

**COLD SUPPLY CHAIN MANAGEMENT AND FINANCIAL
PERFORMANCE OF PHARMACEUTICAL COMPANIES IN
NAIROBI, KENYA**

BY

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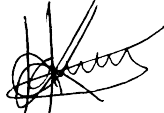
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DECLARATION

I declare that this research project is my original work and has never been presented to any other University for assessment or award of a degree.

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This project has been presented with my authority as the university supervisor.

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ABBREVIATIONSAND ACRONYMS

AHP	Analytic Hierarchy Process
EFA	Exploratory Factor Analysis
EPS	Earnings per Share
OMS	Outsourcing and Multi- Suppliers
RBV	Resource-Based View
ROE	Return on Equity
ROI	Return on Investment
SCLP	Strategic Collaboration and Lean Practices
SCM	Supply Chain Management
SPSS	Statistical Package for Social Sciences

ABSTRACT

Based on the impact on health, the government and key stakeholders in the health sector recognize the importance of the cold supply chain. Very little effort is made to control the effects of cold supply chain logistics such as transport, storage, packing, technological capacity, and a variety of other sensitive activities that contribute to the safety and quality of such products. The objective of the study was to establish the relationship between cold supply chain management and financial performance of pharmaceutical companies in Nairobi, Kenya. The study adopted a descriptive cross-sectional survey. The target population was senior managers in pharmaceutical companies in Nairobi County, Kenya. The samples were purposively select one senior employee in the supply chain department and finance department; thus, the target population of the study was 74 senior employees working with 37 licensed pharmaceutical companies in Nairobi. This study used a questionnaire. Data collected from the field was checked for completion, cleaned and edited. The data was then processed using the SPSS version 23.0 computer software. The generated quantitative data was examined using descriptive and inferential statistics. Percentages, means, standard deviations, and frequencies were examples of descriptive statistics. The data is presented in form of tables. Inferential statistics included the correlational and regression analysis. Correlational analysis was conducted to determine the strength of the relationship between the independent and dependent variables. Regression analysis was used to establish the association between cold supply chain management and the financial performance of pharmaceutical companies in Nairobi. The study found a significant and positive link between cooling systems management and financial performance of pharmaceutical companies. A statistically significant association was found between cold storage management and financial performance. Cold transport management had a statistically significant association with financial performance of pharmaceutical companies. Cold processing and distribution management had a positive and significant relationship with financial performance of pharmaceutical companies. The study conclusion was that cold supply chain management is positively related to financial performance of pharmaceutical companies in Nairobi. The study proposes that pharmaceutical businesses employ cold supply chain management in all of their activities, beginning with the drug's creation, storage, and distribution and ending with the drug's administration to the customer. This is incorrect since medications are sensitive biological substances that, when frozen, lose effectiveness or are destroyed. Cold supply chain management should be part of the company strategies to ensure quality assurance and efficiency of the pharmaceutical products and hence improve their performance.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Globalization has made the world a global village by utilizing technology via phone calls, e-conferencing, videos, emails and social networking. However, this has not yet spread to industries that need the physical movement of goods, including pharmaceuticals. The interconnected actions that get a product to market and satisfy customers are all included in SCM. The SCM program unifies concepts from purchasing, transportation, manufacturing operations, and physical distribution. Thus, effective SCM plans and combines all of these operations into a single process (Doan, 2020).

This study will be ground on the agency theory, resource-based view theory and the 3-dimensional theory. The agency theory describes a association between two parties. It is helpful in the study of SCM in the pharmaceutical sector because it explains why companies choose to work with distributors or agents to supply products. The resource-based view theory explains the firm's capability to use its resources in SCM to enhance its financial performance. According to the three-dimensional generic theory approach, the organization structure has an impact on information exchange, the technical and functional execution of operations associated to the cold chain, and the safety of the supply chain items.

Given the large importance that pharmaceutical companies play in the economy, the financial performance of pharmaceutical corporations in Kenya is a crucial topic. As the number of pharmaceutical companies grows over time and customer rivalry intensifies, there is need for an investigation on the effect of SCM in pharmaceutical companies (Kabiru, Kalunda & Nduku, 2016). Because the pharmaceutical industry's supply chain process involves numerous stakeholders, considerable risks, and significant financial investments, it has traditionally been disregarded. In light of this, the purpose of this study is to establish the association between temperature controlled pharmaceutical products and financial performance of pharmaceutical companies in Nairobi, Kenya.

1.1.1 Cold Supply Chain Management

Cold SCM is a specific area of SCM that makes use of temperature-controlled systems for product distribution, storage, and transportation to keep the product in the ideal conditions. The system of shipping and storing medications at the advised temperature range of (-15°C to -25°C for freezer drugs) and (+2°C to +8°C for refrigerator drugs) is known as "cold SCM." Cold SCM starts when the medication is produced, stored, and distributed and concludes when it is given to the patient (Desalegn, 2015). Drug damage is most frequently caused by freezing because drugs are fragile biological substances that might lose their effectiveness or be destroyed if frozen.

Delivery or giving of an item or items to the intended recipient is referred to as distribution. Supplies go from a central location to the user facilities through a system of administrative processes, transportation facilities, storage facilities, and user facilities (MSH, Managing Drug Supply, 2017). A number of operations relating to procurement, storage, distribution, and other associated processes go into distributing vaccine from the manufacturers to the intended recipients. The erratic demand and supply for vaccines is one of the problems. Because the birth rate is still rising in many low- and middle-income nations, there is an exponential rise in the demand for vaccines. Additionally, immunizations are employed as a quick response to illness outbreaks (Deveshwar *et al*, 2010).

Quality control and the effectiveness of pharmaceutical products are largely to blame for the sudden rise in demand for cold SCM. Due to their widespread usefulness, biologics have emerged, necessitating the need of a cold chain during production, delivery, and use to ensure their proper operation. Contrary to common chemically created medicines, biologics like the insulin vaccine are produced biologically from living cells, necessitating the best logistical planning from creation through delivery.

1.1.2 Financial Performance

The ability of a company to employ resources from its main line of business and create income is measured by its financial performance. It is the process of evaluating the financial outcomes of a company's policies and operations (Mwangi, 2016). By creating connections between the components of the financial position and income statement, it reveals a company's financial strengths and shortcomings. The phrase is

also used to compare similar businesses within the same industry or to analyze entire industries or sectors in aggregate. It serves as a general indicator of a firm's overall financial health over a certain period of time. There are numerous ways to gauge a company's effectiveness, but each one should be combined. Along with total unit sales, line items like operating income, operational revenue, or cash flow from operations might be included (Njeru, 2016).

According to Lyria (2017), a company's financial performance may be judged by its return on investment, competitive position, growth in market share, overall profitability, increase in sales volume, and improvement in cash flow and profits. Financial and nonfinancial data would be combined to determine how well a company is performing. Profit, sales, return on investment (ROI), return on equity (ROE), and earnings per share (EPS) are examples of financial measurements (Omar, 2017). They have the benefit of being unbiased, straightforward, and simple to comprehend. However, they have the disadvantage of being difficult to access and historical, providing only lagging information. Incompleteness and manipulation are also possible (Ng'ang'a, 2017). The number of employees, revenue growth, revenue generated per employee, market share, customer and employee happiness, and market share are non-financial measures. The non-financial metrics' weakness is that they are arbitrary (Uzel, 2015). A hybrid approach that combines both financial and non-financial performance measures of profit, revenue, return on investment (ROI), return on equity (ROE), and earnings per share (EPS), number of employees, revenue growth, revenue per employee, market share, customers' satisfaction, and employees' satisfaction has become the generally accepted standard due to the limitations of the financial and non-financial measures.

A pharmaceutical company's strong financial performance not only helps to boost the value of that particular company on the market, but it also helps the industry as a whole expand, which in turn helps the economy as a whole benefit (Banafa, Muturi & Ngugi, 2015). Analyzing a company's financial performance entails calculating the financial impact of its operations and policy decisions. It is used to assess a company's long-term financial stability. Financial performance analysis can also be used to aggregate industries or sectors or to

compare similar companies within the same industry (Maaka, 2013). Because pharmaceutical firms function well, this demonstrates competent management and efficient resource allocation, which benefits the national economy as a whole.

1.1.3 Pharmaceutical Companies in Nairobi County

The pharmaceutical industry in Nairobi County is made up of local producers, franchise importers active in distribution, global corporations, wholesalers, and retailers, all of whom contribute significantly to the country's health sector (Denis, 2015). Historically, the pharmaceutical industry was not a large consumer of cold chain logistics because the majority of its products did not require it. With the growing acceptance of a new class of medications known as biologics, there has been an explosion of cold supply chain operations in the business. Despite their recent entry into the medical field, they have already had a significant impact on the industry, both in terms of the treatments they can provide and the demands they are imposing on the pharmaceutical supply chain. Most biologics need distribution that is both temperature- and time-controlled (Kamau & Mukui, 2015).

The storage facilities and conditions in Nairobi County's pharmaceutical enterprises are subpar, and there is a dearth of specialized transportation systems to ensure that the cold chain does not break during shipment by conducting accurate temperature monitoring. In order to maintain the proper temperatures and conditions to assure the safety of vaccines, questionable packaging materials are utilized (Kamau & Mukui, 2015). Additionally, it appears that most businesses lack the technological skills necessary to manage the cold chain safely. Suitable packing, the safety of the cold chain goods to the user level is influenced by regulatory and compliance challenges relating to transit, storage, packaging, and technical compliance (Bishara, 2017). This is why this study, which examines the impact of cold chain supply logistics on the availability of safe cold chain products, is timely.

1.2 Research Problem

Effective vaccine and medicine storage, handling, and stock management; strict cold chain temperature control; and maintenance of suitable logistics management information systems are all part of the job of cold SCM (Bishara, 2017). Based on their impact on health, the government and major industrial stakeholders clearly understand the significance of the cold supply chain. Controlling the effects of cold supply chain logistics, like transport,

storage, packing, technological capacity, and many other delicate tasks that maintain such products safe and of high quality, requires very little work (Bishara, 2017). According to Bishara (2017), pharmaceutical cold chain products like vaccines are extremely delicate materials that, if manufactured and supplied without strict controls, might lose their potency and become ineffective or even dangerous for the user.

Given the considerable importance that pharmaceutical companies play in the economy, financial performance of pharmaceutical corporations in Kenya is a crucial topic (Kabiru, Kalunda & Nduku, 2016). Financial performance of pharmaceutical companies is largely influenced by SCM of drugs. Because the cold supply chain process involves numerous parties, high risks, and significant financial investments, cold SCM has typically been neglected in the Kenyan pharmaceutical industry with regard to the establishment, development, maintenance, and control of the activities involved, particularly in the private sector which really supports the health sector. Large volumes of cold chain products may be destroyed in a matter of hours when there is a primary level equipment or management failure (Kamau & Mukui, 2015).

Empirical studies done include; Njuguna, Mairura, and Ombui (2015) conducted research on the impact of cold chain supply logistics on the security of vaccines, using a case study of a Nairobi County pharmaceutical distributor. The results of the study showed that cold chain supply logistics had a good impact on the security of vaccinations. In Ethiopia's medicines fund and supply agency, Bayeh (2018) examined the elements that affect the SCM of vaccines. The study found that insufficient vehicles for distributing vaccinations to public healthcare facilities were among the issues that affected the SCM system of vaccines. In 2020, Srimarut and Mekhum conducted study on SCM and how it affected the success of Thai pharmaceutical firms. According to the study, supply chain production flexibility and supply chain sourcing flexibility have a large and favourable impact on the performance indicators of pharmaceutical enterprises in Thailand.

Much of the studies done have been conducted in other countries where operating environment for pharmaceutical companies is different from Kenya. The studies have also

failed to establish the link between cold SCM and financial performance of pharmaceutical companies, hence the research gap. This study seeks to fill the existing research gap by answering the following research question, Is there an association between cold SCM and financial performance of pharmaceutical companies in Nairobi, Kenya?

1.3 Research Objective

The study was guided by the following objectives

1. To determine the cold SCM practices commonly used by pharmaceutical companies in Nairobi, Kenya.
2. To establish the association between cold SCM and financial performance of pharmaceutical companies in Nairobi, Kenya

1.4 Value of the Study

The findings of the study may be of great importance to the management of pharmaceutical companies in Kenya as they may understand how cold SCM influences the financial performance of their organization. This would assist them in coming up with strategies to manage cold supply chain in order to enhance the financial performance of their organizations.

The study findings may be of great significance to policy makers in the pharmaceutical industry in Kenya, as they would get enlightened on the effects of cold SCM on the financial performance of pharmaceutical companies. This would assist them in coming up with policies that would guide the cold SCM among pharmaceutical companies in Kenya.

The study may be of interest to future researchers and academicians since it will serve as the foundation for future research and give literature for future studies. The study findings would add to the body of information on the association between cold SCM and pharmaceutical company financial success.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews the existing literature on the association between cold SCM and the financial performance of pharmaceutical companies. In specific the chapter covers the theoretical underpinning, the empirical review on cold SCM and financial performance, the conceptual framework and lastly the hypothesis.

2.2 Theoretical Underpinning

This study sought to establish the association between cold SCM and financial performance of pharmaceutical companies in Nairobi, Kenya. The study was guided by the agency theory, resource-based view theory and the 3-dimensional theory.

2.2.1 Agency Theory

The association between two parties, often an agent and a principal, is explained by the agency theory. In this association, the principal delegated to the agent his authority to act on his behalf, represent him, and conduct business with a third party. In these partnerships, power abuse by agents is a common tendency, and issues result from agency inefficiency. Agency theory helps comprehend the situations under which a supply chain member is likely to attempt to exploit other members. The idea also directs research into how such opportunism affects supply chain effectiveness and how it might be avoided or reduced. The agency theory, which was popularized by Max Weber's fundamental writings (Bogataj & Vodopivec, 2015), focused mostly on the confrontation between the political master and state authorities. The neoclassical perspective of organizations, which sees them as operational black boxes and overlooks the "association between performance and incentives," served as the basis for this viewpoint (Agyekum, 2012).

The current understanding of this theory is possible due to the novel institutionalism notion of firms, which enhanced understanding about functioning of the firm. Opportunistic behavior based on the rational system view predominated in the old institutionalism approach (Bogataj & Vodopivec, 2015). On the other hand, the new institutionalist

perspective on organizations encourages the delegation of duties and operation through an open system perspective toward the environment (Agyekum, 2012). The agency theory, whether seen from a classical or neoclassical perspective, adds to our understanding of SCM. Numerous aspects of SCM, such as outsourcing, sourcing, and supply chain collaboration, have been studied using agency theory (Ayaya, Liechty, Conway, Kamau & Esamai, 2017). Since it explains why businesses choose to use distributors or agents to provide items, agency theory is useful in the analysis of the pharmaceutical industry's cold supply chain. The association between cold SCM and financial success of pharmaceutical enterprises in Nairobi, Kenya, was established using the agency theory.

2.2.2 Resource Based View Theory

The Resource-Based View emerged as a result of the change that has occurred since the early 1980s toward prioritizing internal resources and capabilities as the main source of competitiveness (RBV). The internal competencies of the company were the subject of resource-based theory created by Barney and Wernerfelt in 1991 and strategic management in 1984. RBV contends that a company's priceless and distinctive assets are the foundation of its competitive advantage. The new viewpoint asserts that businesses will compete on the basis of their unique internal talents, competencies, and resource capabilities (Hoskisson, Hitt, Wan & Yiu, 1999). The ability of a company to marshal resources and manage their deployment in a way that results in greater performance determines its competitive advantage (Grant, 1991).

Businesses are always looking for innovative methods to increase production and efficiency. New knowledge leads to new combinations of resource sets or new applications for already-existing resources. Understanding the connection between the kind of supply chain and the characteristics of business processes, as well as the impact on organizational performance, is made possible by the resource-based theory (Bharadwaj, 2000). The study selected a resource-based view to explain the association between cold SCM and financial performance of pharmaceutical enterprises in Nairobi, Kenya because of its focus on resource attributes and their utility in the organization.

2.2.3 Three-Dimensional Generic Theory Approach

Different aspects of effective intra- and interorganizational information management in the cold chain supply (Althoff, Ellebrecht & Petersen, 2015). The technical aspect includes information about how data is distributed and stored, how it could be exchanged, and generally what technology is used. According to Craig (2017), the technological dimension is a set of mostly visible, measurable, tangible, and adaptable components. Organizational structure provides information about how various jobs and activities, such as those carried out in cross-functional teams, are performed.

In their techno-managerial approach, Van der Vorst, Da Silva, and Trienekens (2007) distinguish between a technical and an organizational or managerial perspective when describing management methods, power and leadership structures, risk and reward structures, and culture and attitude of the involved organizations. In a quality and health management setting, information management is determined by a third functional dimension of functional needs, according to Althoff et al. (2015) definition. This dimension primarily relates to the proposed linking of quality-related data to other data sets at inspection and decision points in pharmaceutical cold chain management. In terms of information sharing and the technical and functional execution of operations associated to the cold chain, the organizational structure has an impact on the safety of the products. The study examined the association between cold SCM and the financial success of pharmaceutical enterprises in Nairobi, Kenya, using the three-dimensional generic theory technique.

2.3 Empirical Review

Narathip (2019) investigated variables influencing the effectiveness of the cold chain for exporting Thai longan fruit. The research aimed to discuss the key performance attributes that affect the efficiency of the cold chain for longan fruit exports in Thailand. The Analytic Hierarchy Process (AHP) was used to evaluate the factors affecting performance of cold chain level for exported longan fruits. This analytical process provided a clear picture of the company's cold chain performance in relation to each unique cold chain element. Data were gathered through the use of surveys and interviews with export specialists. It was found that a cold chain is important for the export of longan fruit in Thailand to reduce longan fruit

losses, waste and meet the customers' needs in quality and safety. The cold chain added value to the fruits, maintained their quality and extended their shelf life.

In Addis Abeba, pharmaceutical businesses' organizational effectiveness was investigated by Aboneh (2017) in relation to SCM methods. Studying how SCM methods affect the organizational performance of Pharmaceuticals is the goal of this research. The study made use of a descriptive research methodology. The results of the correlation analysis revealed a substantial positive link between the two variables (the effectiveness of information sharing and customer association management) and organizational performance.

Lia and Ragu-Nathan (2016) investigated how SCM strategies affected organizational performance and competitive advantage. The purpose of this study was to determine how SCM affected competitive advantage and organizational performance. Structural equation modeling was used to investigate the correlations suggested in the framework after data from 196 organizations were collected for the study. According to the findings, SCM practice at higher levels can boost competitive advantage and boost organizational performance.

The effect of SCM strategies on performance was studied by Lenny et al. (2017). This study's goal was to evaluate a framework that depicted the connections between SCM practices, operational effectiveness, and SCM related organizational performance. Strategic collaboration and lean techniques, as well as outsourcing and multiple suppliers (OMS). The findings show that both the SCLP and OMS factors have a direct, positive, and substantial impact on operational success. In contrast, neither SCLP nor OMS have a major or direct effect on organizational performance connected to SCM.

Njuguna (2015) investigated how vaccination safety in pharmaceutical distributors in Nairobi County was affected by cold chain supply logistics. The study's primary goal was to determine how supply chain logistics affected the distribution of secure pharmaceutical cold chain products by pharmaceutical distributor companies in Nairobi County. Because it is not experimental and examines the link between unmodified variables in a natural situation, descriptive survey design was taken into consideration. Out of the 16 recognized cold chain pharmaceutical distributors in Nairobi County, the study was conducted at five large pharmaceutical companies. Out of 211 employees in the department of procurement

and stores, 67 people made up the sample size. Questionnaires that were self-administered were used to gather the data. When dependent and independent factors were compared using correlation analysis, it was discovered that technical capacity and storage conditions had the strongest correlation with and influence on the safety of vaccinations.

2.4 Conceptual Framework

Conceptual framework comprises well organized ideas that connect the independent variables to the dependent variable using moderating variable which provides focus, tools and rationale for interpreting and integrating information of the research under investigation. The figurative representation of the conceptual framework is used to explain the associations between the components of the independent variable as they influence the dependent variable, which will be the solution to establish the link amid cold SCM and financial performance of pharmaceutical companies in Nairobi.

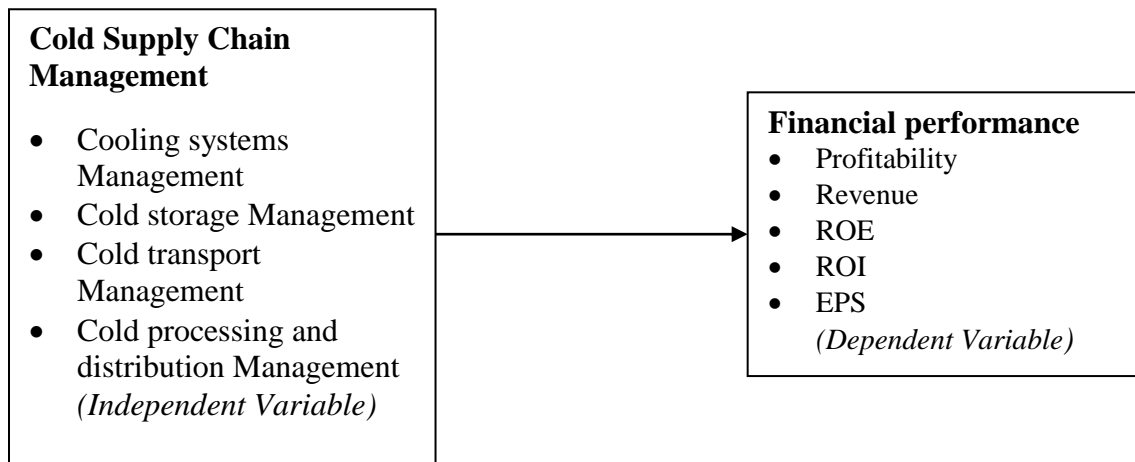


Figure 1: Conceptual Framework

2.5 Research Hypothesis

The study sought to test the following research hypothesis

H₀₁ There is no significant association between cold SCM and financial performance of pharmaceutical companies in Nairobi, Kenya.

H_{A1} There is significant association between cold SCM and financial performance of pharmaceutical companies in Nairobi, Kenya.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the research approach that was employed. Further details include the nature and source of the data, the intended audience, the sampling methodologies, and the methodology used to determine the sample size. It also details the procedure for gathering and analysing data.

3.2 Research Design

A research design is a strategy for deciding which sources and types of data will be used to address a particular research issue (Kerlinger, 2007). A descriptive cross-sectional survey was used in the study. Cooper and Schindler (2006) assert that cross-sectional investigations are only performed once. In order to explore associations between variables at a specific period, descriptive cross-sectional research involves asking participants who are the subject of the study and who are members of a representative sample using a standardized questioning approach (Saunders et al, 2007). The study goal is to determine the association between cold SCM and the financial success of pharmaceutical enterprises in Nairobi, Kenya, hence this methodology was acceptable.

3.3 Target Population

According to Ngechu (2004), a population is a clearly defined collection of individuals, occasions, things, or households that are the subject of a study. The study population was pharmaceutical companies in Nairobi County, Kenya. There are thirty-seven licensed pharmaceutical companies in Kenya, with their head office located in Nairobi. The study was conducted in the 37 pharmaceutical companies. Since the population is small all the pharmaceutical companies formed the study sample. The study respondents were one senior employee in the supply chain department and finance department in each of the pharmaceutical companies in Nairobi.

3.4 Data Collection Instruments

A questionnaire was employed in this investigation. Three components will make up the questionnaire; the second section was on cold SCM and the third section was on financial performance of pharmaceutical companies. The questionnaire was semi-structured and comprised close-ended and five-point Likert scale items. Questionnaires were chosen because, according to Cooper and Schindler (2011), they are useful data collection tools that allow respondents to express their views on the study subject (Cox, 2010). The questions were self-administered by the researcher to the respondents. The researcher additionally followed up with those respondents who were chosen to complete out the surveys at various intervals.

3.5 Data Analysis and Presentation

Data collected from the field was checked for completion, cleaned and edited. The Statistical Package for Social Science (SPSS) computer program, version 23.0, was then used to process the data. Descriptive and inferential statistics were used to analyze the quantitative data that was produced. Included in descriptive statistics were frequencies, averages, percentages, and standard deviations. Tables were used to present the information.

Inferential statistics included the correlational and regression analysis. Correlational analysis was conducted to determine the strength of the association between the variables. Regression analysis was used to determine the association of cold SCM and financial performance of pharmaceutical companies in Nairobi. The regression model was as follows;

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

Where:

Y is the dependent variable (financial performance)

X₁ is cooling systems Management

X₂ is cold storage Management

X₃ is cold transport Management, X₄ is cold processing and distribution Management

β_0 is the regression constant, β_1 , β_2 , β_3 , β_4 are the coefficients of independent variables

ε is the error term which captures the unexplainable variations in the model.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter covers data analysis, results and discussions on its aim to determine the association between cold SCM and financial performance of pharmaceutical firms in Nairobi. It covers the demographic data, descriptive and inferential statistics.

The study population was 74 respondents; they were all issued with questionnaires. The returned questionnaires were 68, forming a response rate of 92%. Mugenda (2009) posits that, a response rate of above 70% is excellent.

4.2 Demographic Information

4.2.1 Gender of Respondents

The study sought to determine the respondent's gender. This is depicted in Figure 4.1. According to the findings, 63 percent of respondents were male, while 37 percent were female. This suggests that the study included both male and female participants.

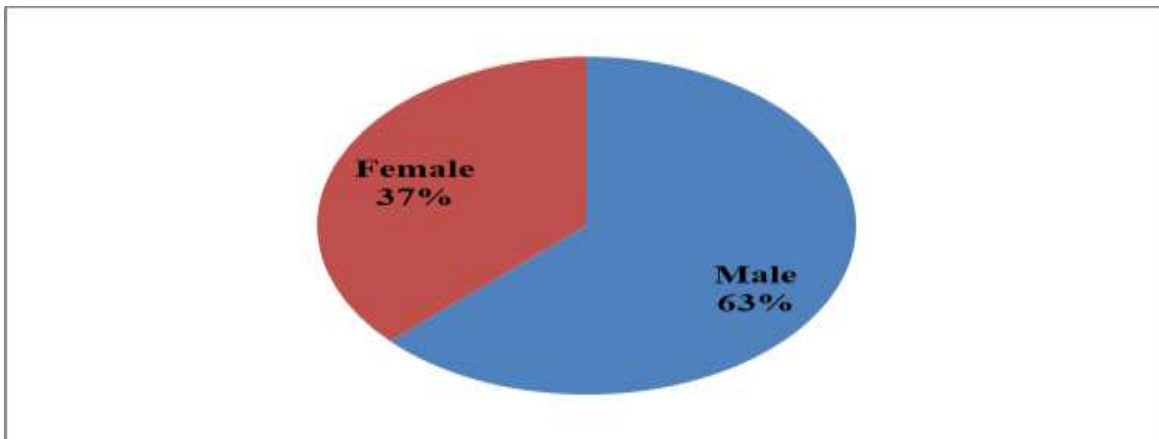


Figure 4.1: Gender of Respondents

4.2.2 Respondents Period of Service

The respondents were asked to specify how long they had been with their current employer. As illustrated in Figure 4.2. According to the data, 44 percent of respondents

reported that they had worked in their current organization for a period of 6-10 years, 32 percent for a period of 2-5 years, 19 percent for more than 11 years, and 4 percent for less than 1 year.

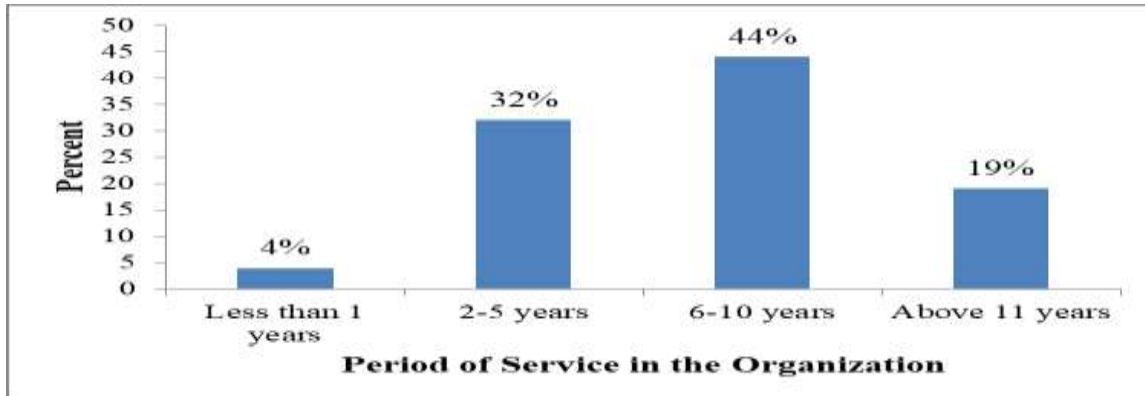


Figure 4.2: Respondents Period of Service

4.3 Cold SCM

The participants were asked to indicate which of the following cold SCM practices are commonly used in their pharmaceutical company. Results were as shown in Table 4.1. From the findings, 63% of the respondents they use cooling systems management, 94% use cold storage management, 75% use cold transport and 56% use cold processing and distribution management. This implies that the pharmaceutical companies use different cold SCM practices.

Table 4.1: Use of Cold SCM

Category	Frequency	Percent
Cooling systems Management	43	63%
Cold storage Management	64	94%
Cold transport	51	75%
Cold processing and distribution Management	38	56%

The respondents were asked to rate their agreement with the following statements about cold SCM in pharmaceutical companies in Nairobi.

From the findings in Table 4.2, the respondents agreed that different storage equipment are used for different kinds of medicines as shown by a mean of 4.059, storage equipment are regularly checked to ensure they are in the right condition as depicted by a mean of 4.044, the firm has enough vehicles to achieve demand for distribution of pharmaceutical products as illustrated by a mean of 4.015, transport and distribution practices of pharmaceutical products are satisfactory as shown by a mean of 3.985, equipment for transporting pharmaceutical products are checked and serviced regularly to prevent breakdown as shown by a mean of 3.971, Only packaging materials that have been explicitly recommended for certain commodities are used as shown by a mean of 3.926, existing standard operation procedures are followed to ensure proper storage of medicines as shown by a mean of 3.971, while cold chain items are in transit, recommended temperatures are checked and maintained as shown by a mean of 3.912, vehicles for transporting pharmaceutical products are outfitted with temperature and humidity monitoring systems that work as shown by a mean of 3.882, quality laboratory tests are carried out to confirm the potency of cold chain goods as shown by a mean of 3.882, pharmaceutical items do not require more time than is indicated while on transit as shown by a mean of 3.868, delivery of pharmaceutical products is done within recommended timelines as shown by a mean of 3.853 and the organization has special vehicles for transportation of its pharmaceutical products as depicted by a mean of 3.824.

Table 4.2: Cold SCM

Statements	Mean	SD
Different storage equipment is used for different kinds of medicines	4.059	0.928
Storage equipment are regularly checked to ensure they are in the right condition	4.044	0.905
Existing standard operation procedures are followed to ensure proper storage of medicines	3.971	0.822
The organization has special vehicles for transportation of its pharmaceutical products	3.824	0.972
The organization has enough vehicles to meet demand for distribution of pharmaceutical products	4.015	0.865
Vehicles used to transport pharmaceutical supplies are outfitted with temperature and humidity monitoring systems	3.882	1.046
Pharmaceutical products are delivered within the timeframes specified	3.853	0.769
Pharmaceutical product transportation and distribution processes are satisfactory	3.985	0.844
While in transit, pharmaceutical products do not take any longer than is recommended	3.868	0.872
While cold chain items are in transit, recommended temperatures are checked and maintained	3.912	0.814
For specified items, only packaging materials that have been specially recommended are used	3.926	0.815
Quality laboratory tests are carried out to confirm the potency of cold chain goods	3.882	0.769
To avoid breakdowns, pharmaceutical transport equipment is tested and serviced on a regular basis	3.971	0.883

4.4 Financial Performance

This section analyses the financial performance of pharmaceutical companies. The results were an average of financial performance of all the pharmaceutical firms. The results on profit, ROA, return on investments, market share, customer base, ROE and EPS were as presented in the figures as follows;

Based on the findings profits increased from 25% in 2016 to 32% in 2017 then increased to 37% in 2018, then increased to 40% in 2019 and increased to 42% in 2020.

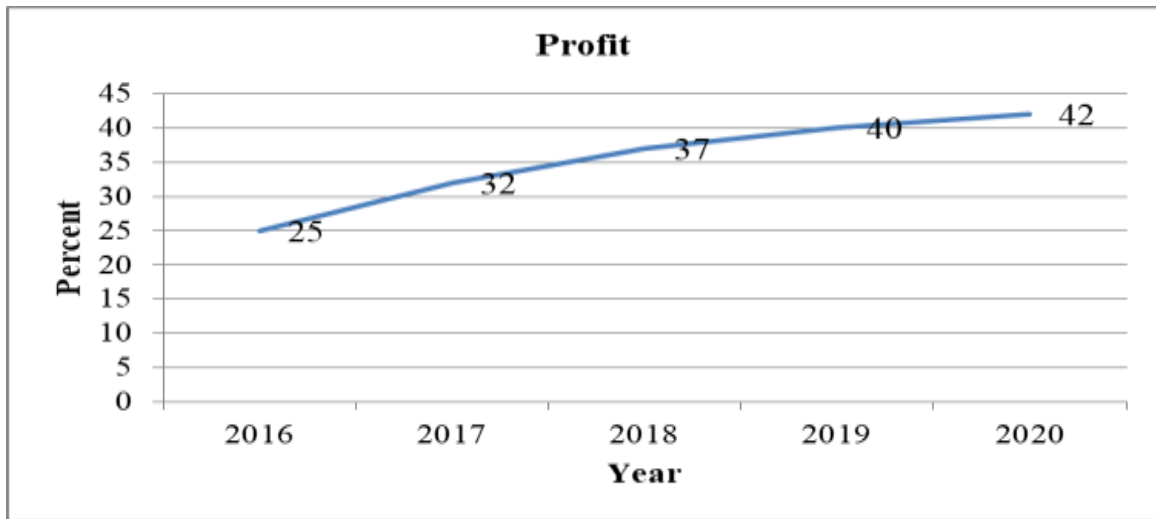


Figure 4.3: Profit

From the findings, ROA increased from 16% in 2016 to 24% in 2017, decreased to 18% in 2018, increased to 21% in 2019 and decreased to 19% in 2020.

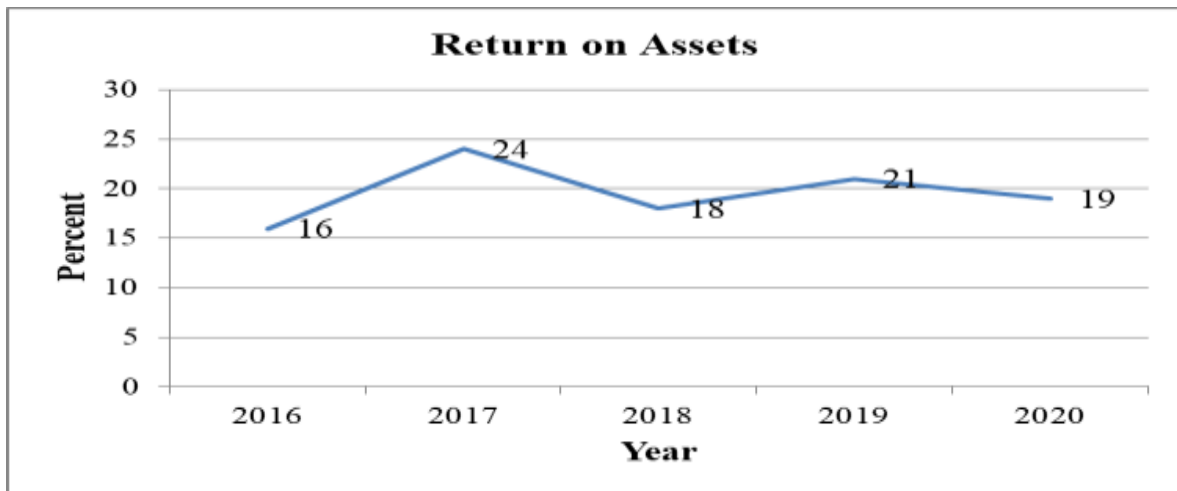


Figure 4.4: ROA

Based on the findings in Figure 4.5, ROI increased from 13% in 2016 to 20% in 2017, increased to 29% in 2018, reduced to 23% in 2019 and increased to 25% in 2020.



Figure 4.5: ROI

From the findings, market share increased from 15.3% in 2016 to 29.7% in 2017, increased to 38.1% in 2018, increased to 39.8% in 2019 and 38.1% in 2020.

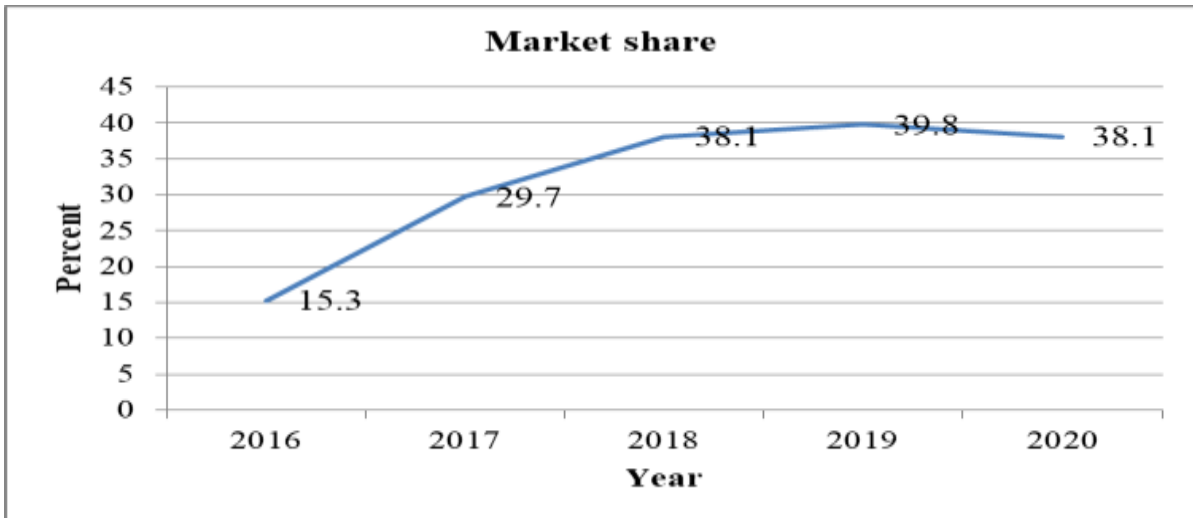


Figure 4.6: Market Share

From the findings in Figure 4.7, customer base increased from 14.9% in 2016 to 24.4% in 2017, increased to 315 in 2018, increased to 33.6% in 2019 and increased to 35.85 in 2020.

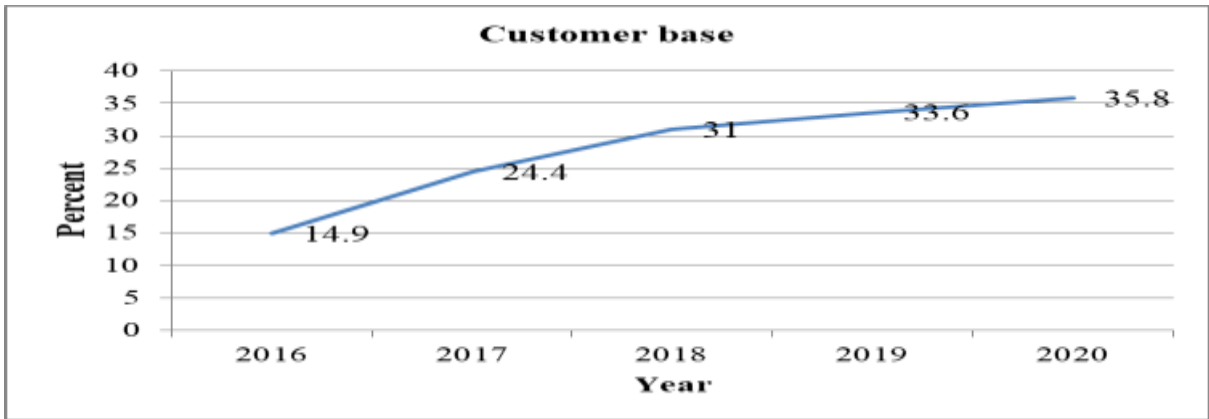


Figure 4.7: Customer Base

Based on the findings, ROE increased from 19% in 2016 to 28% in 2017, increased to 33% in 2018, increased to 36% in 2019 and increased 44% in 2020.

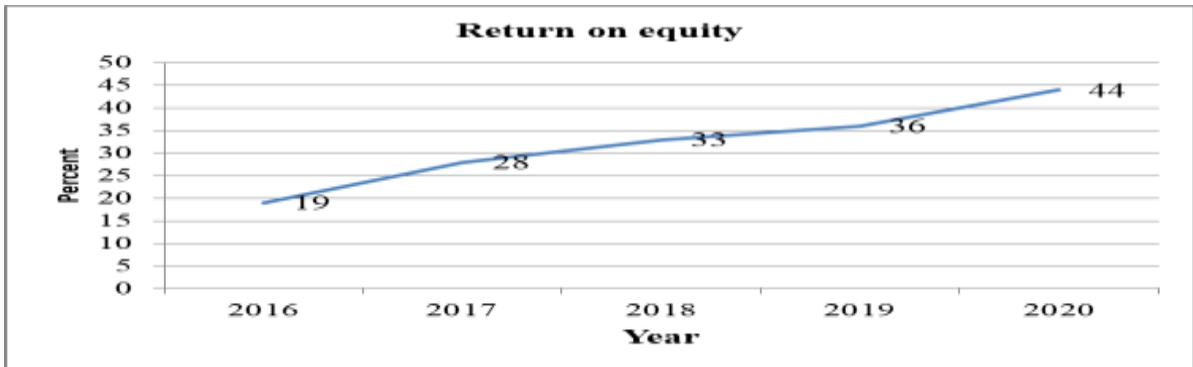


Figure 4.8: ROE

Based on the findings, EPS increased from 20.1% in 2016 to 24.7% in 2017, EPS also increased to 31.3% in 2018, increased to 35.2% in 2019 and increased to 39.5% in 2020.



Figure 4.9: EPS

The average financial performance in 2016 was 17.6%, in 2017 it was 26.1%, in 2018 it was 31.1%, in 2019 it was 32.7% and in 2020 it was 34.8%. This implies that the financial performance of pharmaceutical companies has been increasing since 2016 to 2020.

Table 4.3: Average Financial Performance

Year	2016	2017	2018	2019	2020
Financial performance	17.6%	26.1%	31.1%	32.7%	34.8%

4.5 Correlational Analysis

The study conducted a correlational analysis to determine the strength of the association amid the independent and dependent variables. Results were as shown in Table 4.4.

From the results in table 4.3, cooling systems management had a strong positive correlation with performance of pharmaceutical companies ($r=0.693$, $p=0.01$), cold storage management had a strong positive correlation with performance of pharmaceutical companies ($r=0.726$, $p=0.01$), cold transport management had a strong positive correlation with performance of pharmaceutical companies ($r=0.672$, $p=0.01$) and cold processing and distribution management had a strong positive correlation with performance of pharmaceutical companies ($r=0.694$, $p=0.01$).

Table 4.4: Correlational Analysis

		Financial Performance	Cooling systems Management	Cold storage Management	Cold transport Management	Cold processing and distribution
Financial Performance	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	68				
Cooling systems Management	Pearson Correlation	.693**	1			
	Sig. (2-tailed)	.001				
	N	68	68			
Cold storage Management	Pearson Correlation	.726**	.364	1		
	Sig. (2-tailed)	.001	.019			
	N	68	68	68		
Cold transport Management	Pearson Correlation	.672**	.446	.397	1	
	Sig. (2-tailed)	.001	.014	.018		
	N	68	68	68	68	
Cold processing and distribution Management	Pearson Correlation	.694**	.437	.354	.454	1
	Sig. (2-tailed)	.001	.016	.015	.012	
	N	68	68	68	68	68

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

4.6 Regression Analysis

To assess the link between the independent and dependent variables, a regression analysis was used. As illustrated in Table 4.4. According to the findings, the value of R squared is 0.687; this implies that there was variation of 68.7% on financial performance due to changes in cooling systems management, cold storage management, cold transport management and cold processing and distribution management. The remaining 31.3% implies that there are other factors that can be attributed to financial performance of pharmaceutical companies in Nairobi that were not part of this model.

Table 4.5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Sign
1	.829 ^a	.687	.681	.03270	.001

The population parameters had a significance level of 0.01 based on the ANOVA results, indicating that the data is excellent for forming a judgment on the population's parameter because the value of significance (p-value) is less than 5%. The estimated value exceeded the crucial value ($2.311 < 11.834$), indicating that cooling systems management, cold storage management, cold transport management and cold processing and distribution management significantly influence financial performance of pharmaceutical companies in Nairobi.

Table 4.6: Analysis of Variance

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Residual	9.419	4	2.355	11.834	.001 ^b
Regression	12.536	63	0.199		
Total	21.995	67			

The regression model was as follows;

$$Y = 1.184 + 0.361X_1 + 0.404X_2 + 0.385X_3 + 0.393X_4 + \varepsilon$$

From the equation, it was revealed that holding cooling systems management, cold storage management, cold transport management and cold processing and distribution management to a constant zero, financial performance of pharmaceutical companies in Nairobi would be at 1.184.

The results also show that, there was a statistically significant association between cooling system management and pharmaceutical company financial performance ($B=0.361$, $p=0.005$). This means that cooling systems management had a positive and significant association with financial performance of pharmaceutical companies.

Cold storage management had a statistically significant association cooling systems management and pharmaceutical company financial performance ($B=0.404$, $p=0.001$). This implies that cold storage management had a positive and significant association with pharmaceutical companies financial performance.

Cold transport management had a statistically significant association between cooling systems management and pharmaceutical company financial performance ($B=0.385$,

p=0.001). This depicts that cold transport management had a positive and significant link with pharmaceutical companies' financial performance.

Cold processing and distribution management had a statistically significant association with cooling systems management and pharmaceutical company financial performance (B=0.393, p=0.003). This infers that cold processing and distribution management had a positive and significant link with pharmaceutical companies' financial performance.

Table 4.7: Beta Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	Constant	1.184	0.218		5.431	.002
	Cooling systems Management	0.361	0.110	.314	3.282	.005
	Cold storage Management	0.404	0.101	.382	4.000	.001
	Cold transport Management	0.385	0.094	.320	4.096	.001
	Cold processing and distribution Management	0.393	0.099	0.326	3.970	0.003

4.7 Discussion

The study found that pharmaceutical companies use cooling systems management, cold storage management, cold transport and cold processing and distribution management practices. The study also found that storage equipment is regularly checked to ensure they are in the right condition, the company has an adequate number of vehicles to satisfy demand for pharmaceutical product distribution, its transport and distribution procedures are satisfactory, and its equipment for conveying pharmaceutical products is routinely inspected and maintained to prevent breakdowns. Higher levels of SCM practice, according to Lia and Ragu-Nathan (2016), can boost competitive advantage and boost organizational performance.

The results also showed that to ensure proper storage of medicines, existing standard operating procedures are followed, recommended temperatures are monitored and maintained while cold chain items are in transit, vehicles for transporting pharmaceutical products are equipped with functional temperature and humidity monitoring devices.

Additionally, pharmaceutical products are transported in accordance with approved timelines and undergo quality laboratory testing to confirm their efficacy for cold chain items, delivery of pharmaceutical products is done within recommended timelines and the organization has special vehicles for transportation of its pharmaceutical products. This is related to Njuguna (2015), who discovered that storage conditions and technical capacity had the strongest correlation and impact on the safety of vaccinations.

The study found that cooling systems management had a strong positive correlation with performance of pharmaceutical companies, cold storage management had a strong positive correlation with performance of pharmaceutical companies, cold transport management had a strong positive correlation with performance of pharmaceutical companies and cold processing and distribution management had a strong positive correlation with performance of pharmaceutical companies. The results supported by Lia and Ragu-(2016) Nathan's finding that increased levels of SCM practice can boost competitive advantage and boost organizational performance. The study also found that there was variation of 68.7% on financial performance due to changes in cooling systems management, cold storage management, cold transport management and cold processing and distribution management. Njuguna (2015) discovered that storage conditions and technical capacity had the strongest correlation and influence on the safety of vaccinations.

The study also found that, there is a statistically significant link with cooling systems management and financial performance of pharmaceutical companies in Nairobi, cold storage management had a statistically significant link with cooling systems management and financial performance of pharmaceutical companies in Nairobi, cold transport management had a statistically significant link with cooling systems management and financial performance of pharmaceutical companies in Nairobi and cold processing and distribution management had a positive and significant link with financial performance of pharmaceutical companies in Nairobi. The results are supported by Lia and Ragu-(2016) Nathan's findings that increased SCM practice can improve organizational performance and competitive advantage.

The study also revealed that the performance of the pharmaceutical companies in Nairobi have been improving since 2016. This is evidenced by the fact that profits, ROA, return on

investments, market share, customer base, return on equity and earnings per share have been increasing steadily over the years. According to Banafa, Muturi, and Ngugi (2015), strong financial performance in the pharmaceutical sector not only contributes to the firm's rise in market value but also spurs the expansion of the sector as a whole, which in turn boosts the economy's overall health.

CHAPTER FIVE: SUMMARY AND CONCLUSION

5.1 Introduction

This chapter presents the summary of findings, conclusion and recommendations the association between cold SCM and financial performance of pharmaceutical firms in Nairobi.

5.2 Summary of the Study

The study aim was to establish the association between cold SCM and financial performance of pharmaceutical companies in Nairobi. The study adopted a descriptive cross-sectional survey. The target population was senior managers in pharmaceutical companies in Nairobi County. This study used a questionnaire. Data collected from the field was checked for completion, cleaned and edited. The SPSS computer program, version 23.0, was then used to process the data. Descriptive and inferential statistics were used to analyze the quantitative data that was produced. The data was presented in form of tables. Inferential statistics included the correlational and regression analysis.

The study found that different storage equipment are used for varied types of medicines, storage equipment are checked regularly to ensure they are in the right condition, the organization has enough vehicles to meet demand for distribution of pharmaceutical products, transport and distribution practices of pharmaceutical products are satisfactory, only packaging materials that are specifically advised for a given item are used for transportation of pharmaceutical products, equipment is routinely inspected and serviced to prevent breakdown, existing standard operating procedures are followed to ensure proper storage of medications, recommended temperatures are monitored and maintained while cold chain items are in transit, and vehicles for transporting pharmaceutical products are equipped with functional temperature and humidity monitoring systems., delivery of pharmaceutical products is done within recommended timelines and the organization has special vehicles for transportation of its pharmaceutical products.

The also found that cooling systems management had a strong positive correlation with performance, cold storage management had a strong positive correlation with performance, cold transport management had a strong positive correlation with performance of and cold processing and distribution management had a strong positive correlation with performance

of pharmaceutical companies. There is a statistically significant link with cooling systems management and financial performance, cold storage management had a statistically significant link with cooling systems management and financial performance, cold transport management had a statistically significant link with cooling systems management and financial performance and cold processing and distribution management had a positive and significant link with financial performance of pharmaceutical companies.

5.3 Conclusion

The study established a significant and positive link between cooling systems management and financial performance of pharmaceutical companies. The study concludes that cooling systems management is positively related to financial performance. A statistically significant association between was revealed between cold storage management and financial performance. The study concludes that cold storage management is positively related to financial performance of pharmaceutical companies.

Cold transport management had a statistically significant link with financial performance of pharmaceutical companies. The study concludes that Cold transport management is positively related to financial performance of pharmaceutical companies. Cold processing and distribution management had a positive and significant link with financial performance of pharmaceutical companies. The study concludes that processing and distribution management is positively related to financial performance of pharmaceutical companies.

5.4 Recommendations

The study conclusion was that cold SCM is positively related to financial performance of pharmaceutical companies in Nairobi. The study recommends that the pharmaceutical companies should make use of cold SCM in all their processes from the time the drug is manufactured, stored, distributed and ends when it is administered to the client. This is true because medications are sensitive biological compounds that, when frozen, lose their effectiveness or are completely destroyed. Cold SCM should be incorporated into business strategies to ensure the effectiveness and quality of pharmaceutical items, which will enhance their performance.

5.5 Limitations

The study was limited to pharmaceutical companies in Nairobi. A wider scope could help in making comparison. The study was limited to four objectives cooling systems management, cold storage management, cold transport management and cold processing and distribution management. Data collected on financial performance was based on five years that is 2016-2020. A longer study period would have included boom and bust cycles as well as other eras of relevance. This may have given the problem a wider dimension by giving it a longer temporal focus.

5.6 Recommendations for Further Research

This study focused on the association between cold SCM and financial performance of pharmaceutical companies in Nairobi. The study recommends that another study should be conducted to determine the effect of cold SCM on the agricultural sector. Studies should cover other factors of cold SCM that were not discussed in this study.

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APPENDICES

Appendix I: Questionnaire

Kindly tick on the provided spaces

Section A: Demographic Information

1. Kindly indicate your gender

Male

Female

2. How long have you been working in your current organization?

Less than 1 years

2-5 years

6-10 years

Above 11 years

Section B: Cold SCM

1. Which of the following cold SCM practices are commonly used in your pharmaceutical company?

Cooling systems Management

Cold storage Management

Cold transport Management

Cold processing and distribution Management

Others.....

.....

2. Indicate your level of agreement on the following statements about cold SCM in pharmaceutical companies in Nairobi. Using the scale 1-strongly disagree, 2-disagree, 3-moderate, 4-agree, 5-strongly agree

Statements	1	2	3	4	5
Different storage equipment is used for different kinds of medicines					
Storage equipment are regularly checked to ensure they are in the right condition					
Existing standard operation procedures are followed to ensure proper storage of medicines					
The organization has special vehicles for transportation of its pharmaceutical products					
The organization has enough vehicles to meet demand for distribution of pharmaceutical products					
Vehicles used to transport pharmaceutical supplies are outfitted with temperature and humidity monitoring systems					
Pharmaceutical products are delivered within the timeframes specified					
Pharmaceutical product transportation and distribution processes are satisfactory					
While in transit, pharmaceutical products do not take any longer than is recommended					
While cold chain items are in transit, recommended temperatures are checked and maintained					
For specified items, only packaging materials that have been specially recommended are used					
Quality laboratory tests are carried out to confirm the potency of cold chain goods					
To avoid breakdowns, pharmaceutical transport equipment is tested and serviced on a regular basis					

Section C: Financial Performance

Kindly provide the following data of the financial performance of the pharmaceutical company you work in

Indicators	2016	2017	2018	2019	2020
Profit					
Return on Assets					
Return on Investments					
Market share					
Customer base					
Return on equity					
Earnings per Share					

THANK YOU FOR YOUR PARTICIPATION