.5. These findings indicate that to a great extent, supply chains in the firms reacts fast to changes in customer demand, and that the supply chains react fast to changes in raw materials supply. The results also indicate that to a great extent, when there are disruptions in the supply chain, the firms adapts efficiently. Additionally, the companies have been able to optimize use of resources in the supply chains, the firms use technology to optimize

resource use in their supply chain and that the firms focus on upskilling and outsourcing supply chain expertise. The findings moreover, indicate that the organizations have optimum order-to-delivery lead time and that customers of the firms are satisfied based on the time it takes to deliver their orders. Besides, the companies have very few complaints regarding delayed deliveries, usually have on-time delivery of their products to customers, mostly deliver products accurately according to order and have been able to optimize the average cost of delivery. Additionally, the findings indicate that the companies have high supply chain reaction time when disruptions occur and have the capacity to easily adjust production levels based on changes in demand. Furthermore, the findings indicate that the supply chains of the firms gathered data for use in future improvements.

4.5 Logistic management practices in supply chain management of pharmaceutical manufacturing companies.

The research undertook a multivariate analysis to examine how the LMP's influenced supply chain performance. Besides, several multivariate regression models were fitted which showed how the logistics management practices influenced the five measures of SCP (reaction time of the supply chain, reaction time, delivery performance, utilization of resources, lead time form order to delivery to customers, and flexibility). The next section provides the multiple regression findings of all the predictor variables against each of the five measures of SCP.

4.5.1 Influence of Logistics Management Practices on Supply Chain Reaction Time

The research explored the influence of LMPs on the reaction time of the supply chain. Analysis through multiple regressions was utilized to achieve this objective where the independent variables were inventory and warehouse management, logistics automation, transportation, and packaging whereas the dependent variable was supply chain reaction time. The ANOVA, regression model summary, and the coefficients of the model are provided herein. The findings of the model summary are summarized in Table 4.8.

Table 4.8: Model Summary for Logistics Management Practices on Supply Chain Reaction Time

R	R Square	Adjusted R Square	Std. Error of the Estimate
.577	.333	.304	1.019

a. Predictors: (Constant), Inventory and warehouse management, Logistics automation, Transportation, Packaging

Table 4.8 shows the model's moderate explanatory power. According to the model's correlation coefficient (r = 0.577), there is a moderate linear association between the LMP's and supply chain reaction time. The research findings also show that 33.3% change in supply chain reaction time can be explained by the four logistics management practices (r squared = 0.333, or 33.3%). This indicates that 66.7% of the change in the supply chain reaction time of the pharmaceutical manufacturing companies was triggered by aspects that were not captured in the model.

The model's ANOVA was also undertaken. This was done to determine if LMP's have a substantial influence on reaction time of the supply chain and to assess the model's fitness. Table 4.9 provides the research findings.

Table 4.9: ANOVA for Logistics Management Practices on Supply Chain Reaction Time

Source of variance	Sum of Squares	df	Mean Square	F	Sig.
Regression	46.701	4	11.675	11.245	.000
Residual	93.446	90	1.038		
Total	140.147	94			

a. Dependent Variable: Supply Chain Reaction Time

b. Predictors: (Constant), Inventory and warehouse management, Logistics automation, Transportation, Packaging

The study results provided in Table 4.10 portrayed that the model exhibited good fitness ($F = 11.245$, $p < 0.05$). This indicates that at least one of the four logistics management practices (inventory and warehouse management, logistics automation, transportation, and packaging) have a statistically significant effect on the reaction time of the supply chain. The fact that the model fitted the data well implies that regression analysis model was appropriate for the study to determine how logistics management practices influence supply chain reaction time.

The supply chain reaction time was regressed against the independent variables (inventory and warehouse management, logistics automation, transportation, and packaging). The findings are reported together with the t statistics, regression coefficients, and significance levels. Table 4.10 provides the research findings.

Table 4.10: Influence of Logistics Management Practices on Supply Chain Reaction Time

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	-1.987	1.573		-1.263	.210
Inventory and warehouse management	.384	.162	.263	2.374	.020
Logistics automation	.194	.242	.079	.801	.425
Transportation	.448	.170	.325	2.639	.010
Packaging	.284	.196	.152	1.452	.150

a. Dependent Variable: Supply Chain Reaction Time

Research findings provided in Table 4.10 who that inventory and warehouse management significantly and positively affected supply chain reaction time of Kenyan pharmaceutical manufacturing companies ($\beta = 0.384$, $t = 2.374$, $p < 0.05$). The findings also demonstrate that logistics automation had no significant influence on the reaction time of the supply chain of Kenyan pharmaceutical manufacturing companies ($\beta = 0.194$, $t = .801$, $p > 0.05$). Besides, findings showed that transportation significantly and positively affected supply chain reaction time of Kenyan pharmaceutical manufacturing organizations ($\beta = 0.448$, $t = 2.639$, $p < 0.05$). Moreover, findings indicate that packaging had no significant effect on supply chain reaction time of pharmaceutical manufacturing firms in Kenya ($\beta = 0.284$, $t = 1.452$, $p > 0.05$).

Since only the significant coefficients are incorporated in a model, these findings were fitted in the proposed model as indicated below;

$$Y_1 = 0.448X_1 + 0.384X_3$$

In the model, 'Y_1' represents supply chain reaction time, 'X_1' represents transportation management, and 'X_3' represents warehousing and inventory management.

4.5.2 Influence of Logistics Management Practices on Resource Utilization

The research investigated how resource mobilization was affected by logistics management practices. To do this, multiple regression analysis was employed with the dependent variable being resource utilization and the independent variables being inventory and warehouse management, logistics automation, transportation, and packaging. The ANOVA, the regression coefficients, and the regression model summary are presented in this section. The model summary findings are provided in Table 4.11.

Table 4.11: Model Summary for LMPS on Resource Utilization

R	R Square	Adjusted R Square	Std. Error of the Estimate
.701	.491	.468	.667

a. Predictors: (Constant), Inventory and warehouse management, Logistics automation, Transportation, Packaging

The model's modest explanatory power is shown in Table 4.11. Resource utilization and logistics management practices have a moderate linear connection, as shown by the model's correlation coefficient (r = 0.701). The study's results also demonstrate that the four logistics management practices are responsible for 49.1% of the change in resource utilization (r squared = 0.491, or 49.1%). This shows that 50.9 percent of the change in the pharmaceutical manufacturing businesses' resource utilization in the supply chain was brought on by variables that the model did not account for.

ANOVA was used to analyze the variance in the model. This was done to examine the model's fitness and see whether logistics management strategies had a significant influence on supply chain resource utilization. Table 4.12 provides the study findings.

Table 4.12: ANOVA for Logistics Management Practices on Resource Utilization

Source of variance	Sum of Squares	df	Mean Square	F	Sig.
Regression	38.643	4	9.661	21.686	.000
Residual	40.094	90	.445		
Total	78.737	94			

a. Dependent Variable: Resource Utilization

b. Predictors: (Constant), Inventory and warehouse management, Logistics automation, Transportation, Packaging

The model showed high fitness, according to the research findings reported in Table 4.12 ($F = 21.686$, $p < 0.05$). This shows that the supply chain resource utilization is statistically significantly impacted by at least one of the four logistics management practices (inventory and warehouse management, logistics automation, transportation, and packaging). The model's good data fit suggests that the study's goal of determining how logistics management practices affect supply chain resource utilization was a proper use of regression analysis.

The independent factors (inventory and warehouse management, logistics automation, transportation, and packaging) were regressed against the supply chain resource utilization. Along with the results, the t statistics, regression coefficients, and significance levels are provided. Table 4.13 presents the research results.

Table 4.13: Effect of Logistics Management Practices on Resource Utilization

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	-.120	.517		-.233	.817
Inventory and warehouse management	.244	.113	.236	2.155	.034
Logistics automation	.337	.122	.239	2.751	.007
Transportation	.767	.132	.650	5.806	.000
Packaging	.363	.099	.406	3.672	.000

a. Dependent Variable: Resource Utilization

Table 4.13 presents the results of the research and they indicate that inventory and warehouse management considerably and favorably influenced the supply chain's resource utilization of Kenyan pharmaceutical manufacturing firms ($\beta = 0.244$, $t = 2.155$, $p < 0.05$). The results also show that supply chain's resource utilization of Kenyan pharmaceutical manufacturing enterprises was significantly impacted by logistics automation ($\beta = 0.337$, $t = 2.751$, $p < 0.05$). Additionally, results demonstrated that transportation considerably and favorably influenced the supply chain's resource utilization of Kenyan pharmaceutical manufacturing enterprises ($\beta = 0.767$, $t = 5.806$, $p < 0.05$). Additionally, results show that packaging significantly influenced utilization of resources in the supply chain of Kenyan pharmaceutical manufacturing enterprises ($\beta = 0.363$, $t = 3.672$, $p < 0.05$).

These findings were fitted into the multiple linear regression model as indicated below;

$$Y_2 = 0.767X_1 + 0.337X_2 + 0.244X_3 + 0.363X_4 + \varepsilon$$

In the model, 'Y_2' denotes resource utilization, 'X_1' represents transportation management, 'X_2' represents logistics automation, 'X_3' represents warehousing and inventory management, and 'X_4' represents packaging.

4.5.3 Influence of logistic management practices on Lead time from Order to Delivery

The study explored the influence of LMP's on order-to-delivery lead time. The research applied multiple regression analysis to achieve this objective where the independent variables were inventory and warehouse management, logistics automation, transportation, and packaging whereas the dependent variable was order-to-delivery lead

time. This section provides the ANOVA, regression model summary, and the model coefficients. Table 4.14 displays the study results for the model summary.

Table 4.14: Model Summary for logistic management practices on Order-to-Delivery Lead Time

R	R Square	Adjusted R Square	Std. Error of the Estimate
.774	.599	.581	.562

a. Predictors: (Constant), Inventory and warehouse management, Logistics automation, Transportation, Packaging

Table 4.14 shows the model's moderate explanatory power. According to the model's correlation coefficient (r = 0.774), there is a moderate linear association between the LMP's and order-to-delivery lead time. The results from the study also show that 59.9% of the change in supply chain resource utilization can be explained by the four logistics management practices (r squared = 0.599, or 59.9%). This infers that 40.1 percent of the change in the supply chain resource utilization of the pharmaceutical manufacturing companies was triggered by aspects that were not captured in the model.

The model's ANOVA was also explored. This was done to determine if LMP's have a substantial influence on utilization of resources in supply chain and to assess the model's fitness. The study findings are summarized in Table 4.15.

Table 4.15: ANOVA for Logistics Management Practices on Order-to-Delivery Lead Time

Source of variance	Sum of Squares	df	Mean Square	F	Sig.
Regression	42.519	4	10.630	33.603	.000
Residual	28.470	90	.316		
Total	70.989	94			

a. Dependent Variable: Order-to-Delivery Lead Time

b. Predictors: (Constant), Inventory and warehouse management, Logistics automation, Transportation, Packaging

Table 4.15 presents the research results which showed that the model exhibited good fitness ($F = 33.603$, $p < 0.05$). This implies that at least one of the four logistics management practices (inventory and warehouse management, logistics automation, transportation, and packaging) have a statistically substantial impact on the lead time from order to product delivery. The fact that the model fitted the data effectively implies that regression analysis model was appropriate for the study to determine how LMP's influence the lead time from order to delivery of the product.

The lead time from order to delivery of the product was regressed against the independent variables (inventory and warehouse management, logistics automation, transportation, and packaging). The findings are reported together with the t statistics, regression coefficients, and significance levels. The research results are displayed in Table 4.16.

Table 4.16: Influence of Logistics Management Practices on Order-to-Delivery Lead Time

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	.259	.436		.595	.553
Inventory and warehouse management	.440	.095	.448	4.617	.000
Logistics automation	.234	.103	.175	2.268	.026
Transportation	.401	.111	.358	3.605	.001
Packaging	.055	.083	.065	.666	.507

a. Dependent Variable: Order-to-Delivery Lead Time

Research findings presented in Table 4.16 demonstrate that inventory and warehouse management significantly and positively affected order-to-delivery lead time of Kenyan pharmaceutical manufacturing companies ($\beta = 0.440$, $t = 4.617$, $p < 0.05$). The findings

further indicate that logistics automation had had a significant effect on order-to-delivery lead time of Kenyan pharmaceutical manufacturing firms ($\beta = 0.234$, $t = 2.268$, $p < 0.05$). Besides, findings showed that transportation significantly and positively affected order-to-delivery lead time of Kenyan pharmaceutical manufacturing organizations ($\beta = 0.401$, $t = 3.605$, $p < 0.05$). Moreover, findings indicate that packaging had no significant influence on order-to-delivery lead time of Kenyan pharmaceutical manufacturing companies ($\beta = 0.055$, $t = .666$, $p > 0.05$).

The significant coefficients were incorporated in the model and the fitted model is provided below;

$$Y_3 = 0.401X_1 + 0.234X_2 + 0.440X_3$$

In the model, 'Y_3' denotes lead time from order to product delivery, 'X_1' represents transportation management, 'X_2' represents logistics automation, 'X_3' represents warehousing and inventory management, and 'X_4' represents packaging.

4.5.4 Influence of Logistics Management Practices on Delivery Performance

The research investigated how delivery performance was affected by logistics management practices. To do this, multiple regression analysis was employed with the outcome variable being delivery performance and the predictor variables being inventory and warehouse management, logistics automation, transportation, and packaging. The ANOVA, the regression coefficients, and the regression model summary are presented in this section. The model summary results are indicated in Table 4.17.

Table 4.17: Model Summary for logistic management practices on Delivery Performance

R	R Square	Adjusted R Square	Std. Error of the Estimate
.784	.615	.598	.698

a. Predictors: (Constant), Inventory and warehouse management, Logistics automation, Transportation, Packaging

The model's modest explanatory power is shown in Table 4.17. The supply chain delivery performance and logistics management practices have a moderate linear association, as shown by the model's correlation coefficient (r = 0.784). The study's results also demonstrate that the four logistics management practices may account for 61.5% of the variation in supply chain delivery performance (r squared = 0615, or 61.5%). This shows that 38.5% of the variation in the pharmaceutical manufacturing businesses' supply chain delivery performance was brought on by variables that the model did not account for.

ANOVA was used to analyze the variance in the model. This was done to examine the model's fitness and see whether LMP's had a significant influence on delivery performance of the supply chain. Table 4.18 presents the research findings.

Table 4.18: ANOVA for Logistics Management Practices on Delivery Performance

Source of variance	Sum of Squares	df	Mean Square	F	Sig.
Regression	70.063	4	17.516	35.913	.000
Residual	43.895	90	.488		
Total	113.958	94			

a. Dependent Variable: Delivery Performance

b. Predictors: (Constant), Inventory and warehouse management, Logistics automation, Transportation, Packaging

The model showed high fitness, according to the study results reported in Table 4.18 (F = 35.913, $p < 0.05$). This shows that the supply chain's delivery performance is statistically

significantly impacted by at least one of the four logistics management practices (inventory and warehouse management, logistics automation, transportation, and packaging). The model's good data fit suggests that the study's goal of determining how logistics management techniques affect supply chain's delivery performance was a proper use of regression analysis.

The independent variables (inventory and warehouse management, logistics automation, transportation, and packaging) were regressed against the supply chain's delivery performance. Along with the results, the t statistics, regression coefficients, and significance levels are provided. The findings are summarized in Table 4.19.

Table 4.19: Influence of logistic management practices on Delivery Performance

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	.204	.541		.378	.706
Inventory and warehouse management	.505	.118	.406	4.264	.000
Logistics automation	.267	.128	.158	2.085	.040
Transportation	.418	.138	.294	3.020	.003
Packaging	.285	.103	.265	2.761	.007

a. Dependent Variable: Delivery Performance

The study's findings are displayed in Table 4.19 and they indicate that inventory and warehouse management considerably and favorably influenced the supply chain's delivery performance of Kenyan pharmaceutical manufacturing companies ($\beta = 0.505$, $t = 4.264$, $p < 0.05$). The results also show that supply chain's delivery performance of Kenyan pharmaceutical manufacturing enterprises was significantly impacted by logistics

automation ($\beta = 0.267$, $t = 2.085$, $p < 0.05$). Additionally, results demonstrated that transportation considerably and favorably influenced the supply chain's delivery performance of Kenyan pharmaceutical manufacturing enterprises ($\beta = 0.418$, $t = 3.020$, $p < 0.05$). Additionally, results show that packaging had significant influence on the delivery performance of the supply chains of Kenyan pharmaceutical manufacturing enterprises ($\beta = 0.285$, $t = 2.761$, $p < 0.05$).

The significant coefficients were incorporated in the model and the fitted model is provided below;

$$Y_4 = 0.418X_1 + 0.267X_2 + 0.505X_3 + 0.285X_4$$

In the model, 'Y_4' represents delivery performance, 'X_1' represents transportation management, 'X_2' represents logistics automation, 'X_3' represents warehousing and inventory management, and 'X_4' represents packaging.

4.5.5 Influence of Logistics Management Practices On Flexibility

The study explored the effect of logistic management practices on the flexibility of the supply chain. The research utilized multiple regression analysis to achieve this objective where the independent variables were inventory and warehouse management, logistics automation, transportation, and packaging whereas the dependent variable was supply chain flexibility. This section provides the ANOVA, regression model summary, and the model coefficients. The findings of the model summary are provided in Table 4.20.

Table 4.20: Model Summary for logistic management practices on Flexibility

R	R Square	Adjusted R Square	Std. Error of the Estimate
.723	.523	.501	.591

a. Predictors: (Constant), Inventory and warehouse management, Logistics automation, Transportation, Packaging

Table 4.20 shows the model's moderate explanatory power. According to the model's correlation coefficient (r = 0.723), there is a moderate linear association between the LMP's and supply chain flexibility. The study's findings also show that 52.3% change in supply chain flexibility can be explained by the four logistics management practices (r squared = 0.523, or 52.3%). This indicates that 47.7 percent of the change in the flexibility of the supply chain of the pharmaceutical manufacturing companies was triggered by aspects that were not captured in the model.

The model's ANOVA was also examined. This was done to determine if LMP's have a substantial influence on the flexibility of the supply chain and to assess the model's fitness. The study findings are provided in Table 4.21.

Table 4.21: ANOVA for Logistics Management Practices on Flexibility of Supply Chain

Source of variance	Sum of Squares	df	Mean Square	F	Sig.
Regression	34.462	4	8.616	24.635	.000
Residual	31.475	90	.350		
Total	65.937	94			

a. Dependent Variable: Flexibility

b. Predictors: (Constant), Inventory and warehouse management, Logistics automation, Transportation, Packaging

The research findings displayed in Table 4.21 showed that the model exhibited good fitness ($F = 24.635$, $p < 0.05$). The implication is that at least one of the four LMP's (inventory and warehouse management, logistics automation, transportation, and packaging) have a statistically significant influence on the flexibility of the supply chain. The fact that the model fitted the data well implies that regression analysis model was

appropriate for the study to determine how logistics management practices influence supply chain's flexibility.

The supply chain reaction time was regressed against the independent variables (inventory and warehouse management, logistics automation, transportation, and packaging). The findings are reported together with the t statistics, regression coefficients, and significance levels. Table 4.22 presents the study results.

Table 4.22: Influence of Logistics Management Practices on Flexibility

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	.247	.458		.539	.591
Inventory and warehouse management	.351	.100	.371	3.503	.001
Logistics automation	.289	.108	.225	2.664	.009
Transportation	.459	.117	.425	3.923	.000
Packaging	.145	.087	.177	1.652	.102

a. Dependent Variable: Flexibility

Research findings presented in Table 4.22 demonstrate that inventory and warehouse management significantly and positively affected supply chain's flexibility of pharmaceutical manufacturing companies in Kenya ($\beta = 0.351$, $t = 3.503$, $p < 0.05$). The findings also indicate that logistics automation had a significant effect on supply chain's flexibility of pharmaceutical manufacturing enterprises ($\beta = 0.289$, $t = 2.664$, $p < 0.05$). Besides, findings showed that transportation significantly and positively affected supply chain's flexibility of pharmaceutical manufacturing firms ($\beta = 0.459$, $t = 3.923$, $p < 0.05$). Moreover, findings indicate that packaging had no significant effect on supply chain's flexibility of Kenyan pharmaceutical manufacturing firms ($\beta = 0.145$, $t = 1.652$, $p > 0.05$).

The significant coefficients were incorporated in the model and the fitted model is provided below;

$$Y_5 = 0.459X_1 + 0.289X_2 + 0.351X_3$$

In the model, 'Y_5' represents flexibility, 'X_1' represents transportation management, 'X_2' represents logistics automation, 'X_3' represents warehousing and inventory management, and 'X_4' represents packaging.

4.6 Challenges in Logistics Management

The research investigated the challenges experienced in logistics management across pharmaceutical manufacturing firms. The various challenges experienced by pharmaceutical manufacturing businesses are described and analyzed in this section. The respondents were given information on several challenges in logistics management experienced by pharmaceutical manufacturing businesses, and they were asked to rate how widely these challenges were experienced in their organizations. On an ordinal scale, the challenges were rated from a low of 1 (very low extent) and a high of 5 (very great extent). The study utilized means (M) and standard deviations (SD) in analysis and Table 4.23 provides the study results.

Table 4.23: Challenges in Logistics Management

Challenges In Logistics Management	Mean	SD
Government and environmental regulations	1.97	.742
High risks in logistics pertaining to pharmaceutical products	3.85	.829
Difficulty in changing organizational culture when implementing logistics management practices	2.37	.707
Inadequacy of information systems linkages and integration with partners in the supply chain	2.46	.781
Lack of commitment and support from top management	2.39	.865
Lack of cooperation amongst supply chain partners	2.45	.811
Inadequate sensitization and training to staff regarding logistics management practices	3.94	.606

Failure to link logistics management practices with key performance indicators	4.16	.893
High costs of adopting and implementing modern logistics management practices	2.09	.772
Having inadequate measures of supply chain performance	3.75	.784
Poor communication of the logistics management strategy to the employees and partners	3.88	.806
Resistance to implementation from logistics partners and employees	2.43	.592

Study results presented in Table 4.23 indicate that the study participants indicated that challenges experienced to a great extent included inadequate sensitization and training to staff regarding logistics management practices, failure to link logistics management practices with key performance indicators, and high risks in logistics pertaining to pharmaceutical products. These had means of between 3.5 and 4.5. Other experienced to a great extent included having inadequate measures of SCP, and poor communication of the logistics management strategy to the employees and partners. The other challenges listed in Table 4.8 were experienced to a low extent as they had means of between 1.5 and 2.5. These challenges included Government and environmental regulations and high costs of adopting and implementing modern logistics management practices among others.

4.7 Discussion of Findings

The results from this study determined that best inventory and warehousing management practices, logistics automation practices, transportation best practices, and packaging practices were prevalent in the pharmaceutical manufacturing companies. These results give credence to the transaction cost theory developed by North (1992) which provides a mainstream monetary methodology that prescribes the boundaries of a firm and utilizes

efficiency as a core incentive that drives organizations to adopt best practice logistics practices with other supply chain partners. The results also support the findings by Shang (2019) that various manufacturing companies apply logistics management best practices with the goal of reducing supply chain costs and enhancing the SCP and robustness. The research results are in accordance with the results by Marchet et al. (2018) that adopting logistics management best practices in the firm is done to benefit the company to reduce working capital needs and reduce operational costs.

The research also sought to examine the effect of LMPs on SCP of Kenyan pharmaceutical manufacturing companies. The study results indicated that inventory and warehouse management significantly and positively affected supply chain reaction time, supply chain's resource utilization, lead time from product order to delivery, delivery performance of the supply chain and supply chain's flexibility of pharmaceutical manufacturing firms. The findings demonstrated that logistics automation had no significant influence on supply chain reaction time, but had a significant influence on supply chain's resource utilization, lead time from product order to delivery, delivery performance and supply chain's flexibility. Additionally, the study results showed that transportation significantly and positively affected supply chain reaction time, supply chain's resource utilization, and lead time from product order to delivery, supply chain's delivery performance and supply chain's flexibility. Results also indicated that packaging had no significant influence on supply chain reaction time, supply chain's flexibility and lead time from product order to delivery, but had a significant effect on the supply chain's resource utilization, and supply chain's delivery performance of pharmaceutical

manufacturing firms. These findings concur with the network theory by Haakansson (1987) which links an enterprise's LMP's with that of its supply chain partners to achieve more through joint efforts compared to individual efforts. Network theory, according to Chen et al. (2017), promotes relationships amongst firms by emphasizing the importance of special relationships among diverse companies, the enhancement of trust through accommodating, long-term and constructive relationships, and mutual integration of systems and routines through interlinked logistical processes which results to supply chain performance.

The findings that LMPs have a positive influence on supply chain management practices concurs with Ristovska et al. (2017) who explored the influence of LMP's, such as warehousing, transportation, packaging, information management, and inventory on an organization's effectiveness and efficiency. The research by Ristovska et al. (2017) established that to reduce the company's total expenses, logistics managers must focus on warehousing, storage, information management, inventory and transportation practices. The findings from the current research further collaborate the results by Chala and Kumar (2021) that warehouse, inventory, and transportation management have a favorable and statistically substantial impact on a firm's overall performance.

The third objective was to explore the challenges encountered by Kenyan pharmaceutical manufacturing firms in the adoption of LMP's. Study results indicated that challenges experienced to a great extent included inadequate sensitization and training to staff regarding LMP's, failure to link logistics management practices with key performance

indicators, and high risks in logistics pertaining to pharmaceutical products. These findings concur with Rapario (2019) who determined that when an organization links with other organizations to delivery supply chain performance through a networked LMP's, it will have challenges in managing the network. The challenges may emanate from linkages and information exchange and control.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The research summary, conclusions and recommendations are discussed in this chapter. An overview of the study's results regarding each of the specific objectives are provided first. The chapter finishes with the deductions and approvals for improvements and further research.

5.2 Summary

The research purpose was to investigate the influence of LMPs on SCP of Kenyan pharmaceutical manufacturing companies. The study's first objective was to explore the prevalent logistic management practices of Kenyan pharmaceutical manufacturing firms. The research determined that the inventory and warehousing best practices were prevalent in the studied manufacturing companies. Descriptive results on inventory and warehousing management showed that to a very great extent, products are stored in a situation to enable first-to-expire, first-out distribution (M = 4.65, SD = 0.686) and the firms have refrigeration and "High-risk" products storage facilities (M = 4.60, SD = 0.761). Study results also demonstrated that to a great extent, the firms have adopted inventory and warehousing management systems to track reorder points and replenishments (M = 4.31, SD = 0.895), the warehouses are cleaned and disinfected regularly (M = 4.18, SD = 0.781) and all inbound and outbound products are inspected and recorded for temperatures, packing condition and spillage (M = 3.86, SD = 0.941).

The study also determined that logistics automation practices were prevalent in the pharmaceutical manufacturing companies. The results on logistics automation indicated that to a great extent, ordering system with key customers were fully automated and IT enabled (M = 4.44, SD = 0.815), the firms had interlinked their intranet and extranet in their logistics processes (M = 4.25, SD = 0.920) and the firms used electronic data interchange (EDI) to coordinate various logistics processes (M = 4.15, SD = 0.717). Additionally, to a great extent, the firms have adopted modern technology for information sharing and logistics integration with partners (M = 3.99, SD = 0.943) and they have predictive analytics to produce forecasting models for pricing, optimal shipping frequency, demand, and optimal inventory levels (M = 3.62, SD = 0.881).

The study further determined that transportation best practices were prevalent in the pharmaceutical manufacturing companies. The findings indicated the companies strictly complied with all regulations relating to transportation of pharmaceutical products to a great extent (M = 4.46, SD = 1.419). Besides, to a great extent, the companies tracked every shipment through all the stages of the transport process (M = 4.36, SD = 1.111), transported their products in insulated or refrigerated trucks (M = 3.95, SD = 1.079) and exercised due diligence when selecting third party transport partners (M = 3.72, SD = 1.453). Additionally, to a great extent, the companies had adopted satellite tracking and total visibility solutions for the transport fleet (M = 3.71, SD = 0.936).

The descriptive findings on packaging demonstrated that to a great extent, the companies strictly adhere to all pharmaceutical regulations regarding packaging (M= 4.38, SD =

0.776) and that the companies always provide protective packaging for fragile products (M = 4.36, SD = 0.695). Besides, to a great extent, the companies had improved packaging efficiency through automation (M = 4.35, SD = 0.694), had optimized the safety of their pharmaceutical products through good packaging (M = 4.17, SD = 0.871) and all labels on the packaging of the companies' products were easily legible (M = 3.71, 0.913).

This research's second objective was to explore the influence of logistic management practices on supply chain performances of Kenyan pharmaceutical manufacturing firms. The study findings demonstrated that inventory and warehouse management significantly and positively affected supply chain reaction time of Kenyan pharmaceutical manufacturing firms ($\beta = 0.384$, $t = 2.374$, $p < 0.05$). On supply chain resource utilization, the study determined that inventory and warehouse management considerably and favorably influenced the supply chain's resource utilization of Kenyan pharmaceutical manufacturing firms ($\beta = 0.244$, $t = 2.155$, $p < 0.05$). The study also established that inventory and warehouse management significantly and positively affected order-to-delivery lead time of pharmaceutical manufacturing enterprises ($\beta = 0.440$, $t = 4.617$, $p < 0.05$). The study's findings further showed that inventory and warehouse management considerably and favorably influenced the supply chain's delivery performance of Kenyan pharmaceutical manufacturing enterprises ($\beta = 0.505$, $t = 4.264$, $p < 0.05$). Besides, inventory and warehouse management significantly and positively affected supply chain's flexibility of pharmaceutical manufacturing enterprises ($\beta = 0.351$, $t = 3.503$, $p < 0.05$).

The findings also indicate that logistics automation had no significant influence on supply chain reaction time of pharmaceutical manufacturing enterprises ($\beta = 0.194$, $t = .801$, $p > 0.05$). The research findings also showed that supply chain's resource utilization of Kenyan pharmaceutical manufacturing enterprises was significantly impacted by logistics automation ($\beta = 0.337$, $t = 2.751$, $p < 0.05$). The results also indicate that logistics automation had a significant influence on order-to-delivery lead time of pharmaceutical manufacturing enterprises ($\beta = 0.234$, $t = 2.268$, $p < 0.05$). The findings also showed that supply chain's delivery performance of Kenyan pharmaceutical manufacturing enterprises was significantly impacted by logistics automation ($\beta = 0.267$, $t = 2.085$, $p < 0.05$). The research results also indicate that logistics automation had a significant influence on supply chain's flexibility of pharmaceutical manufacturing enterprises ($\beta = 0.289$, $t = 2.664$, $p < 0.05$).

The study findings showed that transportation significantly and positively affected supply chain reaction time of pharmaceutical manufacturing enterprises ($\beta = 0.448$, $t = 2.639$, $p < 0.05$). Additionally, findings demonstrated that transportation considerably and favorably influenced the supply chain's resource utilization of Kenyan pharmaceutical manufacturing enterprises ($\beta = 0.767$, $t = 5.806$, $p < 0.05$). Besides, findings showed that transportation significantly and positively affected order-to-delivery lead time of pharmaceutical manufacturing enterprises ($\beta = 0.401$, $t = 3.605$, $p < 0.05$). Further, findings demonstrated that transportation considerably and favorably influenced the supply chain's delivery performance of Kenyan pharmaceutical manufacturing enterprises ($\beta = 0.418$, $t = 3.020$, $p < 0.05$). Besides, findings showed that transportation

significantly and positively affected supply chain's flexibility of pharmaceutical manufacturing enterprises ($\beta = 0.459$, $t = 3.923$, $p < 0.05$).

Results demonstrated that packaging had no significant influence on reaction time of the supply chain of Kenyan pharmaceutical manufacturing firms ($\beta = 0.284$, $t = 1.452$, $p > 0.05$). Additionally, results show that packaging had a significant influence on the resource utilization of the supply chains of Kenyan pharmaceutical manufacturing enterprises ($\beta = 0.363$, $t = 3.672$, $p < 0.05$). Additionally, findings show that packaging had a significant influence on the delivery performance of the supply chain of Kenyan pharmaceutical manufacturing enterprises ($\beta = 0.285$, $t = 2.761$, $p < 0.05$). Moreover, findings indicate that packaging had no significant influence on order-to-delivery lead time of Kenyan pharmaceutical manufacturing firms ($\beta = 0.055$, $t = .666$, $p > 0.05$). Further, findings demonstrated that packaging had no significant effect on supply chain's flexibility of pharmaceutical manufacturing enterprises ($\beta = 0.145$, $t = 1.652$, $p > 0.05$).

The third objective was to explore the challenges encountered by Kenyan pharmaceutical manufacturing firms in adoption of LMP's. Study findings indicated that challenges experienced to a great extent included inadequate sensitization and training to staff regarding logistics management practices, failure to link logistics management practices with key performance indicators, and high risks in logistics pertaining to pharmaceutical products. These had means of between 3.5 and 4.5. Other challenges experienced to a great extent included having inadequate measures of SCP, and poor communication of the logistics management strategy to the employees and partners. The other challenges

were experienced to a low extent as they had means of between 1.5 and 2.5. These challenges included Government and environmental regulations and high costs of adopting and implementing modern logistics management practices among others.

5.3 Conclusions

This research concludes that the Logistic management practices were vital for the supply chain performance of pharmaceutical manufacturing companies in Kenya. These practices include packaging, inventory and warehouse management, logistics automation and transportation. Managing these practices effectively thus, will have a positive effect on the SCP as measured through delivery performance, supply chain response time, supply chains' utilization of resources, lead time from product order to delivery, and adaptability of the supply chain. The research also concludes that pharmaceutical manufacturing companies in Kenya have largely adopted best logistics management practices regarding packaging, inventory and warehouse management, logistics automation and transportation.

The research further concludes that pharmaceutical manufacturing enterprises in Kenya encountered various challenges in their logistics management which comprised of insufficient employee training and sensitization to logistics management techniques, a failure to integrate these practices with key performance measures, and significant risks in the logistics of pharmaceutical products. Inadequate supply chain performance metrics and insufficient employee and partner understanding of the logistics management plans

were other significant challenges that were faced by pharmaceutical manufacturing companies.

5.4 Recommendations

The research recommends to management of pharmaceutical manufacturing companies to have refrigeration and "High-risk" product storage facilities. Further, senior management should operationalize inventory and warehousing management systems to track replenishment points and reorder points, and also ensure that the warehouses are routinely cleaned and sanitized. Besides, the study recommends that all incoming and outgoing products are examined and recorded for temperatures, packing condition, and spillage. Regarding logistics automation, senior management of Kenyan pharmaceutical manufacturing enterprises should ensure interconnectedness of their intranet and extranet in their logistics processes. Moreover, the management should ensure the ordering systems are fully automated and IT-enabled.

The study also recommends to management of the pharmaceutical manufacturing companies to adhere to all rules pertaining to the shipment of pharmaceutical items. Additionally, the businesses should ensure that they choose their third-party shipping partners carefully. Regarding packaging, the study recommends that the firms should always follow carefully all pharmaceutical packaging rules and also enhance their packaging efficiency through automation.

5.5 Limitations of the Study

This study investigated how supply chain performance of Kenyan pharmaceutical manufacturing enterprises was influenced by logistic management practices. The study's specific objectives were to identify the most prevalent logistic management practices adopted by Kenyan pharmaceutical manufacturing businesses, as well as the effect these practices have on supply chain performance and the difficulties these companies encounter in implementing these LMP's. Though the study provided valuable evidence regarding these objectives, it has few limitations and thus the study results should be applied and interpreted while considering these limitations. To begin with, the research only focused on Kenyan pharmaceutical manufacturing enterprises. This implies that the results may not be gladly generalizable to other manufacturing sectors or to manufacturing companies outside Kenya.

The study applied a descriptive mono-method study that utilized only structured questionnaires to gather data that was utilized in the study. This is a limitation since utilization of a monomethod provides only one perspective from the study findings. Various perspectives may be required to provide even explanations of the findings and why the situation as it is as evidenced through the study findings. Besides, the study could have applied a wider population not just the management level employees since they can be biased.

5.6 Suggestions for Further Research

This research sought to explore the effect of logistic management practices on supply chain performance of pharmaceutical manufacturing enterprises in Kenya. The research specifically was focused on exploring the prevalent logistics management practices of pharmaceutical manufacturing enterprises in Kenya, assess the influence of LMP's on supply chain performance, and explore the challenges encountered by pharmaceutical manufacturing companies in Kenya in adoption of LMP's. Based on the findings and the research limitations, this section provides proposals for further research using the shortcomings and scope of the current study. First, this research only focused on pharmaceutical manufacturing enterprises in Kenya. Due to the differences in operations, and practices, another study is recommended to focus on manufacturing companies in other sectors such as food and beverage, leather, plastics and metal and allied. Besides, the role played by LMP's on supply chain performance in companies in other counties apart from Nairobi need to be explored. Lastly, this study only used a structured questionnaire as the data gathering tool. Further research should be conducted using qualitative data collection instruments such as key informant interviews and focus group discussions to provide deeper insights into the importance of LMP's in supply chain management.

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Appendix: Questionnaire to Pharmaceutical Manufacturing Companies in Kenya.

SECTION A: GENERAL INFORMATION

1. Kindly indicate your gender
   Female [ ] Male [ ]

2. What is your highest level of education?
   College diploma [ ]
   Undergraduate degree [ ]
   Master's degree [ ]
   PhD [ ]
3. Indicate the number of years you have worked in this organization
   Below 5 years [ ] 5 - 10 years [ ] Over 10 years [ ]

SECTION B: LOGISTICS MANAGEMENT PRACTICES

1. Considering the logistics management practices listed in the table below, indicate the extent that this organization has adopted these practices. Use the following scale when rating; 5 = Very great extent; 4 = Great extent; 3 = Moderate extent; 2 = Low extent; 1 = Very low extent.

Logistics management Practices	**1**	**2**	**3**	**4**	**5**
Transportation management practices					
The company transports its products in insulated or refrigerated trucks					
The company tracks every shipment through all the stages of the transport process					
The company strictly complies with all regulations relating to transportation of pharmaceutical products					
The company has adopted satellite tracking and total visibility solutions for the transport fleet					
The company exercises due diligence when selecting third					

party transport partners					
Warehousing and inventory management practices					
The firm has refrigeration and "High-risk" products storage facilities					
The firm has adopted inventory and warehousing management systems to track reorder points and replenishments					
The warehouses are cleaned and disinfected regularly					
Products are stored in a situation to enable First-to-Expire, First-Out distribution.					
All inbound and outbound products are inspected and recorded for temperatures, packing condition and spillage					
Packaging practices					
The company has improve packaging efficiency through automation					
The company has optimized the safety of its pharmaceutical products through good packaging					
The company strictly adheres to all pharmaceutical regulations regarding packaging					
The company always provides protective packaging for fragile products					
All labels on the packaging of the company's products are easily legible					
Logistics automation practices					
The firm has adopted modern technology for information sharing and logistics integration with partners					
The firm uses electronic data interchange (EDI) to coordinate various logistics processes					
Ordering system with key customers is fully automated and					

IT enabled					
The firm has interlinked its intranet and extranet in its logistics processes					
The firm has predictive analytics to produce forecasting models for pricing, optimal shipping frequency, demand, and optimal inventory levels					

SECTION C: SUPPLY CHAIN PERFORMANCE

1. Considering the supply chain performance indicators listed below, indicate the extent that this organization has been able to meet them. Use the following scale when rating; 5 = Very great extent; 4 = Great extent; 3 = Moderate extent; 2 = Low extent; 1 = Very low extent.

Supply chain reaction time	**1**	**2**	**3**	**4**	**5**
The supply chain reacts fast to changes in customer demand					
The supply chain reacts fast to changes in raw materials supply					
When there are disruptions in the supply chain, the firm adapts efficiently					
Resource utilization					
The company has been able to optimize use of resources in the supply chain					
The firm use technology to optimize resource use in its supply chain					
The firm focuses on upskilling and outsourcing supply chain expertise					
Order-to-delivery lead time					
The organization has optimum order-to-delivery lead time compared to other pharmaceutical manufacturers					
Customers of this firm are satisfied based on the time it takes to deliver their orders					
The company has very few complaints regarding delayed deliveries					
Delivery performance					
The company always has on-time delivery of its products to customers					
The company always delivers products accurately according to order					

The company has been able to optimize the average cost of delivery					
Flexibility					
The company has high supply chain reaction time when disruptions occur					
The firm has the capacity to easily adjust production levels based on changes in demand					
The supply chain used data for use in future improvements					

SECTION D: CHALLENGES IN LOGISTICS MANAGEMENT

5. Indicate the extent that the organization has been faced with the listed challenges in managing its logistics. Use the following scale when rating; 5 = Very great extent; 4 = Great extent; 3 = Moderate extent; 2 = Low extent; 1 = Very low extent.

Challenges in logistics management	**1**	**2**	**3**	**4**	**5**
Government and environmental regulations					
High risks in logistics pertaining to pharmaceutical products					
Difficulty in changing organizational culture when implementing logistics management practices					
Inadequacy of information systems linkages and integration with partners in the supply chain					
Lack of commitment and support from top management					
Lack of cooperation amongst supply chain partners					
Inadequate sensitization and training to staff regarding logistics management practices					
Failure to link logistics management practices with key performance indicators					
High costs of adopting and implementing modern logistics management practices					
Having inadequate measures of supply chain performance					
Poor communication of the logistics management strategy to the employees and partners					
Resistance to implementation from logistics partners and employees					

Your participation is appreciated