EFFECT OF SUPPLY CHAIN INFORMATION SYSTEMS ON PERFORMANCE OF MANUFACTURING FIRMS IN NAIROBI KENYA

BY

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DECLARATION

Declaration by the Student

I declare that this is my original work and has not been presented for a degree in any other University.

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DEDICATION

With the pride that only a satisfied parent can know, I dedicate this research study to my mother Rose A. Okeyo, my son Shawn Mbogoh, my beautiful daughter Amelia Steya and to my husband George Kwemoi who have filled my life with the magic and beauty of love.

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ABSTRACT

In today's highly competitive and globalized business environment, manufacturing firms are continuously seeking ways to enhance their overall performance. Supply chain information systems (SCIS) have emerged as a critical tool to achieve this objective, facilitating seamless communication, collaboration, and data-driven decision-making throughout the supply chain. Most organizations have embraced information systems in an effort to improve their performance. However, while existing literature acknowledges the importance of information systems in enhancing supply chain efficiency and overall firm performance, it primarily draws from studies conducted in developed economies. The purpose of the study was to establish the Effect of Supply Chain Information Systems on Performance of Manufacturing Firms in Nairobi Kenya. The specific objectives were to establish the effect of enterprise resource planning (ERP), electronic data interchange (EDI) and warehouse management systems (WMS) on performance of manufacturing firms. The study was grounded by Dynamic Capability theory (DCT) and Resource based view (RBV) theories. Explanatory research design guided the study. Stratified sampling technique was used to select a sample of 254 firms drawn from the target population of 698 manufacturing firms in Nairobi Kenya. Primary data was collected using closed ended questionnaires. Data were analyzed using descriptive and inferential statistics. Descriptive was in the form of frequency distribution, means and standard deviations, while inferential consisted of correlation and multiple regressions. Pearson correlation was used to establish the association among variables while multiple regression was used to establish the effect of independent variables on the dependent variable. The findings indicated that Enterprise Resource Planning (ERP) (β=.274, p=.0.002<0.05) and Electronic Data Interchange (EDI) (β=0.500, p=0.000<0.05) had significant effects on performance of manufacturing firms in Nairobi Kenya. While Warehouse Management Systems (WMS) had an insignificant effect β=-0.094 and p-value of 0.342> 0.05 on performance. This study therefore concludes that ERP and EDI have significant effects on performance of manufacturing firms. The findings of the study support the Dynamic Capability Theory and the Resource Based View theory. This research study was limited to manufacturing firms in Nairobi hence the state of the effect on the other parts of the country was not known. Further research on WMS such as strategies to enhance their effectiveness in improving performance should be done. Manufacturing firms are encouraged to embrace the utilization of supply chain information systems as a means to enhance long-term performance. They should also consider collaborating with industry peers, trade associations, and governmental bodies to share insights and best practices on the adoption of supply chain information systems (SCIS).

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABREVIATIONS AND ACRONYMS

EAC	:	East African Community
EDI	:	Electronic Data Interchange
ERP	:	Enterprise Resource Planning
FP	:	Firm Performance
IS	:	Information Systems
KAM	:	Kenya Association of Manufacturers
NACOSTI	:	National Commission of Science Technology and Innovation
RBV	:	Resource Based View
RFID	:	Radio-frequency identification
SC	:	Supply Chain
SPSS	:	Statistical Package for Social Sciences
WMS	:	Warehouse Management System

OPERATIONAL DEFINATION OF TERMS

Enterprise Resource Planning: are comprehensive internal tools for managing an organization core business processes and data. It covers a wide range of activities, including finance, human resources, manufacturing, inventory management, procurement, and more(Venter, 2009).

Electronic Data Interchange: are systems that focus on facilitating external data exchange and collaboration with trading partners of structured business documents such as purchase orders, invoices, and shipping notices between different organizations in a standardized format 1Oba (2017).

Firm Performance: Is defined by the efficiency with which an organization could use its resources for achieving its objectives and the relevance of those accomplishments to its user (Taoub, 2019).

Supply Chain Information Systems: are defined by the capacity to change businesses and support the emergence of new ventures. The main objectives are to improve information dissemination and streamline the decision-making process (Sousa 2017).

Supply Chain: encompasses various operations like obtaining raw materials, procuring components, and manufacturing, warehousing, inventory tracking, handling

orders, distributing goods, and delivering them to consumers, using necessary information systems (Habib, 2011).

Warehouse Management Systems: are specialized tools for optimizing inventory, improving order accuracy and maximizing warehouse efficiency and other warehouse operations. When used together, they can improve both internal and external operations in various industries (Chemnitz, 2021).

CHAPTER ONE

INTRODUCTION

1.1 Overview

Chapter one of this study encompasses the background of the study, statement of the problem, objectives of the study, hypothesis of the study, significance of the study and lastly the scope of the study.

1.2 Background of the Study

In the era of globalization, businesses operate in an interconnected and highly competitive international environment. Tudose's insights (2021) on performance management resonate globally, emphasizing the universal challenge faced by managers in navigating the complexities of internal dynamics and measuring performance effectively. The quest for integrated methodologies is not confined to a specific region but is a concern shared by organizations worldwide.

The impact of organizational resources on firm performance, as highlighted by Chandler (1962), Cockburn *et al.*, (2000), Newbert (2008), Pearce *et al.*, (2012), and Talaja (2012), transcends geographical boundaries. Teece *et al.*,'s perspective (1997), as cited by Walter (2018), emphasizes the role of aggressive market interactions, a phenomenon not limited to any specific region. Among multinational enterprises, firm performance stands out as a common thread (Ongeti, 2014), underscoring the universal relevance of this metric in assessing organizational success.

Jan's (2013) exploration of firm performance in a global market provides valuable insights into the multifaceted nature of performance metrics. In this context, it becomes imperative to consider China's role as a major player in the global market. China's economic prowess and its manufacturing sector, which has witnessed unprecedented growth, position it as a significant competitor on the international stage.

Fernandez-Perez *et al.*'s research (2012) on strategic adaptability highlights the importance of extensive networks among business leaders. In the context of global competition, China's influence in international networks cannot be understated. The robust connections and capabilities of Chinese businesses contribute to shaping the global economic landscape, impacting the strategic adaptability of firms worldwide.

Sousa's insights (2017) on information systems altering businesses apply not only at a regional or national level but also resonate internationally. Information systems play a pivotal role in improving efficiency and reducing costs, objectives that are universally relevant in the competitive global market. Yaser's (2014) distinction between data and information remains pertinent, with businesses worldwide seeking meaningful and practical ways to organize and utilize their data.

In the past decade, the discussion around Information Systems (IS) and business strategy has transcended national borders. The relationship between supply chain information systems (SCIS) and firm performance has been a subject of academic

research globally. Decision-makers globally evaluate the value of IS, aiming to maximize its benefits and gain a competitive edge. The implementation of SCIS into long-term strategies is a practice not confined to a specific region, with businesses worldwide recognizing its potential advantages.

The effect of SCIS on firm performance is not limited to specific industries or geographical locations. Asih's (2019) insight into the indirect influence of supply chain information systems on firm performance holds true internationally. Businesses globally leverage SCIS to gain advantages such as increased productivity, operational effectiveness, and competitive assets.

Examining the manufacturing sector in Nairobi, Kenya, requires acknowledging the global context, especially with China emerging as a manufacturing powerhouse. The manufacturing industry's significance in a nation's economy, as highlighted, holds true globally. However, in the international arena, China stands out as a key player with the fastest-growing manufacturing exports in Africa.

Kenya's manufacturing sector, while the largest in East Africa, faces the challenge of other East African countries experiencing faster growth (Were, 2016). China's influence on the manufacturing landscape is undeniable, with its advanced industrial capabilities and a vast export-oriented manufacturing sector. The international competition between Kenya and China in manufacturing necessitates a thorough examination of the factors influencing firm performance.

The collaborative approach in business, promoting a positive competitive environment, is a global trend. Understanding the significance of interconnectedness and collaboration is crucial for navigating the complex business environment. As businesses increasingly collaborate globally, supply chain information systems play a pivotal role in facilitating these interactions. In the case of Kenya's manufacturing companies, there is a notable gap in fully leveraging supply chain information systems, hindering their competitiveness on the global stage.

Among multinational enterprises, the focus on firm performance (Ongeti, 2014) takes on a distinct significance in the African context. Africa's socio-economic landscape introduces additional variables that influence firm performance, making it imperative for businesses to navigate factors beyond traditional market dynamics.

In the pursuit of Africa's prosperity, as outlined in Muteshi and Kariuki's (2020) research, the study centers on the global networking framework and strategy. However, this global perspective requires a nuanced understanding of Africa's specific challenges and opportunities. Africa's economic landscape is characterized by a blend of emerging markets, diverse cultures, and varying levels of infrastructure development, influencing the strategic adaptability of businesses.

Sousa's insights (2017) into the transformative capacity of information systems resonate in the African context, where businesses grapple with challenges in information dissemination and decision-making processes. Information systems,

particularly in the supply chain, play a crucial role in overcoming logistical hurdles and improving efficiency.

Over the past decade, the discussion around Information Systems (IS) and business strategy has extended to include Africa's unique challenges and opportunities. Decision-makers on the continent consistently evaluate the value of IS, recognizing its potential to address specific challenges such as infrastructural gaps and market uncertainties. Integrating IS into long-term strategies is not merely a global practice; it is a strategic imperative for African businesses seeking to gain a competitive edge.

The effect of Supply Chain Information Systems (SCIS) on firm performance is not uniform across regions. Asih's (2019) insight into the indirect influence of information systems on firm performance is particularly relevant in the African context, where businesses often grapple with diverse challenges ranging from infrastructural limitations to market volatility. While the transformative opportunities of information systems are universal, their implementation and effectiveness may vary based on regional dynamics.

The manufacturing sector in Nairobi is unique within the East African context. While Kenya boasts the largest and most sophisticated manufacturing sector in the region, other East African countries are witnessing faster growth (Were, 2016). This regional competition necessitates a careful examination of the factors influencing firm performance, particularly in the context of supply chain information systems.

In Kenya, as in many African nations, a robust manufacturing sector is pivotal for economic growth. However, the sector has faced challenges, including a decline in industrial activity compared to other African nations, reflecting the need for strategic interventions to reinvigorate growth. The introduction of information systems into the manufacturing sector is expected to not only enable growth but also enhance performance on a regional level, offering potential avenues for advancing the manufacturing industry in Nairobi and Kenya at large.

The transition from multipolarity to multilateralism signifies a shift in the global business environment. In the African context, this transition necessitates a renewed focus on creating and fostering regional networks. Companies operating in Nairobi's manufacturing sector must develop strategic plans to improve their overall performance and competitiveness within the changing regional environment.

The world of business has undergone significant changes, with an increasing emphasis on regional collaborations. This collaborative approach fosters a positive competitive environment and improves overall business performance. However, the significance of interconnectedness and collaboration must be understood within the regional context. Information systems, crucial for business survival and success, play a pivotal role in regional collaborations, facilitating communication and coordination among businesses.

The study delves into the complexities that define the business environment in the country. Tudose's insights (2021) on performance management are highly applicable in Kenya, where managers face the challenge of effectively handling internal dynamics for business success.

Chandler's (1962) perspective on how organizational resources impact firm performance holds true in the Kenyan context. Kenya's diverse markets and regulatory environment significantly influence long-term business performance, emphasizing the need for strategic adaptability, as highlighted by Teece*et al.*'s perspective (1997), as cited by Walter (2018). The intense market interactions are not just a global phenomenon but are particularly pronounced in Kenya, where markets often undergo collisions, new beginnings, divisions, changes, and eventual endings.

Jan's (2013) exploration of firm performance metrics provides ways to assess Kenyan firms. However, the application of these metrics must consider the nuances of the Kenyan market, where unique economic challenges may impact the performance of businesses differently than in the international arena.

The effect of supply chain information systems on firm performance in Kenya has been studied for over 30 years. Macharia's (2015) insight into the relationship between IS spending and firm performance becomes particularly relevant in the Kenyan context. As the country seeks to position itself competitively, understanding the role of information technology becomes paramount.

In the Kenyan manufacturing sector, the underutilization of supply chain information systems poses challenges to competitiveness. Unlike more developed markets, Kenyan businesses, as highlighted by Sousa (2017), can significantly benefit from the introduction of supply chain information systems. The goals of improving information dissemination and streamlining decision-making processes are not only applicable globally but are crucial for Kenyan businesses seeking efficiency and cost reduction.

In 2016 KNBS reported that Kenya's manufacturing sector contributed 10.3% of the country's GDP, growing at rates of 3.5% in 2015 and 3.2% in 2014. The manufacturing industry has, however, generally been growing more slowly than the economy as a whole, which saw 5.6% growth in 2015. This suggests that manufacturing's share of the GDP has been steadily declining over time (Were, 2016). Yaser's (2014) distinction between data and information remains pertinent in Kenya, where the effective organization of data is essential for meaningful decision-making. For over a decade, the discussion around Supply Chain Information Systems (SCIS) and business strategy has evolved, with Kenyan decision-makers consistently evaluating the value of SCIS. The implementation of IS into long-term strategies is not just a global trend but represents a strategic significance for Kenyan businesses to gain a competitive advantage.

As the world transitions from multipolarity to multilateralism (Muteshi & Kariuki, 2020), the dynamics of doing business in Kenya's manufacturing sector undergo significant changes. The need for businesses to focus on creating and interacting with

new networks becomes even more crucial at the national level. Strategic plans aimed at improving overall performance and competitiveness must consider the changing international and regional environments. This study therefore intends to identify the effects of supply chain information systems on performance to be able to identify areas of improvement for the manufacturing sector.

1.3 Statement of the Problem

Manufacturers, K.A. (2018) Manufacturing firms play a significant role in Kenya's economic development and growth for several reasons such as economic growth, job creation, export opportunities and technological advancement that requires innovation and the adoption of advanced technologies, which can lead to skill development and technological transfer. Kenya's manufacturing sector has not been sufficiently developed, which has led to a declining manufacturing sector GDP contribution of 8.4% in 2017 and 9.2% in 2016. (KAM, 2023) The manufacturing industry generated 336.8 thousand employment opportunities across both the public and private sectors, marking a decrease from the 343.7 thousand jobs that were established in 2017.

While existing literature acknowledges the importance of supply chain information systems in enhancing efficiency and overall firm performance, it primarily draws from studies conducted in developed economies.

In his study (Qinghua, 2022) revealed that investing in improved information systems boosts performance by enhancing innovation and productivity. However, each

company must tailor its' IS solutions. Hugos (2018) provided an overview of supply chain management and discussed the importance of information systems in modern supply chains. These studies may not fully capture the unique challenges and opportunities faced by Kenyan manufacturing firms. Supply chain information systems in manufacturing firms in Kenya can be influenced by various socio-economic issues that may present challenges and considerations that organizations need to address when implementing these systems such as the cost of implementation, shortage of skilled professionals and technicians which raises the concern of skills gap, infrastructure and connectivity, job displacement, cultural resistance where employees may resist adopting new technologies and investments from China in Africa involve favoring Chinese interests over local requirements, with approximately 16% of Africa's complete manufacturing imports originating from China in 2018 (Freitas, 2023). These are perceived reasons why supply chain information systems have not been fully embraced in developing countries like Kenya, leading to slower implementation and potential productivity issues.

To address this critical research gap, this study seeks to examine the effect of supply chain information systems on performance of manufacturing firms in Nairobi Kenya. In summary, the existing literature does not adequately address the issues and implications of supply chain information systems in the Kenyan manufacturing sector and there is a lack of empirical studies focusing on this specific context. This research seeks to fill this gap by exploring the effect of supply chain information systems on

performance and contributing to a more comprehensive understanding of how Kenyan manufacturing firms can harness technology to enhance their competitiveness.

1.4 Objectives of the Study

The study had the following objectives.

1.4.1 General Objective

The purpose of this study was to establish the effect of supply chain information systems on performance of manufacturing firms in Nairobi Kenya.

1.4.2 Specific Objectives

i. To establish the effect of enterprise resource planning on performance of manufacturing firms in Nairobi Kenya
ii. To determine the effect of electronic data interchange on performance of manufacturing firms in Nairobi Kenya
iii. To ascertain the effect of warehouse management systems on performance of manufacturing firms in Nairobi Kenya

1.5 Hypothesis

H_{O1}: Enterprise resource planning in supply chain had no significant effect on performance of manufacturing firms in Nairobi Kenya

H_{O2}: Electronic data interchange in supply chain had no significant effect on performance of manufacturing firms in Nairobi Kenya.

H_{O3}: There were no significant effect of warehouse management systems in supply chain on performance of manufacturing firms in Nairobi Kenya.

1.6 Significance of the Study

This study aimed to add new data and practical observations to advance our knowledge and understanding of a variety of topics, including the effect of supply chain information systems on performance of manufacturing firms in Nairobi, Kenya. Future empirical research can be built on the suggestions and recommendations made in this project. The purpose of this study's findings was to inform manufacturing companies on the importance of adopting supply chain information systems to boost or improve their performance as a company. Additionally, the study sought to change how supply chain/procurement managers across various organizations viewed the effects of SCIS as they relate to pivotal strategic choices for their performance.

The findings of this study can provide valuable insights to the government, enabling them to better understand the effect of supply chain information systems on enhancing service delivery. Consequently, this knowledge can empower the government to make informed strategic decisions and implement initiatives aimed at attracting investors to the country. The study sought to inform the body of Kenya Association of Manufacturers to update their knowledge on manufacturing companies.

Ultimately, the outcomes of this study will serve as a valuable resource for other academicians, scholars, and researchers who have an interest in pursuing further

research in this area. This is because the study provided adequate literature related to this field, aiding in the advancement of knowledge related to this topic.

1.7 Scope of the Study

This study focused on the effect of supply chain information systems on performance of manufacturing firms in Nairobi Kenya. Data was collected from a sample of 254 firms drawn from 698 manufacturing firms in Nairobi where questionnaires were issued to procurement managers/supply chain managers, since they were the key individuals handling strategic issues within the departments. The study was conducted over a two-year period, beginning in 2022 and ending in 2023.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter examined previous research study in the same area by other scholars. To identify any gaps in the research, the researcher carefully reviewed their work and summed up the findings. The goal of this literature review was to determine what previous research studies and models had learned about how to improve the efficiency of supply chains, raise the quality of goods and services, lower supply chain costs, and boost firm competitiveness. This is closely related to how supply chains use information systems. The study's planning and organization were based on the data obtained from this literature review.

2.2 Concept of Performance

In the 1950s, people believed that a firm's performance was equivalent to its organizational efficiency. This referred to how effectively a company, which is similar to a group of people with few resources and tools, could accomplish its objectives without making its employees work too hard. They evaluated an organization's performance based on its productivity, adaptability, and ability to manage conflicts with other organizations (Georgopoulos, 1957). Since information systems were still relatively new and unexplored in the 50’s by the majority, firm performance did not heavily rely on information science hence a firm’s success was not pegged on its information systems.

In the early 2000s, according to Omar (2019), the key factors in defining performance of a firm were the efficiency with which an organization could use its resources for achieving its objectives and the relevance of those accomplishments to its users.

The adaptation of Information systems in the 21stCentury has strategically enhanced most firms' performance which this study sought to measure through: growth, market share.

For a firm to be able to grow, make money and turn their assets into cash is mainly through sales. Growing a company is really important for people who own the business, run it, and invest in it. This will assist in envisioning how well the business is doing. Sales can be called different things, like turnover, sales revenue, or just sales. Many studies use the increase in sales as a way to measure how much a company is growing. They say that if a company's sales are growing quickly, it's a sign that the company is doing well.

The concept of firm performance is crucial in research as it helps researchers and stakeholders, such as procurement supply chain managers, investors, and policymakers, understand how well a company is functioning and whether it is achieving its desired outcomes. The specific dimensions and indicators used to measure firm performance can vary depending on the research goals, industry, and specific context of the study. The study employed qualitative methods to assess and analyze firm performance comprehensively. Some common non-financial

measurements and aspects of firm performance that researchers often examine include customer satisfaction, market share and growth.

Customer satisfaction means the happiness, peace of mind, or confidence a person feels when they buy and use a product that fulfills their needs. So, when customers are satisfied, they're more likely to stick around and keep coming back for more. This is a key factor in making sure customers stay loyal over time, as explained by Ndubisi in 2019. Hunt (1977) reveals that customer satisfaction can be seen as a way of assessing whether an experience was at least as good as expected. Tse & Wilton (1988) further explained this concept by stating that customer satisfaction involves how consumers react when they compare what they expected from a product or service with how it actually performed after they used it. In other words, it's about measuring the difference between what they thought they would get and what they actually got.

Wadud (2012) revealed that customer loyalty and satisfaction often depend on how well consumers perceive the services provided by a company right from the beginning. It's clear that with the implementation of Information Systems (IS), a firm becomes more efficient, which in turn leads to increased growth.

Businesses depend on customers, this means a firm's profits can go up or down based on how much customers want their products. Because of this, it's really important to treat customers as the most important people in the market. In simpler terms, when

customers are happy with the quality and variety of products a company offers, they're more likely to buy more products, leading to increased profits (Ali 2021).

Market share is the total number of sales made and earned by a firm over a specified period of time. According to (Zaleckyte, 2016), being competitive in the high-tech world of today requires a few key actions. It entails producing goods effectively, utilizing cutting-edge technology, improving production with the help of the CEO, and maximizing the company's competitive advantages such as its brand, innovation, and cost-cutting expertise. In this instance, the business has succeeded by implementing better technology, increasing brand recognition, being creative and lowering production costs.

Measuring the firm's market share over time can indicate how successfully it's capturing a larger portion of its target market. Gaining market share can lead to increased influence and competitiveness which in turn reflects on its growth. A company's growth rate is really important in explaining how well it's doing, even more so than other factors like its size, how efficiently it operates. This has been shown by various researchers (Cooper *et al.*, 2009; Watanabe *et al.*, 2012; Sean, 2015; Jaideep *et al.*, 2017; Alan & Kevin, 2018) as mentioned in Mohammed Musah's work in 2019.

Competitiveness in today's tech-driven world includes having a good production process, strong leadership from the CEO to improve production, using advanced

technology, and making the most of the company's strengths like its brand reputation, innovation, and manufacturing expertise to reduce costs.

2.3 Concept of Supply Chain Information Systems

An information system is designed to collect, process, store, and disseminate data, which subsequently helps most organizations make decisions. While information systems don't necessarily require computerization, the significance of Information Technology (IT) in organizations has grown due to the rapid pace of technological advancements. In the present day, a majority of information systems, except the smallest ones, rely on IT. This is because modern IT facilitates streamlined operations and enhances management effectiveness across organizations of varying sizes.

Information systems (IS) have a profound influence on various facets of supply chain management (SCM), encompassing critical processes like planning, sourcing, and delivery. This impact extends across multiple tiers, spanning from tactical operational aspects to the overarching organizational strategy. The extensive interplay between IS and SCM has given rise to a wide array of research, often characterized by its diverse and fragmented nature (Mohammad, 2019).

IS in Supply Chain Management (SCM) are aiding in the production of better supply chain decisions responsible for improving business competitiveness, service quality, and cutting down costs and e-risks. An increase in technology and IT software, such as EDI, RFID, Bar Code, Electronic Commerce, Decision Support systems, ERP

packages etc., allows for organizations to make use of a virtual supply chain network which ensures successful coordination within, as well as outside of organizations. This technology can also be used to prevent e-risks (Varma, 2014).

2.3.1 Enterprise Resource Planning (ERP)

(Venter, 2009) ERP systems are comprehensive internal tools for managing an organization's core business processes and data. It covers a wide range of activities, including finance, human resources, manufacturing, inventory management, procurement, and more.

2.3.2 Electronic Data Interchange (EDI)

EDI according to 1Oba (2017), stated that it focuses on facilitating external data exchange and collaboration with trading partners of structured business documents such as purchase orders, invoices, and shipping notices between different organizations in a standardized format.

2.3.3 Warehouse Management Systems (WMS)

WMS systems are specialized tools for optimizing inventory, improving order accuracy, and maximizing warehouse efficiency and other warehouse operations. When used together, they can improve both internal and external operations in various industries (Chemnitz, 2021).

2.4 Theoretical Framework

A theoretical framework is a set of theories demonstrated by experts of a particular field that you plan to research about. The right theoretical framework guides your data analysis and interpretation of results. Put simply, a theoretical framework is a collection of ideas and theories derived from prior research that have been empirically tested and published. It serves as a critical foundation for a researcher, enabling the researcher to analyze and clarify the significance of integrating it into their data analysis (Kivunja, 2018). This study was based on the following theories; Dynamic Capability theory and Resource Based View Theory.

2.4.1 Dynamic Capability Theory

Samsudin (2019), discussed the definition of dynamic capabilities developed by Teece*et al.*, (1997), which is described as the capacity of the organization to integrate, create, and customize external and internal competencies in order to keep up with quickly changing conditions. Further research has established several definitions of dynamic capabilities; such as Eisenhardt and Martin (2000), who defines it as the process of utilizing resources to develop new resources that can alter the market. Furthermore, this can result in the market evolving, emerging, splitting or even ceasing. Additionally, a dynamic capability is the consequence of the alteration of resources that have been accumulated, combined, and put together to create new strategies (Grant, 1996; Pisano, 1994). As a result, dynamic capability is the source of new competitive advantages (Henderson &Cocburn, 1994; Teece*et al.*, 1997).

Dynamic capability theory suggests that firms that can adapt and change rapidly in response to external changes will outperform their competitors. Supply chain information systems in this case enterprise resource planning (ERP), electronic data interchange (EDI) and warehouse management systems (WMS) enable firms to gather, analyze, and act on real-time data, enhancing their ability to adapt to market dynamics and improve performance. Dynamics capability theory explains the independent variable in this study whereby a firm's capabilities in reference to supply chain information systems continued competitive gain such as the ability of a firm to use external and internal expertise.

2.4.2 Resource Based View Theory

The perspective of the resource-based view (RBV) asserts that enterprises harbor an array of resources, within which a subset holds the potential to confer them with a competitive edge. Among these, a further subset is accountable for yielding elevated, enduring performance levels. Distinctive resources, ones that prove both valuable and scarce, possess the capability to engender a competitive advantage. This advantage, in turn, can be upheld over extended durations as long as the enterprise effectively shields against endeavors aimed at replicating, relocating, or replacing said resources. On a broader scale, investigations grounded in empirical research and employing this theory have consistently lent robust support to the tenets of the resource-based view (Foss, 2005).

The RBV harks back to Penrose's focus on differences between businesses and its emphasis on the particularities of each firm. Nonetheless, when it is related to Porter’s five forces, many of Penrose’s major topics such as adapting to an unpredictable environment, knowledge-gaining as an innovative practice, the effects of path-dependency, leadership, pioneering, and efficiency in resource use rather than the resources themselves appear to be beyond its scope (Demsetz, 1973).

RBV theory suggests that a firm's unique resources and capabilities contribute to its competitive advantage. Enterprise resource planning (ERP), electronic data interchange (EDI) and warehouse management systems (WMS) in the supply chain can be seen as a strategic resource that enhance a firm's ability to manage information, make informed decisions, and respond to market changes, ultimately leading to improved performance.

The resource-based view theory explains how a firm attribute its performance to a firm’s resources.

2.5 Empirical Review

2.5.1 Enterprise Resource Planning and Firm Performance

ERP is a term introduced by The Gartner Group in 1990 to refer to a suite of integrated software applications that integrate the various aspects of a business operation under one platform. This term has been broadened to include any large program package. The objective of an ERP system is to make it simpler to monitor the

business processes across various departments. By using these systems, companies can reduce their costs by avoiding the need to manually copy and monitor information from multiple disparate systems. Daniel *et al.,* in 2003 stated that ERP systems have the ability to streamline workflow tracking across various departments, hence leading to a reduction in operational costs associated with manual data tracking and duplication across disparate systems (Venter, 2009).

Organizations employ ERP (Enterprise Resource Planning) software solutions to enhance their decision-making capabilities, achieve cost-saving efficiencies by streamlining business processes, integrate various operational facets, enhance managerial oversight, accelerate and optimize functional workflows, thereby elevating customer service standards and fostering heightened customer contentment. This, in turn, fosters transparency within operations, harmonizes interdepartmental coordination, empowers IS infrastructure and information assets, and ultimately confers a distinct competitive advantage. (Importance of ERP software solutions).

Henk (2003), shed light on the influence of prevailing ERP systems on trends within Supply Chain Management (SCM). The outcomes of this investigation exhibit an exploratory nature, particularly in relation to how current ERP systems affect these SCM dynamics.

The overarching inference derived from our Delphi study is that excessively high expectations should not be placed on ERP systems for effectively managing supply

chains in extended enterprises. This conclusion, though not entirely unexpected, is noteworthy. ERP systems have gained prominence across industries by replacing disparate local legacy systems, thus creating a process-centric foundation for transactional activities within a single business entity. This consolidation, however, encounters limitations when addressing the complexities of supply chain management, particularly across multiple interconnected enterprises.

While ERP systems possess the architectural advantage of seamless integration within a singular organization, this very attribute becomes a strategic drawback within the evolving business landscape. The contemporary milieu demands modular, adaptable, and open IS solutions, a criterion that ERP systems were not inherently designed to fulfill. The future trajectory will unveil whether these required solutions will be developed atop, in conjunction with, or in lieu of ERP systems, and whether they will be spearheaded by the existing ERP software vendors or alternative entities.

However, temporal progression alone is insufficient. A more comprehensive and thorough investigation is imperative. Such research would bridge the existing gap in the timely scholarly exploration of the tangible business impacts brought forth by ERP systems.

With the rapid and constant change and upgrade in technology, most organizations have embraced the integration of technology into their day-to-day activities. The rise of the Internet, coupled with its communication protocol, and the adoption of

industry-specific standards such as XML and Rosettanet, is poised to significantly simplify the process of integrating distinct ERP implementations. Furthermore, these technologies and concepts play a pivotal role in establishing 'plug and play' infrastructures, where tailored solutions for specific challenges can be seamlessly incorporated into an existing ERP environment. This would facilitate the establishment of an interconnected supply chain and unlock tangible advantages stemming from substantial IS investments made over the preceding decade.

While strides in information and communication technology infrastructure have made achieving supply chain transparency straightforward, the notion of supply chain collaboration remains somewhat enigmatic. Further exploration into research encompassing comprehensive evaluations of supply chain performance and the formulation of incentive structures is imperative. This research will furnish a robust theoretical underpinning to complement the strides made in technology.

In their study The Impact of Enterprise Resource Planning in Supply Chain Management, (Seyed, 2013), state that it is possible to solve the supra-organizational problems of the chain via processing transactional information. Hence, the creation of the analytical layer, crucial for guiding decision-making processes and addressing supra-organizational challenges, hinges on either an information structure or the transactional layer. Stated differently, Enterprise Resource Planning (ERP) systems alone cannot comprehensively resolve the entirety of supply chain issues. However, there are compelling reasons that establish ERP as a fundamental prerequisite for

analyzing supply chain complexities and informing organizational decision-making. These reasons encompass the ability to disseminate extensive information throughout supply chain operations, the organization's capacity to effectively assimilate this information, and the utilization of both cross-organizational and intra-organizational data within the chain's processes.

In essence, ERP functions as a comprehensive system that seamlessly manages various commercial domains, such as finance, logistics, sales, production, and distribution, which are inherently interconnected. This ensures that when an activity is registered in one domain, it instantaneously resonates across all other pertinent areas.

2.5.2 Electronic Data Interchange and Firm Performance

Electronic Data Interchange (EDI) embodies the inter-organizational interchange of business documentation presented in a structured, machine-process able format. This entails a direct computer-to-computer exchange of business transactions in standardized formats between two or more collaborating enterprises, referred to as trading partners. EDI serves as a facilitator, enabling organizations to autonomously generate, receive, and manage data without necessitating human intervention ((hud.gov).

(1Oba, 2017) Electronic Data Interchange (EDI) is a form of communication between firms whereby data is exchanged through electronic means. This process enables the firms to share documents such as orders, bills, and shipping details without any

problems, no matter the distance. EDI has been in existence for over 30 years. There are different types of EDI languages, which can be referred to as computer conversations between businesses.

Lim (2001), concluded that every component of customer service has varying significance for every functional area of a firm. For instance, when it comes to purchasing goods, works and/or services, the research shows that using EDI technology can make orders happen faster and let the company keep fewer extra products in storage. In shipping, people agree that the advantages of using EDI supersedes not having it at all to enable efficient exchange of information (Gourley, 1998; Schatz, 1988). Just-in-time systems can only be implemented with EDI since it ensures efficiency in product delivery. In marketing, a pivotal objective revolves around ensuring customers receive outstanding service and find contentment in the offerings presented to them. Lim and Palvia reveal in their study a favorable correlation between Electronic Data Interchange (EDI) and customer service, encompassing five out of the six essential aspects. The flexible influence of EDI is poised to exert a positive momentum on its widespread adoption.

José (2004) demonstrated the potential advantages of incorporating Electronic Data Interchange (EDI) into supply chain management. The simulation experiment assesses the influence of Electronic Data Interchange (EDI) on various key parameters within the supply chain, including mean inventory costs, order quantities, cumulative expenses, amplification, and net excess stock. In each instance, the simulations

incorporating EDI demonstrate noteworthy and statistically significant reductions in the values of the examined variables. The extensive adoption of EDI leads to a firm's saving which ensures smooth running and managing of the supply chain.

2.5.3 Warehouse Management Systems and Firm Performance

With a focus on maximizing its efficiency, warehouse management entails the skillful operation of a warehouse and distribution system. Customers expect efficient, impressive performance in the logistics at minimized costs of a firm that can lead to a firm opening up new markets. Warehouses and systems for moving materials are the main parts of how goods go from the manufacturer to the customer/consumer. Every warehouse is designed uniquely for storing and delivering goods, and it has three important parts: the basic technical setup, the organizational and operational framework, and how everything is controlled and coordinated.

Warehouse management systems play a significant role in the regulation and enhancement of warehouse operations, leading to a various array of connections with neighboring systems that can be challenging to represent accurately. Depending on the circumstances and system architecture, certain control modules may also be integrated within these neighboring systems. Smaller enterprises, do not necessarily need to adopt and incorporate non-original elements into their WMS (Michael, 2005).

Order processing efficiency relies on product safety and accurate stock management. A streamlined warehousing approach optimizes traversal paths and storage capacities,

leading to cost savings. The Warehouse Management System (WMS) employs sequencing strategies for Just-in-Sequence and Just-in-Time operations. It includes an integrated vehicle control mechanism and plant visualization infrastructure for improved oversight and management (Chemnitz, 2021).

Darlington (2015) concluded that A well-implemented Warehouse Management System (WMS) significantly improves an organization's effectiveness and efficiency by reducing operating costs, optimizing warehouse processes, lowering inventory levels, increasing responsiveness to demand, strengthening competitive advantage, improving data accuracy, optimizing resource utilization, and enabling scalability. These benefits include reduced labor costs, improved inventory management, responsiveness to customer demands, and overall competitive advantage. WMS also helps minimize errors in order processing, inventory management, and shipment tracking, ensuring informed decision-making and strategic planning. Additionally, a scalable WMS supports expansion plans, ensuring smooth operations and increased order volumes.

A warehouse management system is now required because it can increase accuracy and efficiency in the warehouse, offering solutions to issues that may arise there. Furthermore, as noted by Harjano (2019), automation has enhanced the reliability and effectiveness of the warehouse system. This streamlining of operations benefits not only the operators but also the suppliers and dealers involved in the process.

2.6 Research Gaps

While several studies have explored information systems in the context of supply chains within Kenyan manufacturing firms, none have specifically addressed the objectives of this research. A prior study by Chelimo in 2019 emphasized the importance of manufacturing firms enhancing their processes and supply chain connections by adopting information systems. This indicates that manufacturing firms in Kenya have yet to fully incorporate information systems into their supply chain operations, potentially impacting their overall performance.

Henk (2003) claimed that ERP systems were initially created for the smooth integration of business processes within an organization in his article titled "The Impact of ERP on Supply Chain Management." However, the dynamic business environment requires flexible and team-based multi-enterprise supply chain management (SCM) solutions. When used outside of a single company, ERP systems' traditional structure may have limitations. The challenge lies in determining whether new solutions coexist with current ERP systems or if they completely replace them. It is necessary to conduct thorough research to understand the business implications, difficulties, and potential advantages of extending ERP systems to support supply chain across various enterprises. Technology advancements, market demands, and well-informed research will have an impact on the trajectory of ERP systems and their integration with new solutions.

In their study "EDI in Strategic Supply Chain: Impact on Customer Service," Lim & Palvia (2001), emphasized the need for additional research and suggested that future researchers may want to look into how EDI affects other elements of the value chain. Investigating additional elements that affect the adoption and success of EDI will be a fruitful research direction. Although we looked at the industry factor, more research is required.

Daria (2021) concluded that the current literature on WMS is so narrow, e.g., WMS sustainability supporting systems, could be developed and researched through testing and implementing other related areas sustainable supporting technologies in warehousing context. Adding contributions to this research gap would be essential from other area-specific academics to take sustainability aspects more profoundly into account in WMS studies.

The aim of this study is to fill the gaps that have been identified in previous research by examining the effect of supply chain information systems on performance of manufacturing firms located in Nairobi, Kenya. This research seeks to contribute to a deeper understanding of how the implementation of supply chain information systems can affect various aspects on performance of manufacturing firms in the specific context of Nairobi, Kenya.

2.7 Summary of Literature

The performance of manufacturing firms was thoroughly examined in this chapter in relation to the independent variables of enterprise resource planning, electronic data interchange, and warehouse management systems. It examined the viewpoints of various academics on these variables and delved into the specific roles that each predictor variable played within the operations of a firm. The chapter also clarified the significance of the dependent variable, firm performance, in relation to a firm's operations. The chapter also introduced and covered the two theories that serve as the foundation for this study: Dynamic Capability Theory and Resource-Based View Theory. These theories were thought to be pertinent to the study's goals and offered helpful insights into the anticipated results.

The chapter also revealed gaps in earlier studies, which provided the basis for carrying out this investigation. The objective of this study was to fill in these found gaps in the literature.

2.8 Conceptual Framework

The conceptual framework illustrates the conceptualized link between the independent variables and the dependent variable. In this study, the dependent variable pertains to the performance of manufacturing firms concerning supply chain information systems. The independent variables considered in this research encompass enterprise resource planning, electronic data interchange, and warehouse management systems. This relationship is visually represented in the diagram provided below:

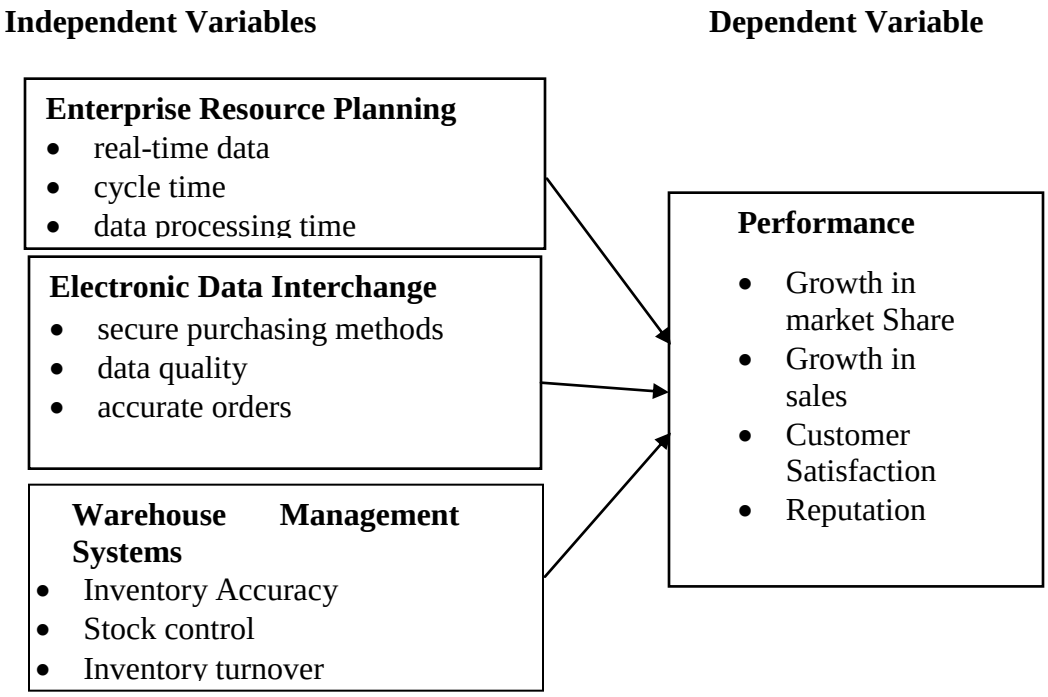

Figure 2.1: Conceptual Framework

***Source**: Author, 2021*

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses research design, target population, sample and sampling technique, data collection, validity and reliability, data analysis and presentation, ethical considerations and finally the measurements of the study variables.

3.2 Research Design

This project employed an explanatory and cross-sectional research design. Explanatory was used for in-depth understanding of why the problem persists in its current state. And examine the effect of supply chain information systems on performance while cross-sectional research design is where data was collected from several units at one point in time. These approaches were therefore appropriate for this study, since they intended to collect detailed information, compile the data, identify important variables and formulate hypotheses. This was vital in explaining the relationship between variables, which is one of the main objectives of this study.

3.3 Target Population

According to (Majid, 2018), the population of interest is the specific group under scrutiny, which the study aims to examine or address. When embarking on research, it is frequently impractical or unsuitable to engage the complete population of interest. In these instances, researchers opt to enlist a subset, or sample, from the population of interest to incorporate in their investigation. In such cases, the objective of the

research study is to generalize the findings obtained from the sample to the larger population of interest. The unit of analysis for this study included the selected manufacturing firms in Nairobi Kenya, focusing mainly on procurement managers/supply chain managers of the 698 mentioned firms. This was because 80% of manufacturing companies are based in Nairobi therefore there was no bias in collecting data for the study as shown on table below.

Table 3.1: Target Respondents

Sector	Manufacturing Firms	% of Manufacturing firms
Building, Mining & Construction	43	6
Service & Consultancy	116	17
Chemical & Allied Sectors	25	4
Energy, Electrical & Electronics	100	14
Food & Beverages	122	17
Leather & Footwear	16	2
Metal & Allied Sector	36	5
Motor Vehicle & Accessories	43	6
Plastics & Rubber	65	9
Pharmaceutical & Medical Equipment	18	3
Paper & Board	51	7
Fresh Produce	8	1
Textiles & Apparels	33	5
Timber, Wood & Furniture	22	3
TOTAL	**698**	**100**

Source: *KAM, 2021*

3.4 Sample and Sampling Technique

Stratified sampling technique was used to select the samples since the manufacturing firms are classified in sectors. Sampling is the systematic process, technique, or procedure used to pick a subset from a larger population with the aim of including this selected subgroup in a study (Ogula, 2005). This study used the simplified formula proposed by Taro in 1967 to determine the sample size. The formula was applied to ascertain the required number of responses, as specified by the

$$n = \frac{N}{1 + N(e)^2}$$

equation.

Where:

n = Sample size

N =Population size

e = The level of precision (0.05)

l = Constant

$n = 698/ \{1+698(0.05)^2\}$

$=254.28 \approx 254$

Table 3.2: Sample Size

Sector	Firms
Building, Mining & Construction	16
Service & Consultancy	42
Chemical & Allied Sectors	9
Energy, Electrical & Electronics	36
Food & Beverages	44
Leather & Footwear	6
Metal & Allied Sector	13
Motor Vehicle & Accessories	16
Plastics & Rubber	24
Pharmaceutical & Medical Equipment	7
Paper & Board	19
Fresh Produce	3
Textiles & Apparels	12
Timber, Wood & Furniture	8
TOTAL	**254**

Source: *Author, 2021*

This study targeted 254 firms comprising of procurement managers/supply chain managers of the manufacturing companies in Nairobi Kenya. The sample size was derived from the target population using the formula mentioned above. The researcher applied distribution of the sample proportionately across its sectors then the units were selected through random sampling from the sampling frame (Table 3.1). The table above (Table 3.2) presents a summary of the obtained sample size.

3.5 Data Types, Collection and Procedures

This study used primary data to address the research problem.

3.5.1 Type and Source of Data

The study used primary data as its main source of data because it was generated directly from the source and its viability can be trusted. The closed ended questions were used to guide the respondent on the study questions. Closed-ended questions are frequently employed by researchers to characterize an individual's qualities, convictions, or perspectives (Dillman, 2014).

3.5.2 Data Collection Instruments

Data was collected from supply chain and procurement managers of particular manufacturing companies in Nairobi, Kenya. The data was collected using questionnaires, comprising closed ended questions. A five-point Likert scale of five responses was used in this study. In its final form, the Likert scale is a five-point scale which is used to allow the individual to express how much they agree or disagree whereby the five points were indicated as: 5-Strongly Agree, 4- Agree, 3- Moderate extent, 2- Disagree and 1- Strongly Disagree. According to McLeod (2019), this presumption is based on the idea that attitudes can be measured and that the intensity or degree of an attitude follows a linear scale, ranging from strongly agree to strongly disagree.The study adopted its questions about enterprise resource planning (Group, 2020), electronic data interchange (True Commerce, 2019), warehouse management systems (Frankel, 2014), and performance (Mjongwana, 2018).

3.6 Pilot Testing of Instruments

The primary data collection exercise was carried out in two phases. The first phase was the pilot study which was done to pretest the research instrument. A sample size of 10% out 254 manufacturing firms was done. The pilot test was carried out in 20 manufacturing firms out of 25, in Uasin-Gishu County which were not part of the study population. Pilot tests are important to the researcher to test the reliability and viability of the data collection instrument through a small but similar group of the main study in this case manufacturing companies within Uasin-Gishu County were used for testing. Pilot testing helped to confirm the reliability and validity of the modified research instrument.

3.6.1 Reliability of the Research Instruments

Reliability, in research, pertains to the consistency of the obtained scores or results. It signifies the degree of consistency demonstrated by the research tools or procedures. Reliability is typically assessed by conducting multiple measurements on the same subjects. Poor reliability can hinder the ability to monitor changes in measurements within a study and can diminish the precision of a single measurement, as noted by Mislery (2004). To establish the reliability of the data collection instruments, a pilot study was conducted in which the researcher administered the research instruments to manufacturing firms in Uasin-Gishu County. These research instruments were given to the same respondents twice, with a two-week interval, to assess reliability. In this study, Cronbach's alpha coefficient, which typically falls between 0 and 1, was used as a

measure of reliability. A Cronbach's alpha coefficient of 0.7 was considered reliable for the purposes of this study.

3.6.2 Validity of Research Instruments

According to Mugenda (1999), Validity is the extent to which the conclusions drawn from data analysis accurately and illustrates the phenomenon being studied. To assess this, researchers commonly use various validity tests, including face validity, content validity, and construct validity. In this study, the content validity of the questionnaires was used. Content validity refers to the extent to which the components of an assessment instrument align with and accurately represent the intended construct for a specific assessment purpose (MSB, 2019). The statements in the questionnaire were assessed by the supervisors for relevance. Before the final data collection exercise, the instruments were appropriately adjusted based on their evaluation. Additionally, the KMO Bartlett test was applied to the data from the pilot tests. Kaiser- Meyer-Olkin Measure of Sampling Adequacy, according to Smith (2017), is a statistic that shows the percentage of variance in your variables that could be caused by underlying factors. In this context, manufacturing firms in Nairobi were considered as the representative elements of assessment, standing for all other organizations or firms included in this study.

3.6.3 Administration of Research Instruments

The research instruments were personally administered by the researcher after a prior visit, which enabled fine-tuning the timing for distributing questionnaires. This initial encounter also offered a preliminary insight into the expectations of the respondents.

A mutual arrangement was established with the participants regarding the schedule for administering the research instruments and the exact dates for questionnaire completion. Ample time was given to the respondents to ensure their comprehensive response to the questionnaires.

3.7 Data Analysis and Presentation

The primary data for this study was collected through the use of self-administered questionnaires containing closed-ended questions. Descriptive and Inferential statistics was used to show the potential relationships between variables and also describe, summarize and draw conclusions from data collected. Measures of dispersion including range, interquartile range, standard deviation and variance were used to show the measures of variability and central tendencies including weighted mean, were used to determine the spread and normalcy of data collected. A data array was created through analysis using the Statistical Package for Social Sciences (SPSS) ® version 25 computer program, which was then used to carry out further data analysis.

3.8 Regression Assumptions

Regression analysis is used in a study to show the relationship between the independent and dependent variables. To ensure the reliability and validity of the results, several key assumptions should be met. Regression assumptions are said to be linearity, normality, multicollinearity, homoscedasticity and data independence.

3.8.1 Linearity Test

The linear relationship between independent and dependent variables suggests a direct proportional relationship, but nonlinearity may occur when residuals' standard deviation exceeds the dependent variable's standard deviation (Garson, 2012).Testing for linearity in a regression analysis is crucial to ensure that the relationship between the independent and dependent variables can be adequately represented by a linear model. A scatterplot of the independent variable against the dependent variable can provide a visual indication of whether the data points tend to fall along a straight line. A linear pattern in the scatter plot suggests linearity.

3.8.2 Normality Test

Normality refers to the characteristics of a symmetric, bell-shaped curve, wherein the highest frequency of scores occurs in the middle, with lesser frequencies toward the extremes. Assessing normality involves obtaining skewness and kurtosis values to some extent (Pallant, 2016).Histograms serve as effective tools for visualizing the distribution of a single continuous variable, such as age or perceived stress scores (Pallant, 2013). Skewness, on the other hand, refers to the asymmetry or lack thereof in a distribution. The more prevalent form is right skew, where the tail of the distribution points towards the right. Left skew, in which the tail points to the left, is less common (Garson, 2012). It is generally recommended that skewness values fall within the range of -2 to +2. In the case of this study, the sample size consists of fewer than 200 respondents (141), thus necessitating the use of skewness for analyzing the data distribution (Pallant, 2013).

3.8.3 The Assumptions of Multicollinearity

Multicollinearity arises when two or more independent variables within the regression model exhibit correlation. Even a slight degree of multicollinearity can occasionally pose significant issues, while moderate to high levels of multicollinearity can present more substantial challenges that require resolution **(**Daoud, 2017).The variance inflation factor (VIF) is indeed a measure that quantifies the severity of multicollinearity in regression analysis. Multicollinearity refers to the situation in which two or more independent variables in a multiple regression model are highly correlated, making it difficult to distinguish their individual effects on the dependent variable. VIF assesses how much the variance of an estimated regression coefficient is inflated due to multicollinearity. As a rule of thumb, a tolerance of 0.1 or less is a cause for concern and a VIF values above 2.5 may be a cause for concern Senaviratna (2019). The study does not exhibita multicollinearity problem.

3.8.5 Testing for Homoscedasticity

Testing for homoscedasticity is done to highlight the unequal spread of residuals. Homoscedasticity is therefore measured to avoid outliers. In other words, the spread of data points around the regression line should be consistent. Non-uniform errors (residuals) across different sections of the range indicate a lack of homoscedasticity. In cases where the assumption of homoscedasticity is fulfilled, the residuals tend to form a more evenly dispersed cloud of points, indicating a more consistent pattern (Garson, 2012). To assess homoscedasticity, standardized scatter plots are commonly employed, as they readily reveal any deviations from the expected pattern. Maintaining

homoscedasticity aids in mitigating the impact of outliers which should range between -2 to +2, indicating that the assumption of homoscedasticity is satisfied during the multivariate analyses conducted in this study. Points that fall beyond -3 and +3 are typically considered outliers.

3.9 Regression Model

The general regression model was as follows:

$$y = .956 + .274X_1 + .500X_2 + -.094X_{3 + \varepsilon}$$

Where;

y = Firm/company performance,

$X_{1=}$ Enterprise Resource Planning

$X_{2=}$ Electronic Data Interchange

$X_{3=}$ Warehouse Management Systems

ε= Error term denoting factors not included in the model

3.10 Ethical Consideration

Before undertaking this research study, the researcher obtained consent from the University, The National Commission of Science Technology and Innovation (NACOSTI), as well as the individuals identified within the manufacturing firms who would be participating. The researcher took care to comprehensively explain the research's nature and objectives to the respondents. Throughout the research process, utmost respect was afforded to the rights of each individual, ensuring the protection of

their personal integrity. Furthermore, the respondents were given assurance that their identities would remain confidential, and their participation in the study would be anonymous, thereby fostering an environment of trust and privacy during the data collection phase.

3.11 Measurement of the Study Variables

Table 3.3: Measurement of the Study Variables

Variable	Type of Variable	Indicators	Author
Enterprise Resource Planning	Independent	Real-Time Data Cycle Time Data Processing time	Panorama Consulting group (Group, 2020)
Electronic Data Interchange	Independent	Secure Purchasing Methods Data quality Accurate orders	(True Commerce, 2019)
Warehouse Management systems	Independent	Inventory Accuracy Stock control Inventory turnover	(Frankel, 2014)
Firm Performance	Dependent	Growth in market Share Growth in sales Customer Satisfaction Reputation	(Andile Mjongwana, 2018) (Xiaojing, 2019)

Source: *Author, 2021*

CHAPTER FOUR

DATA ANALYSIS PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter discusses the analysis, presentation and interpretation of data collected on the effects of integrating information systems in supply chain on performance of manufacturing firms in Nairobi Kenya. The unit of analysis of this study was the selected manufacturing firms in Nairobi Kenya that have integrated information systems in their supply chain units. The chapter is organized as follows: response rate and missing data, descriptive statistics on respondents' demographic information, descriptive statistics for the study variables, descriptive statistics for the constructs, scale reliability, factor analysis, correlation analysis, testing assumptions for regression analysis, multiple regression analysis results and hypothesis testing.

4.2 Response Rate and Missing Data

Self-administered Questionnaire responses from sampled manufacturing companies in Nairobi Kenya were given to 254 firms comprising Procurement / Supply Chain Managers of which 141 responded indicating a response rate of about 56% of the 254 respondents, 33 of the selected firms did not respond because they did not have systems in place due to financial constraints whereas 80 of the expected respondents did not respond at all. According to Bailey (2000), a response rate of 50% is considered acceptable, and a response rate of 70% or higher is considered good. In this study, we achieved an acceptable response rate of 56%

Table 4.1: Response Rate

Firms	Sample Size	Response	Response Rate
698	254	141	56%

Source: *Research Data, 2022*

4.3 Descriptive Statistics for Study Variables

Descriptive statistics was performed on all three variables, Information Systems (Enterprise Resource Planning, Electronic Data Interchange and Warehouse Management Systems) as independent variables and Firm Performance as the dependent variable. The descriptive analyses included means and standard deviations.

4.3.1 Descriptive Statistics for Firm Performance

The table below (table 4.2) shows a majority of manufacturing firms' growth was better than their major competitors (mean of 4.16). The small standard deviation of 0.825 suggested that firms' growth compared to their major competitors had a small variation. Most manufacturing firms had better market share and customer satisfaction with means of 4.13 and 4.28 respectively with little standard deviation of 0,855 and 0.796. On-time delivery had a mean of 4.35 with a small standard deviation of 0.738 suggesting that on-time delivery had little variation among the manufacturing companies. Majority of the firms stated that they had better customer loyalty (mean of 4.35) with a small standard deviation of 0.697. Most firms stated that their social reputation was better than their major competitors as evidenced by mean scores of 4.33 and a small standard deviation of 0.732, whereas the majority of the manufacturing firms agreed that their return on sales was fair (mean of 3.93) compared to their major competitors with a little standard

deviation of 0.938 suggesting that return on sales for the various companies had a little variation. The consistent small standard deviation in other words, means that the values in the dataset are relatively consistent and do not deviate significantly from the mean.

Table 4.2: Mean and Standard Deviation for Firm Performance

N=141 *Five-point scale: 1=Much Worse; 5= Much Better

Firm Performance	Mean	Std.dvn
Firm's growth compared to major competitors	4.16	0.825
Firm's s market share compared to your major competitors	4.13	0.855
Firm's customer satisfaction compared to your major Competitors	4.28	0.796
Firm's growth in market share compared to your major competitors	4.11	0.837
Firm's return on sales compared to your major competitors	3.93	0.938
Firms on time delivery compared to your major competitors	4.35	0.738
Firm's customer Loyalty compared to your major competitors	4.35	0.697
Firm's social reputation compared to your major competitors	4.33	0.732

Source: *Research Data, 2022*

4.3.2 Descriptive Statistics for Enterprise Resource Planning

Table 4.3 below shows a majority of the respondents agreed that enterprise resource planning had improved their customer service as evidenced by a mean of 4.32 and a small standard deviation of 0.730. Most firms agreed that ERP has led to growth in revenue by optimizing its business processes (mean of 4.23) and a small standard deviation of 0.796. Majority of the firms agreed that they had real-time data consistency across all units (mean of 4.27) and a small standard deviation of 0.836 suggesting that real-time data consistency across all units had little variation among the respondents.

A number of firms stated that there was an increase in inventory turnover to a moderate extent (mean of 4.01) and a standard deviation of 0.707, whereas most of the respondents stated that there was a decrease in overall operational cost to a moderate extent with a mean of 3.70 and a small standard deviation of 0.908. Majority of the firms stated to a moderate extent that enterprise resource planning increased their purchasing power as seen with a mean of 3.88 and a small standard deviation of 0.779 suggesting that there was a small variation in the various manufacturing companies. Most of the firms stated that enterprise resource planning to a moderate extent had an effect on reduction in cycle times with a mean of 3.96 and a standard deviation of 0.691 whereas several firms agreed that it led to an increase in productivity and efficiency (mean of 4.17 and standard deviation of 0.717).

Most firms stated that there was an improvement in on-time shipments to a moderate extent (mean of 3.94 and a standard deviation of 0.725) whereas majority of the firms agreed that there was an increase in data processing time with the introduction of enterprise resource planning with a mean of 4.29 and a small standard deviation of 0.770 suggesting that increase in data processing time had a little variation from the various firms that responded. The consistent small standard deviation in other words, means that the values in the dataset are relatively consistent and do not deviate significantly from the mean.

Table 4. 3: Mean and Standard Deviation for Enterprise Resource Planning

Enterprise Resource Planning	Mean	Std.dvn
Improved its customer service	4.32	0.730
Growth in revenue by optimizing its business processes	4.23	0.796
Real-time data consistency across all units	4.27	0.836
Increase in inventory turnover	4.01	0.707
Decrease in overall operational cost	3.70	0.908
Increase in purchasing power	3.88	0.779
Reduction in cycle times	3.96	0.691
Increase in productivity and efficiency	4.17	0.717
Improvement in on time shipments	3.94	0.725
Increase in data processing time	4.29	0.770

N=103 *Five-point scale: 5=Strongly Agree; 1= Strongly Disagree

Source: *Research Data, 2022*

4.3.3 Descriptive Statistics for Electronic Data Interchange

Table 4.4 presents data indicating that the majority of respondents expressed agreement regarding the secure methods of purchasing brought about by electronic data interchange. The mean score for this statement was 4.33, with a standard deviation of 0.906. Most of the firms agreed that it has led to the quality of data through a reduction in incorrect orders (mean of 4.30 and a standard deviation of 0.947) whereas a number agreed that EDI has led to minimized errors due to data accuracy with a mean of 4.35 and a small standard deviation of 0.926 suggesting that there is little variation among the firms that respondents. It has also led to lower costs through reduction of manual processes as stated by the manufacturing firms to a moderate extent (mean of 3.96) with a standard deviation of 1.020. The flexibility of integrating new systems into the EDI had a mean of 3.64 with

a small standard deviation of 0.958 suggesting a little variation from the respondents of the various firms.

Most of the respondents stated that electronic data interchange has hastened the time constraint in the purchase of goods (mean of 4.01 and a standard deviation of 0.866). There was also an increase in sales revenues to a moderate extent as evidenced by the mean of 3.81 with a small standard deviation of 0.948. To a moderate extent, majority of the firms have experienced a reduction in transaction costs (mean of 3621 and a small standard deviation of 0.883), and a reduction in administrative costs through the introduction of EDI (mean of 3.91) with a small standard deviation of 0.890. Majority of the respondents agreed that there was ease of processing for order entries since the introduction of electronic data interchange with a mean of 4.34 and a small standard deviation of 0.893 suggesting that there was little variation on the issue of ease of processing for order entries through EDI among the various firms. The consistent small standard deviation in other words, means that the values in the dataset are relatively consistent and do not deviate significantly from the mean.

Table 4.4: Mean and Standard Deviation for Electronic Data Interchange

Electronic Data Interchange	Mean	Std.dvn
Secure methods of purchasing	4.33	0.906
Quality of data through a reduction in incorrect orders	4.30	0.947
Minimized errors due to data accuracy	4.35	0.926
Lower costs through reduction of manual processes	3.96	1.020
Flexibility of integrating new systems into the EDI	3.64	0.958
Hastened the time constraint in the purchase of goods	4.01	0.866
Increase in sales revenues	3.81	0.948
Reduction in transaction costs	3.62	0.883
Reduction in administrative costs	3.91	0.890
Ease of processing for order entries	4.34	0.893

N=103 *Five-point scale: 5=Strongly Agree; 1= Strongly Disagree

Source: *Research data, (2022)*

4.3.4 Descriptive Statistics for Warehouse Management Systems

Table 4.5 provides information demonstrating that a significant proportion of firms encountered fewer challenges when it came to inventory accuracy and tracking processes through warehouse management systems. The mean score for this aspect was 4.30, accompanied by a standard deviation of 1.948. Most had experienced a decrease in total carrying cost of inventory (mean of 3.44 and a standard deviation of 1.051) while a number of the respondents stated that their firms had experienced an increase in rate of Inventory turnover to a moderate extent with a mean of 3.89 and a small standard deviation of 0.829 suggesting that there was a little variation among the various respondents. Majority of the respondents agreed that there was a reduction in picking errors through WMS (mean of 4.29 and a standard deviation of 0.833) and that they had experienced maximum use of storage space with a mean of 3.93 and a standard deviation

of 0.892. Most of the firms agreed that they had experienced optimal stock control through the use of warehouse management systems (mean of 4.16) with a small standard deviation of 0.850 suggesting that the respondents had very little variation. A number of the firms stated that they had experienced improved work productivity to a moderate extent (mean of 4.05 and a small standard deviation of 0.805). The respondents also stated that their firms experienced the system guiding workers through risk assessments and flagging up Warehouse safety requirements as evident with a mean of 3.67 and a standard deviation of 0.806. The consistent small standard deviation in other words, means that the values in the dataset are relatively consistent and do not deviate significantly from the mean.

Table 4.5: Mean and Standard Deviation for Warehouse Management Systems

Warehouse Management Systems	Mean	Std.dvn
Inventory Accuracy and tracking processes.	4.30	1.948
Decrease in total Carrying cost of inventory.	3.44	1.051
Increase in rate of Inventory turnover.	3.89	0.829
Reduction in picking errors	4.29	0.833
Maximum use of storage space	3.93	0.892
Optimal stock control	4.16	0.850
Improved work productivity	4.05	0.805
Warehouse safety requirements	3.67	0.806

N=103 *Five-point scale: 5=Strongly Agree; 1= Strongly Disagree

Source: *Research Data, (2022)*

4.4 Descriptive Constructs

Table 4.6 below illustrates the descriptive statistics for the constructs of all four variables. An aggregate mean for all the variables was done by computing the total sum of scores

and dividing them by the number of items. Firm performance with a mean of 4.2066 and a standard deviation of 0.69452, enterprise resource planning with a mean of 4.0780 and a standard deviation of 0.54512, electronic data interchange with a mean of 4.0262 and a standard deviation of 0.75144 and finally warehouse management systems (mean of 3.9672 and standard deviation of 0.68100). The four variables indicate strong means drawn from the various manufacturing firms that responded clearly stating that most of the respondents agreed that the introduction of information systems has a positive effect on their firm performance. The standard deviation of the four variables also shows little variation among the respondents. The consistent small standard deviation in other words, means that the values in the dataset are relatively consistent and do not deviate significantly from the mean.

Table 4.6: Descriptive Statistics for the Constructs

Variable	Minimum	Maximum	Mean	Std.dvn
Firm Performance	2.10	5.00	4.2066	0.69452
Enterprise Resource Planning	1.00	5.00	4.0780	0.54512
Electronic Data Interchange	1.00	5.00	4.0262	0.75144
Warehouse Management Systems	1.88	5.00	3.9672	0.68100

N=141

Source: *Research Data, 2022*

4.5 Scale Reliability

Reliability refers to the consistency of the scores obtained, the extent of consistency exhibited by research instruments or procedures. This quality is assessed by

conducting multiple measurements on the same subjects. Poor reliability reduces the ability to track changes in measurement in a study and reduces the accuracy of a single measurement (Mislery, 2004). The reliability of the questionnaire was tested using Cronbach's alpha coefficient of 0.7 which was considered reliable. The reliability coefficients of each independent variable are as shown in Table 4.7:

Table 4.7: Test Results for Reliability

Variable	N of Items	α=Alpha	Comment
Company Performance	8	0.807	Reliable
Enterprise Resource Planning	10	0.922	Reliable
Electronic Data Interchange	10	0.906	Reliable
Warehouse Management Systems	8	0.919	Reliable

Source: *Research Data, 2022*

The Cronbach's alpha reliability coefficient typically ranges from 0 to 1. While there is no defined lower threshold for the coefficient, its proximity to 1.0 signifies enhanced internal consistency among the scale's items. In other words, as the Cronbach's alpha coefficient approaches 1.0, the greater the similarity and reliability observed among the items within the scale (Joseph, 2003). The findings in Table 4.7 show Cronbach's alpha are greater than 0.7 in all four variables therefore the questionnaire is reliable for the study.

4.6 Factor Analysis

Factor analysis serves the purpose of condensing data to enable further understanding of relationships and patterns to be quickly and simply understood. Its application commonly

involves the consolidation of variables into a small number of clusters, characterized by shared variance. Consequently, this process aids in the segregation and elucidation of distinct constructs and concepts (Young, 2013). Factor analysis was conducted on each variable as a means to summarize data. This analysis employed the extraction method known as principal component analysis. It was also performed to interpret relationships between the variables by extracting the total variance of the variables and constructs with factor loadings less than 0.5 being omitted to increase the validity of the constructs.

Factor analysis relies on latent variables driving correlations among dependent variables. There are two forms: exploratory and confirmatory. Exploratory involves researchers discovering a shared structure without preconceived notions, while confirmatory uses preconceived theoretical insights to validate and affirm hypothesized structures. Both methodologies aim to uncover structure without prior assumptions and validate assumed structures (Balasundaram, 2009). Confirmatory factor analysis was utilized in this study since the researcher had a prior theoretical hypothesis.

4.6.1 Factor Analysis for SCIS: Enterprise Resource Planning

The study's factor analysis of the independent variables used principal component extraction with varimax rotation. In this analysis, factor loadings represent the correlation coefficients that quantify the relationships between the variables (rows) and the factors (columns). These coefficients help assess how variables are associated with underlying factors. The method most frequently used for combining variables into a smaller set of unrelated factors is known as Principal Component Analysis (PCA). Balasundaram's

discussion in 2009, stated that all variables with a factor loading greater than 0.5 are referred to as factors collectively. Table 4.8 shows factor loading of 0.750, 0.756, 0.727, 0.617, 0.667, 0.744, 0.669, 0.676, 0.763 and 0.741 that are all above the standard measure of 0.5.

Table 4.8: Principal Component Analysis for Enterprise Resource Planning

Variables	Scale Items	Components	
		1	2
Enterprise Resource Planning	Our organization has improved its customer service	0.750	
	Our organization has experienced growth in revenue by optimizing its business processes	0.756	
	Our organization has real-time data consistency across all units	0.727	
	Our organization has experienced an increase in inventory turnover	0.617	
	Our organization has experienced a decrease in overall operational cost	0.667	
	Our organization has experienced an increase in purchasing power	0.744	
	Our organization has experienced a reduction in cycle times	0.669	
	Our organization has experienced an increase in productivity and efficiency	0.676	
	Our organization has experienced an improvement in on time shipments	0.763	
	Our organization has experienced an increase in data processing time	0.741	

Source: *Research Data, 2022*

The Eigenvalue relevant to a particular factor serves as an indicator of the amount of variance present in all the variables that is explained by that specific factor. A lower Eigenvalue is frequently regarded as less significant in contrast to more notable factors, and it may be seen as carrying unwanted information. Among the various extraction

methods, one of the most commonly employed criteria is the "root greater than one" rule. This guideline dictates that factors should be retained if their corresponding Eigenvalues exceed one, signifying their meaningful contribution to the data's variability and pattern structure (Balasundaram, 2009).

Table 4.9 below shows a percentage variance of 50.579 and the eigenvalue for ERP (5.076) was greater than 1. 0. The cumulative percentage of variance explained for ERP was 61.017%. This means that more than 61% of the variance of 10 items can be explained.

Table 4.9: Total Variance Explained

Compo-nent	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of variance	Cumul-ative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	5.076	50.759	50.759	5.076	50.759	50.759	3.137	31.368	31.368
2	1.026	10.258	61.017	1.026	10.258	61.017	2.965	29.649	61.017
3	.877	8.774	69.791						
4	.734	7.343	77.135						
5	.571	5.707	82.842						
6	.516	5.157	87.998						
7	.421	4.215	92.213						
8	.296	2.961	95.174						
9	.263	2.628	97.803						
10	.220	2.197	100.00						

Extraction Method: Principal Component Analysis

Source: *Research Data, 2022*

The Kaiser-Meyer-Olkin (KMO) measure of Sampling Adequacy serves as an assessment of whether the distribution of values is suitable for conducting Factor Analysis (FA). A KMO measure greater than 0.9 indicates an excellent level of adequacy, while a measure surpassing 0.8 is considered commendable. A value exceeding 0.7 is regarded as moderate, above 0.6 as modest, and greater than 0.5 as subpar. On the contrary, a KMO measure lower than 0.5 is seen as unsatisfactory and inappropriate for conducting Factor Analysis (Balasundaram, 2009). According to Pallant (2013), the value of KMO is 0.6 and above. Enterprise Resource Planning had a KMO of 0.848 that is above the cut-off of 0.6 which is considered commendable, with a chi-square of 671.732 and a p-value less than 0.0001 as shown in Table 4.10 below:

Table 4.10: KMO and Bartlett's Test ERP

Kaiser-Meyer-Olkin Adequacy.	Measure of Sampling	**.848**
Bartlett's Test of Sphericity	Approx. Chi-Square	**671.732**
	Df	**45**
	Sig.	**.000**

Source: *Research Data, 2022*

4.6.2 Factor Analysis for SCIS: Electronic Data Interchange

Table 4.11 below explains factor analysis for Electronic Data Interchange which had factor loading of 0.878, 0.892, 0.874, 0.776, 0.577, 0.861, 0.797, 0.777, 0.838 and 0.874 these factor loadings are all above the standard measure of >0.5

Table 4.11:Principle Component Analysis for Electronic Data Interchange

Variables	Scale Items	Component
		1
Electronic Data Interchange	Our organization's Purchase of goods is more secure compared to other ways and methods of purchasing	0.878
	Our organization has increased its quality of data through a reduction in incorrect orders	0.892
	Our organization has minimized errors due to data accuracy	0.874
	Our organization has lower costs through reduction of manual processes	0.776
	Our organization has experienced flexibility of integrating new systems into the EDI	0.577
	Our organization has hastened the time constraint in the purchase of goods	0.861
	Our organization has experienced an increase in sales revenues	0.797
	Our organization has experienced a reduction in transaction costs	0.777
	Our organization has experienced a reduction in administrative costs	0.838
	Our organization has experienced an ease of processing for order entries	0.874

Source: *Research Data, (2022)*

Table 4.12 shows a percentage variance of 67.125 and an eigenvalue (6.712) which was greater than 1. 0. The cumulative percentage of variance explained for EDI was 67.125%. This means that more than 67% of the variance of 10 items can be explained.

Table 4.12: Total Variance Explained

Component	Initial Eigen values			Extraction Sums of Squared Loadings		
	Total	%of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.712	67.125	67.125	6.712	67.125	67.125
2	.814	8.136	75.260			
3	.738	7.384	82.644			
4	.5	5.163	87.808			
5		3.367	91.175			
6		2.860	94.035			
7		2.066	96.100			
8		1.614	97.715			
9		1.378	99.092			
10		.908	100.000			

Extraction Method: Principal Component Analysis

Source: *Research Data, 2022*

Electronic Data Interchange had a KMO of 0.915 that is above the cut-off of 0.6 which is considered as an excellent level of adequacy with a chi-square of 1275.410 and a p-value less than 0.0001 as seen in table 4.14. This therefore indicates that the factor analysis is appropriate as shown in Tables 4.11, 4.12 and 4.13.

Table 4.13: KMO and Bartlett's Test EDI

Kaiser-Meyer-Olkin Adequacy.	**Measure of Sampling**	**.915**
Bartlett's Test of Sphericity	Approx. Chi-Square	1275.410
	Df	45
	Sig.	.000

Source: *Research Data, (2022)*

4.6.3 Factor Analysis SCIS: Warehouse Management Systems

Research data as seen in Table 4.14 below shows factor loading for Warehouse Management Systems of 0.835, 0.600, 0.810, 0.799, 0.826, 0.828, 0.867 and 0.670 these factor loadings are all above the standard measure of >0.5

Table 4.14: Principal Component Analysis for Warehouse Management Systems

Variables	Scale Items	Component
		1
Warehouse Management Systems	Our organization's Purchase of goods is more secure compared to other ways and methods of purchasing	0.835
	Our organization has increased its quality of data through a reduction in incorrect orders	0.600
	Our organization has minimized errors due to data accuracy	0.810
	Our organization has lower costs through reduction of manual processes	0.799
	Our organization has experienced flexibility of integrating new systems into the EDI	0.826
	Our organization has hastened the time constraint in the purchase of goods	0.828
	Our organization has experienced an increase in sales revenues	0.867
	Our organization has experienced a reduction in transaction costs	0.670

Source: *Research Data, 2022*

Warehouse Management Systems had a percentage variance of 61. 848% and eigenvalue (4.919) greater than 1. 0. The cumulative percentage of variance explained for WMS was 61.848%. This means that more than 61% of the variance of 8 items can be explained.

Table 4.15: Total Variance Explained

Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**		
	Total	% of Variance	Cumulative %	Total	%of Variance	Cumulative %
1	4.919	61.484	61.484	4.919	61.484	61.484
2	.937	11.710	73.194			
3	.608	7.595	80.789			
4	.483	6.039	86.828			
5	.345	4.313	91.141			
6	.236	3.637	94.778			
7	.182	2.949	97.727			
8		2.273	100.000			

Extraction Method: Principal Component Analysis

Source: *Research Data, 2022*

Table 4.16 explains factor analysis for Warehouse Management Systems which had a KMO of 0.896 that is above the cut-off of 0.6 which is considered to be commendable with a chi-square of 702.349 and a p-value less than 0.0001. This therefore indicates that the factor analysis is appropriate as shown in Tables 4.14, 4.15 and 4.16.

Table 4.16: KMO and Bartlett's Test WMS

Kaiser-Meyer-Olkin Adequacy.	Measure of Sampling	0.896
Bartlett's Test of Sphericity	Approx. Chi-Square	702.349
	Df	28
	Sig.	.000

Source: *Research Data, 2022*

4.5.4 Factor Analysis Firm Performance (Dependent Variables)

The research data also shows firm performance had factor loading of .885, .887, .844, .886, .864, .809, .844 and .843 which are all above the acceptable measure of >0.5. This can be seen in table 4.17 below:

Table 4.17: Principal Component Analysis for Company Performance

Variable		Component
		1
Firm Performance	How would you compare your company's Growth compared to your major competitors?	0.885
	How would you compare your company's Market Share compared to your major competitors?	0.887
	How would you compare your company's Customer satisfaction compared to your major competitors?	0.844
	How would you compare your company's Growth in market share compared to your major competitors?	0.886
	How would you compare your company's Return on sales compared to your major competitors?	0.864
	How would you compare your company's on time delivery compared to your major competitors?	0.809
	How would you compare your company's Customer Loyalty compared to your major competitors?	0.844
	How would you compare your company's social reputation compared to your major competitors?	0.843

Source: *Research Data, 2022*

Firm Performance also had a percentage variance of 73.670% and eigenvalue (5.894) was greater than 1. 0. The cumulative percentage of variance explained for FP was 73.670%. This means that more than 73% of the variance of 8 items can be explained.

Table 4.18: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% Of Variance	Cumulative %	Total	% Of Variance	Cumulative %
1	5.894	73.670	73.670	5.894	73.670	73.670
2	.520	6.502	80.171			
3	.391	4.885	85.056			
4	.316	3.948	89.005			
5	.280	3.503	92.508			
6	.257	3.208	95.716			
7	.202	2.524	98.240			
8	.141	1.760	100.000			

Extraction Method: Principal Component Analysis.

Source: *Research Data, 2022*

Firm performance had a KMO of 0.938 that is above the cut-off of 0.6 which indicates an excellent level of adequacy with a chi-square of 977.912 and a p-value less than 0.0001 as shown in Table 4.19 below. This therefore indicates that the factor analysis is appropriate as shown in tables 4.17, 4.18 and 4.19.

Table 4.19: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.938
Bartlett's Test of Sphericity	Approx. Chi-Square	977.912
	df	28
	Sig.	.000

Source: *Research Data, (2022)*

4.6 Data Transformation

Transformations serve to enhance the interpretability, distribution, or relationship of the data, thus aiding in achieving more meaningful insights and analyses (Osborne, 2002). Data was transformed from the Likert scale before the analysis of inferential statistics. Summation of data from each variable was divided by the number of items as shown in table 4.7 where Enterprise Resource Planning was computed using 10 items with a mean of 4.0780 and standard deviation of 0.54512, Electronic Data Interchange was computed using 10 items with a mean of 4.0262 and standard deviation of 0.75144 and Warehouse Management Systems was computed using 8 items with a mean of 3.9672 and standard deviation of 0.68100 whereas Firm Performance was computed using 8 items and had a mean of 4.2066 and a standard deviation of 0.69452. This was done to further investigate analysis such as testing assumptions of regression analysis, correlation analysis and hypothesis testing.

4.7 Testing Assumptions of Regression Analysis

Before conducting the regression analysis, various assumptions of the regression model were subjected to testing. These statistical assumptions are grounded in the mathematical implications fundamental to each statistic, describing the boundaries within which we anticipate unbiased sample estimates and accurate significance tests. The first assumption is that of linearity which dictates that the connections between dependent and independent variables adhere to linear relationships. Moreover, the error terms are expected to satisfy the conditions of homoscedasticity, implying consistent variance across different levels of predictor variables. Another assumption also pivotal is

Independence of error terms ensuring that the residuals are uncorrelated and unrelated to one another. Lastly, the assumption of normal distribution is essential, stipulating that the error terms exhibit a normal distribution pattern. This condition underpins the accuracy of various statistical interpretations. By scrutinizing and confirming these assumptions, the regression analysis gains a solid foundation for producing reliable and valid results (Bart *et al.,* 2015).

4.7.1 Linearity Test

The linear relationship between independent and dependent variables suggests a direct proportional relationship, but nonlinearity may occur when residuals' standard deviation exceeds the dependent variable's standard deviation (Garson, 2012). A scatter plot of the independent variable against the dependent variable can provide a visual indication of whether the data points tend to fall along a straight line. A linear pattern in the scatter plot suggests linearity. Fig 4.1 below shows evenly distributed residuals falling between -2 and +2 points hence the assumption of linearity in multivariate analyses was met in this study. Points beyond -3 and +3 are considered outliers.

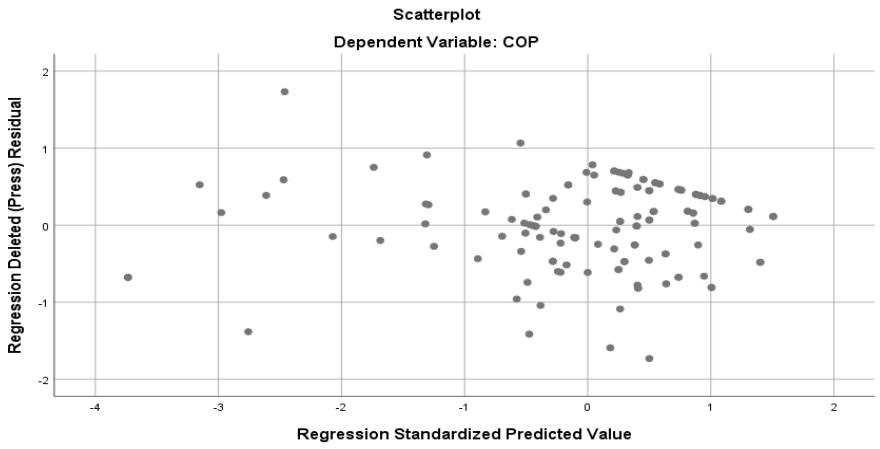

Figure 4.1: Scatter Plot for Linearity

Source: *Research Data, 2022*

4.7.2 Normality Test

As explained by Garson (2012), a normal distribution exhibits a bell-shaped curve with symmetrical properties. Specifically, a standard normal distribution is characterized by having a mean of 0 and a standard deviation of 1. The histogram below shows that it adheres to the characteristics of a normal distribution, with a mean of -9.66 and a standard deviation of 0.989.

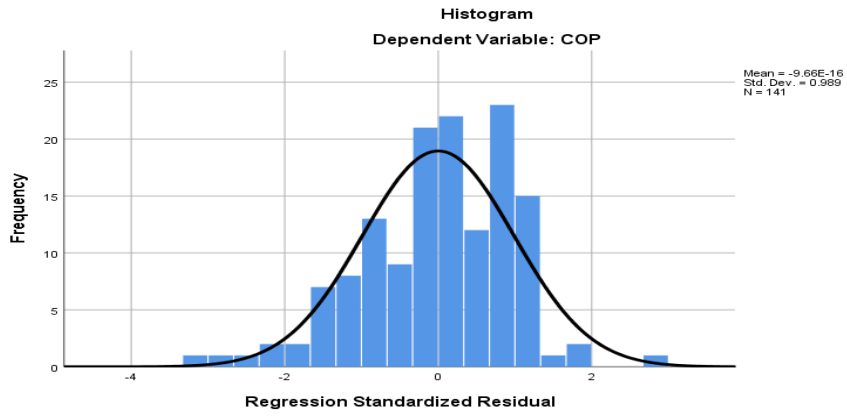

Figure 4.2: Normality Test

Source: *Research Data, 2022*

As outlined by Pallant (2013), histograms serve as visual aids to illustrate the distribution of a single continuous variable, such as age or perceived stress levels. The concept of skewness in a distribution refers to its tilt or lack of symmetry. Right skewness is more common and occurs when the distribution's tail extends to the right, while left skewness, though less frequent, occurs when the tail extends to the left. This skewness patterns show which direction the dataset's data values are distributed. Garson (2012), explained that the range of a skew lies between -2 and +2 as seen in Fig 4.2 above which is acceptable. This study had less than 200 respondents (141) hence using skewness. The data size of respondents above 200 uses the Shapiro test.

4.7.3 The Assumptions of Multicollinearity

The table below shows the tolerance values and variance-inflation factors for the predictor variables. Where ERP has a tolerance value of 0.532 (VIF=1.881), EDI has a tolerance value of 0.416 (VIF=2.406) and WMS tolerance value is 0.417 and a VIF of 2.396. A tolerance of 0.1 or less generally raises red flags, and a VIF value greater than 2.5 may also be problematic (Senaviratna, 2019). The results in Table 4.20 below exhibit that there is no multicollinearity problem.

Table 4.20: Variance Inflation Factor (VIF) and Tolerance Table

Predictor Variables	Collinearity Statistics	
	Tolerance	VIF
ERP	.532	1.881
EDI	.416	2.406
WMS	.417	2.396

Dependent Variable: FP

Source: *Research Data, 2022*

4.7.4 Testing for Homoscedasticity

Homoscedasticity is a consistent relationship in the entire range of the dependent variables, while non-homoscedasticity results in larger residuals in certain segments. It is pivotal to identify non-homoscedasticity as it affects regression analysis reliability and the validity of statistical assumptions. Non-homoscedasticity is evident in standardized scatterplots, which highlights the unequal spread of residuals (Garson, 2012). Homoscedasticity is therefore measured to avoid outliers.

4.8 Correlation Analysis

According to Correlation Analysis in SPSS (2020), correlation is employed to identify the association between the variables. It is therefore measured by the strength and significance of each of the values. The values of Pearson correlation when the values lie between 0.7 to 1 the relationship is considered strong equally when the values lie between 0.3 to 0.7 the relationship is to be moderate and when less than 0.3 the relationship is considered as weak. A p-value greater than 0.05 is considered to be insignificant whereas a p-value less than 0.05 is said to be significant.

Table 4.21: Correlation Analysis

1	2	3	4
1.Firm Performance	1		
2.Enterprise Resource Planning	.548**	1	
3.Electronic Data Interchange	.616**	.638**	1
4. Warehouse management Systems	.442**	.636**	.731** 1

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

Source: *Research Data, 2022*

Table 4.21 shows the correlation values of all the study variables. All the paired variables lie between 0.3 to 0.7. This shows that the Pearson correlation between the variables had a moderate relationship whereas the significance levels are all below 0.001. This exhibits that the correlation between the variables is significant. The findings illustrate the correlation between Enterprise Resource Planning and Firm performance demonstrated its strength when correlation coefficient (r) reached a value of 0.548, p-value = 0.000, Electronic Data Interchange and Firm performance demonstrated its strength when correlation coefficient (r) reached a value of 0.616., p-value = 0.000 whereas the relationship between Warehouse Management Systems and Firm performance had a moderate relationship of r = 4.42, p-value = 0.000. In this study, there is no issue of multicollinearity, as evidenced by a correlation coefficient of 0.731, which is below the threshold of 0.8. Multicollinearity typically becomes a concern when correlation coefficients between variables exceed this threshold, indicating a high degree of linear association among the predictors. According to Garson (2012), intercorrelation among the independents above .80 signals a possible problem.

4.9 Regression Analysis

The research utilized a multiple linear regression approach to evaluate firm performance. The analysis focused on investigating the effect of three distinct independent variables: enterprise resource planning, electronic data interchange, and warehouse management systems. Additionally, the study used the beta coefficients and the corresponding p-values obtained from the regression to examine the proposed hypotheses.

From table 4.22 below, the findings indicated that the model correlation coefficient was 0.653 which indicated that the model predicted over 65.3% of the change in the independent variable. This relationship was significant considering the coefficient of determination value of 0.531. The findings further demonstrate that an R square of 0.427 percent variation in firm performance can explain all three independent variables (predictors): ERP, EDI and WMS. This showed that considering the three independent variables, there is a probability of predicting firm performance by 42.7%. (Adjusted R squared = 0.414), means that when firm owners use supply chain information systems, their performance improves by 41.4%. The model was adequate in this case as indicated by the Durbin-Watson statistic value of 1.846 which is in the range of 1.5 and 2.5. The Durbin-Watson statistic should fall between 1.5 and 2.5 (Garson, 2012).

Table 4.22: Model Summary

Model	R	R Square	AdjustedR Square	Std. Error of the Estimate	Durbin - Watson
1	.653[a]	.427	.414	.53163	1.846

a. Predictors: ERP, EDI, WMS
b. Devendant variables: FP

Source: *Research Data, 2022*

Table 4.23 shows the ANOVA results for the predictors' ERP, EDI and WMS suggest that they are satisfactory indicators of supply chain information systems on manufacturing firms in Nairobi. The results show F= 33.978 and significance level of 0.000<0.05 which implies that the predictors, ERP, EDI and WMS have significant effect on performance.

Table 4.23: ANOVA

Sum of Squares	df	Mean Square	F	Sig
Regression	28.810	3	9.60333.978	.000b
Residual	38.721	137	.283	
Total	67.531	140		

a. Dependent Variable: FP
b. Predictors: (Constant), WMS, ERP, EDI

Source: *Research Data,2022*

Table 4.24 below exhibits the computed regression model using the significance levels of the coefficients. The coefficient size explains the extent of influence whereas beta coefficients form the results of regression equation analysis which indicates the slope that explains the independent and dependent variables. The study aimed to reject or fail to reject the relationship between the independent and dependent variables. The study employed hierarchical regression analysis as the appropriate method for this study.

Table 4.24: Multi Regression Analysis Test Results

Unstandardized Coefficients		Standardized Coefficients			
B	Std. Error	Beta	t	Sig	
(Constant)	.956	.354		2.703	.008
ERP	.349	.110	.274	3.160	.002
EDI	.462	.090	.500	5.123	.000
WMS	-.096	.101	-.094	-.953	.342

a. Dependent Variable: FP

b. Predictors: (Constant), Enterprise Resource planning (ERP), Electronic Data Interchange (EDI), Warehouse Management Systems (WMS)

Source: *Research Data, 2022*

Model:

$y = .956 + .274X_1 + .500X_2 + -.094X_{3 + \varepsilon}$

Where;

y = Firm/company performance,

$X_{1=}$ Enterprise Resource Planning

$X_{2=}$ Electronic Data Interchange

$X_{3=}$ Warehouse Management Systems

ε= Error term denoting factors not included in the model

From the table above (Table 4.24), it was observed that the study had an intercept of .956 which implies that when all other factors are held constant, a variation in organizational performance would be .956.

Enterprise Resource Planning (β=0.274) with a p-value < 0.05, (p= 0.002) this means that for each unit that increased in enterprise resource planning, there is an increase of up to 0.274 units in firm performance. Further, the effect of enterprise resource planning is

indicated by the t-test value of = 3.160 which means that the effect of enterprise resource planning surpasses that of the error.

Electronic data interchange (β=0.500) and p-value <0.05, (p= 0.000) means that there is an increase of up to 0.500 units in firm performance. The results further show the effect of electronic data interchange as indicated by the t-test value of = 5.123 means that the effect of electronic data interchange surpasses that of the error.

Warehouse management systems (β=-0.094) and p= value of 0.342 (table 4.24), which is > than 0.05 at a 5% level was not significant which means that implementation of the Warehouse Management System (WMS) has not shown a statistically significant impact on the aspect of warehouse performance that was examined. The results further reveal the effect of warehouse management systems as indicated by the t-test value of = -.953 less than 1.96. When the absolute value of the t-test statistic is less than the critical value, it indicates that the results are not statistically significant. The t-test value of -0.953 confirms that warehouse management systems does not surpass that of the error.

Table 4.25: Summary of Hypothesis Test Results

	Hypothesis	Beta	p-value	Results
Hypothesis H_{O1}	Integrating enterprise resource planning in supply chain has a significant effect on performance of manufacturing firms in Nairobi Kenya	0.274	0.002	Reject
Hypothesis H_{O2}	Integrating electronic data interchange in supply chain has a significant effect on performance of manufacturing firms in Nairobi Kenya.	0.500	0.000	Reject
Hypothesis H_{O3}	There are no significant effects of integrating warehouse management systems in supply chain on performance of manufacturing firms in Nairobi Kenya	-0.953	0.342	Fail to Reject

Note: sig at p<0.05

Source: *Research Data, 2022*

4.10 Hypothesis Testing

The study examined the hypotheses by assessing the outcomes derived from the regression model. The findings of the hypotheses test are summarized in Table 4.25 above.

The first hypothesis HO1 stated that enterprise resource planning (ERP) in supply chain had no significant effect on performance, ERP had a significant effect on performance of manufacturing firms in Nairobi Kenya as seen in table 4.23indicating (β=0.274) with a p-value < 0.05, (p= 0.002) which implies that the relationship was statistically significant

hence the hypothesis was rejected. These findings agree with earlier research conducted by scholars like Wieder*et al.,* (2021) and Hunton*et al.,*(2003)Fauzi (2022) revealed that the implementation of enterprise resource planning (ERP) led to long-term financial performance improvement.

Hypothesis two HO2 of the study stated that electronic data interchange had no significant effect on performance of manufacturing firms in Nairobi Kenya. The results as shown in Table 4.23 above revealed (β=0.500) and p-value <0.05, (p= 0.000) which implies that the relationship was statistically significant hence the hypothesis was rejected. This finding aligns with the research conducted by Musawa in 2012, who suggested that the adoption of EDI positively influenced performance due to perceived direct and indirect advantages. Musawa's (2012) study indicated that the adoption of EDI by SMEs in Nigeria could eventually lead to various positive advantages, both direct and indirect, for a firm. The regression analysis in Musawa's research demonstrated a significant relationship between the level of SMEs' EDI adoption and their perceived advantages.

Finally, hypothesis HO3 asserted that there were no significant effects of warehouse management systems on performance of manufacturing firms in Nairobi Kenya. The table above indicates (β=-0.094) and p= value of 0.342 (table 4.24), which is > than 0.05 as shown in the results which implies that the relationship was statistically insignificant hence the researcher failed to reject the hypothesis with a t-test value of less than 1.96. These findings are not in agreement with the study by Yong (2009), who highlighted that

the implementation of WMS significantly improved the services provided by the warehouse and contributed to enhanced internal and external relationships. These improvements were reflected in performance metrics and contributed to the warehouse's ability to gain a competitive advantage.

4.11 Discussion of Findings

This section includes an examination of the results obtained from the different tests that were carried out during the research. The results of every hypothesis that was looked at during the study are explored in detail in the discussion.

4.11.1 Effect of Enterprise Resource Planning on Performance

The study's primary focus was to assess the effect of Enterprise Resource Planning (ERP) on Firm Performance. The results highlighted the significance of ERP ($\beta = 0.274$, $p = 0.002$), falling below the conventional significance level of 0.05, as indicated in table 4.24. In their study, Sara AlMuhayfith and Hani Shaiti's (2020), "The Impact of Enterprise Resource Planning on Business Performance: With the Discussion on Its Relationship with Open Innovation," corroborated the findings, emphasizing the substantial connection between effective ERP system usage and business performance. Earlier studies (Wieder *et al.,* 2006) and (Hunton *et al.,* 2003) similarly supported these outcomes.

Additionally, Fauzi (2022), research on "Impact of enterprise resource planning systems on management control systems and firm performance" unveiled a significant

enhancement in long-term financial performance due to ERP implementation, with a p-value of 0.031, highlighting in line with the current study, the subsequent effect of enterprise resource planning in supply chain on overall firm performance.

However, the study results contrasted with Suprapto W. & J.'s research, revealing that information sharing had an adverse impact and lacked significance in operational performance, attributable to manual data processing and limited comprehension of integrated data within the ERP system among manufacturing companies.

4.11.2 Effect of Electronic Data Interchange on Performance

The second hypothesis of the research was to assess the effect of Electronic Data Interchange (EDI) on Firm Performance. The results indicated a statistically significant relationship for EDI, with a recorded β coefficient of 0.500 and a p-value of 0.000, which falls below the generally accepted significance level of 0.05, as displayed in table 4.24. This finding is consistent with the outcomes outlined in the study conducted by Schroeder (2009) titled "The Impact of Electronic Data Interchange on Delivery Performance," where it was demonstrated that the degree of EDI utilization is significantly associated with delivery performance.

Furthermore, in his research on "The Adoption of Electronic Data Interchange (EDI) Technology by Nigerian SMEs," Musawa (2012), proposed that the adoption of EDI is positively influenced by both direct and indirect perceived benefits. His study, which involved 204 participants, indicated significant outcomes ($F = 12.009$, $p = 0.000$), with an

R-squared value of 0.268 and an adjusted R-squared value of 0.246. The regression analysis, presented in Table 5, revealed a notable connection between the level of EDI adoption by SMEs and its perceived benefits, aligning with the current investigation's findings on the positive effects of integrating electronic data interchange in the supply chain on firm performance.

The consistent affirmation of the positive effect of EDI on various aspects of business operations emphasizes its instrumental role in enhancing overall firm performance. The evidence presented in the study underscores the necessity for a strategic embrace of EDI systems, not only to streamline supply chain processes but also to harness the associated benefits for sustained competitive advantage and improved operational efficiency.

4.11.3 Effect of Warehouse Management Systems on Performance

The third hypothesis focused on the effect of Warehouse Management Systems on Firm Performance. However, the study's findings indicated that Warehouse Management Systems exhibited insignificance, with a β coefficient of -0.094 and a p-value of 0.342, as presented in table 4.24. This value surpasses the commonly accepted significance level of 0.05. This is in contrast with Yong (2009) as highlighted in his study that the implementation of the system has considerably enhanced the services provided by the warehouse, thereby improving both internal and external relationships. These improvements were reflected in the performance measures, ultimately positioning the warehouse to attain a competitive edge. Interestingly, these outcomes differ from the

current study's findings, which demonstrate that warehouse management systems in supply chain failed to yield a significant effect on a firm's overall performance.

While the significance of Warehouse Management Systems may not have been established in the context of this study, it is essential to recognize the broader contributions that effective warehouse management can bring to the operational efficiency and competitiveness of businesses. Given the multifaceted nature of supply chain dynamics, Warehouse Management Systems continue to play a crucial role in optimizing inventory control, streamlining logistics, and enhancing customer service. Despite the specific study's outcomes, it remains imperative for organizations to explore and implement robust warehouse management strategies tailored to their unique operational demands, thus harnessing the potential benefits associated with effective warehouse management practices.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

In keeping with the study's goals, this chapter offers a summary of the research results, conclusions, recommendations, limitations and further research of the study. The purpose of the research was to examine the effects of integrating information systems in supply chain on the performance of manufacturing companies in Nairobi, Kenya was impacted by the integration of information systems into the supply chain. The Statistical Package for Social Sciences (SPSS® V25) was used to perform the tests, and the results were extracted from those tests.

5.2 Summary of Research Findings

The general objective of this study was to establish the effect of supply chain information systems on performance of manufacturing firms in Nairobi Kenya. The summary of findings is discussed below:

The descriptive findings indicated that respondents agreed with various statements indicating that enterprise resource planning had enhanced their overall performance. The correlation coefficient between firm performance and ERP was approximately 0.548**, signifying that this correlation was statistically significant at the 0.01 level (two-tailed), underscoring the high significance of the connection between firm performance and ERP. Furthermore, the results of the regression analysis demonstrated that the coefficient for

ERP was statistically significant, implying that ERP significantly influenced firm performance.

The descriptive findings showed that the respondents were in agreement with various statements, indicating that the electronic data interchange (EDI) had resulted in improved overall firm performance. The correlation coefficient between firm performance and EDI was approximately 0.616**, indicating a strong and highly significant positive correlation between firm performance and EDI. This correlation was statistically significant at the 0.01 level (two-tailed), emphasizing the strong relationship between firm performance and EDI. Furthermore, the regression analysis conducted revealed that the coefficient for EDI had a highly statistically significant positive effect on performance.

The descriptive findings revealed that the respondents expressed agreement with various statements indicating that the warehouse management systems (WMS) led to improved overall firm performance. However, the correlation coefficient between firm performance and WMS was approximately 0.442**, signifying that this correlation was statistically significant at the 0.01 level (two-tailed). This implies that there is a significant positive relationship between firm performance and WMS, although this relationship appears to be somewhat weaker when compared to the correlations observed with ERP and EDI. Moreover, when conducting regression analysis, the results indicated that the coefficient for WMS did not have a statistically significant impact on performance in this analysis.

5.3 Conclusions

The main objective of this study was to establish the effect of supply chain information systems on performance of manufacturing firms in Nairobi Kenya.

Based on the research findings, it can be concluded that:

The implementation of Enterprise Resource Planning (ERP) had a significant and positive effect on the performance of manufacturing firms. Therefore, stakeholders within the manufacturing industry should collaborate to encourage and advance the adoption of ERP systems. The use of Electronic Data Interchange (EDI) had a positive and statistically significant influence on the performance of manufacturing firms. Consequently, stakeholders in the manufacturing sector should cooperate to promote the adoption of EDI. The use of warehouse management systems (WMS) had an insignificant effect on the performance of manufacturing firms. Consequently, stakeholders in the manufacturing industry should collaborate to advocate for the adoption and utilization of WMS in order to enhance long-term firm performance.

5.4 Recommendations of the Study

5.4.1 Managerial Implications

Being a third world country, the adoption of supply chain information systems (SCIS) is hindered by financial constraints arising from substantial tax burdens imposed by the government. However, embracing these systems in the long run is projected to significantly enhance a firm's services, ultimately reflecting in improved performance and a competitive edge. Stakeholders, including manufacturing firms and the Kenya

Association of Manufacturers (KAM), should carefully consider the following recommendations.

Stakeholders should prioritize the adoption or optimization of Enterprise Resource Planning (ERP) and Electronic Data Interchange (EDI) systems, emphasizing comprehensive employee training, process alignment with supply chain objectives, regular system updates, and customization to meet specific business requirements. Additionally, continuous monitoring and evaluation of system performance are crucial for identifying potential areas for enhancement.

Critical Evaluation of WMS: Given the study's findings that Warehouse Management Systems (WMS) had no significant impact on the performance of manufacturing firms in Nairobi, stakeholders are advised to conduct thorough cost-benefit analyses before implementing or continuing the use of WMS. Exploring alternative strategies for optimizing warehouse operations, aligning WMS implementation with organizational needs and supply chain goals, and conducting regular reviews of WMS relevance and effectiveness are recommended.

Critical Evaluation of WMS: Given the study's findings that Warehouse Management Systems (WMS) had no significant impact on the performance of manufacturing firms in Nairobi, stakeholders are advised to conduct thorough cost-benefit analyses before implementing or continuing the use of WMS. Exploring alternative strategies for optimizing warehouse operations, aligning WMS implementation with organizational

needs and supply chain goals, and conducting regular reviews of WMS relevance and effectiveness are recommended.

5.4.2 Policy Implications

Manufacturing firms, the government, and trade associations can facilitate the widespread adoption of supply chain information systems (SCIS) through collaborative efforts and policy measures. The following recommendations are crucial for the development of effective policies and guidelines:

Manufacturing firms should actively engage in collaborative initiatives with industry peers, trade associations, and government bodies to foster knowledge sharing and the dissemination of best practices in SCIS adoption. Collective learning through collaborative endeavors can lead to the formulation of mutually beneficial strategies.

Acknowledging the unique nature of each organization, manufacturing firms should prioritize the customization of SCIS solutions to align with their specific operational requirements. Flexibility in adapting strategies based on evolving market dynamics and technological advancements is pivotal for ensuring the continued efficacy of SCIS within the manufacturing sector.

5.5 Limitations of the Study

Since this research project was only focused on manufacturing firms in Nairobi, the state of the effect on the other parts of the country was not known. Further, the project was carried out within a specified period of time which was not possible to study the effects

for a longer period. Consequently, when taken into account the influence of social desirability and response it is hypothesized that these phenomena may have prompted responses that presented the person or firm in a favorable light. The average response rate may have also limited the actual significance of the study.

5.6 Areas for Further Research

The findings reveal that Warehouse Management Systems (WMS) did not have a statistically significant effect on performance of manufacturing firms in Nairobi Kenya. Therefore, further research such as strategies to enhance their effectiveness in improving performance should be done. Further research should also be done to investigate the economic implications of technology in supply chain management such as the return on investment (ROI) for implementing ERP, EDI, and WMS systems, including factors like cost savings, revenue generation, and overall financial performance. Further research can also be done by introducing potential moderators or mediators. Conduct industry-specific studies within Nairobi's manufacturing sector to determine whether the impact of these technologies varies based on the nature of the products being manufactured and explore how SCIS affects performance in industries such as electronics, food processing, or automotive manufacturing.

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APPENDICES

Appendix I: Introductory Letter

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

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Date of Issue: **25/May/2022**

RESEARCH LICENSE

This is to Certify that Ms,. Dorothy Achieng Okeyo of Moi University, has been licensed to conduct research in Nairobi on the topic: Effects of Integrating Information Systems in Supply Chain on Performance of Manufacturing Firms in Nairobi Kenya for the period ending : 25/May/2023.

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Appendix II: Research Questionnaire

This questionnaire is to collect data for purely academic purpose. The study seeks to investigate the **"*Effect of Supply Chain Information Systems on Performance of Manufacturing Firms in Nairobi Kenya".*** The information provided will be treated with strict confidence. Your cooperation will be highly appreciated.

PART A: Background Information (please tick (√) appropriately)

1) Name of your organization ……..……

2) For how long has your organization been operational?

a) Under 5 years	[ ]	b) 6-10 years	[ ]
b) 11-15 years	[ ]	d) Over 16 years	[ ]

3) How many employees do you have in your organization?

4) Which sector does your organization fall under?

Service & Consultancy	
Building, Mining & Construction	
Chemical & Allied Sectors	
Energy, Electrical & Electronics	
Food & Beverages	
Leather & Footwear	
Metal & Allied Sector	
Motor Vehicle & Accessories	
Paper & Board	
Pharmaceutical & Medical Equipment	
Plastics & Rubber	
Fresh Produce	
Textiles & Apparels	
Timber, Wood & Furniture	

PART B: In the last three years how does your firm perform compared to your major (please tick (√) appropriately)

5) **Much Better; 4) Better; 3) Fair; 2) Worse; 1) Much worse**

		1	**2**	**3**	**4**	**5**
P1	How would you compare your company's Growth compared to your major competitors?					
P2	How would you compare your company's Market Share compared to your major competitors?					
P3	How would you compare your company's Customer satisfaction compared to your major competitors?					
P4	How would you compare your company's Growth in market share compared to your major competitors?					
P5	How would you compare your company's Return on sales compared to your major competitors?					
P6	How would you compare your company's on time delivery compared to your major competitors?					
P7	How would you compare your company's Customer Loyalty compared to your major competitors?					
P8	How would you compare your company's Social reputation compared to your major competitors?					

PART C: On a scale of 1-5 please indicate the performance of the firm for the last 3 years in relation to the Information Systems and the degree to which it has affected your firm's performance (please tick (√) appropriately)

5) Strongly Agree; 4) Agree; 3) Moderate extent; 2) Disagree;1) Strongly Disagree

	I Enterprise Resource Planning	**1**	**2**	**3**	**4**	**5**
ERP1	Our organization has improved its customer service					
ERP2	Our organization has experienced growth in revenue by optimizing its business processes					
ERP3	Our organization has real-time data consistency across all units					
ERP4	Our organization has experienced an increase in inventory turnover					
ERP5	Our organization has experienced a decrease in overall operational cost					
ERP6	Our organization has experienced an increase in purchasing power					
ERP7	Our organization has experienced a reduction in cycle times					
ERP8	Our organization has experienced an increase in productivity and efficiency					
ERP9	Our organization has experienced an improvement in on time shipments					
ERP10	Our organization has experienced an increase in data processing time					
	II Electronic Data Interchange					
EDI1	Our organization's Purchase of goods is more secure compared to other ways and methods of purchasing					
EDI2	Our organization has increased its quality of data through a reduction in incorrect orders					
EDI3	Our organization has minimized errors due to data accuracy					

EDI4	Our organization has lower costs through reduction of manual processes					
EDI5	Our organization has experienced flexibility of integrating new systems into the EDI					
EDI6	Our organization has hastened the time constraint in the purchase of goods					
EDI7	Our organization has experienced an increase in sales revenues					
EDI8	Our organization has experienced a reduction in transaction costs					
EDI9	Our organization has experienced a reduction in administrative costs					
EDI10	Our organization has experienced an ease of processing for order entries					
	III Warehouse Management Systems					
WMS1	Our organization has experienced less challenges in Inventory Accuracy and tracking processes.					
WMS2	Our organization has experienced a decrease in total Carrying cost of inventory.					
WMS3	Our organization has experienced an increase in rate of Inventory turnover.					
WMS4	Our organization has experienced a reduction in picking errors					
WMS5	Our organization has experienced maximum use of storage space					
WMS6	Our organization has experienced optimal stock control					
WMS7	Our organization has experienced improved work productivity					
WMS8	Our organization has experienced the system guide workers through risk assessments and flag up warehouse safety requirements					

THANK YOU FOR YOURTIME

Appendix III: List of Manufacturing Companies in Kenya

Sector		Members	%
Building, Mining & Construction			
Afrikstones Limited Bamburi Cement Limited Blue Stone Limited Coast Calcium Limited Cemex Holding Ltd Dittman Construction Co. Ltd Erdemann Gypsum Limited Gjenger Makers Ltd Halai Concrete Quarries Greystone Industries Ltd Hydro Water Well (K) Ltd Keda (K) Ceramics Kay Construction Ltd Kenya Builders and Concrete Ltd Kensalt Ltd Kenbro Ltd Kurawa Ltd Krystalline Salt Ltd Koto Housing Kenya Laxmanbhai Construction Ltd Mayleen (K) Ltd Mombasa Cement Ltd Mineral Enterprises Ltd	National cement Ltd Orbit Enterprises Ltd North Rift Concrete Works Ltd Pride Enterprises Ltd Rai Cement Limited Quest Works Limited Roofings Kenya Limited Rexe Roofing Products Savannah Cement Ltd Saj Ceramics Ltd Shajan and Creative Limited Shaga Engineering Works Limited Skylark Construction Ltd Silverstone Quarry Limited Space and Style Ltd Super stone 2006 Ltd Tiptop Constructions Limited Tile &Carpet Center Vallem Construction Ltd Wotech Kenya Limited	43	6
Service & Consultancy			
AAM Resources ADAFRIC COMMUNICATIONS ACO Drainage Systems Limited AARO E.A. LTD Aggreko Kenya Energy Rentals African Management Industries Analabs Limited All Seasons Communications Limited Ascent Capital Advisory Services LLP Barclays Bank of Kenya B2B Africa Ltd Biomerieux Kenya Limited	Lean Energy Solutions Ltd Leadership Management International Kenya Lan-X Africa Louis Dreyfus Kenya Ltd Lori Systems Ltd Mantoz Enterprises K. Ltd Mane Kenya Ltd Magnate Ventures Ltd MAC Mobile International Ltd Mereka& Company Meghraj Capital Ltd Matengo Githae & Associates Marubeni Corporation .Mistui& Co Europe PLC Muthee Soni Associates	116	17

Beyond Borders Limited Botosoft Technologies Limited BluekeySeido Broadcast Solutions International Ltd Broadband Communications Networks Limited Career Readiness Social Initiative CFL Advocates Centurion Systems Limited Cotecna Kenya Ltd Cooperative Bank of Kenya Commercial Bank of Kenya Delta Blade Consultants Deloitte &Touche Kenya Delegation German Industry & Commerce De La Rue Currency & Security Print Ltd Custody & Registrars' Services Ltd East African Tea Trade Association (EATTA) Dump Sagacity Ltd Diverse Management Consultancy Ltd Ecobank Kenya Ltd Ernst & Young Fanisi Capital Ltd Fame Electrical Ltd Express Communication Ltd Flexi Personnel Givaudex East Africa Ltd Goodman Agencies Ltd Hotpoint Appliances Ltd Homeland Freight Ltd Imexolutions Ltd Illumine Africa Ltd Imexolutions Ltd Illumine Africa Ltd IDB Capital Ltd IBL International Ltd Ibis ESG Intertek International Ltd International Supply Chain Solutions Ltd Insight Management Consultants Ltd Industrial Promotion Services	Muriu Mungai & Company MtechLimitd NIC Bank Limited Oraro& Company Advocates Novastar Venturs LLP Power Governors Ltd Pima Smart Technologies Ltd Pet Bottles Recyclers Protection Logics Ltd Prosel Ltd Proctor & Gamble Distribution East Africa Red Company Ltd React Cert Africa Ltd Raj Consulting Limited Safaricom Limited Rongai Workshop & Transport Limited Sagisa Processing Engineering (K) Ltd Sendy Limited Sea Submarine Communications Ltd Standard Chartered Bank (K) Ltd Sols Inclination Ltd Sunflower Tents & Décor Ltd Sunesis Consulting Limited Summit Recruitment & Search Ltd StratoStaff E.A Ltd Techno-Check Limited TechbizInfotech Limited Takataka Solutions Ltd Syspro Kenya Ltd Symbion Kenya Ltd Tilisi Development PLC The Toolkit Skills (TTI) Ltd The Kenya Flower Council The Copy Cat Ltd Tropical Power Kenya Ltd Value Connect Management Consultants Ltd Usafi Comfort Waugh Mcdonald Wealth Management		

Industrial & Commercial Development Corporation Kaizen Institute Africa Jade Collections Ltd J.W Season & Co Insurance Brokers (Kenya) Ltd KaranjaKiarie& Company Kamongo Waste Paper Kenya Ltd Kieti Advocates LLP Knights and Apps Ltd Logwin Air & Ocean Kenya Ltd	Viscar Industrial Capacity Ltd Zamara Actuaries, Administrators &Consultants Ltd		
Chemical & Allied Sectors			
Aluglass Africa Ltd Bayer East Africa Ltd Basf East Africa Limited Basco Products (K) Ltd Blends of Nature Limited Biocorn Products (Epz)Ltd Belersdorf East Africa Ltd Blue Ring Products Ltd BOC Kenya Limited Carbacid (Co2) Limited Canon Chemicals Ltd (Former United Chemicals Ltd) Buyline Industries Ltd Chemraw E. A Ltd Crown Paints Kenya Plc Colgate Palmolive (EA) Ltd	Desbro Kenya Ltd Darfords Industries Ltd Eastern Chemicals Industries Ltd Diversey Eastern & Central Africa Emat For Investment Ltd Elex Products Ltd Ecological Industries Ltd Forsco Kenya Ltd Galaxy Paints & Coating Co.Ltd H.B Fuller Kenya Ltd	25	4
Energy, Electrical & Electronics			
African Cables Ltd Alternative Energy Systems Ltd Azuri Technologies Kenya Ltd BCS Kenya Ltd Biogas International Ltd Biogas Power Holdings (EA)Ltd Cockerill East Africa Ltd (CEAL) Formerly Socabelec (EA) East African Cables Ltd Henkel Kenya Ltd Highchem East Africa Ltd Holman Brothers (EA)Ltd Ibera Africa Power (EA)Ltd Impact Chemicals Ltd	Technik Ltd. Kenya Power Co.Ltd Kenya Petroleum Refineries Kenya Electricity Generating Company Ltd (Kengen) Kenwest Cables Ltd Koko Networks Ltd Lucky Star General Ltd Libya Oil Kenya Ltd Lake Turkana Wind Power Ltd Lacheka Lubricants Ltd Manufactures & Suppliers (K) Ltd Mafi East Africa Limited Metsec Cables Ltd	100	14

InterconsumerMproducts Ltd International Energy Jumbo Mattress Industries Ltd Kanku Kenya Ltd Kansai Plascon Kenya Ltd (Former lsadolin Paints) Kel Chemicals Ltd Kemia International Ltd Kip Melamine Co. Ltd L'oreal East Africa Ltd Maroo Polymers Ltd Mosara Ltd Milly Glass Works Ltd Nature's Touch LLP Neuce Kenya Paint Industry Ltd Orbit Products Africa Ltd (Foprmerlt Orbit Chemical) Odex Chemicals Ltd Norbook Kenya Ltd Pan Africa Chemicals Ltd Osho Chemicals Industries Ltd Polychem East Africa Ltd Protea Chemicals Kenya Ltd Premium Hygiene Products Ltd Pz Cussons EA Ltd Rok Industries Ltd Sanergy Ltd Shreeji Chemicals Ltd Sheth Online Ltd Silmak Agencies Silentnight Bedding Ltd Solpia Kenya Ltd Super sleek Ltd Super form Ltd Sunda Industrial Company Ltd The Amazing NyumbaCo.Ltd Tata Chemicals Magadi Ltd Tam TamDiani Ltd Syneresis Ltd Syngenta East Africa Ltd Suprema Industries Ltd Ujasiri Ltd Twiga Chemical Industries Ltd Tropical Brand (Afrika)Ltd Tri-Clover Industries (K)Ltd Unilever Kenya Ltd Valencia Cosmetics Ltd Uzuri Industries Ltd	M-Kopa Kenya Ltd Mustek East Africa Nationwide Electrical Industries Ltd Optimum Lubricants Ltd Pentagon Agencies Ltd Patrionics Services Ltd Pan Africa Transformers & Switchgears Ltd Philips East Africa Ltd Proto Energy Ltd Premier Solar Solutions Ltd Powered Lubricants Ltd Repetectric (K)Ltd Rabai Power Ltd Schneider Electric Ltd (Formerly Technics East Africa) Saiger Kenya Ltd Sierra Cables East Africa Sollatek Electronics (Kenya) Solinc East Africa Ltd-Formerly Ubbink Syenergy Lubricant Solutions Ltd Syenergy Gases (K)Ltd Tianm Long Industry Ltd Yash Poles Ltd Flower City Kenya Ltd		

Vitafoam Products Ltd Yilmaz Company Ltd Welrods Ltd Vivo Energy Yocean Group Ltd			
Food & Beverages			
Afrimac Nut Company Alpine Coolers Alpha Fine Foods Almasi Beverages Limited Al-Mahra Industries Limited Alliance One Tobacco Kenya Ltd Al-Noor Feisal & Co Ltd Agriner Agriculture Development Arax Mills Limited Africa Spirits Ltd Agri Pro-Pak Limited Agriner Agricultural Development Alpha Grain Millers Limited Aquamist Ltd Aviano East Africa Bdel Ltd Bakex Millers Ltd Bake mark Limited Azavi Collections Bloc Enterprises Limited Bio Food Products Limited Bidco Africa Limited Blue plasticsand Water Co. Limited Brookside Dairy Ltd Broadway Bakery Ltd Bakers Corner Ltd Bdelo Ltd Belfast Millers Ltd Bio Food Products Limited Bulto Foods Ltd Candy Kenya Ltd Chirag Kenya Limited Confini Limited C.Czarnikow Sugar (EA)Ltd C Dormans Ltd Candy Kenya Ltd Centrofood Industries Ltd Caterina Bakery Limited Crofts Ltd Confine Limited	Kenya Wine Agencies Limited Kirinyaga Flour Mills Kifaru Maize Meal, Kifaru Home baking Koba Waters Ltd/ Broomhill Springs Water Kuguru Food Complex Ltd Kwality Candies & Sweets Ltd Landeco Ltd Manji Food Industries Ltd Mashwa Breweries Ltd Melvin Marsh International Mini Bakeries (Nrb) Ltd Miritini Kenya Monwalk Investment Ltd Nairobi Bottlers Ltd Nairobi Flour Mills Ltd New Kenya Co-Operative Creameries Ltd Nicola Farms Ltd Patco Industries Limited Pearl Industries Ltd Pembe Flour Mills Ltd PernodRicard Kenya Ltd Premier Flour Mills Ltd Premier Food Industries Limited Propack Kenya Limited Purple Iris Africa Rafiki Millers Ltd RAZCO LIMITED Re-Suns Spices Limited Sahara Venture Capital Company Ltd SalimWazarani Kenya Company Sameer Agriculture & Livestock (Kenya) LTD SBC Kenya Limited Scrumptios Eats Ltd Shree Sai Industries Simply Foods Ltd Sky Foods Limited	122	17

DanoneNutrica DPL Festive Ltd East African Sea Food Ltd East African Seed Co. Ltd Edible Oil Poducts Elekea Limited ELLE Kenya Limited Erdemann Co. (K) Ltd Europack Industries Limited Excel Chemicals Ltd Frigoken Ltd Giloil Company Limited Glacier Products Ltd Global Fresh Ltd Gonas Best Ltd Green Forest Foods Ltd Jambo East Africa Ltd Kamili Packers Ltd Kedsta Investment Limited Kenafric Industries Limited Kenchic Ltd Kenya Co-Operative Coffee Dealers Ltd (KCCD) Kenya Highland Seed Co. Ltd Kenya Sweets Ltd Kenya Tea Development Agency	Social Bites Ltd Spice World Ltd Stawi Foods and Fruits Limited Sunny Processors Ltd Septic Passion NFC Trisquare Products Ltd Tropical Heat Limited (Formerly Deepa Industries) Trufoods Ltd Ultravetis East Africa Ltd Unga Group Ltd Usafi Services Ltd Valuepak foods Vava Coffee Ltd Vert Limited Victoria Juice Company Limited Victory Farms Limited W. E. Tilley (Muthaiga) Ltd Wanji Food Industries Limited West African Seasoning Co. Ltd Zeelandia East Africa Limited		
Leather & Footwear			
Addison Industries Ltd Alpharama Ltd Athi River Tanneries Ltd Bata Shoe Co (K)Ltd Azus Leather Ltd C& P Shoes Industries Ltd Budget Shoes Ltd Denrit Ltd	Kenya Suitcase Manufactures Ltd Leather Industries of Kenya Ltd Maridadi Seasons Handcraft Sandstorm Africa Ltd Umoja Rubber Products Ltd Wazawazi Company Ltd Zingo Investments Ltd Yetu Leather Ltd	16	2
Metal & Allied Sector			
Abyssinia Iron & Steel Ltd Afriken International Ltd Atlantic Ltd Asp Company Ltd Ashut Engineers Blue Nile Wire Products Ltd Canton Attoys Ltd Burn Manufacturing USA LLC Buhler Ltd City Engineering Works Ltd Crystal Industries Ltd	Globology Ltd Gzi Kenya Ltd Guala Closures East Africa Ltd Greif East Africa Ltd Hobra Manufacturing Ltd Hind Aluminum Industries (Kenya) Ltd Hebatullah Brothers Ltd Heavy Engineering Ltd Hydro Aluminum Ltd	36	5

Corrugated Sheets Ltd Davis &Shirtliff Ltd Eco-Steel Africa Easy Clean Africa Ltd Friendship Container Manufacture Ltd Fit Tight Fasteners Ltd Femo Works Engineering Company	ISL Kenya Ltd Insteel Ltd Kens Metal Industries Ltd Khetshi Dharamashi & Co.Ltd Kitchen King Ltd Mabati Rolling Mills Ltd Metal Crowns Ltd Mecol Ltd Mistubishi Corporation		
Motor Vehicle & Accessories			
Abson Motors Limited Africon Group Limited Associated Battery Manufacturers (EA) Ltd Auto Springs East Africa Ltd Auto Ancillaries Ltd Auto Accessories International Associated Vehicles Assemblers Ltd Banbros Ltd Automobile Warehouse Ltd Bmgholdings Ltd Chui Auto Spring Industries CfaoDTdobie& Company (K) Ltd Cica Motors Deeking Kenya Ltd Dalcom Kenya Ltd Global Motors Centre Limited Hans Kenya Ltd Honda Motorcycle Kenya Ltd Isuzu East Africa Ltd Kibo Africa Keri Energy Limited Kenyon Limited King Finn Kenya Limited	Makindu Motors Limited Megh Cushon Industries Ltd Mobius Motors Kenya Ltd Mobikey Truck & Bus Kenya Limited Opibus Limited Pipe Manufacturers Limited Pinnacle System Limited Safe & Cool Ltd Rt (East Africa) Limited Romageco Kenya Ltd Scania East Africa Limited Sagoo Holdings Ltd SafeRide Management Systems Sohansons Ltd Simba Corporation Limited Sonlink (Kenya) Co. Ltd Toyota Kenya Ltd Transtailers Limited Varsani Brake linings Ltd Uni-Truck World Ltd	43	6
Plastics & Rubber			
Mo & Mo Company Nakuru Plastics Ltd Nairobi Plastics Ltd NesPolypack Ltd Novamont Kenya Ltd Paras Industries Ltd Packaging Masters Ltd Packaging Industries Ltd Polly Propelin Bags Ltd Plastico Industries Ltd	Abhani Commercial Ltd A Plus PVC Technology Company Ltd Advanced Plastics Ltd Africa PVC Industries Ltd Aquosys Ltd Betarad (K)Ltd Bobmit Industries Ltd Buruk General Trading Coninx Industries Ltd	65	9

Plastic Electrons Plast Packaging Industries Ltd Polythene Industries Ltd Premier Industries Ltd Redptum Enterprises Ltd Pyramid Packaging Ltd Rubber Products Ltd Royal Group Industries (K)Ltd Ritepak Ltd Sanpac Africa Ltd Safepak Ltd Signode Packaging Systems Ltd Shrink Pack Ltd Silafrica Kenya Ltd Style Industries Ltd (Previously Strategic) Super Manufactures Ltd Techpak Industries Ltd Torrent East Africa Ltd TreadsettersTyres Ltd Vyatu Ltd Visionone Industries Ltd Vintz Plastics Ltd AdarshPolmer Ltd Acme Containers Ltd	Complast Industries Ltd Elgon Kenya Ecological Green Ltd Easton Plastics of Kenya Ltd Foam Mattress Ltd Flair Kenya Ltd Five Star Manufactures Finlay Brush ware Ltd General Plastics Ltd General Industries Ltd Goldsun Ventures Ltd Huming PVC Co.Ltd Hope Plastics Ltd Hari Pipes & Fittings Ltd Jumbo Chem. Industries Jalaram Plastics (K) Ltd Just Plastics Ltd Jumbo Quality Products Ltd Kenstar Plastics Industries Ltd Kenpoly Manufactures Ltd King Plastics Industries Ltd L.G. Harris &Co.Ltd		
Pharmaceutical & Medical Equipment			
African Cotton Industries Ltd Advanced Molecular Imaging Ltd Alpha Medical Manufacturers Ltd Auto Sterile East Africa Limited Biodeal Laboratories Ltd Elsy Chemicals Laboratories Ltd GlaxoSmithkline Kenya Ltd KAM Industries Ltd Laboratory & Allied Ltd NerixPharma Limited	Njimia (K) Ltd Promed Industries Ltd Regal Pharmaceuticals Limited SosureAfripads Ltd Ultravetis East Africa Ltd Ultimate Sports Nutrition (Kenya) (USN) Viva Healthcare Vetcare Kenya Limited	18	3
Paper & Board			
Adpak International Limited Anke Home Appliance Services Ltd Allpack Industries Ltd Anvi Emporium Limited ASL Packaging Limited	Printing Press Ltd Modern Lithographic (K) Ltd Nation Media Group Limited Paper plast Limited		

Armor East Africa Imaging Supplies Ltd Bags & Ballers Manufacturers Ltd Avery Dennison Kenya Ltd. Bizkard Limited Chrome Partners Limited Cartubox Industries (E.A) Ltd Carton Manufacturers Ltd Digital Hub Ltd Dodhia Packaging Kenya Limited Ellams Products Elite Offset Ltd Economic Industries Ltd Excel Packaging Ltd English Press Ltd G & F Company Kenya Limited Fortuna Industries Ltd General Printers Limited Green Pencils Ltd Juja Pulp & Paper Ltd Jubilee Tissue Industries Kenafric Manufacturing Limited Karatasi Industries Ltd Kim-Kay East Africa Ltd Label Converters Limited Manepal International	Paper bags Limited Print well Industries Ltd Print pack Multi Packaging Ltd Press Marketer Africa Ltd Ramco Printing Works Limited Safari Stationers (K) Ltd Skanem Inter labels Nairobi Limited Sitima Printers & Stationers Limited Sintel Security Print Solutions Limited Stat pack Industries Ltd Tetra Pak Ltd the Regal Press Kenya Limited The Print Exchange Limited Tissue Kenya Limited Twiga Stationers & Printed Ltd UNEECO Paper Products Limited Wandi Packaging Limited Zaam Industries Ltd		
Fresh Produce			
Aquila Development Co. Ltd Dilpack Kenya Ltd Exotic Penina Fields Group Ltd Fontana Ltd Flower City Kenya Ltd	Kenya Horticultural Exporters (1977) Rainforest Farmlands Kenya Sierra Flora Ltd	8	1
Textiles & Apparels			
Africa Apparels EPZ Ltd AkinyiOdongo Dharamshi&Co.Ltd Fantex (K) Ltd Fabnon Woven Kenya Ltd Eriken Manufacturing Industries Ltd Hantex Garments Epz Ltd Hansraj&Fulchad Group Ltd Gone Fishing Kamyn Industries Ltd Kenya Shirts Manufacturers	Midco Textiles(EA) Ltd Metamorphosis Fashions Ltd Mills Industries Ltd New Wide Garments Kenya EPZ Ltd Omega Apparel Ltd Oriental Mills Ltd Spot on Enterprises Supra Textiles Ltd Sun Pride Garments Ltd Suman Shakti	33	5

Company Ltd Kidosho Apparel Kiboko Leisure Wear Ltd Kenya Tents Knitkraft Products Ltd Life Bridge Ltd Manchester Outfitters Ltd Mega Garment Industries Kenya (Epz)	Straightline Enterprises Ltd Vaja's Manufactures Ltd United Aryan (EPZ) Ltd Vicamech Ltd		
Timber, Wood & Furniture			
64 Door Factory African Retail Traders (2005) Ltd Comply Industries Ltd Elide Industries Ltd Furniture International Ltd Funkidz Ltd Fine Wood Works Ltd Kimita Investment Marlowlink Timber Products Ltd Newline Ltd Party Lounges Ltd Renocon Rosewood Furniture	Manufactures Ltd Shamco Industries Ltd Shah Timber Mart Ltd Springboard Timber Craft Ltd Turea Ltd Watervale Investment Ltd Yangguang Property Design & Manufacturing Ltd Woodtex Kenya Ltd Woodmakers (K) Ltd	22	3
TOTAL		698	100

***Source**: (KAM, 2021)*

Appendix IV: SPSS Output

Correlations

		COP	ERP	EDI	WMS
COP	Pearson Correlation	1	.548**	.616**	.442**
	Sig. (2-tailed)		.000	.000	.000
	N	141	141	141	141
ERP	Pearson Correlation	.548**	1	.638**	.636**
	Sig. (2-tailed)	.000		.000	.000
	N	141	141	141	141
EDI	Pearson Correlation	.616**	.638**	1	.731**
	Sig. (2-tailed)	.000	.000		.000
	N	141	141	141	141
WMS	Pearson Correlation	.442**	.636**	.731**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	141	141	141	141

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

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Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin Watson
1	.653[a]	.427	.414	.53163	1.846

a. Predictors: (Constant),ERP, EDI, WMS

b. Dependent Variable: FP

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28.810	3	9.603	33.978	.000[b]
	Residual	38.721	137	.283		
	Total	67.531	140			

a. Dependent Variable: COP

b. Predictors: (Constant), WMS, ERP, EDI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.956	.354		2.703	.008
	ERP	.349	.110	.274	3.160	.002
	EDI	.462	.090	.500	5.123	.000
	WMS	-.096	.101	-.094	-.953	.342

a. Predictors: (Constant),ERP, EDI, WMS

b. Dependent Variable: FP