EFFECT OF SUPPLY CHAIN PROCESSES AUTOMATION ON THE PERFORMANCE OF FINANCIAL INTERMEDIARIES IN KENYA

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Effect of Supply Chain Processes Automation on the Performance of Financial Intermediaries in Kenya

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DECLARATION

This Thesis is my original work and has not been presented for a degree in any other University

Signature …… Date ……..

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This Thesis has been submitted for examination with our approval as the University supervisors

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DEDICATION

I dedicate this great work to my supervisors who have whole heartedly supported me through the academic process, without them it could not be what it is now.

Thank you and God bless.

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To God the most merciful be glory and honor for his grace throughout the entire study and my life also. I would also like to express my sincere gratitude and appreciation to the following people whose support and involvement made this study a resounding success. I also wish to thank the University for giving me an opportunity to further my studies, and not forgetting my research supervisors Dr. Jane Gathenya and Prof. Muturi for tirelessly being supportive of the work so far, my parents for supporting my academic pursuits and Elizabeth Wachiuri for a humorous critic of the work.

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LIST OF ABBREVIATIONS AND ACRONYMS

ATS	Automated Trading System
CDS	Central Depository System
CMA	Capital Market Authority
ECN	Electronic Communications Networks
GSCM	Generic Supply Chain Model
ITS	Inter-market Trading Systems
NSE	Nairobi Securities Exchange
TSC	Teachers Service Commission
USA	United State of America

DEFINITION OF TERMS

Automation: Involves the adoption of technology in organization's operations/systems; in this study, automation is defined in terms of extensive use of ICT solutions in operations, use of electronic systems in client's vetting and incorporation of ICT in strategic policy and planning (Skjoett-Larsen, 2010). In this study, automation is defined in terms of extensive use of ICT solutions in operations, use of electronic systems in client's vetting and incorporation of ICT in strategic policy and planning.

Financial Intermediary: A financial intermediary is a financial institution that connects surplus and deficit agents; an entity that acts as the middleman between two parties in a financial transaction. Financial intermediaries offer a number of benefits to the average consumer including safety, liquidity and economies of scale (Leary, 2010).

Human factors: It is the description of inter-action of individuals with each other, with facilities and equipment, and with management systems. This interaction is influenced by both the working environment and the culture of the people involved. What may be a good system of work in one part of an organization, may be found to be less than ideal in a region where culturally driven attitudes to risk taking may be significantly differ (OGP) (Laudon, 2011).

Information Flow: The design of information flow in supply chains has traditionally followed the physical flow along the chain (Lewis & Talalayevski, 2014). Sub-optimal supply chain performance, in many cases, has been the result of poor information sharing. In this study, information flow is defined in terms of information flow systems; technology based information systems and automated information flow systems.

Information Technology: The application of computers and telecommunications equipment to store retrieves, transmit and manipulate data, often in the context of a business or other enterprise (Daintith, 2009). This study identifies information technology as the application of computers and telecommunications equipment to store, retrieve, transmit and manipulate data, in the context of the organization.

Material Flow: Material flow is one of the crucial areas in supply chain automation, as it serves as the key materials feeding channel into the production process, whether tangible products or intangible (Tanchoco, 2012). In this study, material flow is defined in terms of integrated material flow system, synchronized material flow system and execution flexibility.

Organization structure: It defines how activities such as task allocation, coordination and supervision are directed towards the achievement of organizational aims. It also determines how information flows from level to level within the company (Sáenz-Royo, Gracia-Lázaro & Moreno, 2015). This study identifies organizational structure as the perspective of the way the organization has

organized its departments and how roles are distributed among the departments.

Organizational strategy: It is the sum of the actions a company intends to take to achieve long-term goals. Together, these actions make up a company's strategic plan. It is a high level plan to achieve one or more goals under conditions of uncertainty (Henry & Robert, 2010). In this study, organizational strategy refers to the managerial measures taken to enhance performance.

Performance of Intermediaries: Is a set of financial and non financial indicators which offer information on the degree of achievement of objectives and results (Lebans & Euske 2009). In this study, performance of intermediaries is defined in terms of total asset value, operating cost savings and market share.

Relationship Management: In a supply-chain network, there are multiple players including first, second, and third-tier suppliers, contract manufacturers, original equipment manufacturers (OEMs), distributors, and retailers. These can however be broadly categorized as suppliers and customers. For successful supply chain operations and profitability, there is need for coordination between all these players in order to enhance efficiencies in forecasting demand, and hence conducting joint scheduling, and joint product development (Viswanadham, 2002). In study, relationship management is defined in terms of order marching systems, B2B systems and supply chain relationships.

Securities market automation: It is a trading system that allows traders of securities to establish specific rules for both trade entries and exits that, once programmed, can be automatically executed via a computer. It uses electronic platforms for entering trading orders with an algorithm (Leary, 2010).

Supervision and control: is one of the primary functions of management, and it involves setting performance standards, measuring performance and taking corrective actions when necessary (Chand, 2015). Without enough supervision and control systems in place, confusion and chaos can overwhelm a supply chain system. In this study, supervision and control is defined in terms of data-based control systems, online reporting systems and demand planning systems.

ABSTRACT

The purpose of the study was to investigate the effect of supply chain processes automation on performance of financial intermediaries in Kenya. Specifically, the study sought; to establish the effect of material flow on the performance of financial market intermediaries in Kenya; to determine the effect of information flow on performance of financial market intermediaries in Kenya; to establish the effect of supervision and control on performance of financial market intermediaries in Kenya; to establish the influence of relationship management on performance of financial market intermediaries in Kenya; and to determine the moderating effect of supply chain automation on performance of financial market intermediaries. The study reviewed existing literature related to the study variables. The study adopted a cross sectional approach, with study population being 218 employees in 109 financial market intermediary firms. The study used a census approach. The study employed both primary and secondary data. Primary data was collected through questionnaire while secondary data was obtained from the firm's financial records. A pilot study was conducted to measure the research instruments reliability and validity. Descriptive and inferential analysis was conducted to analyze the data while multiple and simple regression analysis were used to measure firms' performance as influenced by supply chain automation. The data was presented using tables, graphs and charts. The study findings indicated that material flow, information flow, supervision and control and relationship management have positive and significant association with firm performance. This implied that supply chain processes and performance of financial market intermediaries change in the same direction. Further, the study found out that material flow and performance of financial intermediaries are positively and significant related ($r=0.426$, $p=0.000$), information flow and performance of financial intermediaries are positively and significant related ($r=0.169$, $p=0.000$). It was further established that supervision and control and performance of financial intermediaries were positively and significantly related ($r=0.221$, $p=0.000$), also relationship management and performance of financial intermediaries are positively and significantly related($r=0.333$, $p=0.000$). This implied that supply chain processes have a positive and significant effect on performance of financial market intermediaries. Results also showed that automation had a significant moderating effect on the relationship between supply chain processes and performance of financial intermediaries in Kenya ($p=0.000$). Based on the study findings, the study concluded that all the supply chain processes had a positive a significant influence on the performance of financial intermediaries in Kenya. Further, the study concluded that automation had a significant moderating effect on the relationship between supply chain processes and performance of financial intermediaries in Kenya.The study recommended that financial intermediaries should fully automate their supply chain processes (material flow, information flow, supervision and control and relationship management). Further, the firms should develop new supply chain models, which are compatible with automation. In addition, the study recommended that data should be accurate and objective and the decision maker should have a single version of the information. The implication of the study is that supply chain processes play a significant role in the performance of financial market intermediaries in Kenya. For these organizations to realize their goals and objectives, they need to adopt the use of modern technology in their systems, especially, the supply chain processes.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

According to Harland (2010), supply chain management is the "design, planning, execution, control, and monitoring of supply chain activities with the objective of creating net value, building a competitive infrastructure, leveraging worldwide logistics, synchronizing supply with demand and measuring performance globally". According to Becker (2000), supply-chain problems cost companies between 9 and 20 percent of their value over a six-month period. Despite this, attempts to automate solutions to majority of these problems are complicated by the need for the different players in a supply chain to maintain the integrity and confidentiality of their information systems and operations. However, for companies to achieve their supply chain management objectives, they must fully integrate and automate all departments and partners, rather than certain areas. Towards this end, technology becomes an indispensable "enabler" for supply chain automation (Nash, 2010).

Like other commercial entities, financial intermediaries - institutions that facilitate the channeling of funds between lenders and borrowers indirectly (Pierre, 2011) - need to automate their supply chain processes in order to increase operating efficiencies, improve profitability, and enhance overall performance. Halachimi (2012) defines performance in stock brokerage firms as being the achievement of business, financial, effectiveness, and organizational objectives. Armstrong (2011) adds that such performance is indicated by market share, sales growth, and development of new products while financial performance is indicated by profit margin, total assets and equity multiplier. Indicators of effectiveness include quality of service, degree of social responsibility, positive work culture, and good image of the company and level of customer satisfaction.

Chavan (2009) argues that performance focuses not only on what people achieve, but also how they achieve it. Boatright (2012) adds that financial performance is a subjective measure of how well a firm can use assets from its primary mode of business and generate revenues. This term is also used as a general measure of a firm's overall financial health over a given period of time, and can be used to compare similar firms across the same industry or to compare industries or sectors in aggregation.

According to Wangai and Ngugi (2014), the performance of a stock market of an economy is of interest to various parties including investors, capital markets, the stock exchange and government among others. Stock market performance is influenced by a number of factors, key among them being government activities, and the general performance of the economy. Other factors that affect the stock market's performance include, availability of other investments assets, change in composition of investors, and markets sentiments among other factors (Mendelson & Robbins, 2003).

In his study, Kenneth (2009) postulates that brokerage services industry is cyclical and performance is tied most closely to that of the stock market, which tends to lead economic performance. Christopher (2012) links the stock market cycle to economic cycle and argued that the relationship is far from perfect; with stock market downturns leading recessions by approximately nine months, and market upswings preceding expansions by about five months. Adjasi (2010) attributes the brokerage industry's cyclical nature to two factors. First, most of its business lines (commissions, trading, investment banking, etc.) have a tendency to move in tandem expanding during bull market runs and contracting during corrections. Second, employment numbers increase during bull markets and are significantly cut during bear markets, thus amplifying the effect of the next boom or bust on brokerage firms' bottom lines.

This notwithstanding, argues Christopher (2009), the role of supply chain automation is to create a major source of competitive advantage for the enterprise to differentiate itself in the eyes of the customers from its competitors by operating at a lower cost and hence at a greater profit.

1.1.1 Global perspective of Financial Market Intermediaries Performance

Performance of stock markets differs significantly among countries in the developed, developing, and in the third world due to a myriad of factors. In the US, for instance, rapid technology has led to use of online brokerage, which has significantly changed the dynamics of the marketplace, causing one of the biggest shifts in individual investors' relationships with their brokers since the invention of the telephone. According to Franklin (2012) the percentage of equity trades conducted online has grown tremendously, signaling better performance in the brokerage firms in the US.

Japan, on the other hand, has experienced mixed results in the performance of their brokerage firms. The brokerage firm's traditional main source of revenues, commission fees for undertaking trade, has been threatened by the rise of online discount brokerage firms. The revenues of securities firms that depended on commissions deteriorated. As a result, leading online brokers in Japan have made intensive investment in their internet-based trading systems to offer a variety of advanced trading tools for individual traders. Among the middle to small firms, some select mergers and some enter a partnership with nationwide banks while others are forced out of business (Ministry of Internal Affairs and Communications, 2008).

Allen, Qian and Qian (2007) examined and compared the role of China's financial system in supporting the growth of firms and the economy with that in other countries, and explore directions of future development. The research found out that current financial system is dominated by a large but inefficient banking sector. Reducing the amount of non-performing loans among the major banks to normal levels is the most important objective for reforming the financial system in the short run. Second, despite the initial fast growth of the stock market, its role of resource allocation in the economy has been both limited and ineffective. Further

development of China's financial markets is the most important long-term objective. Third, the research found that that the most successful part of the financial system, in terms of supporting the growth of the overall economy, is a non-standard sector that consists of alternative financing channels, governance mechanisms, coalitions, and institutions. According to Allen, Qian and Qian (2007), both financial market and banking sectors should co-exist in the future in order to continue to support the growth of the Hybrid Sector (non-state, non-listed firms).

McKillop and Hutchinson (1991) attempted to identify, on a United Kingdom wide basis, the regional dispersion of the various groupings of financial markets and intermediaries. The authors noted that although London dominates there is, however, evidence of significant pockets of autonomous financial intermediaries in certain of the regions. Further, research identified key issues likely to impact upon the future growth performance of financial intermediaries at regional level. Three issues weigh particularly heavy in this part of the discussion: the added flexibility now on offer to financial intermediaries due to information technology; relocation within the financial services industry and its impact on regional financial sectors; and European integration, with special reference to regulation and the likely consequences for continued financial services growth at both national and regional level in the United Kingdom.

1.1.2 Regional perspective of Financial Market Intermediaries Performance

Performance of the stock market in emerging markets has had mixed results. For instance, August of 2015 saw the Shanghai Composite Index (SCI) fall by more than 20%. The losses, concentrated at the end of the month, represented the second significant market drop in less than two months, following a similar plunge in July (Bendini, 2015). The rout was dramatic, but so had the gains; given that backlash had come after a remarkable growth of the Shanghai stock market by more than 150 % between June 2014 and June 2015. According to Bendini (2015) this plunge saw Chinese investors lose close to EUR 5 trillion - a sum higher than China's entire market capitalization in 2012. In the weeks since the SCI reached its 12 June peak, the index has lost more than 40 % of its capitalization. The smaller and

technologically-oriented Shenzhen Stock Exchange (STE) suffered even higher losses, nullifying all the gains that it had made in 2015.

In their study, Sumra *et al.* (2011) explored the impact of internet trading on the profitability of investment banks and brokerage firms in Pakistan ascertained that the proliferation and penetration of internet opened new horizons and scenarios for the retail banking industry. As the scholars found out, banks provided their products and services through the electronic medium; where internet banking was considered to have substantial impact on banks' performance. They concluded that internet trading had increased the profitability of investment banks and brokerage firms; it had enabled them to meet their costs and earn profits even in the short span of time.

Prior to the 1980s the financial sectors in Sub-Sahara Africa countries were generally described as underdeveloped, risk averse, highly concentrated in urban areas, and offering only a limited range of financial services (Andrianaivo & Yartey, 2009). But since the beginning of the 1980s several SSA countries have adopted policies aimed at creating environments that are conducive to financial intermediation. These include strengthening the institutional framework for banking regulation, promoting monetary policy autonomy, and establishing central bank credibility (Ndikumana, 2001). The results have been relatively impressive. The dominance of state-owned financial institutions has been drastically reduced, restrictive regulations have been dismantled, and new financial products as well as innovative delivery systems have been encouraged. At a regional level, there have been growing cross-border banking activities with the rapid development of networks of pan-African banks. All these have significantly changed the financial landscape in SSA.

1.1.3 Local perspective of Financial Market Intermediaries Performance

In Kenya, a third world country, dealing in stocks and shares started in the 1920s when the country was still under British colony (Wangai & Ngugi, 2014). There was however no formal market, no rules and no regulations to govern stock brokerage activities. Trading took place on gentlemen's agreement in which standard

commissions were charged with clients being obligated to honor their contractual agreements of making good delivery and settling relevant costs. In 1951 Francis Drummond established the first professional stock brokerage firm and other stock brokerage firms were later established (Wangui & Ngugi, 2014). The Nairobi Stock Exchange was constituted as a voluntary association of stockbrokers registered under the societies Act in 1954 and in 1991 the Nairobi Stock Exchange was incorporated under the companies Act of Kenya as a company limited by guarantee and without a share capital.

Subsequent development of the market has seen an increase in the number of stockbrokers, introduction of investment banks, establishment of custodial institutions and credit rating agencies and the number of listed companies have increased over time. Securities traded include, equities, bonds and preference shares (NSE, 2014).

The period preceding the 2002 general election saw the NSE experience decline in market performance (Kibuthu, 2005). The uncertainty of the business environment resulted in the decline in the confidence and subsequently poor performance of the stock market. After the new government came into power, the market infrastructure was improved by installation of a computerized central depository system (CDS) introduced on November 2004 and whose operations included, keeping the share registry, clearing and settlement arrangement hence assuring faster, safer and easier trading insecurities *(*Kibuthu, 2005). Despite the measures taken, several firms such as Nyaga Stock Brokers and Thuo Stock Brokers were declared bankrupt back in the year 2007. Discount Securities Limited was also placed under receivership and several other companies continue to face solvency challenges.

1.2 Statement of the Problem

Despite several economic and cultural changes, the main goal of establishing a supply chain network has remained the same. These goals include; procurement of raw materials, transforming them into final products, and delivering them to the final customers at the specified time and place (Viswanadham, 2002). The effectiveness of

these activities largely depends on the automation of the entire supply chain system. Supply chain automation is considered as one of the most important functions in an organization, as it is a key contributor to overall profitability (Une & Sangle, 2014).

The financial market intermediaries in Kenya have been experiencing performance problems, this is despite automation of their supply chain systems in 2006 (Nairobi Stock Exchange, 2014). The collapse of stockbrokerage firms has resulted to market decline as whole, investors lose money and cut back on their consumption leading to low economic development. Recessions witness the loss of jobs, and again a decline in consumption (Wangai & Ngugi, 2014). The rate at which the financial intermediaries have been performing poorly and collapsing is alarming and it begs the question whether automation had something to do with it. Over the past few years, brokerage firms such as Nyaga and Thuo Stockbrokers either collapsed or went under receivership, taking with them about Ksh3 billion of investors' money (Daily Nation, Oct 28, 2009). Much of this poor performance has been blamed on the macro environment such as the cyclical nature of the financial markets industry, with performance tied most closely to that of the stock market. This, in turn, is related to economic performance and the relationship between the stock market and economic cycle. The imperfections in the macro-economy lead to stock market downturns consequently leading to poor performance of brokerage firms (Kenneth, 2009).

However, trading at the NSE involves stockbrokers and other intermediaries, who control the investor's orders running in the supply chain through the Automated Trading Systems (ATS), (Otuke, 2006). There have been complaints raised by investors' touching on certain intermediaries, with the money at various levels of the supply chain not adding up in the clearing accounts (Ngigi, 2011). Concerns of supply chain fraud have also been raised with some brokers living off their clients' investment with shares being traded without permission. Other market players will fail to pay promptly the proceeds as required by law under NSE regulations (Bonyop, 2009).

Une and Sangle (2014) further argued that supply chain management processes such as material flow, information flow, supervision and control and relationship management can benefit from supply chain automation. Based on these findings, the study set out to establish the effect of supply chain processes automation on the performance of financial market intermediary firms in Kenya.

1.3 Research objectives

1.3.1 General Objectives

The study sought to investigate the effect of supply chain processes automation on performance of financial intermediaries in Kenya.

1.3.2 Specific objectives

i. To establish the effect of material flow process on the performance of financial market intermediaries in Kenya.
ii. To determine the effect of information flow process on performance of financial market intermediaries in Kenya.
iii. To establish the effect of supervision and control process on performance of financial market intermediaries in Kenya.
iv. To establish the influence of relationship management process on performance of financial market intermediaries in Kenya.
v. To determine the moderating effect of automation on the relationship between supply chain processes and performance of financial market intermediaries.

1.4 Research Hypotheses

The research was based on the following null hypotheses:

Ho_1: material flow process has no significant effect on the performance of financial market intermediaries in Kenya.

Ho_2: information flow process has no significant effect on performance of financial market intermediaries in Kenya.

.*Ho_3:* supervision and control process has no significant effect on performance of financial market intermediaries in Kenya

Ho_4: relationship management process has no significant effect on performance of financial market intermediaries in Kenya.

Ho_5: automation has no significant moderating effect on the relationship between supply chain processes and performance of financial market intermediaries in Kenya.

1.5 Significance of the study

Although it is commonly acknowledged that automation of supply chain management is an essential ingredient in managing logistics operations in networks, and will be an increasingly so over time, empirical evidence of the specific benefits of this practice in financial intermediaries, more so in stock brokerage firms operating in Kenya are not clear. The study will thus be beneficial to a number of institutions not restricted to the following:

1.5.1 Brokerage Firms and investment banks

This study is expected to be of great value to the stock brokerage firms in Kenya. These firms will benefit from the findings as the study will highlight the impact that automation of supply chain management has on the firm's profitability, staff productivity, growth in sales and market share, as well as levels of customer satisfaction.

1.5.2 Policy makers

The policy makers in the stock brokerage industry (NSE board and also the CMA) will better understand the relationship between supply chain automation and performance of industry players. This will empower the policy makers to make more informed decisions in this respect, in their capacity as industry regulators.

1.5.3 Investors

Individual and corporate investors served by the stock brokerage firms will better understand the relationship between supply chain automation and the stability of stock brokerage firms, and thus make more informed decisions on the firms to invest their money through.

1.5.4 Academicians

To researchers and academicians, the study will add value to the field of research in the area of automating supply chain management and how the process affects the brokerage firms in regard to performance, besides providing a basis for further research in the same field.

1.6 Scope of the Study

The scope of the study encompassed all the 109 financial market intermediary firms currently in Kenya. The 109 firms formed the unit of analysis for study with our main focus being the investment analysts and supply chain officers in the firms. The study population comprised 218 employees working in the 109 firms. The study used

a census as a main mode of study. Geographically, the study was conducted on the firm's head offices. Conceptually, the study scope lief on looking at various aspects of supply chain automation, including: material flow, information flow, supervision and control, and relationship automation.

1.7 Limitations of the Study

The study findings were limited to financial market intermediaries only and also considered four variables as the processes influencing the performance of financial intermediaries whereas there could be other processes. The study also considered only the financial performance of financial intermediaries whereas there could be non-financial indicators of performance. Further, there was difficulty in gaining access to the sampled respondents.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter explores the literature that focuses on the effect of automation of supply chain processes on the performance of financial market intermediary firms in Kenya. The chapter reviews theories explaining the performance of financial market intermediary firms; the conceptual framework; besides providing empirical literature, as well as knowledge and research gaps.

2.2 Theoretical Framework

This section reviews two key theories underpinning supply chain processes and automation: the supply chain management systems theory, and process theory model. The supply chain theory explains the implications of the supply chain practices while the process theory model elucidates on the complementary nature of technology to the supply chain management practices.

2.2.1 Supply Chain Management/Systems Theory

This theory has been widely used by scholars in trying to explain issues surrounding supply chains and the enhancing systems. Some scholars such as Sushil (2012) emphasized the need for a 'flexible system theory', relating to several systems based approaches and techniques as a means of effectively catering to problem situations. According to Siau (2010) new insights are gained by abstracting the view of the information systems field. In a similar vein, new and crucial insights may emerge out of the application of general systems theory to supply chains and supply chain management.

As suggested by Caddy (2010) the purpose of developing a Generic Supply Chain Model (GSCM) is to provide a deeper understanding of supply chains, in terms of their development, operation and management. A representative literature review of supply chain and supply chain management frameworks and models reveal that there

is not an already developed and generally accepted comprehensive model of supply chain as revealed by (Helou, 2009). According to Moon (2009) models of supply chain seem to concentrate on only one particular aspect or dimension of the supply chain, viz. organization structure/strategy while negating on other aspects such as information technology and human factors as was proposed by (Calantone, 2010).

If views by Sushil (2012) are anything to go by, each of these dimensions should be considered crucial by their own, as each factor by itself does not provide a complete and comprehensive view of supply chains and their management. Combining the above mentioned three dimensions result in the development of a generic supply chain model, in which each of the dimensions provides a separate as well as a related conjoint contribution. The generic model shown below allows for the diversity of real world situations by incorporating into the model the interactions among the three dimensions. Different outcomes are generated given the nature of the type and level of interaction. In addition, the type and level of interactions it would be contingent upon organizational culture, the environment in which the organization operates, and the characteristics of the supply chains utilized in the exchanges that occur among organizations. The theory is significant and relevant to this study since it explains the relationship between supply chain processes such as supervision and control and systems' enhancement.

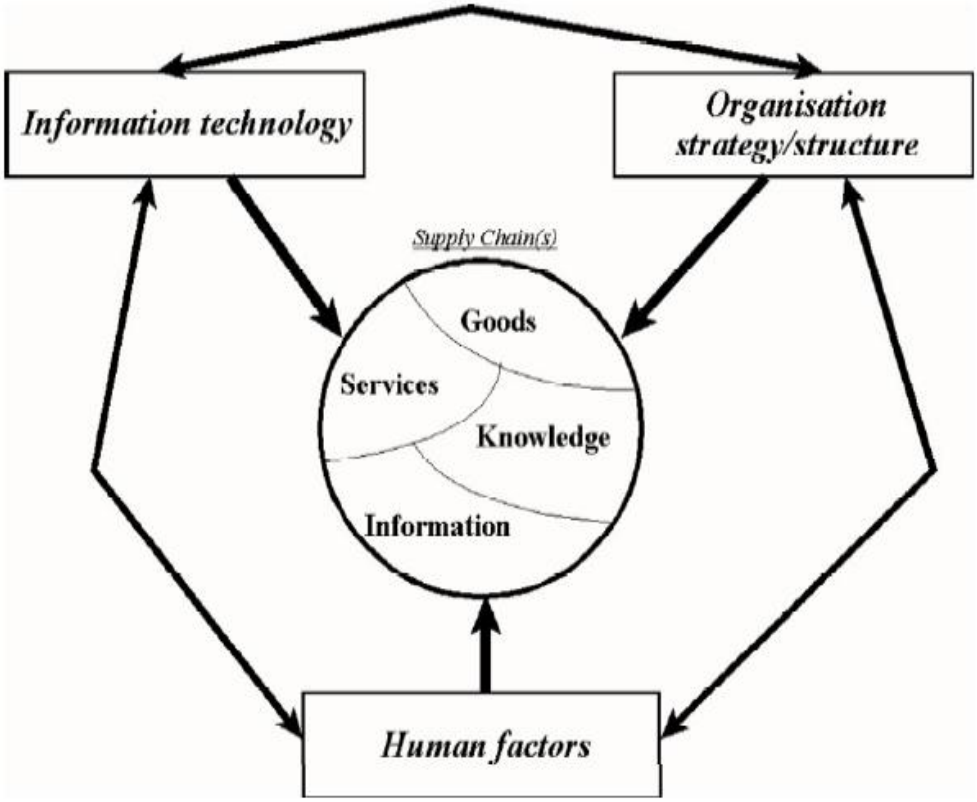

Figure 2.1: Systems Theory of Supply Chain

Source: Helouand Caddy (2006)

2.2.2 Process theory

The application of process theory on information technology and business value was initially proposed by Soh and Markus (2012). Their process theory model suggests that investments in IT projects, applications, and skill base represent creation of IT assets in an organization. Successful deployment of IT assets leads to redesigned processes, improved decision-making, and improved coordination. The model further argues that IT infrastructure, rather than directly impacting aggregate firm performance, may instead support critical processes that improve firm performance. The process theory view of IT payoff is that firms derive business value from intermediate operational and management processes. As IT continues to permeate the organization, the authors argue, automation has a greater impact on the processes and eventually on the organization.

Complementing the process theory models were the findings of Barua (1996) who presented a theory of business value complementarity. Using the process model the authors argue that the value of having more of one factor increases by having more of another complementary factor. The authors suggest that organizational payoff is maximized when several factors relating to IT, organizational structure, business processes, and incentives are changed in a coordinated manner in the right directions by the right magnitude to move toward an ideal design configuration.

Applying the process theory to the notion that IT exerts indirect effects on firm performance via process variables, the current study proposes that automation of security market compliments organizational characteristics and processes, and that the adoption of IT and business process optimization cannot succeed if done in isolation. Thus, even with automation of the security market performance of firms may differ depending on other factors such as organizational structure, human resource among others. The theory is significant and relevant to this study since elaborates the role of automation in enhancing firms' performance.

2.2.3 The Constraint Theory

The theory of constraint is systematic method for improving operational performance of an organization. Goldratt *et al*. (1992) advanced the argument that the theory of constraints takes a scientific approach to improvement of business processes where every complex system consists of multiple linked activities, one of which acts as a constraint upon the entire system.

Goldratt *et al.* (1992) further noted that the main goal for most organizations is their bottom-line and that the theory of constraints provides a powerful set of tools for helping to achieve that goal including the five focusing steps which is a methodology for identifying and eliminating constraints. In the thinking processes are set of tools for analyzing and resolving problems and lastly throughput accounting which is a method for measuring performance and guiding leadership decisions. He concluded by emphasizing that successful integration of the theory will result to better profitability, enhanced abilities, reduced inventory, and reduced process times which

in essence mean less work-in process inventory. The theory of constraint is significant and relevant to this study since the study focuses on supply chain processes, whose improvement is expected to increase firms' performance. In particular, the theory explains the material flow aspect which is one of the variables in this study.

2.2.4 Information Theory

This theory has great impact in supply chain management. The theory was originally proposed by Shannon in 1940s as mathematical theory of communication to deal with problems of transmission electrical engineering. According to Beckstead and Beckie (2011) the central issue of focus in this theory is quantities information and uncertainty. According to Budd (2010) anything that would be information is communicative and inherently includes exchange. Budd (2010) posit that exchange requires real language, signs and the act of communicating entails as an intentional purpose and connects human and organizations intentionality to the construction of informative actions for the benefit of all players. Related to information theory is Signaling theory which is based on the assumption that information is not equally available to all parties at the same time leading supply chain disruptions.

The interdependence nature of tasks performed by supply chain participants and interactions among organizations creates uncertainties to which organizations must respond (Cegielski *et al*., 2012). Among organizations that participate in supply chain management, there is a requirement for information sharing, collaboration, and connectivity if firms are to perform at an optimal level (Sanders *et al*., 2011). Uncertainty is a major factor among supply chain members as it creates a gap of disconnect between information available and the information available for decision making in business organizations. Uncertainty being a state of limited knowledge in which it is not possible to exactly describe possible future outcome with certainty (Hubbard, 2010) creates a fertile ground for bullwhip effect along the supply chain. The theory is significant and relevant to this study since it provides a link between information flow and firms' performance.

2.2.5 Psychological Contract Theory

The theory has its foundation in human resource management, specifically in employment. Chris Argris (1960) was the first to apply the psychological contract to the workplace. He believed that employees and their organization created psychological contracts that allowed the expression and gratification of each other's needs. According to Armstrong (2009) a psychological contract represents a set of unwritten expectations that exist between an employee and the employer. The expectations are implied and therefore concerned with the perceptions held by both parties to the employment relationship, the organization and individual (Quest, 2007). A contract represents a set of aspirations as a belief system revolving around actions expected of employees and reciprocal actions by employers in return. While reasonable amount of the psychological contract literature has focused on employee–employer relationships, it is fitting to extend evaluation of this theory to relationships in other areas (Kingshott & Pecotich, 2007).

The theory informs the study by providing an understanding of how modern integrated supply chain is characterized by long term relationship management in order to achieve organizational goals (Menon, 2012). The theory provides valid theoretical framework that build on mutual trust among the chain partners in long term relationship characterized by interdependence which if well managed results in a win-win exchange situation for all the stakeholders.

Systems theory also informs the study and it is the study of systems in general with the aim of making clear the principles that can be applied to all types of systems at all nesting levels in all fields of research (Bertalanffy, 1956). He further argued that theory of systems is significant and relevant to this study since lean practices are components of lean systems employed to improve processes. Systems theory can be considered a specialization of systems thinking or basically in depth scrutiny of how systems are developed interconnected and work together.

2.2.6 Expectancy Theory

The expectancy valance theory was proposed by Vroom in 1964. As a behavioral motivational theory it explains why actors make decisions and assert that behavioral choices is a function of expectancy-the probability of realizing desired outcome, and valance-the value attached to the desired outcome (Chen, Ellis & Holsapple, 2015). It holds that behavioral choices are depended upon motivational force which is a function of the valance of anticipated outcome (Pinder, 1984). It is premised on the understanding that individuals adjust their behavior in respect to anticipated satisfaction of valued goal, usually highest positive or lowest negative motivational force and performance is influenced by expectations concerning future events (Chen, Ellis & Holsapple, 2015).

Drawing on expectancy theory, financial intermediary firms comprises of rational, thinking ,reasoning individuals who make choices in a way that maximizes expected utility (Vroom, 1964) and the monetary gains from the supply chain automation initiatives is an anticipated future outcome that can motivate the firms to perform.

This theory aligns itself with supply chain automation initiatives with expected and anticipated outcomes. The ability of the financial intermediary firms to adopt automation in their supply chain processes determines the firms' future success (Zaniboni *et al.,* 2011). The theory is significant and relevant to this study since it offers useful insights of how supply chain processes automation can influence the performance of financial market intermediary firms.

2.3 Conceptual Framework

The conceptual framework explains the possible connection between the variables and answers the why question. The conceptual framework for this study was consisting of material flow, information flow, supervision and control and relationship management as independent variables. The dependent variable was performance of financial market intermediary firms. The relationship between supply chain processes and performance of financial market intermediary firms was

moderated by the supply chain automation. These relationships were represented in Figure 2.2.

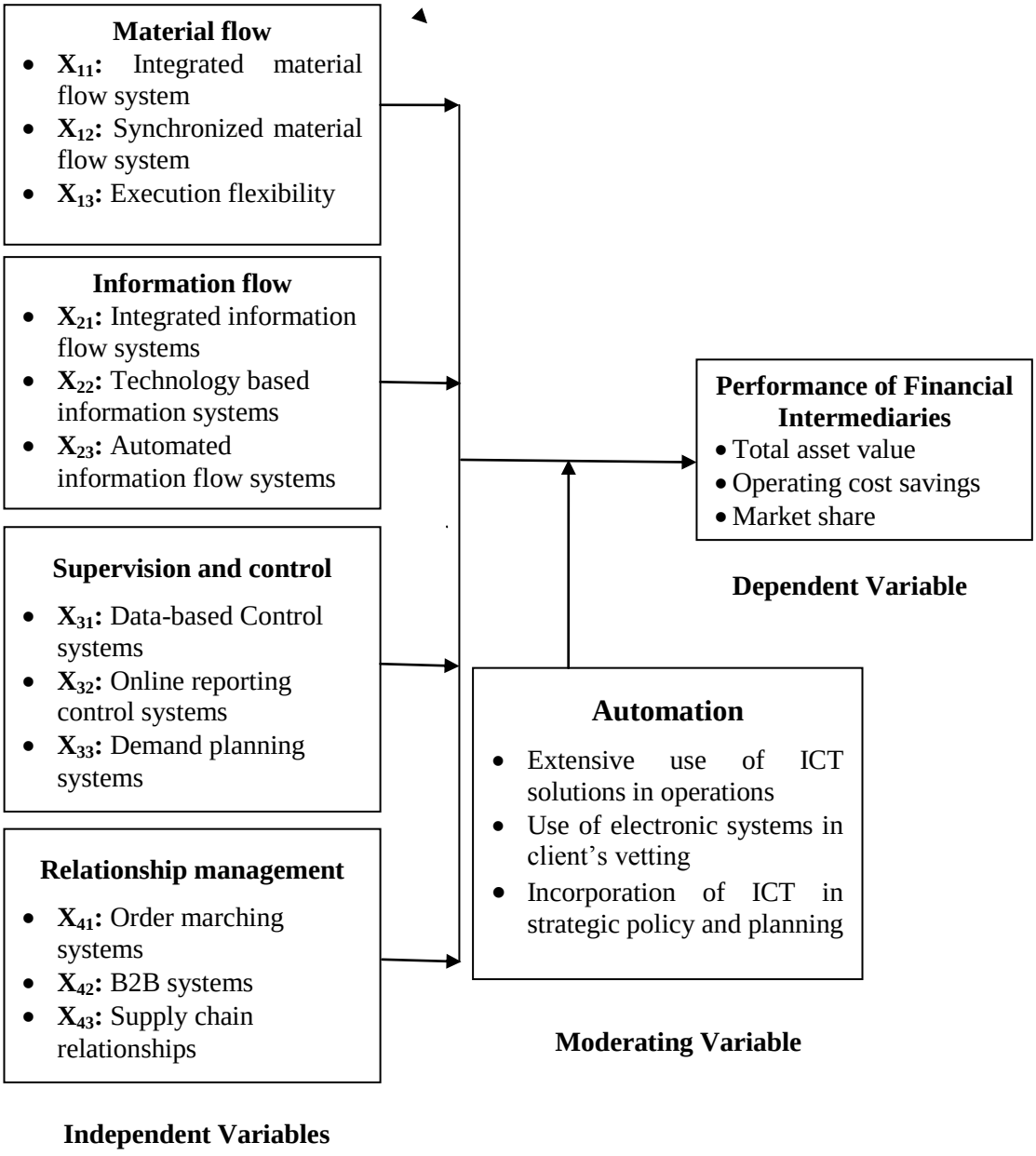

Figure 2.2: Conceptual Framework

The conceptual framework as shown in Figure 2.2 above suggests that there is a moderation effect of automation on the relationship between supply chain processes (independent variables) and the firm's performance (dependent variable). Indeed, according to Wisner (2002), deployment of ICT, a key factor in supply chain management, allows a company to automate and integrate most of its business processes, share common data and practices throughout the system, and produce and access information in a real-time environment. This, in effect, enhances process efficiencies, decision-making, customer service, and company's productivity.

2.4 Empirical Review

2.4.1 Material Flow and supply chain automation

Tanchoco (2012) observed that material flow is one of the crucial areas in supply chain automation, as it serves as the key materials feeding channel into the production process, whether tangible products or intangible. According to Tanchoco (2012), key factors to consider when planning for an effective material flow automation system include the specifications of individual system components, as well as the overall objective of the manufacturing system. Within a manufacturing process, from where supply chain management and automation evolved, material flows through the production line, the route ways between factory and suppliers and customers. Tancho (2012) further adds that manage and control of material flow is an important method of increasing firms' profitability, more so given the process' centrality in matching supply of materials, production of goods, warehousing on the one hand, and consumer demand and marketing on the other.

Luo (2006) noted that the main purpose of automating the material flow process is to decrease the cost of logistics and inventory, while increasing the efficiency of material sources and information, in order to satisfy market requirements. To achieve this, scholars have developed a number of models to optimize the process. This includes Material Requirements Planning (MRP), Just In Time (JIT) delivery, an d Lean Manufacturing. MRP is a set of algorithms designed to establish material requirements based upon known sales orders (or forecast), bills of materials and

material supplier lead times (OSIRS, 2008). The limitation with MRP is that the algorithms are normally carried out in sequence. In other words, the materials requirements are calculated in advance, after which then organization plans the capacity. In practice, however, this would lead to capacity constraints, mean that materials could be delivered later or may be required earlier; hence re-planning of materials is required. In this case, there would be more problems, such as increased lead-time (Viswanadham, 2002), which could impact the capacity planning and so the process goes on.

Ohno (1978) observed that JIT is a methodology aimed primarily at reducing flow times within production as well as response times from suppliers and to customers. The heart of JIT is the kanban card - a pull system that triggers the movement of materials from one operations through to the next (MANAGE, 2008). In a JIT environment, both earliness and tardiness must be discouraged since early finished jobs increase inventory cost, while late jobs lead to customer dissatisfaction and loss of business goodwill (Wong, 2006). The typical attention areas of Just-In-Time include: Inventory reduction; smaller production lots and batch sizes; quality control; complexity reduction and transparency; flat organization structure and delegation; and waste minimization (MANAGE, 2008).

Womack *et al*. (1990) pointed out that lean manufacturing or lean production, often simply "lean", is a systematic method for the elimination of waste ("Muda") within a manufacturing system. Lean also takes into account waste created through overburden ("Muri") and waste created through unevenness in workloads ("Mura"). Working from the perspective of the client who consumes a product or service, "value" is any action or process that a customer would be willing to pay for (Shah & Ward, 2003).

Essentially, lean is centered on making obvious what adds value by reducing everything else. Lean manufacturing is a management philosophy derived mostly from the Toyota Production System (TPS) (hence the term Toyotism is also prevalent) and identified as "lean" only in the 1990s (Womack *et al*, 1990). TPS is renowned for its focus on reduction of the original Toyota seven wastes to improve

overall customer value, but there are varying perspectives on how this is best achieved. The steady growth of Toyota, from a small company to the world's largest automaker, (Bailey & David, 2008) has focused attention on how it has achieved this success. In three approaches discussed above, among others, highlight the centrality of material flow management in ensuring a firm's efficiency, and productivity (Shah, & Ward, 2003).

Narasimhan, Talluri and Das (2004) posited that material flow is execution flexibility, which is the ability of the physical and non-physical flow to adapt to changes. Flexibility means the ability to produce different sizes, volumes, or variations of products with minimum penalties in costs, quality or time (Upton, 1994). Also it's the description of the transportation of raw materials, pre-fabricates, parts, components, integrated objects and finally products as a flow of entities. It incorporates the aspects of volume, mix, timing, and new product flexibility, as well as responsiveness to the market, which have been identified to be the most important aspects of supply chain flexibility (Vickery *et al.,* 1999).

2.4.2 Information Flow and supply chain automation

Lewis and Talalayevski (2004) observed that the design of information flow in supply chains has traditionally followed the physical flow along the chain. Sub-optimal supply chain performance, in many cases, has been the result of poor information sharing. Adopting advanced information systems, which enable efficient information sharing between the members of supply chains and over supply chain phases, may however change the situation timeliness (Kehoe & Boughton, 2001). The main purpose of automating the information flow process is to achieve collective goals that individual actors cannot reach. The need for such coordination is evident in supply chains, as companies forming a supply chain are dependent on the performance of other organizations. Supply chain coordination is however achieved when a decision maker, acting rationally, and basing decisions on accurate information, makes decisions that are efficient for the supply chain as a whole (Gupta & Weerawat, 2006).

Information flow in supply chains has been studied before, for example by Sahin and Robinson (2002; 2005), who state that incomplete understanding on the interaction between information sharing and physical flow hinder attempts to achieve higher levels of supply chain integration. In many cases information sharing alone does not improve supply chain performance (Petersen, 2005). They argued that physical flow coordination among the trading partners is essential. The key to enhanced supply chain operations does not lie solely in efficient information transfer and sharing, but also in information availability and timeliness (Kehoe & Boughton, 2001, English, 2001).

Petersen (1999) observed that the quality of shared information has a clear impact on the planning outcome and is critical to the effectiveness of decision-making. Furthermore, Simchi-Levi *et al*. (2003) saw supply chain management as being concerned with utilizing the data and the sophisticated analyses of this data.

The primary issue is what data should be transferred and what part of the data can be ignored. There are, however, few research results that relate to how the quality of shared information affects the performance of supply chains. Information quality is defined as the degree to which the information meets the needs of the organization. This includes such aspects as accuracy, timeliness, adequacy, completeness, credibility, ease of access, and compatibility across users (Monczka *et al*., 1998).

English (2001) noted that information quality according to the needs of the decision maker, and argued that the right data in a complete form and in the right context is needed. The data need to be accurate and objective, and the decision maker should have a single version of the information (Petersen, 2005). The data should be in such a form that it can be used efficiently and effectively, and at the right time and place for the right purpose. Some writers have pointed out a new challenge, which arises from frequent and wide information sharing practices: companies may face difficulties surviving the overabundance of data (Malhotra, 2000).

A few studies have examined how offering information from various sources and in a frequent manner may harm decision-making. One example is the study by Disney *et al*. (2004), who based their work on the earlier study by Hong-Minh *et al*. (2000), and studied decision making in the Beer Game. They noticed that the decision maker could not improve decisions when he/she had a wide range of data; it confused the player and ended up in worse decisions and higher inventories in the chain. Wagner (2002) concluded that, particularly when human intervention is needed, decision-making becomes more complex in a transparent environment.

Lewis and Talalayevski (2004) noted that the design of information flow in supply chains has traditionally followed the physical flow along the chain. Sub-optimal supply chain performance, in many cases, has been the result of poor information sharing. Adopting advanced information systems, which enable efficient information sharing between the members of supply chains and over supply chain phases, may however change the situation. Instead of suffering from scarcity of data, the challenge for companies is to achieve good quality information (Wagner, 2002) and to decide which data can be utilized in decision making to improve supply chain performance and which data can be ignored. Information flow is described as volume of information shared, which describes the existence, extent, and availability of data and also includes three features of information flow: speed, frequency, and abundance of information.

Samaddar *et al*. (2006) argued that volume of information shared is selected because advances in information technology have made it possible to communicate demand between supply chain partners and also over supply chain echelons. In some cases a company may suffer from overabundance of information, or from scarcity of data. Traditionally companies have suffered from inadequate or asymmetric information and had to base their decisions on local and often sparse information, which lead to many supply chain inefficiencies (Patnayakuni, 2006). It has become imperative for firms to receive and share information to align supply and demand and to cope with changes in the environment. The term ‘volume of information shared’ is related to the term ‘information quality’, when it is understood broadly, in a meaning how well

information supports the needs of a decision maker. However, information quality is realized only when information is used.

Patnayakuni (2006) observed that a huge literature does exist concerning developments in information technology that have provided new opportunities through electronic commerce where transactions are competed through a variety of electronic media, including electronic data interchange (EDI), electronic fund transfer (EFT), bar codes, point of sale systems (POS), fax, automated voice mail, CD-ROM catalogues, and a variety of others (Croom, 1999). These issues are dealt with not only at a dyadic level: information technologies are supply chain "enablers" in that they can help managers in developing information systems not visualizing information as a set of repetitive transaction between entities such as buyers and suppliers, or distributors and retailers. Rather they should help them in developing ideal systems spanning all functions and organizations throughout the entire supply chain (Handfield & Nichols, 1999).

2.4.3 Supervision and control and supply chain automation

Chand (2015) noted that control is one of the primary functions of management, and it involves setting performance standards, measuring performance and taking corrective actions when necessary. Without enough control systems in place, confusion and chaos can overwhelm a supply chain system. Within the supply chain system, managers define goals for the department in specific, precise, operational terms, which includes standards of performance to compare with organizational activities (Viswanadham, 2002). Performance standards, against which actual performance will be compared, may be derived from past experience, statistical methods and benchmarking (based upon best industry practices). As far as possible, the standards are developed bilaterally rather than top management deciding unilaterally, keeping in view the organization's goals Hong-Minh *et al*. (2000).

Kehoe and Boughton (2001) posited that most organizations prepare formal reports of performance measurements both quantitative and qualitative (where quantification is not possible) that the managers review regularly These measurements should be

related to the standards set in the first step of the control process. For example, if sales growth is a target within the supply chain automation process, the organization should have a means of gathering and reporting sales data (English, 2001). Data can be collected through personal observation (through management by walking around the place where things are happening), statistical reports (made possible by computers), oral reporting (through conferencing, one-to-one meeting, or telephone calls), written reporting (comprehensive and concise, accounting information – normally a combination of all (Viswanadham, 2002).

English (2001) noted that comparing the system's performance with set standards can be accomplished by having supply chain managers read system reports, or by physically observing operations. In so doing, they identify whether actual performance meets, exceeds, or falls short of standards. Typically, performance reports simplify such comparison by placing the performance standards for the reporting period alongside the actual performance for the same period and by computing the variance—that is, the difference between each actual amount and the associated standard (Bailey & David, 2008). The manager must know of the standard permitted variation (both positive and negative). Management by exception is most appropriate and practical to keep insignificant deviations away. Timetable for the comparison depends upon many factors including importance and complexity attached with importance and complexity (Viswanadham, 2002).

Viswanadham (2002) postulated that the ultimate aim of supply chain supervision and control is to inform decisions necessary for the system managers to take corrective action, as well as to reinforce successes. When performance deviates from standards, managers must determine what changes, if any, are necessary and how to apply them. In the productivity and quality-centered environment, workers and managers are often empowered to evaluate their own work. After the evaluator determines the cause or causes of deviation, he or she can take the fourth step—corrective action. The corrective action may be to maintain status quo (reinforcing successes), correcting the deviation, or changing standards (Bailey & David, 2008). The most effective course may be prescribed by policies or may be best left up to employees' judgment and initiative. The corrective action may be immediate or basic

(modifying the standards themselves). Next generation of supply chain suites will synchronize supplier planning, production planning, logistics planning, and demand planning. These solutions will provide a comprehensive view of all supply chain activities and enable upper management to make more informed tradeoff decisions (Bailey & David, 2008).

English (2001) pointed out the trend for modeling a supply chain is (supervisory) control of the supply chain operation. In other words, a set of requirements are assigned on the supply chain operation, and the control agent ensures that the process satisfies those requirements. In the literature, frameworks from control systems theory have been exploited to model the supply chain operation (Tuncel, & Alpan, 2010). For instance, a model-predictive control (MPC) framework is developed to dynamically manage inventories and meet customer requirements in a demand network such as supply chains. According to Braun (2003), MPC, as a control-oriented framework, can be tuned to provide acceptable performance in the presence of uncertainty, forecast error, and constraints.

2.4.4 Relationship Management processes and Supply Chain Automation

Viswanadham (2002) argued that in a supply-chain network, there are multiple players including first, second, and third-tier suppliers, contract manufacturers, original equipment manufacturers (OEMs), distributors, and retailers. These can however be broadly categorized as suppliers and customers. For successful supply chain operations and profitability, there is need for coordination between all these players in order to enhance efficiencies in forecasting demand, and hence conducting joint scheduling, and joint product development (Viswanadham, 2002).

It is a challenging task to align the enterprise to meet the needs of the customer—available twenty four hours a day, seven days a week via telephone, e-mail, and the Internet—and to keep accurate records of customer interactions and resolve issues quickly with care (Viswanadham, 2002). As the range of products and services expand and customer demands increase, support systems and tools become the integrating factor in business operations (Georgakopoulos, Hornick & Sheth, 1995).

The ability of an employee or self-service option to serve the customer well depends on the speed and latency of the infrastructure moving the data to the person who needs it, the data profiling tools to understand a customer's preferences rapidly, well-constructed Web interfaces, and the ability to manage it all as if the company is aligned around delivering on each customer's needs (Viswanadham, 2002).

Helper (1991) noted that with multiple customer segments and multiple products and services, it is increasingly difficult to deliver the expertise required to keep the many promises a business makes every day needs. To do this and concurrently maintain competitive cost is challenging. The solution to this problem is intelligent and proactive software than can manage various interactions and follow up work items in a manner that aligns business goals and delivers on promises made, over and over again—which leads to attracting new customers and keeping them (Viswanadham, 2002). Attaining this requires specialized customer relations management (CRM) systems. Majority of CRM solution frameworks include: multimedia 24 × 7 customer interactions, intelligent work and customer contact routing, data mining decision making, and tracking tools that link into legacy systems. This new solutions framework creates new operational efficiencies through the alignment of front office and back office processes in direct support of the promises to customers and the business goals for growth, relationships, and efficiency (Georgakopoulos, Hornick & Sheth, 1995).

Helper (1991) further noted that suppliers, on the other hand, are crucial business partners and important sources of inputs that go into the process of meeting customer needs (Helper, 1991). Automating supplier relations involves use of Partner-relationship management (PRM) systems, which use the Internet to provide integrated solutions to the challenges of vendor/partner communication (Viswanadham, 2002). An effective PRM system organizes leads, profiles, and documents in a central repository that can be updated and viewed in real time over the Internet. PRM systems, like extranet systems, enable the user to view information according to their specific characteristics—each user only sees information appropriate for their permission level and interests.

For example, they provide resellers with instant, on-demand access to information and tools. Since resellers have self-service processes for answering their questions and doing their everyday work, the need for costly face-to-face meetings and direct mailings falls dramatically. A good PRM system allows companies to track usage and activity, giving vendors tighter control over communication (Viswanadham, 2002).

Helper (1991) noted that relationships between the actors in the network are perhaps the most important element of the exchange considered. Manufacturing Supply Chain Networks (SCN) are made out of the interconnection of various agents to deliver the right product at the right time to the customer while optimizing the cost and profit needs (Helper, 1991). Agents are manufacturing companies and service providers such as raw material vendors, factories, distributers, warehouses, and retailers. Traditionally, each agent worked and optimized its business process independently. Nowadays, as the market grows larger, coordinating activities among agents is important in order to increase the profit and customer satisfaction at the same time (Viswanadham, 2002). Each agent of the supply chain has a collection of activities or tasks which lead to the completion of a certain duty of the agent. The combination of the individual tasks related to each agent will form the whole supply chain. Each of these tasks can be expressed as a collection of states and events represented by an automaton.

Henry (2006) observed that some of the relationship systems include customer relationship management (CRM) and it focuses on managing the firm's customer base. This helps companies to keep customers satisfied and continue to buy products/services from them. Companies are able to see which customers buy what and keep track of their customers preferences through a database (Viswanadham, 2002). Along with CRM, is supplier relationship management (SRM).

SRM is the "systematic management of supplier relationships to optimize the value delivered through the relationship over a life cycle", as defined by Accenture in the Principles of Supply Chain Management (Wisner, Tan & Leong, 2014).CRM and

SRM are both incorporated into the ERP system to fully integrate the supply chain operations by using the internet in most cases.

2.4.5 Supply Chain Automation

In his study, Viswanadham (2002), asserts that despite several economic and cultural changes, the main goal of creating supply-chain networks has remained the same, i.e., to procure raw materials and transform them into final products and deliver them to the global customer at the time and place specified by him or her in the presence of the other players in the market. Basically, this involves the automation of material, information, and financial flows, and relationships between businesses and customers (Viswanadham, 2002). Recent emphasis has been on the following interrelated and mutually reinforcing categories: material-flow automation, information-flow and decision automation, automated supervision and control, and relationship automation (Viswanadham, 2002).

Skjoett-Larsen (2000) noted that key trends in the supply chain automation involve include e-commerce and e-business supported supply chain management. While e-commerce relates more to website-based processing of customer orders, the latter refers to a more holistic use of IT (Chopra & Meindl, 2001). There is no shortage of examples of the impact that such investments can have in organizations. Cisco, for instance, reported savings of $500 million by restructuring its internal operations and integrating processes with suppliers and customers with the help of web-based tools (Berger, 2000). Currently, 90 per cent of Cisco's sales are facilitated on-line (Copacino & Dik, 2001).

Viswanadham (2002) explains that in a supply-chain network, there are multiple players including first-, second-, and third-tier suppliers, contract manufacturers, OEMs, distributors, retailers, and so on. There is need for coordination between all these players for combined forecasting by sharing point-of-sale information, joint scheduling, and joint product development.

Simchi-Levi *et al*. (2003) explained that objectives of IT in supply chain management are: providing information availability and visibility; enabling single

point of contact of data, allowing decisions based on total supply chain information, and enabling collaboration with supply chain partners. The four most common IT systems used in supply chain automation and internal workflow management are Enterprise Resource Planning (ERP), Customer Relations management (CRM), Supplier Relations Management (SRM), and Collaborative Planning, Forecasting, and Replenishment - CPFR (Wisner, Tan & Leong, 2014).

Wisner, Tan and Leong (2014) noted that ERP is a packaged system that is bought off the shelf or is customized to the company's preference. "It allows a company to automate and integrate the majority of its business processes, share common data and practices throughout the system, and produce and access information in a real-time environment" (Wisner, Tan & Leong, 2014). CRM, on its part, focuses on managing the firm's customer base. This helps companies to keep customers satisfied and continue to buy products/services from them. Companies are able to see which customers buy what and keep track of their customers' preferences through a database. SRM is the "systematic management of supplier relationships to optimize the value delivered through the relationship over a life cycle", as defined by Accenture in the Principles of Supply Chain Management (Simchi-Levi *et al*., 2003). CPFR, on its part, focuses on product forecasting and demand.

The system "combines the intelligence of multiple trading partners in the planning and fulfillment of customer demand" (Wisner, Tan & Leong, 2014). All of these systems are important to the supply chain today and provide for efficiency internally and externally.

Cross (2000) pointed out that the most typical role of IT in supply chain automation is reducing the friction in transactions between supply chain partners through cost-effective information flow. Conversely, IT is more importantly viewed to have a role in supporting the collaboration and coordination of supply chains through information sharing (Lee *et al*., 1997). Third, IT can be used for decision support. In this instance the analytical power of computers is used to provide assistance to managerial decisions (Simchi-Levi *et al*., 2003; Swaminathan & Tayur, 2003).

Malone *et al*. (1987) noted that IT in general, and IT in supply chain management, is argued to enable great opportunities: ranging from direct operational benefits to the creation of strategic advantage. Malone *et al*. (1987) proposes that the value offerings through IT are electronic communication (speed of communication), electronic brokerage (by IT providing a 'lean', automated intermediary for resolving market transactions), and electronic integration (coupling of processes). IT seems to be particularly important in fast clock speed industries. Levary (2000) suggest that automation of supply chain management provides reduction of cycle time, reduction of inventories, minimization of bullwhip effect, and improvement of effectiveness of distribution channels.

Adriaansen (2014) posited that profitability is the ability of a business to earn surplus revenue after it pays all expenses directly related to the generation of the revenue, such as producing a product, and other expenses related to the conduct of the business activities. This is usually expressed through ratios such as profit margin, return on assets, and return on equity.

While there are various kinds of profits reported in financial reports, net profit, and after tax profits are usually the final indicators or how much surplus a firm made within a given time (Adriaansen, 2014). Supply chain automation is considered as one of the most important functions in an organization, as it is a key contributor to overall profitability (Une & Sangle, 2014). Une and Sangle (2014) further argue that supply chain management strategies such as inventory reduction, collaborative planning with key suppliers (strategic relationship with vendor), decreasing manufacturing cost through waste reduction, people motivation in supply chain in particular, and localization from tax optimization perspectives can benefit from supply chain automation. These usually have highly impacts on firm’s profitability.

Bolton (1998) observed that customer satisfaction, as measured through customers’ perception of product offering, pricing, delivery, level of customer service, and firm’s reputation, is an essential part of any company's strategy. Customer satisfaction has important implications for the economic performance of firms because it has the ability to increase customer loyalty and usage behavior and reduce customer

complaints and the likelihood of customer defection (Bolton, 1998). Levels of customer satisfaction can be measured by gathering customer feedback. Proper timing of customer satisfaction surveys depends on the type of product or service provided the type and number of customers served, the longevity and frequency of customer/supplier interactions, and the intended use of the results (Smith, 2015).

Smith (2015) noted that the three most common approaches to measuring customer satisfaction are: Post Purchase Evaluations - these capture the satisfaction of the individual customer at the time of product or service delivery (or shortly thereafter), and the technique typically focuses on securing a long term relationship with the individual customer. ii) Periodic Satisfaction Surveys - these provide an occasional snapshot of customer experiences and expectations and are conducted for specific groups of consumers on a periodic basis.

iii) Continuous Satisfaction Tracking - which is often part of a management initiative to assure quality is at high levels over time (Smith, 2015). Christopher (1998) describes customer satisfaction as a product of customers' experiences with a firm through the following stages in the buying process: pre-transaction, transaction and post-transaction elements.

Good pre-transaction customer service means that customers understand what the company is able to supply, the company is easy to contact, and the company can adapt delivery systems to particular customer needs (Smith, 2015). The transaction elements of customer service are between order and delivery; for example order cycle time, delivery preciseness and order status information. The post-transaction elements refer to issues after the customer has received the original product, for example availability of spares and correct billing.

Lim and Palvia (2001) observed that successful companies have developed focused e-business solutions for improving customer service elements that are most important in their business. The relationship between supply chain information and communication systems and customer service has been identified in several previous researches. Earlier studies have mostly focused on specific ICT solutions, such as

EDI or integrated information systems. Lim and Palvia (2001) found that EDI contributes positively (statistically significantly) to order cycle time, product availability, distribution flexibility, distribution information, and distribution malfunctions. They studied 114 US companies of which 61 were from the automotive industry and 53 from the pharmaceutical industry. Ahmad and Schroeder (2001) reached similar results in their study that was based on data from the World Class Manufacturing project involving 85 manufacturers from US, Japan, and Europe. Vickery *et al*. (2003) observed that there exists as statistical causality of integrated information systems, supply chain automation, customer satisfaction, and financial performance.

2.5 Critique of Existing Literature

A critical review of past literature showed that several conceptual and contextual research gaps existed in the effects of supply chain management on performance of financial market intermediary firms in Kenya.

In a study by Mohammed, Jatang and Keong (2008) investigating the effect of technology strategy and firm's revenue growth in 51 industrial establishments in Malaysia, the researchers found that selection of technology and staff competence have significant positive relationship with revenue growth, at 5% and 1% level respectively. The study also tested the moderating effect of financial resource deployment on the technology strategy-revenue growth relationship. It was found that only the interactions between technology selection and technology posture with financial resources deployment are significant. Thus, financial resources deployment moderates the relationship between technology selection and technology posture with respect to revenue growth (Mohammed, Jatang & Keong, 2008). This research offers only a small insight into how the firm performance is being affected by technology strategies. A wider scope, which include other aspects of the organization such business strategies, human resource and structure, would be appropriate. Ultimately, technology strategy must be integrated with other firms' strategies.

A similar study by Mouelhi (2008) examined the extent to which the use of information and communication technology has contributed to efficiency growth in Tunisian manufacturing firms. The study used a sample size of 1,824 firms and used secondary data of 5 years. The result indicated that the impact of ICT on efficiency is strong. Firms that have a relatively intensive use of ICT are in the average of 5 % more efficient than those that do not. The evidence showed that achieving benefits from investment in ICT requires complementary investments and changes in human capital. This means that the combined use of ICT and human capital in a firm would enhance its efficiency beyond the direct effects of these factors taken alone. Though the study shows the positive relationship between ICT and efficiency it is limited by the use of secondary data, which may not bring out clearly the intensity of ICT use by firm compared to primary data, which the current study intends to incorporate (Mouelhi, 2008).

A study by Matsuura (1998), estimated stochastic frontier functions for 25 Japanese securities companies over the periods 1986-88 and 1991-96. The results showed a widening efficiency gap between major competitive brokers and the others in the post-bubble economy period. Using a similar estimation method, Zhang and Luo (2006) investigated the technological progress, efficiency, and productivity of the US securities firms between 1980 and 2000. They revealed that only a few large investment banks achieved technological innovation, while most firms, especially smaller regional firms, lagged far behind both in efficiency and productivity.

A study conducted by Ayuku (2007) on response strategies to challenges posed by electronic trading system at the Nairobi stock exchange: a survey of stock broking firms, found out that all Stock Broking firms had adopted electronic trading system. Benefits of the system were found to be increased turnover of business as was reported by 65% of the respondents. This was attributed to the system's capability of enabling Stock Broking firms to handle increased number of clients (Ayuku, 2007). Electronic trading has contributed to increased customer satisfaction and improved performance. 75% of the respondents reported that electronic trading system has helped improve efficiency in the order of execution and also saves time. However the

stated study did not relate the benefits accrued from the system with organizational performance which is much wide.

The study also did not give specific relevance to the securities brokerage firms in Kenya, a gap which forms the basis for the need to conduct the current study.

A study conducted by Muthaura (2010) revealed that, CMA regulations, negative publicity of stockbrokers, poor corporate governance and poor financial performance of stock brokerage firms are major challenges facing the firms in the sector. The study also revealed that change in technology was another major challenge. When the issues of performance are considered relative to automation of supply chain management, it can be noticed that there is a gap that the current study seeks to fill by establishing the effect of automation of supply chain systems on performance of stock brokerage firms in Kenya.

A study conducted by Ayuku (2007) on Response strategies to challenges posed by electronic trading system at the Nairobi stock exchange: a survey of stock broking firms showed an objective gap since this study did not address other variables such as Organization structure, Organization strategy and Human factors. It only focused on Information technology. Zhang and Luo (2006) investigated the technological progress, efficiency, and productivity of the US securities firms between 1980 and 2000. There is a contextual gap because of the different geographical locations involved and the current study will seek to close the gap. A Study was conducted by Muthaura, (2010) to investigate strategic responses by stock brokers in Kenya to external environment. The study however only looked at one variable, organization strategy, while it did not involve other variables like Information technology, Organization structure and Human factors. This showed an objective gap which the current study sought to close by involving all the four variables as independent variables.

A study by Bonn, Yokishawa and Phan (2004) carried out in an attempt to compare the effects of board structure on firm performance between Japanese and Australian brokerage firms, showed both objective and contextual gaps. There was an objective

gap because only one of the four variables was used. There was a contextual gap because the study area was in Japan and Australia and this study seeks to close the gaps by investigating the effect of all the four variables on the performance of financial market intermediary firms in Kenya.

2.6 Summary

From the literature review, we find that there is a correlation between supply chain automation and improved performance of commercial entities across the globe. Indeed, such automation has been proven to increase efficiencies in operations, enhance decision making, expand market reach, especially be firms going online, which lead to better customer service, and satisfaction. Various scholars have argued that automation of supply chain plays a pivotal role especially in the fast moving industries such stock brokerage firms. Finally, the chapter takes cognizance about the lack of in-depth Kenyan case studies describing the impact of supply chain automation on financial intermediaries, specifically stock brokerage firms. This was identified as the research gap that the study sought to close.

2.7 Research gaps

While various scholars, including Ayuku (2007) and Muthaura (2010) have studied the factors affecting the performance of stock brokerage firms operating at the NSE, there hasn't been any specific study conducted on the impact of supply chain automation on the brokerage firms' profitability, staff productivity, market growth, and customer satisfaction.

A study by Kibuthu (2005) focused on the development of stock markets in Africa, with NSE as the case study. Her research traces the historical path taken by the NSE, with an emphasis on its structural organisation, rules, policies, trends in market performance, challenges, and the way forward in the new millennium. While the scholar identifies a few challenges hindering the effectiveness of brokerage firms trading at the NSE, the study, however, doesn't specifically investigate supply chain automation and thus presented a conceptual gap.

Both Wangai and Ngugi (2014) studied the influence of information technology on performance of stock brokerage firms in Kenya. Specifically, the study reviewed four variables: automation of IT skills, Current IT policy, IT Infrastructure and Information Security. The study revealed a conceptual gap since it did not address the objectives of the current study.

Lewis and Talalayevski (2004) observed that the design of information flow in supply chains has traditionally followed the physical flow along the chain. Sub-optimal supply chain performance, in many cases, has been the result of poor information sharing. However, the study presented a contextual gap since it was not conducted in Kenya.

As such, there exists a clear research gap regarding what specific effects supply chain automation has on the performance of financial intermediaries, with stock brokerage firms in Kenya as a case study. This is the gap that the study sought to fill.

Table 2.1: Research Gaps

Author & Year	Study Area	Research Gap
Kibuthu (2005)	Study's focused on the development of stock markets in Africa, with NSE as the case study. Her research traces the historical path taken by the NSE, with an emphasis on its structural organisation, rules, policies, trends in market performance, challenges, and the way forward in the new millennium.	The study, however, doesn't specifically investigate supply chain automation, and neither does the study quantify the impact that such automation would have on the performance of the stock brokerage firms. Therefore, the study presents a conceptual gap
Ayuku, (2007) and Muthaura, (2010)	They studied the factors affecting the performance of stock brokerage firms operating at the NSE.	However, there hasn't been any specific study conducted on the impact of supply chain automation on the brokerage firms' profitability, staff productivity, market growth, and customer satisfaction. Therefore, the studies present a conceptual gap.
Wangai and Ngugi (2014)	They studied the influence of information technology on performance of stock brokerage firms in Kenya. Specifically, the study involved 387 respondents, reviewed four variables: automation of IT skills, Current IT policy, IT Infrastructure and Information Security.	However, the study did not quantify the actual impact of the stated variables on the firms' profitability, staff productivity, market growth, and customer satisfaction, which are key performance indicators in measuring firm productivity. Therefore, the study presents a conceptual and contextual gap.
Lewis and Talalayevski (2004)	They observed that the design of information flow in supply chains has traditionally followed the physical flow along the chain. Sub-optimal supply chain performance, in many cases, has been the result of poor information sharing.	However, the study presented a contextual gap since it was not conducted in Kenya.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology that was used in the study including the research design, study population, sample design, data collection method, data analysis and presentation. The chapter also presents the study variables, their operationalization and the analytical models to be employed.

3.2 Research Design

The study employed a cross-sectional approach. According to Elahi and Dehdashti (2011), survey descriptive research is proper when the research objectives include the following: Portraying the characteristics of social or physical phenomena and determining the frequency of occurrence; determining the degree to which the variables are associated and making predictions regarding the occurrence of social or physical phenomena. The study used a descriptive survey to examine the individual and joint effects of automation of supply chain management on the performance of financial market intermediary firms in Kenya. The design enabled the researcher to describe each of the study variables and to establish the relationship between the independent and dependent variables.

Both qualitative and quantitative research approach were used. According to McMillan and Schumacher (1993) qualitative research is concerned with understanding the social phenomenon from the participants' perspective while quantitative research is an inquiry into an identified problem, based on testing a theory, measured with numbers, and analyzed using statistical techniques. Combining the two approaches provides a richer presentation of the reality (Silverman, 2005).

The study used quantitatively measure performance of the firms and supply chain management. A deeper insight on the moderating effect of automation was sought

qualitatively through open-ended questions. The study looked at two major reference views; before automation and after automation. The year that the market was automated was 2006 and so the data worked backwards before automation to ascertain the performance of the firms and then forward after the automation to show the effect of automation of the supply chain on the performance of financial market intermediary firms in Kenya.

3.3 Research Philosophy

This study was guided by positivism philosophy. The key thought of positivism is that the social world exists remotely, and that its properties ought to be measured through target techniques instead of being construed subjectively through sensation, reflection and instinct, (Smith *et al.,* 2008). The positivist rationality premises that learning depends on certainties and that no any deliberations or subjective contemplations can be engaged. Positivism viewpoint hold that there is target reality which can be communicated numerically in view of illustrative and prescient power (Neuman, 2013). Naturally, information from this point of view is substantial just on the off chance that it depends on estimations of reason and actualities, produced from information assembled through direct perceptions and experience, measured utilizing quantitative techniques and subjected to factual investigation to clarify causal connections as conceptualized (Saunders, Lewis & Thornhill, 2012). Along these lines the philosophical establishment supporting this study is positivism where the logical procedure was followed in conjecturing and reasoning the perceptions so as to decide the right position of the speculations.

3.4 Population of the study

The target population for this study was all the financial market intermediary firms in Kenya. The study used the population list of all approved intermediaries in Kenya (NSE, 2014). According to Ngechu (2004), a population is the sum total of the research elements and is also defined as a clustering of people ,services ,elements ,events or things that will need to be investigated. In this study, the target population was all the financial market intermediary firms in Kenya. The financial market

intermediary firms in Kenya are regulated by the capital market authority. The study based its sampling frame from the capital market authority's license manifest as of the year 2014 (CMA, 2014).

3.5 Census

The study assimilated a census approach. According to Israel and Teya (2014) under large populations this method may prove to be a very costly approach of sampling but the technique is very effective when dealing with small populations of 200 of even lesser. In this study, the target population was 109 financial intermediary firms in Kenya, which were less than 200 observations. Therefore, the adoption of census approach in the study was justifiable. The study used the investment analyst or supply chain officers under the licensed financial market intermediary firms and thus used the entire population by selecting 2 employees under each organization as respondents.

A census helped eliminate sampling errors and represented all elements in the population; this is according to Israel (2012), Teya (2014). Further, the use of a census was justifiable since the population size was not very large; hence there was no need to select a sample. The number of respondents was therefore 218 analysts and supply chain practitioners selected from each financial body under capital markets regulation. The table below indicates the approach that was taken in the study sampling technique.

Table 3.1: Census distribution

Intermediary	Number of firms	Percentage taken	Proportion taken
Capital Market Authority	1	0.09%	2
Securities exchange(NSE)	1	0.09%	2
Central depositories(CDSC)	1	0.09%	2
Investment banks	10	9.17%	20
Banks with extended licenses	1	0.09%	2
Stock brokers	22	20.2%	44
Investment advisors	17	15.6%	34
Fund managers	21	19.3%	42
Collective investment schemes	16	14.7%	32
Authorized Depository custodians	15	13.8%	30
Credit rating agencies	2	1.83%	4
Venture capital companies	1	0.09%	2
Dealers	1	0.09%	2
Total	109	100	218

Teya (2014) used the census technique in his study on the moderating effect of technological capabilities on financial infusion and performance of licensed capital market intermediaries in Kenya. Another scholar that used the technique with great effectiveness was Mwangi (2007) in his study on factors influencing financial innovation in Kenya's securities market. The implication of this is that census approach has been used previously by other scholars in their studies, and it was effective. It was, therefore, justifiable to adopt census approach in this study.

3.6 Data Collection Instruments

The study used both and primary and secondary data. The primary data was collected using the self-administered questionnaire. A questionnaire is a pre-formulated written set of questions to which the respondents record the answers usually within rather closely delineated alternatives. The questions in the questionnaire were

organized using various sections depending on the study objectives. Each section contained several questions relating to the title of the section.

Yang (2008) states that the questions or statements in a questionnaire in a study are directly related to the research questions. In development of a survey questionnaire, the variables for which information needs to be collected have to be identified followed by their operational definition. According to Newing (2011), questionnaires consist of a series of specific, usually short questions/statements that are either asked verbally by an interviewer, or answered by the respondent on their own (self-administered). A Likert scale questionnaire was preferred as it makes it possible to convert responses into quantitative format for ease of data analysis using computer based software.

Firstly, the first section contained questions on demographic characteristics of the respondents, for example, number of years worked, organization type and automated systems used. Secondly, the other sections contained questions relating to the study objectives. The questions under this sections were both likert scale and open-ended. Likert scale is an interval scale that specifically uses five anchors of strongly disagree, disagree, neutral, agree and strongly agree. The Likert measures the level of agreement or disagreement. Likert scale is good in measuring perception, attitude, values and behavior (Upagade & Shende, 2012).

On the other hand, open-ended questions allow the respondents to express their opinions concerning a certain aspect of the study. In this study, the open-ended questions helped the study to generate qualitative results.

On the other hand, secondary data was collected using s secondary data template. The review of the secondary data helped create a cause and effect analysis between when the automation took place and the performance parameters before and after automation. If there was an impact of automation then the secondary data would be able to confirm this either by an improvement after automation or a drop in performance after automation.

The secondary data was obtained from the annual financial records of the firms. The records were obtained from the capital market authority. Each brokerage firm is required to deposit the annual report with the authority and the reports are accessible by the members of the public. The data obtained was on performance of the firm.

3.7 Data Collection procedures

Data collection procedures are very important as they determine the success of the data collection exercise. In this study, the researcher sought for authorization to conduct research from Jomo Kenyatta University graduate school. The questionnaire was administered to financial market intermediary firms by trained research assistants who assisted in dropping and following up on the questionnaires. The study adopted the drop and pick later approach of the questionnaires. This enabled the selected respondents to have ample time to read through the questionnaire and understand what was expected of them. After data collection, the collected data was then cleaned, sorted and collated after which it was entered into the computer for analysis and subsequent presentation.

3.8 Pilot Test

The main objective of the pilot study was to establish the reliability and validity of the data collection tool. The data collection tool used in this case was a well-structured questionnaire. Reliability of the questionnaire was measured using the cronbach alpha while the validity of the questionnaire was tested using the communality value. The purpose of pilot testing is to establish the accuracy and appropriateness of the research design and instrumentation (Saunders, Lewis & Thornhill, 2007). Newing (2011) states that the importance of field piloting cannot be overemphasized; you will almost always find that there are questions that people fail to understand or interpret in different ways, places in the questionnaire where they are not sure where to go next, and questions that turn out simply not to elicit useful information.

The cronbach alpha was calculated in a bid to measure the reliability of the questionnaire. This was done by subjecting the questionnaire to sixteen (22)

respondents. All the variables were reliable since their cronbach alpha was above 0.7 which was used as a cut-off of reliability for the study. The validity test results revealed that the constructs of all the variables are valid. This is because their communality values are above 0.49. Therefore, none of the constructs in the variables was discarded. Instead, they were all used for main data collection.

3.8.1 Reliability of the Data Collection Instrument

Reliability refers to the repeatability, stability or internal consistency of a questionnaire (Jack & Clarke, 1998). Cronbach's alpha will be used to test the reliability of the measures in the questionnaire (Cronbach, 1951). Using inter-item correlation matrix as a guide, items that will not strongly contribute to alpha, those that will be too similar, and those whose content will not be critical, will be eliminated.

According to Sekaran (2003), Cooper & Schindler (2006), Cronbach's alpha has the most utility for multi-item scales at the interval level of measurement, requires only a single administration and provides a unique, quantitative estimate of the internal consistency of a scale. To increase the reliability of the questionnaire, this study will use Cronbach alpha for separate domains of the questionnaire rather than the entire questionnaire. Baker (1988) states that the size of a sample to be used for reliability testing varies depending on time, costs and practicality, but the same would tend to be 5- 10 per cent of the main survey. According to Cooper and Schindler (2006) the respondents in a reliability pilot test do not have to be statistically selected when testing the validity and reliability of the instruments. In this study, the data collection instrument, which was a questionnaire, was tested on 10% of the sample of the questionnaires to ensure that it was relevant and effective. It was pilot tested on 22 respondents.

3.8.2 Validity of Data Collection Instrument

Validity refers to whether a questionnaire is measuring what it purports to measure (Bryman & Cramer, 1997). McMillan and Schumacher (2006) describe validity as the degree of congruence between the explanations of the phenomena and the

realities of the world. While absolute validity is difficult to establish, demonstrating the validity of a developing measure is very important in research (Bowling, 1997).The study used both construct validity and content validity. For construct validity, the questionnaire was divided into several sections to ensure that each section assesses information for a specific objective, and also ensure that the same closely ties to the conceptual framework for this study. To ensure content validity, the questionnaire was subjected to thorough examination by two independent resource persons, who were randomly selected among the respondents in the pilot.

The two were asked to evaluate the statements in the questionnaire for relevance and whether they are meaningful, clear, loaded of offensive. On the basis of the evaluation, the instrument was adjusted appropriately before subjecting it to the final data collection exercise. Their review comments were used to ensure that content validity is enhanced.

3.9 Data Analysis and Presentation

Burns and Grove (2003) define data analysis as a mechanism for reducing and organizing data to produce findings that require interpretation by the researcher. Descriptive statistics such as mean scores, standard deviations, percentages, and frequency distribution will be computed to describe the characteristics of the variables of interest in the study. Statistical package for social sciences (SPSS) computer software was used. Microsoft excel was used to complement SPSS especially in production of diagrams and tables.

Inferential statistics such as correlation and regression analysis as suggested by Muthen and Muthen (2007) was used to establish the nature and magnitude of the relationships between the variables and to test the hypothesized relationships. Specifically, the study adopted a linear regression model for the test of the effect of the above model on performance of the financial market intermediary firms. The formula was denoted as follows:

$$Y=\beta_0+ \beta_1X_1+\varepsilon$$

Where;

β_1 represents the coefficient for variable 1 systems.

ε represents the error term.

Y represents the performance of the financial market firm while

X1 represents variable 1

The research hypothesis was also tested at 95% level of confidence in order to provide for drawing conclusions. If the p-value is less than 5% the null hypothesis would fail to be accepted and the alternate hypothesis would fail to be rejected. Also if the p-value is greater than 5% the null hypothesis would fail to be rejected and the alternate hypothesis fail to be accepted.

Multicollinearity in the study was tested using Variance Inflation Factor (VIF), which was calculated using SPSS. A VIF for all the independent and dependent less than 3 (VIF $\leq$ 3) indicate no Multicollinearity while a VIF of more than 10 (VIF $\geq$ 10) indicates a problem of Multicollinearity. The graphical representation was used to test the normality of the residuals. Test for heteroskedasticity was done using Breush-pagan/Cook-Weisberg Test. The null hypothesis in the test is that error terms have a constant variance (i.e. should be Homoskedastic). The error terms are said to be Homoskedastic, if the p value is greater than the conventional p value 0.05, otherwise the errors terms are said to be heteroskedastic. Finally, Autocorrelation Test was conducted to establish whether or not the residual are serially correlated, Durbin-Watson test for autocorrelation was conducted. The Durbin Watson test reports a test statistics, with a value from 0 to 4, where: 2 denotes no autocorrelation; 0 to 2<2 denotes a positive autocorrelation; while >2 denotes a negative autocorrelation. The decision rule is that test statistic values in the range of 1.5 to 2.5 are relatively normal. Values outside this range could be cause for concern (Field, 2009).

3.9.1 Statistical Measurement Models

Material Flow

The study adopted a simple linear regression model for the test of the effect of the above on performance of the financial market intermediary firm. The formula is denoted as follows:

$$Y=\beta_0+ \beta_1X_1+\varepsilon \quad (1)$$

Where β_i represents the coefficient for material flow.

ε represents the error term.

Y represents the performance of the firm while

X1 represents material flow processes

Information flow processes

Given the study assumes a normal causal relationship between the independent and dependent variables for the above variable, the appropriate model used was similar to the model above ie a simple linear regression model denoted as follows:

$$Y=\beta_0+ \beta_2X_2+\varepsilon \quad (2)$$

Where β_2 represents the coefficient for information flow

ε represents the error term.

Y is representative of the performance of the firms.

Supervision and control processes

The strategy adopted by the firm will differ from one firm to the another and the results in performance will also differ, to be able to decipher the distinctions in

performance the simple regression model will be used in the study denoted as follows:

$$Y=\beta_0+ \beta_3X_3+\varepsilon \quad (3)$$

Where β_3 represents the coefficient for supervision and control processes

X_3 represents the supervision and control

ε represents the error term.

Y is representative of the performance of the firms.

Relationship Management Processes

To measure this variable a simple regression model was used and was denoted as follows:

$$Y=\beta_0+ \beta_4X_4+\varepsilon \quad (4)$$

Where β_4 represents the coefficient for relationship management

X_4 represents the relationship management processes

ε represents the error term.

Y is representative of the performance of the firms.

Multiple Regression Models

The analysis adopted the multiple regression models. The models attempted to predict the extent to which the four independent variables and the moderating variable influence the performance of financial market intermediary firms in Kenya. The regression analysis helped the study to compare the effect of material flow, information flow, supervision and control and relationship management on the performance. This provided the magnitude and direction of relationship between each of the independent variables with the dependent variable.

The proposed regression models of the study were as follows:

$$Y = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon \quad (5)$$

$$Y = \beta_o + Z(\beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4) \quad (6)$$

Where:

Y = Performance of Financial Market Intermediaries

i. $\{\beta_i; i=1,2,3,4,\}$ = The coefficients for the various independent variables
ii. X_i for;

X_1 = Material Flow Processes

X_2 = Information Flow Processes

X_3 = Supervision and Control Processes

X_4 = Relationship Management Processes

Z= Automation

Equation (5) shows the relationship between the ordinary predictors X_1 to X_4 which are the material flow, information flow, supervision and control and relationship management respectively and the firm performance.

Equation (6) shows the moderating effect of automation on the relationship between each of the independent variables and firm performance.

Qualitative data obtained from open-ended questions in the questionnaires was analyzed using content analysis. The process involved grouping the various responses into themes and presenting them in narrative form. The themes represented the responses of informants concerning the study variables.

3.10 Ethical Issues

Ethical considerations relate to the moral standards that the researcher should consider in all research methods in all stages of the research design. After approval from the University was obtained to conduct the study, permission was obtained from the financial market intermediary firms. In this research three principles of ethics were used namely beneficence, respect for human dignity as well as justice (Polit *et al.*, 2003). Following the three principles, sensitivity to the participants' emotions was observed when probing questions that could psychologically harm the participants as well as protect the participants from adverse situations.

The participants were also informed that the information they provide would not be used in any way to harm the participants or exploited for commercial and selfish personal gain, but only for academic purposes. Full disclosure, fair treatment and privacy were also practiced.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter comprises of data analysis, findings and interpretation. Results are presented in tables and diagrams. The analyzed data was arranged under themes that reflect the research objectives. The section also consists of pilot results, diagnostic results, and correlation and regression results. Further, the section presents the revised conceptual framework.

4.2 Response Rate

The number of questionnaires that were administered was 218. Out of this, a total of 170 questionnaires were properly filled and returned. However, 48 questionnaires were not properly administered. The 170 questionnaires represented an overall successful response rate of 78% as shown on Table 4.1. This agrees with Babbie (2004) who asserted that return rates of 50% are acceptable to analyze and publish, 60% is good and 70% is very good. Based on these assertion 78% response rate is adequate for the study.00

Table 4.1: Response Rate

Response	**Frequency**	**Percent**
Returned	170	78%
Unreturned	48	22%
Total	**218**	**100**

4.3 Demographic Information

This section analyzes the demographic characteristics of the respondents. This section presents the descriptions of the respondents in terms of the number of years worked; type of organization; and period of existence.

4.3.1 Number of years worked

The respondents were asked to state the number of years they had worked in their respective firms. Results in table 4.2 reveal that 36% of the respondents indicated more than 15 years, 32% indicated 11-15 years, 25% indicated 6-10 years while 7% of the respondents indicated less than 5 years. This implies that a large number of the employees working in the financial intermediaries have been there for more than 10 years. This implies that the employees have the required skills and experience to improve the performance of the firms. These findings agree with those of Nyajom (2013) who in his study found out that 36.6% of the respondents had served in the state corporations for 21 years and above, 26.8% of the respondents had served for 16–20 years, 19.5% had worked in state corporations for 11–15 years, 12.2% had worked for 6–10 years while 4.9% had worked for 1–5 years. This implies that the firms' have skilled and experienced employees who have the capacity to improve the performance of the firms.

Table 4.2: Number of years worked

Number of Years Worked	Frequency	Percent
Less than 5 years	12	7.1
6-10 years	42	24.7
11-15 years	55	32.4
more than 15 years	64	35.9
Total	**170**	**100**

4.3.2 Organization Type

The respondents were asked to indicate the type of financial organization they represent. Results in table 4.3 reveal that majority (62%) of the respondents indicated fund management firms, 15% indicated brokerage firms, 12% indicated investment banker firms while 10% indicated other financial intermediary firms.

This implies that there are more fund management firms compared to other financial intermediaries combined. This agrees with Jan and Stoeldraijer (2010) who asserted that the type of organization directly proportional to the performance of the organization. This implies that the fund management firms offer services that are highly attractive to the customers. This should boost their performance.

Table 4.3: Organization Type

Organization Type	Frequency	Percent
Broker	21	15.3
Investment Banker	17	12.4
Fund management firm	106	62.4
Other	26	10
Total	**170**	**100**

4.3.3 Period of Existence

The respondents were asked to indicate the number of years their organization has been in existence. Results in table 4.4 reveal that majority (95%) of the respondents indicated over 10 years, 3% indicated 6-10 years while 1% indicated 1-5 years and less than 1 year respectively. Brown and Duguid (2003) found that highly skilled personnel enhance production of high quality outcomes and effective quality improvement in an enterprise. This implies that majority of the financial intermediaries have been in operation for more than a decade. This implies that the organizations have sufficient experience in the financial market.

Table 4.4: Period of Existence

Period of Existence	Frequency	Percent
Less than 1 year	2	1.2
1-5 Years	2	1.2
6 – 10 years	4	2.4
over 10 years	162	95.3
Total	**170**	**100**

4.3.4 Automated Systems Used

The respondents were asked to indicate the automated system they use most in their daily operations. Results in table 4.5 reveal that majority of 69% of the respondents indicated proprietary software. This implies that most of the financial intermediaries use proprietary software specifically developed for their company.

Table 4.5: Automated Systems Used

Automated Systems	Frequency	Percentage
Enterprise Resource Planning	59	34.7
Customer Relations Management	77	45.3
Supplier Relationship Management System	55	32.4
Proprietary software specifically developed for your company	118	69.4
Stock market trading specific software	68	40
Interbank trading system	76	44.7

4.3.5 Supply Chain Automation Appropriateness

The respondents were asked to state whether supply chain automation was appropriate for their organization. Results in table 4.6 reveal that majority of 97% of the respondents indicated yes while only 3% indicated no. This implies that financial intermediaries recognize the importance of supply chain automation.

Table 4.6: Supply Chain Automation Appropriateness

Supply Chain Automation	Frequency	Percent
Yes	165	97.1
No	**5**	**2.9**
Total		**100**

The respondents who agreed that supply chain automation was appropriate for their organization, further, gave the following reasons for their response. "It has ensured efficiency in service rendered; it has reduced operational cost; quality of our services has improved drastically; creates awareness about the existing market offer and also enables good co-operation with our clients; new clients have been established due to automation"

4.3.6 Impact of Systems Automation on Team/Department Performance

The respondents were asked to indicate the extent to which systems automation had impacted on their team/department performance. Results in table 4.7 reveal that majority of 54% of the respondents indicated very much, 42% indicated significantly while 4% indicated not at all. This implies that systems automation plays a significant role in influencing team/department performance. Therefore, organization teams/departments should embrace the adoption of automated systems.

Table 4.7: Systems Automation Influence on Teams/Departments' Performance

Extent of Influence	Frequency	Percent
Not at all	6	3.5
Significantly	72	42.4
Very much	92	54.1
Total	**170**	**100**

4.4 Diagnostic Tests

Prior to running a regression model pre-estimation and post estimation tests were conducted. The pre-estimation tests conducted in this case was the Reliability test and multicollinearity test while the post estimation tests were normality test, test for heteroskedasticity and test for autocorrelation. This is usually performed to avoid spurious regression results from being obtained.

4.4.1 Reliability Analysis

The reliability of an instrument refers to its ability to produce consistent and stable measurements. Castillio (2009) explains that reliability can be seen from two sides: reliability (the extent of accuracy) and unreliability (the extent of inaccuracy). The most common reliability coefficient is Cronbach's alpha which estimates internal consistency by determining how all items on a test relate to all other items and to the total test- internal coherence of data. The reliability is expressed as a coefficient between 0 and 1.00. The higher the coefficient, the more reliable is the test.

Reliability of this instrument was evaluated through Cronbach Alpha which measures the internal consistency. Cronbach Alpha value is widely used to verify the reliability of the construct. The findings indicated that material flow had a coefficient of 0.884, information flow had a coefficient of 0.783, supervision and control had a coefficient of 0.835, relationship management had a coefficient of 0.752, automation had a coefficient of 0.905 and performance of financial intermediaries had a coefficient of 0.753. All variables depicted that the value of Cronbach's Alpha are above value of 0.7 thus the study was reliable (Castillio, 2009). This represented high level of reliability and on this basis it was supposed that scales used in this study are reliable to capture the variables.

Table 4.8: Reliability Coefficient

Variables	Number of statements	Cronbach's Alpha	Comment
Performance of Financial Intermediaries	13	0.753	Accepted
Material Flow	9	0.884	Accepted
Information Flow	7	0.783	Accepted
Supervision and Control	9	0.835	Accepted
Relationship Management	8	0.752	Accepted
Automation	10	0.905	Accepted

4.4.2 Multi-Collinearity Test

According to William *et al.* (2013), multi-collinearity refers to the presence of correlations between the predictor variables. In severe cases of perfect correlations between predictor variables, multi-collinearity can imply that a unique least squares solution to a regression analysis cannot be computed (Field, 2009). Multi-collinearity inflates the standard errors and confidence intervals leading to unstable estimates of the coefficients for individual predictors (Belsley *et al*., 1980). Multicollinearity in the study was tested using Variance Inflation Factor (VIF) which was calculated using SPSS. The rule of the thumb is that a VIF for all the independent and dependent less than 3 (VIF $\leq$ 3) indicate no Multicollinearity while a VIF of more than 10 (VIF $\geq$ 10) indicates a problem of Multicollinearity.

Preliminary results indicate that there was no multi-colllinearity between the independent variables and the dependent variable. This was supported by the fact that the VIF for all the variables was less than 3 (VIF $\leq$ 3). The implication of these results is that the association among the independent variables (i.e material flow, information flow, supervision and control, relationship management and automation) is not very high to warrant dropping some of them. If two independent variables are highly correlated, then, there is no need of having both of them in the model. Instead, one of the variables should be dropped since it is redundant. However, in this study, there is no redundancy since the independent variables are not highly correlated. Therefore, none of the independent variables should be dropped. The results are shown in table 4.9.

Table 4.9: Multi-collinearity Test using Variance Inflation Factor

Variables	VIF
Material Flow	1.761
Information Flow	1.856
Supervision and Control	1.837
Relationship Management	1.26
Automation	2.01

4.4.3 Test for Normality

The graphical representation was used to test the normality of the residuals. Figure 4.1 below shows that the data is normally distributed. The result in figure 4.1 shows a normal curve implying that the data represented under the curve is normally distributed. The implication of these results is that the data represented by the normal distribution curve does not have outliers. This means that the observations are not far from the mean.

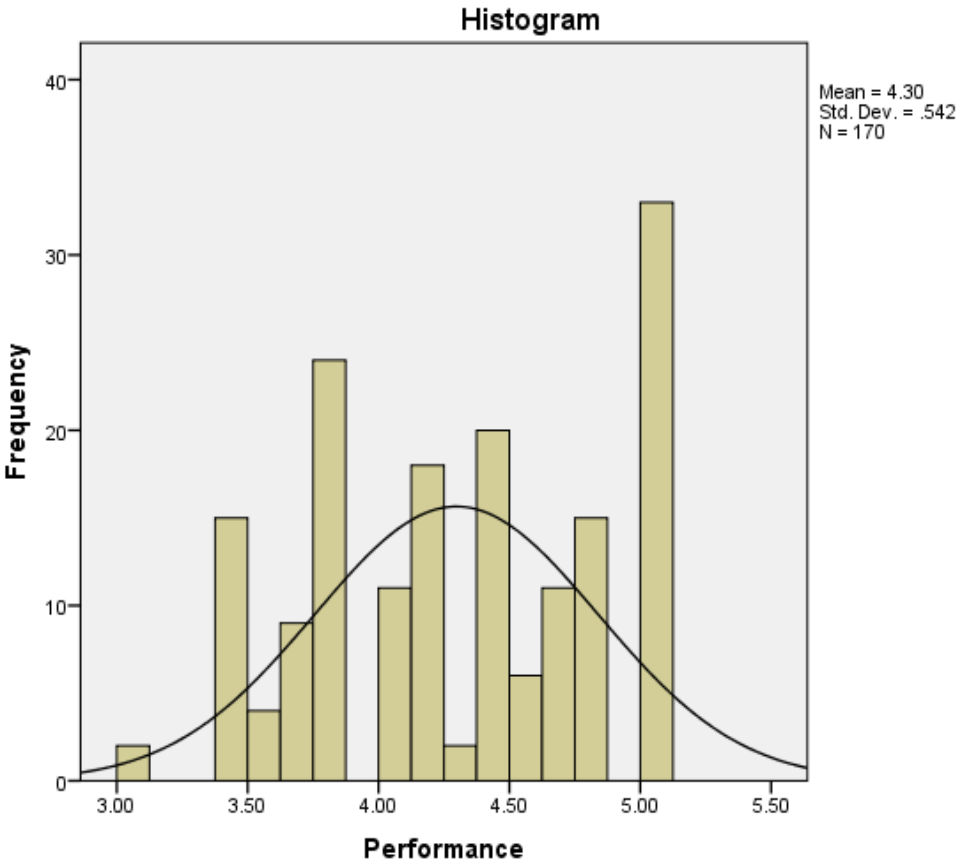

Figure 4.1: Graphical Representation of the Test for Normality

4.4.4 Heteroskedasticity Test

Breush-pagan/Cook-Weisberg Test was used to test for heteroskedasticity. The null hypothesis in the test is that error terms have a constant variance (i.e. should be Homoskedastic). The results in the Table 4.10 below indicate that the error terms are Homoskedastic, given that the p-value is greater than the 0.05 (0.10).

Heteroskedasticity occurs when error terms affect the individual independent variables and sometimes even the dependent variable. The implication of the results, therefore, is that the error term does not affect the independent variables and the dependent variable. Rather, the error terms are homeskedastic, implying that they do not affect the individual variables in the model.

Table 4.10: Heteroskedasticity Test Results

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity		
H0: Constant Variance		
chi2 (1)	=	2.71
Prob>chi2	=	0.100

4.4.5 Autocorrelation Test

To establish whether or not the residual are serially correlated, Durbin-Watson test for autocorrelation was conducted. The Durbin Watson test reports a test statistics, with a value from 0 to 4, where: 2 denotes no autocorrelation; 0 to 2<2 denotes a positive autocorrelation; while >2 denotes a negative autocorrelation. The decision rule is that test statistic values in the range of 1.5 to 2.5 are relatively normal. Values outside this range could be cause for concern (Field, 2009). The results are as indicated in Table 4.11 below and therefore the null hypothesis of no autocorrelation is accepted and that residuals are not auto correlated (Durbin- Watson statistic value=2.25).

Autocorrelation is where the error term of the previous period affects the error term of the current period. Therefore, autocorrelation is a situation where error terms affect each other across different years. Autocorrelation is a problem since it may affect the t- value. In this study, the results revealed that there was no autocorrelation implying that the error terms do not affect each other across different periods.

Table 4.11: Autocorrelation Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.920[a]	.847	.842	.21539	2.25

a. Predictors: (Constant), Automation, Information Flow, Supervision and Control, Relationship Management, Material Flow

b. Dependent Variable: Performance

4.5 Material Flow Processes and Performance of Financial Intermediaries in Kenya

The first objective of the study was to establish the effect of material flow on the performance of financial market intermediaries in Kenya. Using a five-point likert scale, the study sought to know respondents' level of agreement on various statements relating to effect of material flow on the performance of financial intermediaries in Kenya

4.5.1 Descriptive Statistics Analysis

Descriptive statistics such as frequency, percentage, mean and standard deviation were jointly used to summarize the responses as presented in Table 4.12. Results revealed that majority of the respondents who were 98.2% (83.5%+14.7%) agreed that their firms have an integrated material flow system while 1.8% moderately agreed to the statement. The mean of the responses was 4.13 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.39. 98.2% of the respondents agreed that they have control systems in their material flow systems while 1.8% moderately

agreed. The mean of the responses was 4.18 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.43.

The results also revealed that majority of the respondents who were 81% agreed that their firms use synchronized material flow system which is cost effective, 17.6% moderately agreed while 1.2% disagreed. The mean of the responses was 3.98 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.69. Further, 90% of the respondents agreed that they have a lean material flow system while 10% moderately agreed. The mean of the responses was 4.2 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.60. 98.8% agreed that their material flow system has execution flexibility while 1.2% moderately agreed. The mean of the responses was 4.44 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.52.

In addition, results revealed that 96% of the respondents agreed that the material flow is integrated using the ICT solutions while 4% moderately agreed. The mean of the responses was 4.45 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.57. Lastly, 92.4% of the respondents agreed that the material flow system can handle volumes needed by the firm, 4.1% moderately agreed while 3.5% disagreed with the statement. The mean of the responses was 4.02 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.73.

The overall mean of the responses was 4.20 which indicates that majority of the respondents agreed to the statement of the questionnaire. Additionally, the standard deviation of 0.56 indicates that the responses were varied. The results herein imply that material flow processes influence financial intermediaries performance. The findings concur with that of Luo (2006), who concluded that the main purpose of

automating the material flow process is to decrease the cost of logistics and inventory, while increasing the efficiency of material sources and information, in order to satisfy market requirements. Additionally, the findings agree with that of Tanchoco (2012) who stipulated the key factors to consider when planning for an effective material flow automation system. These factors included the specifications of individual system components, as well as the overall objective of the manufacturing system.

Table 4.12: Material Flow

Statement	Strongly disagree	Disagree	Moderately agree	Agree	Strongly agree	Mean	Std. Dev
The firm has an integrated material flow system	0.00%	0.00%	1.80%	83.50%	14.70%	4.13	0.39
We have control systems in our material flow system	0.00%	0.00%	1.80%	78.20%	20.00%	4.18	0.43
The firm uses synchronized material flow system which is cost effective	1.20%	0.00%	17.60%	61.80%	19.40%	3.98	0.69
We have a lean material flow system	0.00%	0.00%	10.00%	60.00%	30.00%	4.2	0.6
Our material flow system has execution flexibility	0.00%	0.00%	1.20%	54.10%	44.70%	4.44	0.52
The material flow is integrated using the ICT solutions	0.00%	0.00%	3.50%	48.20%	48.20%	4.45	0.57
Our material flow system can handle volumes needed by the firm	3.50%	0.00%	4.10%	75.30%	17.10%	4.02	0.73
Average						**4.2**	**0.56**

The respondents were asked to indicate whether material flow systems improve organization performance. Results in figure 4.2 below reveal that 94% of the respondents agreed that material flow systems improve performance while only 6% of the respondents who did not agreed that material flow systems improve performance of their organization.

Further, the respondents who said yes explained why they felt that material flow influence their firm's performance. Majority of the respondents noted that material flow reduces cost; the material flow process is faster; and that the process is flexible.

This implies that a material flow system enhances organizations' performance. The results agree with those of Luo (2006), who concluded that the main purpose of automating the material flow process is to decrease the cost of logistics and inventory, while increasing the efficiency of material sources and information, in order to satisfy market requirements.

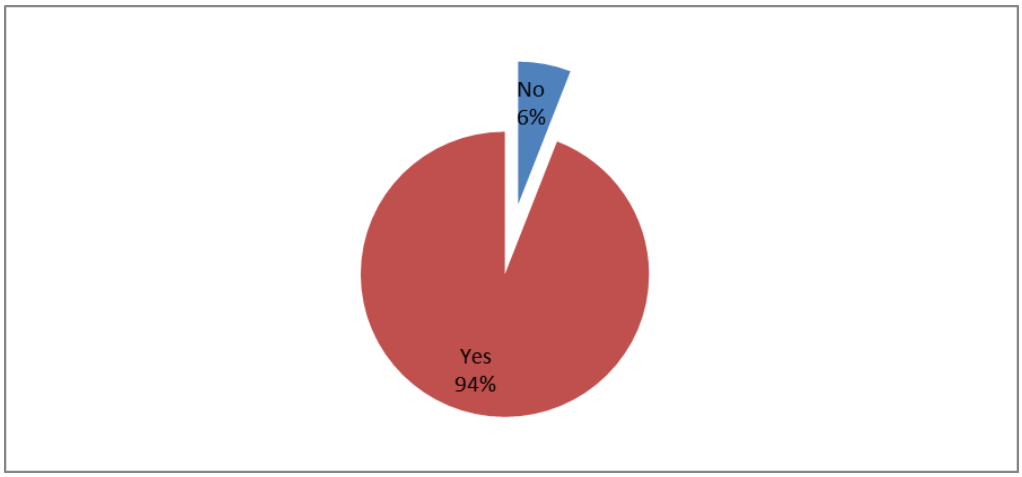

Figure 4.2: Material flow systems influence on performance

The respondents were asked to state whether automation affects material flow systems. Results in figure 4.3 below reveal that 69% of the respondents indicated yes while 31% of the respondents indicated no. The respondents who said yes further gave reasons why they felt that automation affects material flow systems. Majority of the respondents noted that automation of material flow reduces transportation cost

and that it has made work easier. This implies that most of the respondents believe that automation has an influence on material flow systems.

The findings concur with those of Luo (2006), who concluded that the main purpose of automating the material flow process is to decrease the cost of logistics and inventory, while increasing the efficiency of material sources and information, in order to satisfy market requirements.

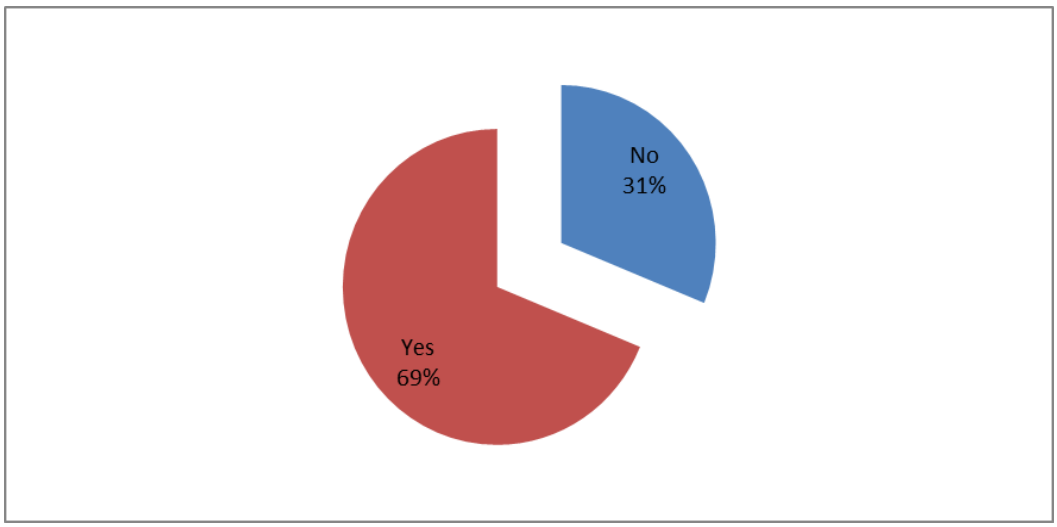

Figure 4.3: Automation influence on material flow systems

When material flow processes was cross tabulated against financial performance, the results in table 4.13 revealed that material flow and financial performance are significantly associated (chi=130.6, p value=0.000). This implies that the influence of material flow processes on the performance of financial intermediaries is significant.

These findings concur with those of Tanchoco (2012), who concluded that management and control of material flow processes is an important method of increasing firms' profitability, more so given the process' centrality in matching supply of materials, production of goods, warehousing on the one hand, and consumer demand and marketing on the other.

Table 4.13: Cross Tabulation (Chi Square)

		Categorical material Flow			
		Low Material flow	High material flow	Total	Chi (p value)
Categorical Performance	Low performance	7	2	9	
	High Performance	0	161	161	
Total		7	**163**	**170**	**130.6(0.000)**

4.5.2 Inferential Statistics Analysis

Correlation Analysis

Results in table 4.14 indicate the correlation analysis between material flow processes and performance of financial intermediaries. The correlation results revealed that there was a positive and a significant association between material flow and performance of financial intermediaries (r=0.784, p=0.000). This implies that material flow and performance of financial intermediaries change in the same direction. Further, the correlation coefficient (r=0.784) reveals a strong association between material flow and performance of financial intermediaries.

Table 4.14: Correlation Analysis

	Performance	**Material Flow**	
Performance	Pearson Correlation	1.000	
	Sig. (2-tailed)		
Material Flow	Pearson Correlation	.784**	1.000
	Sig. (2-tailed)	0.000	
**. Correlation is significant at the 0.01 level (2-tailed).			

Relationship between Material Flow Constructs and Performance of Financial Market Intermediaries

Results in table 4.15 present the regression model used in explaining the relationship between material flow constructs and performance of financial market intermediaries. The regression results in table 4.15 indicate that Integrated material flow system (X_{11}) explained 14% of variations in performance of Financial Market Intermediaries in Kenya. Additionally, results showed that Synchronized material flow system (X_{12}) explained 17% of the variations in performance of Financial Market Intermediaries in Kenya. Lastly, results indicated that Execution flexibility (X_{13}) explained 33% of the variations in performance of Financial Market Intermediaries in Kenya. The findings are supported by a coefficient of determination (R^2) of 14%, 17% and 33% respectively.

Further, results indicate that the three models are statistically significant as supported by a p value of 0.000. This implies that Integrated material flow system (X_{11}), Synchronized material flow system (X_{12}) and Execution flexibility (X_{13}) are good predictors of performance. The results were supported by F statistics of 26.483 (X_{11}), 34.375 (X_{12}) and 84.332 (X_{13}).

Lastly, results indicate a positive and significant relationship between Integrated material flow system (X_{11}) and performance of Financial Market Intermediaries in Kenya as supported by a p value of 0.000 and a beta coefficient of (0.518). Further, results reveal a positive and significant relationship between Synchronized material flow system (X_{12}) and performance of Financial Market Intermediaries in Kenya as supported by a p value of 0.000 and a beta coefficient of (0.323). Finally, results show a positive and significant relationship between Execution flexibility (X_{13}) and performance of Financial Market Intermediaries in Kenya as supported by a p value of 0.000 and a beta coefficient of (0.602).

Based on the beta coefficients, it is possible to rank the constructs as to which best explains the performance of Financial Market Intermediaries in Kenya. The findings indicate the coefficients of the three constructs as follows; Integrated material flow

system (β1=0.518), Synchronized material flow system (β1=0.3.23), and Execution flexibility (β1=0.602). The results herein imply that (X_{13}) best explains performance, followed by (X_{11}) and then (X_{12}).

Table 4.15: Regression Results

	Model 1	**Model 2**	**Model 3**
	Integrated material flow system (X_{11})	Synchronized material flow system (X_{12})	Execution flexibility (X_{13})
(Constant)	2.158	3.013	1.629
β1	0.518	0.323	0.602
R^2	0.136	0.170	0.334
F-statistics	26.483	34.375	84.332
P-value	**0.000**	**0.000**	**0.000**

Model 1: $Y= \beta_0+ \beta_1 X_{11} + e$

Firm Performance $=2.158+0.518X_{11}$

Model 2: $Y= \beta_0+ \beta_2 X_{12} + e$

Firm Performance $=3.013+0.323X_{12}$

Model 3: $Y= \beta_0+ \beta_3 X_{13} + e$

Firm Performance $=1.629+0.602X_{13}$

Relationship between Joint Material Flow Constructs and Performance of Financial Market Intermediaries

The results presented in table 4.16 present the fitness of model used of the regression model in explaining the study phenomena. The results revealed that jointly, material flow constructs explained 55% of the performance of financial market intermediaries in Kenya.

This is supported by coefficient of determination also known as the R square of 55%. This means that 55% of the total variations in performance of the financial intermediaries is explained by material flow. This implies that material flow is a very critical component of the supply chain processes. Firms should, therefore, ensure that the material flow systems are functioning properly.

Table 4.16: Model Fitness

Indicator	Coefficient
R	0.743
R Square	**0.552**
Adjusted R Square	0.544
Std. Error of the Estimate	0.36587

Table 4.17 below provides the results on the analysis of the variance (ANOVA). The results indicate that the overall model was statistically significant as supported by a p value of (0.000) which was less than the conventional probability of (0.05) significance level. Further, the results were supported by an F statistic of 68.159 and the reported p value (0.000). This implies that the overall model was statistically significant and that material flow is a good predictor of financial performance.

These findings concur with those of Tanchoco (2012), who concluded that management and control of material flow is an important method of increasing firms' profitability, more so given the process' centrality in matching supply of materials, production of goods, warehousing on the one hand, and consumer demand and marketing on the other.

Table 4.17: Analysis of Variance

Indicator	Sum of Squares	Df	Mean Square	F	Sig.
Regression	27.372	3	9.124	68.159	0.000
Residual	22.221	166	0.134		
Total	49.593	169			

Table 4.18 below presents the regression of coefficient results. The findings revealed that there is a positive and significant relationship between material flow processes and performance of financial market intermediaries in Kenya as supported by a p value of 0.000 and a beta coefficient of (0.426). This implies that a change in material flow by 1 unit leads to a corresponding change in financial performance by 0.426units. In this case, when material flow increases by 1 unit, then performance of financial market intermediaries increases by 0.426units.

These findings agree with those of Tanchoco (2012), who concluded that management and control of material flow is an important method of increasing firms' profitability, more so given the process' centrality in matching supply of materials, production of goods, warehousing on the one hand, and consumer demand and marketing on the other.

Table 4.18: Regression of Coefficients

	B	**Std. Error**	**T**	**Sig.**
(Constant)	-1.161	0.418	-2.774	0.006
Material Flow Processes	0.426	0.064	6.570	**0.000**

The specific model;

$$Y= \beta_0+ \beta_1 X_1+e$$

Firm Performance = -1.161+0.426 Material Flow Processes

4.5.3 Hypothesis Testing

The hypothesis was tested by using the ordinary least square regression. The acceptance/rejection criteria was that, if the p value is less than the conventional p value (0.05), the H_0 is rejected but if the p value is more than 0.05, the H_0 fails to be rejected.

The null hypothesis was that material flow has no significant effect on the performance of financial market intermediaries in Kenya. Results in Table 4.18 above show that the p value was less than the conventional p value (p=0.05). This indicated that the null hypothesis was rejected hence material flow had a significant relationship with performance of financial market intermediaries. Further, rejection of the null hypothesis implies that the influence of material flow processes on performance of financial market intermediaries is statistically significant. In other words, the role of material flow processes in determining the performance of financial market intermediaries cannot be ignored.

4.5.4 Discussion and Empirical

The descriptive results indicated that the overall mean of the responses was 4.20 which implied that majority of the respondents agreed to the statements of the questionnaire. In addition, the standard deviation of 0.56 revealed that the responses were varied to a small extent. The results imply that material flow processes influence performance of Financial Intermediaries in Kenya. The findings agree with that of Luo (2006), who concluded that the main purpose of automating the material flow process is to decrease the cost of logistics and inventory, while increasing the efficiency of material sources and information, in order to satisfy market requirements.

The inferential results indicated that material flow processes and firm performance are positively and significantly associated. Further, the results revealed that there is a positive and significant relationship between material flow processes and firm performance. These results imply that material flow processes play a significant role in the performance of financial market intermediaries in Kenya.

These findings agree with those of Tanchoco (2012), who concluded that management and control of material flow is an important method of increasing firms' profitability, more so given the process' centrality in matching supply of materials, production of goods, warehousing on the one hand, and consumer demand and marketing on the other.

Further, results on hypothesis testing indicated that the null hypothesis should be rejected, implying that there exist a statistically significant relationship between material flow processes and firm performance.

4.6 Information Flow and Performance of Financial Intermediaries in Kenya

The second objective of the study was to determine the effect of information flow on performance of financial market intermediaries in Kenya. Using a five-point likert scale, the study sought to know respondents' level of agreement on various statements relating to effect of information flow on the performance of financial intermediaries in Kenya

4.6.1 Descriptive Statistics Analysis

Descriptive statistics such as frequency, percentage, mean and standard deviation were jointly used to summarize the responses as presented in Table 4.19. Results revealed that majority of the respondents who were 68% (54.10+14.10) agreed that their organizations have automated systems of information flow, 25.9% moderately agreed while 5.9% disagreed. The mean of the responses was 3.76 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.76.

Also, 95% of the respondents agreed on getting access to information first as a source of strategic edge while 5% moderately agreed. The mean of the responses was 4.31 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.57.

The results also revealed that majority of the respondents who were 87% agreed on fast ordering processes with minimal down time while 13% moderately agreed. The mean of the responses was 4.18 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.65.The findings agree with that of (Petersen, 1999) who stated that the quality of shared information has a clear impact on the planning outcome and is critical to the effectiveness of decision-making (Petersen, 1999).

Further, 85% of the respondents agreed on technology based information systems while 15% moderately agreed. The mean of the responses was 3.98 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.54. Lastly, 90% of the respondents agreed that we have information integration systems with our partner, 8.8% moderately agreed while 1.2% disagreed.

The overall mean of the responses was 4.05 which indicates that majority of the respondents agreed to the statement of the questionnaire. Additionally, the standard deviation of 0.62 indicates that the responses were varied. The results herein imply that information flow processes influence financial intermediaries performance.

These findings concur with that of Sahin and Robinson (2002; 2005), who studied Information flow in supply chains. The study concluded that incomplete understanding on the interaction between information sharing and physical flow hinder attempts to achieve higher levels of supply chain integration. The key to enhanced supply chain operations does not lie solely in efficient information transfer and sharing, but also in information availability and timeliness (Kehoe & Boughton, 2001; English, 2001).

Table 4.19: Information Flow

Statement	Strongly disagree	Disagree	Moderately agree	Agree	Strongly agree	Mean	Std. Dev
Automated systems of flow	0.00%	5.90%	25.90%	54.10%	14.10%	3.76	0.76
Getting access to information first as a source of strategic edge	0.00%	0.00%	5.30%	58.80%	35.90%	4.31	0.57
Fast ordering processes with minimal down time	0.00%	0.00%	13.50%	54.70%	31.80%	4.18	0.65
Technology based information systems	0.00%	0.00%	15.30%	71.20%	13.50%	3.98	0.54
Information integration systems with our partners	1.20%	0.00%	8.80%	75.90%	14.10%	4.02	0.58
Average						**4.05**	**0.62**

The respondents were asked to indicate whether information flow has an influence on firm's performance. Results in figure 4.4 reveal that 93% of the respondents indicated yes while 7% indicated no. This implies that most of the respondents are convinced that information flow systems affect their firms' performance.

The findings agree with that of (Petersen, 1999) who stated that the quality of shared information has a clear impact on the planning outcome and is critical to the effectiveness of decision-making (Petersen, 1999). Further, the respondents who said yes explained why they felt that information flow influence their firm's performance. Majority of the respondents felt that information flow systems were now faster than before; access to information is very fast and saves time; and that less time is taken in ordering processes.

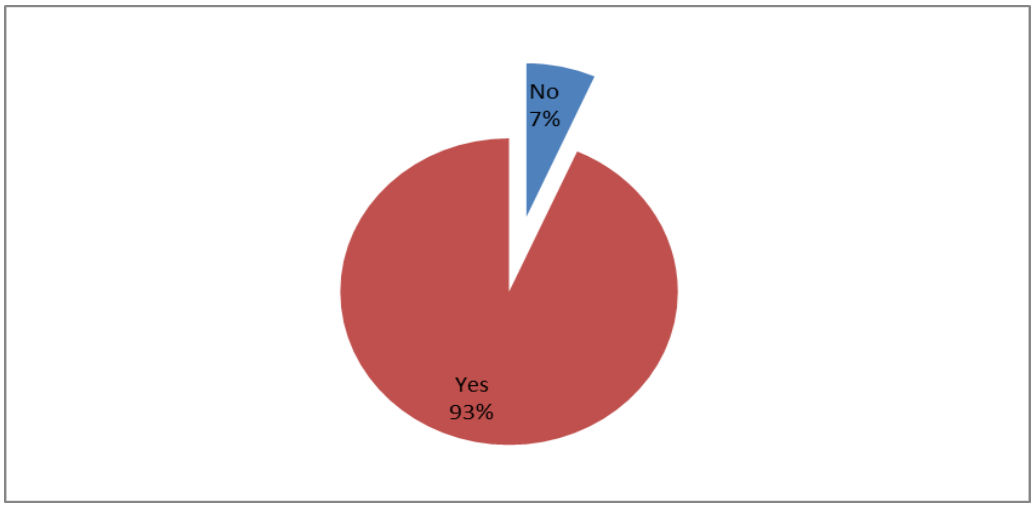

Figure 4.4: Influence of Information Flow on Performance

The respondents were asked to indicate whether automation and ICT capabilities influence information flow. Results in figure 4.5 reveal that 91% of the respondents indicated yes while 9% of the respondents indicated no. This implies that most of the respondents believe that automation affects information flow in their organization. Further, the respondents who said yes gave reasons why they felt that automation influences information flow. Majority of the respondents agreed that with automation, the information flow process is now faster and cost effective;

information stored is very safe; and that information system is faster compared to other systems.

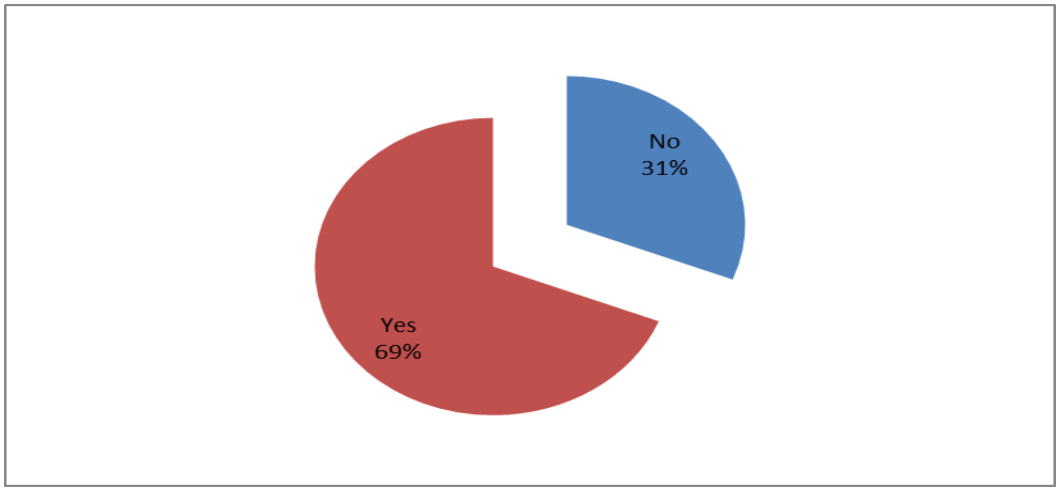

Figure 4.5: Influence of Automation on Material Flow Systems

When information flow processes was cross tabulated against financial performance, the results in table 4.20 revealed that information flow and financial performance are significantly associated (chi=36.204, p value=0.003). This implies that the influence of information flow on the performance of financial intermediaries is significant.

Table 4.20: Cross Tabulation (Chi Square)

		Categorical Information Flow			
		Low information flow	High information flow	Total	Chi (p value)
Categorical Performance	Low performance	2	7	9	
	High Performance	0	161	161	
Total		2	**168**	**170**	**36.204(0.003)**

4.6.2 Inferential Statistics Analysis

Correlation Analysis

Results in table 4.21 indicate the correlation analysis between information flow processes and performance of financial intermediaries. The correlation results revealed that there was a positive and a significant association between information flow and performance of financial intermediaries (r=0.320, p=0.000). This implies that information flow and performance of financial market intermediaries change in the same direction. However, the correlation value (r=0.320) reveals a weak association between information flow and performance of financial intermediaries.

Table 4.21: Correlation Matrix

		Performance	Information Flow
Performance	Pearson Correlation	1.000	
	Sig. (2-tailed)		
Information Flow	Pearson Correlation	.320**	1.000
	Sig. (2-tailed)	0.000	

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

Relationship between Information Flow Constructs and Performance of Financial Market Intermediaries

Results in table 4.22 present the regression model used in explaining the relationship between information flow constructs and performance of financial market intermediaries. The regression results in table 4.22 indicate that integrated information flow systems (X_{21}) explained 12.8% of variations in performance of Financial Market Intermediaries in Kenya. Additionally, results showed that Technology based information systems (X_{22}) explained 14% of the variations in performance of Financial Market Intermediaries in Kenya. Lastly, results indicated that automated information flow systems (X_{23}) explained 13.4% of the variations in

performance of Financial Market Intermediaries in Kenya. The findings are supported by a coefficient of determination (R^2) of 12.8%, 14% and13.4% respectively.

Further, results indicate that the three models are statistically significant as supported by a p value of 0.000. This implies that integrated information flow systems (X_{21}), technology based information systems (X_{22}) and automated information flow systems (X_{23}) are good predictors of performance. The results were supported by F statistics of 24.763 (X_{21}), 27.446 (X_{22}) and 26.036 (X_{23}).

Lastly, results indicate a positive and significant relationship between integrated information flow systems (X_{21}) and performance of Financial Market Intermediaries in Kenya as supported by a p value of 0.000 and a beta coefficient of (0.334). Further, results reveal a positive and significant relationship between technology based information systems (X_{22}) and performance of Financial Market Intermediaries in Kenya as supported by a p value of 0.000 and a beta coefficient of (0.377). Finally, results show a positive and significant relationship between automated information flow systems (X_{23}) and performance of Financial Market Intermediaries in Kenya as supported by a p value of 0.000 and a beta coefficient of (0.260).

Based on the beta coefficients, it is possible to rank the constructs as to which best explains the performance of Financial Market Intermediaries in Kenya. The findings indicate the coefficients of the three constructs as follows; Integrated information flow systems ($\beta1=0.334$), technology based information systems ($\beta1=0.377$), and automated information flow systems ($\beta1=0.260$). The results herein imply that (X_{22}) best explains performance, followed by (X_{21}) and then (X_{23}).

Table 4.22: Regression Results

	Model 1 Integrated information flow systems (X_{21})	**Model 2** Technology based information systems (X_{22})	**Model 3** Automated information flow systems (X_{23})
(Constant)	2.954	2.795	3.320
β1	0.334	0.377	0.260
R^2	0.128	0.140	0.134
F-statistics	24.763	27.446	26.036
P-value	**0.000**	**0.000**	**0.000**

Model 1: $Y= \beta_0+ \beta_1 X_{21} + e$

Firm Performance $=2.954+0.334 X_{21}$

Model 2: $Y= \beta_0+ \beta_2 X_{22} + e$

Firm Performance $=2.795+0.377X_{22}$

Optimal Model 3: $Y= \beta_0+ \beta_3 X_{23} + e$

Firm Performance $=3.320+0.260X_{23}$

Relationship between Joint Information Flow Constructs and Performance of Financial Market Intermediaries

The results presented in table 4.23 present the fitness of model used of the regression model in explaining the study phenomena. The findings reveal that jointly, information flow constructs explained 21% of the performance of financial market intermediaries in Kenya. This is supported by coefficient of determination also known as the R square of 21%. This means that information flow explain 21% of the total variations in the dependent variable (financial market intermediaries performance).

Table 4.23: Model Fitness

Indicator	Coefficient
R	0.455
R Square	**0.207**
Adjusted R Square	0.193
Std. Error of the Estimate	0.48669

Table 4.24 below provides the results on the analysis of the variance (ANOVA). The results indicate that the overall model was statistically significant as supported by a p value of 0.000. This was supported by an F statistic of 14.457 and the reported p value (0.000) which was less than the conventional probability of 0.05 significance level. The results imply that information flow is a good predictor of firm performance.

Table 4.24: Analysis of Variance

Indicator	Sum of Squares	Df	Mean Square	F	Sig.
Regression	10.273	3	3.424	14.457	0.000
Residual	39.320	166	0.237		
Total	49.593	169			

The table 4.25 presents the regression of coefficients results. The findings show that there is a positive and significant relationship between information flow processes and performance of financial market intermediaries in Kenya as supported by a p value of 0.000 and a beta coefficient of (0.169). This implies that an increase in information flow processes by 1 unit would increase the performance of financial market intermediaries by 0.169units.

These findings agree with those of Sahin and Robinson (2005), who states that incomplete understanding on the interaction between information sharing and

physical flow hinder attempts to achieve higher levels of supply chain integration. In many cases information sharing alone does not improve supply chain performance. They argued that physical flow coordination among the trading partners is essential.

The key to enhanced supply chain operations does not lie solely in efficient information transfer and sharing, but also in information availability and timeliness.

Further, Disney *et al*. (2004), who based their work on the earlier study by Hong-Minh *et al*. (2000), and studied decision making in the Beer Game. They noticed that the decision maker could not improve decisions when he/she had a wide range of data; it confused the player and ended up in worse decisions and higher inventories in the chain. It was concluded that, particularly when human intervention is needed, decision-making becomes more complex in a transparent environment.

Table 4.25: Regression of Coefficients

	B	**Std. Error**	**t**	**Sig.**
(Constant)	2.299	0.324	7.100	0.000
Information Flow Processes	0.169	0.066	2.743	**0.000**

The specific model;

$$Y = \beta_0 + \beta_1 X_2 + e$$

Firm Performance = 2.299+0.169 Information Flow Processes

4.6.3 Hypothesis Testing

The hypothesis was tested by using the ordinary least square regression. The acceptance/rejection criteria was that, if the p value is less than the conventional p value (0.05), the H_0 is rejected but if it more than 0.05, the H_0 fails to be rejected, The null hypothesis was that information flow has no significant effect on the

performance of financial market intermediaries in Kenya. Results in Table 4.25 above show that the p value was less than the conventional p value (p=0.05).

This indicated that the null hypothesis was rejected hence information flow had a significant relationship with performance of financial market intermediaries. Further, rejection of the null hypothesis implies that the influence of information flow processes on performance of financial market intermediaries is statistically significant. In other words, the role of information flow processes in determining the performance of financial market intermediaries cannot be ignored.

4.6.4 Discussion and Empirical

The descriptive results indicated that the overall mean of the responses was 4.05 which indicates that majority of the respondents agreed to the statement of the questionnaire. In addition, the standard deviation of 0.62 indicates that the responses were varied. The results imply that information flow processes influence the performance of financial intermediaries in Kenya. These findings concur with that of Sahin and Robinson (2002; 2005), who studied Information flow in supply chains. The study concluded that incomplete understanding on the interaction between information sharing and physical flow hinder attempts to achieve higher levels of supply chain integration.

The inferential results indicated that information flow processes and firm performance are positively and significantly associated. Further, the results revealed that there is a positive and significant relationship between information flow processes and firm performance. These results imply that information flow processes play a significant role in the performance of financial market intermediaries in Kenya.

These findings agree with those of Sahin and Robinson (2005), who states that incomplete understanding on the interaction between information sharing and physical flow hinder attempts to achieve higher levels of supply chain integration. In many cases information sharing alone does not improve supply chain performance.

They argued that physical flow coordination among the trading partners is essential. The key to enhanced supply chain operations does not lie solely in efficient information transfer and sharing, but also in information availability and timeliness.

Further, results on hypothesis testing indicated that the null hypothesis should be rejected, implying that there exist a statistically significant relationship between information flow processes and firm performance.

4.7 Supervision and Control and Performance of Financial Intermediaries in Kenya

The third objective of the study was to establish the effect of supervision and control on performance of financial market intermediaries in Kenya. Using a five-point likert scale, the study sought to know respondents' level of agreement on various statements relating to effect of supervision and control on the performance of financial intermediaries in Kenya.

4.7.1 Descriptive Statistics Analysis

Descriptive statistics such as frequency, percentage, mean and standard deviation were jointly used to summarize the responses as presented in Table 4.26. Majority of 97% (85.30+11.80) of the respondents agreed with the statement that we have control systems based on the data we receive, 1.8% moderately agreed while 1.2 disagreed. The mean of the responses was 4.06 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.49. Also, 98.8% agreed with the statement that our reporting system to all stakeholders is very effective while 1.2% moderately agreed. The mean of the responses was 4.41 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.52.

The results indicated that 94% of the respondents agreed that we have a sales data repository we use to determine our performance metrics, 4.7% moderately agreed while 1.2% disagreed. The mean of the responses was 4.32 which indicates that

majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.62. The results also revealed that majority of the respondents who were 93% agreed that we have online reporting and control systems for our firm on technology based information systems while 7% moderately agreed. The mean of the responses was 4.10 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.48.

In addition, 81% of the respondents agreed that we have demand planning systems while 19% moderately agreed. The mean of the responses was 3.94 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.56. The results further indicated that 56% of the respondents agreed that our forecasting strategies are based on online generated reports, 30% disagreed while 14% moderately agreed. The mean of the responses was 3.31 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 1.29.Lastly, 82% of the respondents agreed that our control systems allow for joint scheduling for orders with our partners in the supply chain, 14% moderately agreed while 4% disagreed. The mean of the responses was 3.81 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.96.

The overall mean of the responses was 3.99 which indicates that majority of the respondents agreed to the statement of the questionnaire. Additionally, the standard deviation of 0.70 indicates that the responses were varied. The results herein imply that supervision and control influence financial market intermediaries performance. These findings concur with those of Kehoe and Boughton, (2001) and English (2001) who concluded that most organizations prepare formal reports of performance measurements both quantitative and qualitative (where quantification is not possible) that the managers review regularly). These measurements should be related to the standards set in the first step of the control process.

Table 4.26: Supervision and Control

Statement	Strongly disagree	Disagree	Moderately agree	Agree	Strongly agree	Mean	Std. Dev
we have control systems based on the data we receive	1.20%	0.00%	1.80%	85.30%	11.80%	4.06	0.49
Our reporting system to all stakeholders is very effective	0.00%	0.00%	1.20%	57.10%	41.80%	4.41	0.52
We have a sales data repository we use to determines our performance metrics	0.00%	1.20%	4.70%	55.30%	38.80%	4.32	0.62
We have online reporting and control systems for our firm	0.00%	0.00%	7.10%	75.90%	17.10%	4.1	0.48
We have demand planning systems	0.00%	0.00%	18.80%	68.80%	12.40%	3.94	0.56
Our forecasting strategies are based on online generated reports	5.30%	24.70%	14.0%	38.80%	17.10%	3.31	1.29
Our control systems allow for joint scheduling for orders with our partners in the supply chain	0.00%	3.50%	14.80%	68.20%	13.50%	3.81	0.96
Average						**3.99**	**0.7**

The respondents were asked to state whether supervision and control practices affect the firms overall performance. Results in figure 4.6 below reveal that 53% of the respondents said yes while 47% said no. This implies that majority of the respondents believe that supervision and control practices affects firms overall performance. Further, the respondents who said yes explained why they felt that supervision and control influence their firm's performance. Majority of the respondents highlighted scheduling of online reporting as one of the main reasons

why supervision and control influences the performance of financial market intermediaries. These findings concur with those of Kehoe and Boughton (2001) and English (2001) who concluded that most organizations prepare formal reports of performance measurements both quantitative and qualitative (where quantification is not possible) that the managers review regularly). These measurements should be related to the standards set in the first step of the control process.

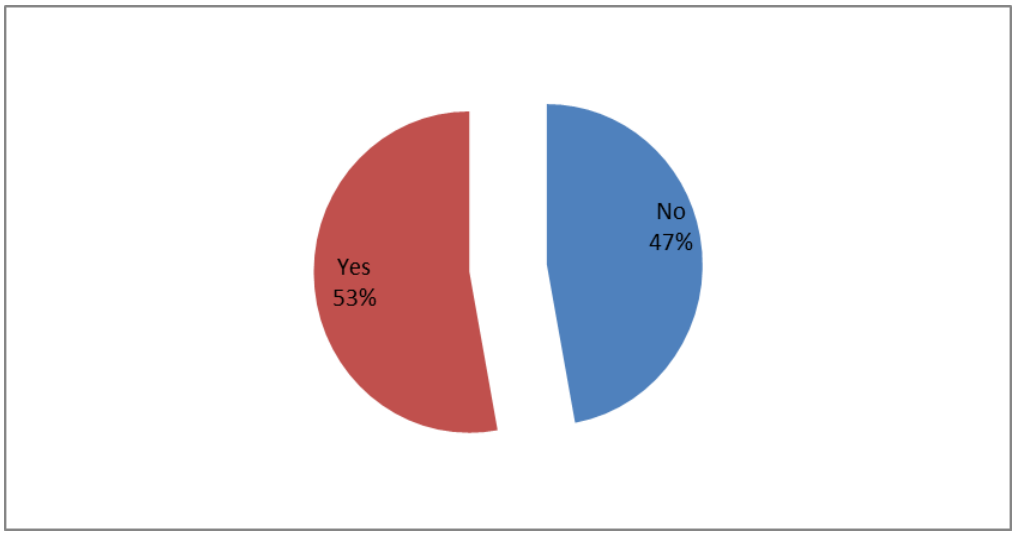

Figure 4.6: Influence of Supervision and Control on Performance

The respondents were asked to indicate whether automation affect the supervision and control processes in their firm. Results in figure 4.7 reveal that 51% of the respondents indicated yes while 49% indicated no. This implies that majority of the respondents believe that automation influences the supervision and control systems in their organizations.

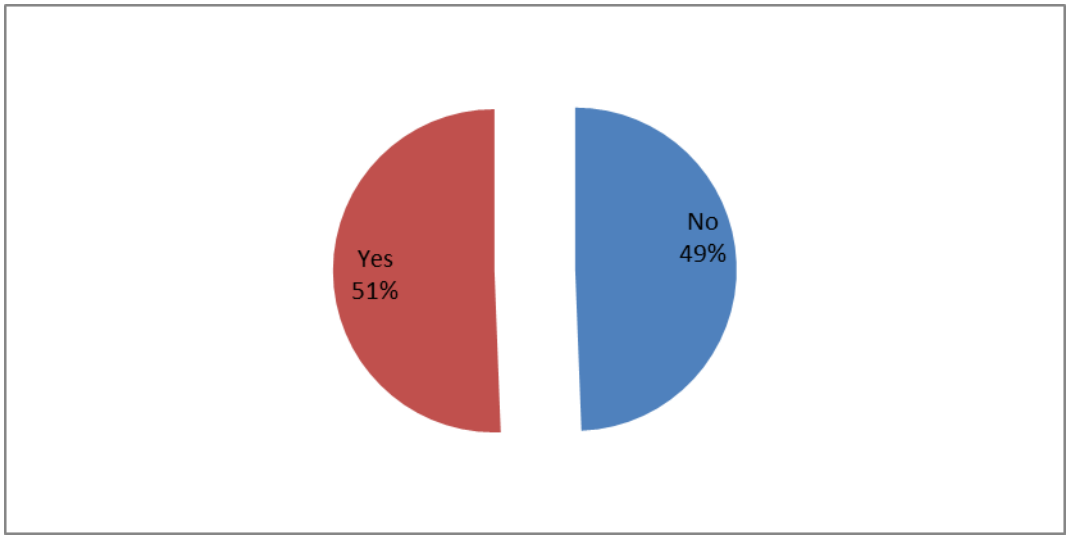

Figure 4.7: Influence of Automation on Supervision and Control Processes

When supervision and control processes was cross tabulated against financial performance, the results in table 4.27 revealed that supervision and control and financial performance are significantly associated (chi=16.329, p value=0.014). This implies that the influence of supervision and control on the performance of financial intermediaries is statistically significant.

Table 4.27: Cross Tabulation (Chi Square)

		Categorical Supervision			
		Low supervision	High supervision	Total	Chi (p value)
Categorical Performance	Low performance	2	7	9	
	High Performance	2	159	161	
Total		4	**166**	**170**	**16.329(0.014)**

4.7.2 Inferential Statistics Analysis

Correlation Analysis

Results in table 4.28 indicate the correlation analysis between supervision and control processes and performance of financial intermediaries. The correlation results revealed that there was a positive and a significant association between supervision and control and performance of financial intermediaries (r=0.497, p=0.000). This implies that supervision and control and performance of the financial intermediaries change in the same direction. However, the correlation coefficient (r=0.497) reveals a weak association between supervision and control and performance of financial intermediaries.

Table 4.28: Correlation Matrix

		Performance	Supervision and Control
Performance	Pearson Correlation	1.000	
	Sig. (2-tailed)		
Supervision and Control	Pearson Correlation	.497**	1.000
	Sig. (2-tailed)	0.000	

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

Relationship between Supervision and Control Constructs and Performance of Financial Market Intermediaries

Results in table 4.29 present the regression model used in explaining the relationship between supervision and control constructs and performance of financial market intermediaries. The regression results in table 4.29 indicate that Data-based Control systems (X_{31}) explained 13% of variations in performance of Financial Market Intermediaries in Kenya. Additionally, results showed that Online reporting control systems (X_{32}) explained 8% of the variations in performance of Financial Market Intermediaries in Kenya.

Lastly, results indicated that Demand planning systems (X_{33}) explained 38% of the variations in performance of Financial Market Intermediaries in Kenya. The findings are supported by a coefficient of determination (R^2) of 13%, 8% and38% respectively.

Further, results indicate that the three models are statistically significant as supported by a p value of 0.000. This implies that Data-based Control system (X_{31}), Online reporting control systems (X_{32}) and Demand planning systems (X_{33}) are good predictors of performance. The results were supported by F statistics of 24.854 (X_{31}), 14.609 (X_{32}) and 103.101 (X_{33}).

Lastly, results indicate a positive and significant relationship between Data-based Control system (X_{31}) and performance of Financial Market Intermediaries in Kenya as supported by a p value of 0.000 and a beta coefficient of (0.398). Further, results reveal a positive and significant relationship between Online reporting control systems (X_{32}) and performance of Financial Market Intermediaries in Kenya as supported by a p value of 0.000 and a beta coefficient of (0.325). Finally, results show a positive and significant relationship between demand planning systems (X_{33}) and performance of Financial Market Intermediaries in Kenya as supported by a p value of 0.000 and a beta coefficient of (0.601).

Based on the beta coefficients, it is possible to rank the constructs as to which best explains the performance of Financial Market Intermediaries in Kenya. The findings indicate the coefficients of the three constructs as follows; Data-based Control system ($\beta1=0.398$), Online reporting control systems ($\beta1=0.325$), and demand planning systems ($\beta1=0.601$). The results herein imply that (X_{33}) best explains performance, followed by (X_{31}) and then (X_{32}).

Table 4.29: Regression Results

	Model 1	**Model 2**	**Model 3**
	Data-based Control systems (X_{31})	Online reporting control systems (X_{32})	Demand planning systems (X_{33})
(Constant)	2.679	2.971	1.934
β1	0.398	0.325	0.601
R^2	0.129	0.080	0.380
F-statistics	24.854	14.609	103.101
P-value	**0.000**	**0.000**	**0.000**

Model 1: $Y= \beta_0+ \beta_1 X_{31} + e$

Firm Performance $=2.679+0.398X_{31}$

Model 2: $Y= \beta_0+ \beta_2 X_{32} + e$

Firm Performance $=2.971+0.325X_{32}$

Model 3: $Y= \beta_0+ \beta_3 X_{33} + e$

Firm Performance $=1.934+0.601X_{33}$

Relationship between Joint Supervision and Control Constructs and Performance of Financial Market Intermediaries

The results presented in table 4.30 present the fitness of model used of the regression model in explaining the study phenomena. The findings revealed that jointly, Supervision and control constructs explained 38% of the performance of financial market intermediaries in Kenya. This is supported by coefficient of determination also known as the R square of 38%. This means that supervision and control explain 38% of the total variations in the performance of financial market intermediaries in Kenya.

Table 4.30: Model of Fitness

Indicator	Coefficient
R	0.617
R Square	**0.381**
Adjusted R Square	0.370
Std. Error of the Estimate	0.42998

Table 4.31 provides the results on the analysis of the variance (ANOVA). The results indicate that the overall model was statistically significant as supported by a p value of 0.000. Further, results were supported by an F statistic of 34.081 and the reported p value (0.000) which was less than the conventional probability of 0.05 significance level. This implies that supervision and control is a good predictor of firm performance.

Table 4.31: Analysis of Variance

Indicator	Sum of Squares	Df	Mean Square	F	Sig.
Regression	18.903	3	6.301	34.081	0.000
Residual	30.690	166	0.185		
Total	49.593	169			

Table 4.32 presents the regression of coefficients results. The findings show that there is a positive and significant relationship between supervision and control and performance of financial market intermediaries in Kenya as supported by a p value of 0.000 and a beta coefficient of (0.221). This implies that increase in supervision and control by 1 unit would increase the performance of financial market intermediaries by 0.221units.

These findings agree with those of Bailey and David (2008) who concluded that the ultimate aim of supply chain supervision and control is to inform decisions necessary for the system managers to take corrective action, as well as to reinforce successes. When performance deviates from standards, managers must determine what changes, if any, are necessary and how to apply them.

In the productivity and quality-centered environment, workers and managers are often empowered to evaluate their own work. After the evaluator determines the cause or causes of deviation, he or she can take the fourth step— corrective action. The corrective action may be to maintain status quo (reinforcing successes), correcting the deviation, or changing standards.

Table 4.32: Regression of Coefficients

	B	**Std. Error**	**t**	**Sig.**
(Constant)	1.908	0.344	5.553	0.000
Supervision and Control Processes	0.221	0.058	3.730	**0.000**

The specific model;

$$Y= \beta_0+ \beta_1 X_3+e$$

Firm Performance = 1.908+0.221 Supervision and Control Processes

4.7.3 Hypothesis Testing

The hypothesis was tested by using the ordinary least square regression. The acceptance/rejection criteria was that, if the p value is less than the conventional p value (0.05), the H_0 is rejected but if it more than 0.05, the H_0 fails to be rejected, The null hypothesis was that supervision and control has no significant effect on the performance of financial market intermediaries in Kenya. Results in Table 4.32 above show that the p value was less than the conventional p value (p=0.05). This

indicated that the null hypothesis was rejected hence supervision and control had a significant relationship with performance of financial market intermediaries.

Further, rejection of the null hypothesis implies that the influence of supervision and control processes on performance of financial market intermediaries is statistically significant. In other words, the role of supervision and control processes in determining the performance of financial market intermediaries cannot be ignored.

4.7.4 Discussion and Empirical

Descriptive results indicated that the overall mean of the responses was 3.99 which indicates that majority of the respondents agreed to the statement of the questionnaire. In addition, the standard deviation of 0.70 indicates that the responses were varied to a small extent. The results herein imply that supervision and control influence performance of financial market intermediaries in Kenya. These findings concur with those of Kehoe and Boughton (2001) and English (2001) who concluded that most organizations prepare formal reports of performance measurements both quantitative and qualitative (where quantification is not possible) that the managers review regularly). These measurements should be related to the standards set in the first step of the control process.

The inferential results indicated that supervision and control processes and firm performance are positively and significantly associated. Further, the results revealed that there is a positive and significant relationship between supervision and control processes and firm performance. These results imply that supervision and control processes play a significant role in the performance of financial market intermediaries in Kenya.

These findings agree with those of Bailey and David (2008) who concluded that the ultimate aim of supply chain supervision and control is to inform decisions necessary for the system managers to take corrective action, as well as to reinforce successes. When performance deviates from standards, managers must determine what changes, if any, are necessary and how to apply them.

In the productivity and quality-centered environment, workers and managers are often empowered to evaluate their own work. After the evaluator determines the cause or causes of deviation, he or she can take the fourth step— corrective action. The corrective action may be to maintain status quo (reinforcing successes), correcting the deviation, or changing standards.

Further, results on hypothesis testing indicated that the null hypothesis should be rejected, implying that there exist a statistically significant relationship between supervision and control processes and firm performance.

4.8 Relationship Management and Performance of Financial Intermediaries in Kenya

The fourth objective of the study was to establish the influence of relationship management on performance of financial market intermediaries in Kenya. Using a five-point likert scale, the study sought to know respondents' level of agreement on various statements relating to effect of relationship management on the performance of financial intermediaries in Kenya.

4.8.1 Descriptive Statistics Analysis

Descriptive statistics such as frequency, percentage, mean and standard deviation were jointly used to summarize the responses as presented in Table 4.33. Majority of 96% (84.70+10.60) of the respondents agreed that they have order matching systems that allow for faster ordering for our firm while 4.7% moderately agreed. The mean of the responses was 4.06 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.39. 74% agreed with the statement that our ordering systems help reduce the lead time, 24% moderately agreed while 2.4% disagreed. The mean of the responses was 3.85 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.66.

Further, the results revealed that majority of the respondents who were 63% agreed that we can communicate to stakeholders and change contract terms flexibly, 34% moderately agreed while 3% disagreed. The mean of the responses was 3.77 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.82.

In addition, 61% of the respondents agreed that the B2B systems have contributed to performance, 38% moderately agreed while 1.2% disagreed. The mean of the responses was 3.67 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.63. Further, 87% of the respondents agreed that the supply chain relationships enhance supply chain visibility, 10.6% moderately agreed while 2.4% disagreed. The mean of the responses was 3.88 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.60.

Lastly, 79.4% of the respondents agreed that the business partners apply win-win concepts, 12.6% moderately agreed while 8% disagreed. The mean of the responses was 3.71 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 1.05. The overall mean of the responses was 3.82 which indicates that majority of the respondents agreed to the statement of the questionnaire. Additionally, the standard deviation of 0.69 indicates that the responses were varied. The results herein imply that relationship management influences the performance of financial market intermediaries.

These findings concur with those of Viswanadham (2002) who noted that in a supply-chain network, there are multiple players including first, second, and third-tier suppliers, contract manufacturers, original equipment manufacturers (OEMs), distributors, and retailers. These can however be broadly categorized as suppliers and customers. For successful supply chain operations and profitability, there is need for coordination between all these players in order to enhance efficiencies in forecasting demand, and hence conducting joint scheduling, and joint product development.

Table 4.33: Relationship Management

Statement	Strongly disagree	Disagree	Moderately agree	Agree	Strongly agree	Mean	Std. Dev
We have order matching systems that allow for faster ordering for our firm	0.00%	0.00%	4.70%	84.70%	10.60%	4.06	0.39
Our ordering systems help reduce the lead time	0.00%	2.40%	23.50%	61.20%	12.90%	3.85	0.66
We can communicate to stakeholders and change contract terms flexibly	1.80%	1.20%	33.50%	45.30%	18.20%	3.77	0.82
Our B2B systems have contributed to our performance	0.00%	1.20%	38.20%	52.90%	7.60%	3.67	0.63
Our supply chain relationships enhance supply chain visibility	2.40%	0.00%	10.60%	81.80%	5.30%	3.88	0.6
Our business partners apply win-win concepts	7.10%	1.20%	10.60%	67.60%	11.80%	3.71	1.05
Average						**3.82**	**0.69**

The respondents were asked to state whether relationship management influences firm's performance. Results in figure 4.8 reveal that 93% of the respondents indicated yes while 7% indicated no. This implies that relationship management plays a significant role in enhancing performance. Therefore, a firm with an effective relationship management system is expected to performance better. Further, the respondents who said yes gave various reasons for their agreement. Majority of the respondents noted that the adoption of relationship management systems has led to a good concept between managers and clients. Further, there is now good relationship between the partners/clients and the management at large.

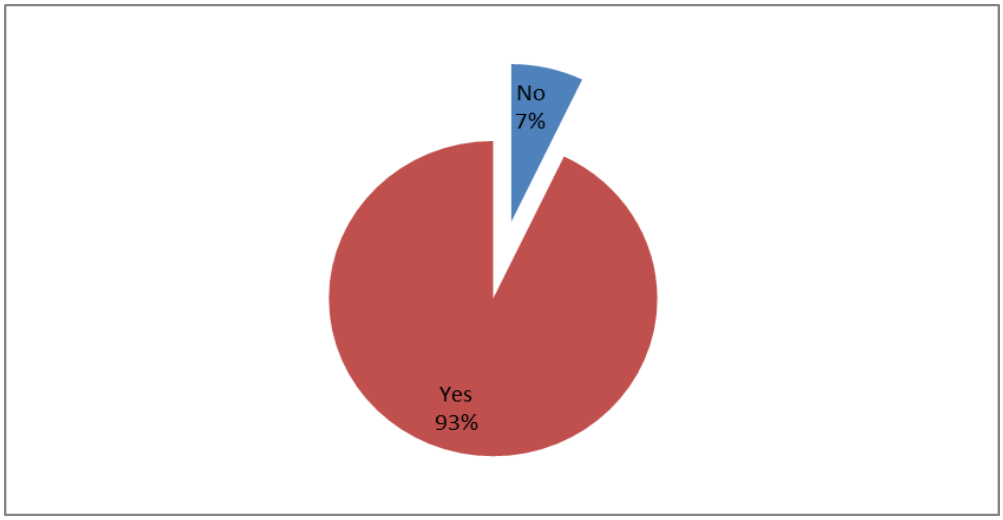

Figure 4.8: Influence of Relationship Management on Performance

The respondents were further asked to indicate whether automation improves or deters managing relationships. Results in figure 4.9 reveal that 89% of the respondents indicated yes while 11% of the respondents indicated no. This implies that automation has a great impact on managing relationships. This implies that firms should ensure they atomize their relationship management systems. Further, majority of the respondents who agreed noted that automation of relationship management systems has enhanced trust and that data is secure.

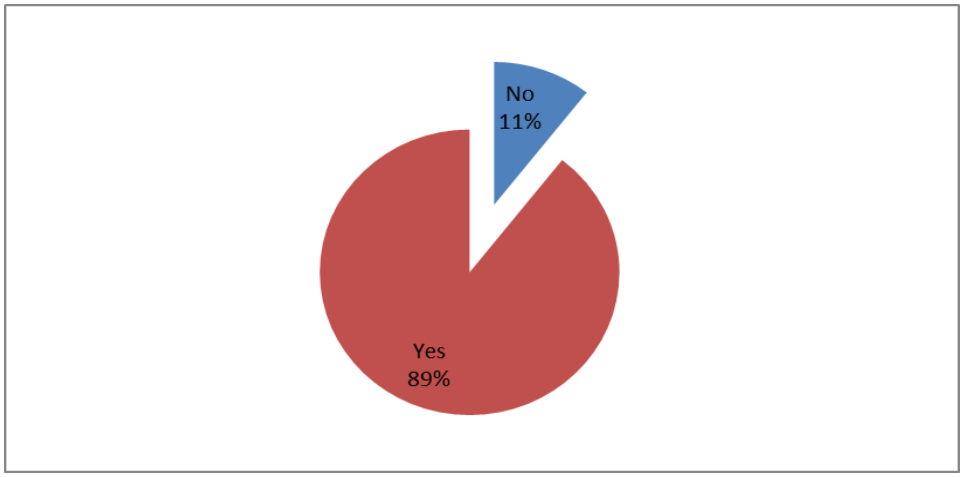

Figure 4.9: Automation influence on Relationship management

When relationship management processes was cross tabulated against financial performance, the results in table 4.34 revealed that relationship management and financial performance are significantly associated (chi=81.356, p value=0.000). This implies that the influence of relationship management on the performance of financial intermediaries is statistically significant.

Table 4.34: Cross Tabulation (Chi Square)

		Categorical Relationship			
		Poor Relationship	Good Relationship	Total	Chi (p value)
Categorical Performance	Low performance	2	7	9	
	High Performance	2	159	161	
Total		4	166	170	**81.356(0.000)**

4.8.2 Inferential Statistics Analysis

Correlation Analysis

Results in table 4.35 indicate the correlation analysis between relationship management processes and performance of financial market intermediaries. The correlation results revealed that there was a positive and a significant association between relationship management and performance of financial intermediaries (r=0.616, p=0.000). This implies that both relationship management and performance of the financial intermediaries change in the same direction. Further, the correlation coefficient (r=0.616) reveals a strong association between relationship management and performance of financial intermediaries.

Table 4.35: Correlation Matrix

		Performance	Relationship Management
Performance	Pearson Correlation	1.000	
	Sig. (2-tailed)		
Relationship Management	Pearson Correlation	.616**	1.000
	Sig. (2-tailed)	0.000	
** Correlation is significant at the 0.01 level (2-tailed).			

Relationship Management Constructs and Performance of Financial Market Intermediaries

Results in table 4.36 present the regression model used in explaining the relationship between relationship management constructs and performance of financial market intermediaries. The regression results in table 4.36 indicate that Order marching systems(X_{41}) explained 30% of variations in performance of Financial Market Intermediaries in Kenya. Additionally, results showed that B2B systems (X_{42}) explained 21% of the variations in performance of Financial Market Intermediaries in Kenya.

Lastly, results indicated that Supply chain relationships (X_{43}) explained 19% of the variations in performance of Financial Market Intermediaries in Kenya. The findings are supported by a coefficient of determination (R^2) of 30%, 21% and 19% respectively.

Further, results indicate that the three models are statistically significant as supported by a p value of 0.000. This implies that Order marching systems(X_{41}), B2B systems (X_{42}) and Supply chain relationships (X_{43}) are good predictors of performance. The results were supported by F statistics of 73.496 (X_{41}), 44.534 (X_{42}) and 39.989 (X_{43}).

Lastly, results indicate a positive and significant relationship between Order marching systems(X_{41}) and performance of Financial Market Intermediaries in Kenya as supported by a p value of 0.000 and a beta coefficient of (0.771). Further, results

reveal a positive and significant relationship between B2B systems (X_{42}) and performance of Financial Market Intermediaries in Kenya as supported by a p value of 0.000 and a beta coefficient of (0.392). Finally, results show a positive and significant relationship between Supply chain relationships (X_{43}) and performance of Financial Market Intermediaries in Kenya as supported by a p value of 0.000 and a beta coefficient of (0.397).

Based on the beta coefficients, it is possible to rank the constructs as to which best explains the performance of Financial Market Intermediaries in Kenya. The findings indicate the coefficients of the three constructs as follows; Order marching systems (β1=0.771), B2B systems (β1=0.392), and Supply chain relationships (β1=0.397). The results herein imply that (X_{41}) best explains performance, followed by (X_{43}) and then (X_{42}).

Table 4.36: Regression Results

	Model 1	**Model 2**	**Model 3**
	Order marching systems (X_{41})	B2B systems (X_{42})	Supply chain relationships (X_{43})
(Constant)	1.170	2.858	2.757
β1	0.771	0.392	0.397
R^2	0.304	0.210	0.192
F-statistics	73.496	44.534	39.989
P-value	**0.000**	**0.000**	**0.000**

Model 1: $Y= \beta_0+ \beta_1 X_{41} + e$

Firm Performance $=1.170+0.771X_{41}$

Model 2: $Y= \beta_0+ \beta_2 X_{42} + e$

Firm Performance $=2.858+0.392X_{42}$

Model 3: $Y= \beta_0+ \beta_3 X_{43} + e$

Firm Performance $=2.757+0.397X_{43}$

Joint Relationship Management Constructs and Performance of Financial Market Intermediaries

The results presented in table 4.37 present the fitness of model used of the regression model in explaining the study phenomena. The findings revealed that jointly, Relationship management constructs explained 45% of the performance of financial market intermediaries in Kenya. This is supported by coefficient of determination also known as the R square of 45%. This means that relationship management explains 45% of the total variations in performance of financial market intermediaries in Kenya.

Table 4.37: Model of Fitness

Indicator	Coefficient
R	0.672
R Square	**0.451**
Adjusted R Square	0.442
Std. Error of the Estimate	0.40482

Table 4.38 provides the results on the analysis of the variance (ANOVA). The results indicate that the overall model was statistically significant as supported by a p value of 0.000. The results were also supported by an F statistic of 45.541 and the reported p value (0.000) which was less than the conventional probability of 0.05 significance level. This implies that relationship management is a good predictor of firm performance.

Table 4.38: Analysis of Variance

Indicator	Sum of Squares	Df	Mean Square	F	Sig.
Regression	22.389	3	7.463	45.541	0.000
Residual	27.204	166	0.164		
Total	49.593	169			

Table 4.39 below presents regression of coefficient results. The findings show that there is a positive and significant relationship between relationship management and performance of financial market intermediaries in Kenya as supported by a p value of 0.000 and a beta coefficient of (0.333). This implies that an improvement in relationship management by 1 unit results to an improvement in performance of financial market intermediaries by 0.333 units.

These findings agree with those of Viswanadham (2002) who noted that in a supply-chain network, there are multiple players including first, second, and third-tier suppliers, contract manufacturers, original equipment manufacturers (OEMs), distributors, and retailers. These can however be broadly categorized as suppliers and customers.

For successful supply chain operations and profitability, there is need for coordination between all these players in order to enhance efficiencies in forecasting demand, and hence conducting joint scheduling, and joint product development.

Table 4.39: Regression of Coefficients

	B	**Std. Error**	**t**	**Sig.**
(Constant)	0.385	0.350	1.100	0.273
Relationship Management Processes	0.333	0.067	4.908	**0.000**

The specific model;

$$Y= \beta_0+ \beta_1 X_4+e$$

Firm Performance = 0.385+0.333 Relationship Management Processes

4.8.3 Hypothesis Testing

The hypothesis was tested by using the ordinary least square regression. The acceptance/rejection criteria was that, if the p value is less than the conventional p value (0.05), the H_0 is rejected but if it more than 0.05, the H_0 fails to be rejected, The null hypothesis was that relationship management has no significant effect on the performance of financial market intermediaries in Kenya. Results in Table 4.39 above show that the p value was less than the conventional p value (p=0.05). This indicated that the null hypothesis was rejected hence relationship management had a significant relationship with performance of financial market intermediaries. Further, rejection of the null hypothesis implies that the influence of relationship management processes on performance of financial market intermediaries is statistically significant. In other words, the role of relationship management processes in determining the performance of financial market intermediaries cannot be ignored.

4.8.4 Discussion and Empirical

Descriptive results indicated that the overall mean of the responses was 3.82 which indicates that majority of the respondents agreed to the statement of the questionnaire. Additionally, the standard deviation of 0.69 indicates that the responses were varied to a small extent. The results herein imply that relationship management influences the performance of financial market intermediaries.

The inferential results indicated that relationship management processes and firm performance are positively and significantly associated. Further, the results revealed that there is a positive and significant relationship between relationship management processes and firm performance. These results imply that relationship management processes play a significant role in the performance of financial market intermediaries in Kenya

These findings agree with those of Viswanadham (2002) who noted that in a supply-chain network, there are multiple players including first, second, and third-tier suppliers, contract manufacturers, original equipment manufacturers (OEMs), distributors, and retailers. These can however be broadly categorized as suppliers and

customers. For successful supply chain operations and profitability, there is need for coordination between all these players in order to enhance efficiencies in forecasting demand, and hence conducting joint scheduling, and joint product development.

Further, results on hypothesis testing indicated that the null hypothesis should be rejected, implying that there exist a statistically significant relationship between relationship management processes and firm performance.

4.9 Supply Chain Automation and Performance of Financial Intermediaries in Kenya

The fifth objective of the study was to determine the moderating effect of supply chain automation on performance of financial market intermediaries. Using a five-point likert scale, the study sought to know respondents' level of agreement on various statements relating to the moderating effect of supply chain automation on performance of financial market intermediaries.

4.9.1 Descriptive Statistics Analysis

Descriptive statistics such as frequency, percentage, mean and standard deviation were jointly used to summarize the responses as presented in Table 4.40. Majority of 93 (78.8%+14.10%) of the respondents agreed that their firm uses extensively ICT solutions in its operations, 5% moderately agreed while 2.4% disagreed. The mean of the responses was 4.04 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.59. Also, 90% of the respondents agreed with the statement that the firm has adapted the new technologies in the stock market within its system, 7% moderately agreed while 3% disagreed. The mean of the responses was 4.14 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.63.

The results revealed that majority of the respondents who were 78% agreed that the operations have been simplified using ICT solutions, 17% moderately agreed while 5% disagreed. The mean of the responses was 3.92 which indicates that majority of

the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.78. Further, 50% of the respondents agreed that registration of accounts is done using ICT technologies, 35% disagreed while 15% moderately agreed.

The mean of the responses was 3.29 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 1.1.

In addition, 50% of the respondents agreed that they vet their clients based on electronic systems, 32% disagreed while 18% moderately agreed. The mean of the responses was 3.24 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 1.19. Further, 92% agreed that ICT strategy is a part of the firm's strategic policy and planning, 6% moderately agreed while 2% disagreed. The mean of the responses was 4.02 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.59. Lastly, 81% agreed that their online reporting systems have enhanced their market brand and customer service, 14% moderately agreed while 5% disagreed. The mean of the responses was 3.86 which indicates that majority of the respondents agreed to the statement. The responses were however varied as indicated by a standard deviation of 0.75.

The overall mean of the responses was 3.79 which indicates that majority of the respondents agreed to the statement of the questionnaire. Additionally, the standard deviation of 0.80 indicates that the responses were varied. The results herein imply that supply chain automation influences the performance of financial market intermediaries. These findings agree with that of Simchi-Levi *et al*. (2003) who stated the objectives of IT in supply chain management as follows: providing information availability and visibility; enabling single point of contact of data, allowing decisions based on total supply chain information, and enabling collaboration with supply chain partners.

Additionally, the findings agree with that of Simchi-Levi *et al*. (2003) who stated the objectives of IT in supply chain management as follows: providing information availability and visibility; enabling single point of contact of data, allowing decisions based on total supply chain information, and enabling collaboration with supply chain partners.

Table 4.40: Supply Chain Automation

Statement	Strongly disagree	Disagree	Moderately agree	Agree	Strongly agree	Mean	Std. Dev
Our firm uses extensively ICT solutions in its operations	1.20%	1.20%	4.70%	78.80%	14.10%	4.04	0.59
The firm has adapted the new technologies in the stock market within its system	0.00%	2.40%	7.10%	65.30%	25.30%	4.14	0.63
The operations have been simplified using ICT solutions	0.00%	5.90%	17.10%	56.50%	20.60%	3.92	0.78
Registration of accounts is done using ICT technologies	0.00%	34.70%	15.90%	34.70%	14.70%	3.29	1.1
We vet our clients based on electronic systems	7.60%	24.70%	17.60%	35.90%	14.10%	3.24	1.19
ICT strategy is a part of the firm's strategic policy and planning	1.20%	1.20%	5.90%	78.20%	13.50%	4.02	0.59
Our online reporting systems have enhanced our market brand and customer service.	2.40%	2.40%	14.70%	67.60%	12.90%	3.86	0.75
Average						**3.79**	**0.8**

The respondents were asked to rate the performance of their firm before automation. Results in table 4.41 reveal that 62% indicated best performance, 35% indicated average performance while 3% indicated poor performance.

Table 4.41: Performance before Automation

Response	Frequency	Percent
poor performance	4	2.5
Average performance	59	34.7
Best performance	105	**61.8**
Total	**170**	**100**

The respondents were also asked to rate the performance of their firm after automation. Results in table 4.42 reveal that 92% of the respondents indicated best performance, 6% indicated average performance while 1% indicated poor performance. Comparing the performance before and after automation, it is evident that majority of respondents indicated best performance after automation. This implies that most of the respondents believe that supply chain automation has led to improved performance.

Table 4.42: Performance after Automation

Response	Frequency	Percent
poor performance	2	1.2
Average performance	10	5.9
Best performance	156	**91.8**
Total	**170**	**100**

The respondents were further asked to indicate the aspects that their company has benefited mostly from automation. Results in table 4.43 reveal that 49% of the respondents indicated financial performance, 28% indicated customer relationship management, 7% indicated supply chain management, 5% indicated client base and trading volume respectively, 4% indicated product development while 2% indicated

data accuracy. This implies that most of the financial market intermediaries have benefitted from automation of financial performance and customer relationship management services.

Table 4.43: Automation Services

Service	Frequency	Percent
Financial performance	83	48.8
Customer relationship management	47	27.6
Client base	9	5.3
Data accuracy	4	2.4
Trading volume	8	4.7
Product development	7	4.1
Supply chain management	12	7.1
Total	**170**	**100**

When supply chain automation was cross tabulated against financial performance, the results in table 4.44 revealed that supply chain automation and financial performance are significantly associated (chi=66.182, p value=0.000). This implies that the influence of supply chain automation on performance of financial intermediaries is statistically significant.

Table 4.44: Cross Tabulation (Chi Square)

		Categorical Automation			
		Low Automation	High Automation	Total	Chi (p value)
Categorical Performance	Low performance	7	2	9	
	High Performance	6	155	161	
Total		13	157	170	**66.182(0.000)**

4.9.2 Discussion and Empirical

Descriptive results indicated that the overall mean of the responses was 4.30 which indicates that majority of the respondents agreed to the statement of the questionnaire. In addition, the standard deviation 0.83 indicates that the responses were varied to a small extent. The results herein imply that automation influences the relationship between supply chain management and performance of financial market intermediaries in Kenya.

The findings agree with that of Simchi-Levi *et al*. (2003) who stated the objectives of IT in supply chain management as follows: providing information availability and visibility; enabling single point of contact of data, allowing decisions based on total supply chain information, and enabling collaboration with supply chain partners.

4.10 Performance of Financial Market Intermediaries in Kenya

The dependent variable in this study was the performance of financial market intermediaries in Kenya. Using a five-point likert scale, the study sought to know respondents' level of agreement on various statements relating to the performance of financial market intermediaries in Kenya.

4.10.1 Descriptive Statistics

Descriptive statistics such as frequency, percentage, mean and standard deviation were jointly used to summarize the responses as presented in Table 4.45. Majority of 96% (25.30+71.20) of the respondents rated the influence of leadership and governance on performance as high while 4% rated it as moderate. The mean of the responses was 4.68 which implied that majority of the respondents rated it as high. However, the responses were varied as indicated by a standard deviation of 0.54. Also, 92% rated the influence of internal cohesion on performance as high, 5.3% rated it moderate while 2.7% rated it low. The mean of the responses was 4.49 which implied that majority of the respondents rated it high. However, the responses were varied as indicated by a standard deviation of 0.71.

Further, 96% of the respondents rated the influence of use of ICT on performance as high while 4% rated is moderate. The mean of the responses was 4.47 which implied that majority of the respondents rated it high. However, the responses were varied as indicated by a standard deviation of 0.59. The results revealed that 91% rated the influence of strategic management strategies on performance as high while 9% rated it moderate.

The mean of the responses was 4.3 which implied that majority of the respondents rated it high. However, the responses were varied as indicated by a standard deviation of 0.62.

In addition, 95% of the respondents rated the influence of good marketing on performance as high while 5% rated it moderate. The mean of the responses was 4.54 which implied that majority of the respondents rated it high. However, the responses were varied as indicated by a standard deviation of 0.59. Further, 66% of the respondents rated the influence of politics on performance as high, 20.6% rated it low while 13.4% rated it moderate. The mean of the responses was 3.67 which implied that majority of the respondents rated it high. However, the responses were varied as indicated by a standard deviation of 1.48. Lastly, 74% rated the influence of macro economics on performance as high, 16% rated it low while 10% rated it moderate.

The overall mean of the responses was 4.30 which indicates that majority of the respondents agreed to the statement of the questionnaire. Additionally, the standard deviation of 0.83 indicates that the responses were varied.

Table 4.45: Performance of Financial Intermediaries in Kenya

Aspects	Very low	Low	Moderate	high	Very high	Mean	Std. Dev
Leadership and governance	0.00%	0.00%	3.50%	25.30%	71.20%	4.68	0.54
Internal cohesion	0.00%	2.40%	5.30%	32.90%	59.40%	4.49	0.71
Use of ICT	0.00%	0.00%	4.70%	43.50%	51.80%	4.47	0.59
Strategic management strategies	0.00%	0.00%	8.80%	52.40%	38.80%	4.3	0.62
Good marketing	0.00%	0.00%	4.70%	36.50%	58.80%	4.54	0.59
Politics	18.20%	2.40%	13.50%	25.90%	40.00%	3.67	1.48
Macro economics	10.00%	5.90%	10.00%	29.40%	44.70%	3.93	1.3
Average						**4.3**	**0.83**

The respondents were asked to state whether automation has influenced the performance of their firms. Results in figure 4.10 reveal that 85% of the respondents agreed that automation has influenced the performance of their firms while 15% of the respondents disagreed that automation has influenced the performance of their firms. This implies that majority of the respondents perceive automation as having influenced their firm's performance. Majority of the respondents noted that automation has greatly enhanced effectiveness and efficiency of the supply chain system, thus improving performance of the firms.

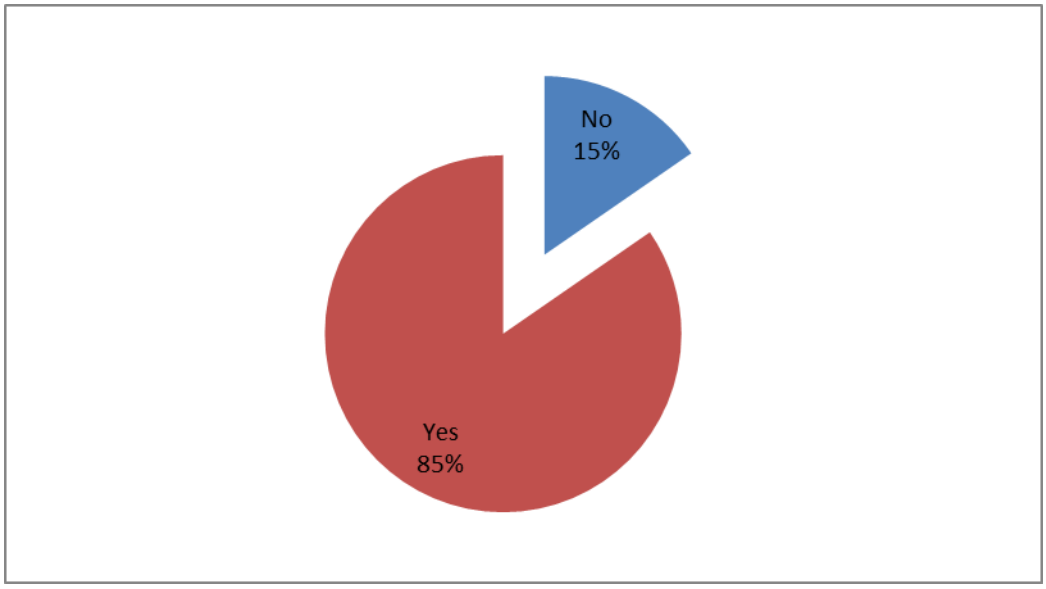

Figure 4.10: Influence of Automation on Performance

The respondents were asked to rate the performance improvement of their firms using the indicators given below. Results in table 4.46 reveal that 67% of the respondents indicated 41-60% improvement in total assets value, 25% of the respondents indicated above 60% improvement in total assets, 6% indicated 21-40% improvement in total assets while 2% indicated 1-20% improvement in total assets.

In terms of improvement in operating cost savings, 52% of the respondents indicated 41-60%, 42% indicated above 60% while 7% indicated 21-40%. In terms of improvement in profit after tax, 53% of the respondents indicated 41-60%, 44% indicated above 60%, 2% indicated 21-40% while 1% indicated no impact. In terms of improvement in sales, 55% of the respondents indicated 41-60%, 44% indicated above 60% while 1% indicated 21-40%. Finally, 65% of the respondents indicated 41-60% improvement in market share, 25% indicated above 60% improvement in market share, 2% indicated 21-40% improvement in market share while 1% indicated no impact on market share improvement. This implies that the overall firms' performance improvement was 41-60%.

Table 4.46: Performance improvement

Statements	No	1-	21 –	41 –	Above

	impact	20%	40%	60%	60%
Improvement in Total assets value	0.00%	2.40%	5.90%	67.10%	24.70%
Improvement in Operating cost savings	0.00%	0.00%	6.50%	51.80%	41.80%
Improvement in Profit after tax	1.20%	0.00%	2.40%	52.90%	43.50%
Improvement in Sales	0.00%	0.00%	1.20%	55.30%	43.50%
Improvement in Market share	0.00%	1.20%	9.40%	64.70%	24.70%

4.11 Trends in Performance of Financial Market Intermediaries in Kenya

4.11.1 Trends in Firm Performance before, during and After Automation

Figure 4.11 shows the trend in the performance of financial market intermediaries in Kenya for the period before, during and after automation of supply chain processes. The diagram shows a constant performance before and during automation. However, the diagram shows a sharp increase in the performance after automation. This means that supply chain automation has a positive impact on the performance of financial market intermediaries in Kenya.

Therefore, the results herein imply that automation of supply chain processes has significantly influenced the performance of financial market intermediaries in Kenya. Further, the results imply that intermediary firms which have not automated their supply chain processes are on the losing edge. There is, therefore, need for these institutions to adopt automation in their supply chain management.

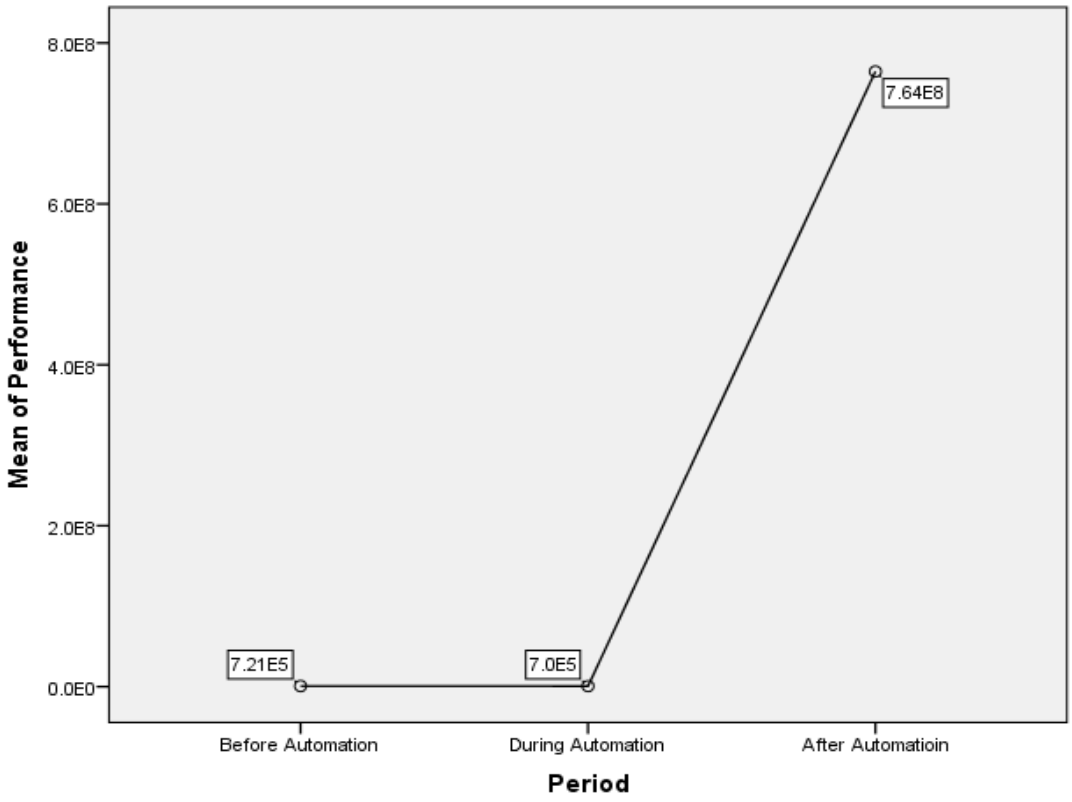

Figure 4.11: Trends in Firm Performance before, during and After Automation

4.11.2 ANOVA Analysis

Table 4.47 below shows that ANOVA results for the firm performance before, during and after automation of supply chain processes. The results reveal a p value of 0.000 which is less than the conventional probability of 0.05 significance level. This implies that there is a statistically significant difference in firms' performance between the three periods.

These findings agree with those of Tanchoco (2012), who concluded that management and control of material flow is an important method of increasing firms' profitability, more so given the process' centrality in matching supply of materials, production of goods, warehousing on the one hand, and consumer demand and marketing on the other.

Table 4.47: ANOVA Analysis

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.40003E+18	2	7.00013E+17	125.822	0.000
Within Groups	3.89446E+16	7	5.56351E+15		
Total	1.43897E+18	9			

4.12 Overall Correlation Analysis

The overall correlation analysis results in table 4.48 revealed that there was a positive and a strong significant association between material flow processes and financial market intermediaries' performance (r=0.784, p=0.000). The results indicated that there was a positive, but weak significant association between information flow processes and financial market intermediaries' performance (r=0.320, p=0.000). The results also indicated that there was a positive, but weak significant association between supervision and control processes and financial market intermediaries' performance (r=0.497, p=0.000). Further the results showed that there was a positive and a strong significant association between relationship management processes and financial market intermediaries' performance (r=0.616, p=0.000). Finally, the results revealed that there was a positive and a strong significant association between supply chain automation and financial market intermediaries' performance (r=0.649, p=0.000).

Therefore, the results herein imply that there is a positive and significant association between supply chain processes and performance of financial market intermediaries in Kenya. This means that as supply chain processes improves, the performance of financial intermediaries also happens to be improving.

Table 4.48: Overall correlation matrix

		Performance	Material Flow	Information Flow	Supervision and Control	Relationship Management	Automation
Performance	Pearson Correlation	1.000					
	Sig. (2-tailed)						
Material Flow	Pearson Correlation	0.784**	1.000				
	Sig. (2-tailed)	0.000					
Information Flow	Pearson Correlation	0.320**	0.502**	1.000			
	Sig. (2-tailed)	0.000	0.000				
Supervision and Control	Pearson Correlation	0.497**	0.621**	0.446**	1.000		
	Sig. (2-tailed)	0.000	0.000	0.000			
Relationship Management	Pearson Correlation	0.616**	0.509**	0.091	0.324**	1.000	
	Sig. (2-tailed)	0.000	0.000	0.236	0.000		
Automation	Pearson Correlation	0.649**	0.698**	0.206**	0.254**	0.702**	1.000

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

4.13 Overall Regression Model before Moderation

The results presented in table 4.49 present the fitness of model used of the regression model in explaining the study phenomena. Material flow, information flow, supervision and control and relationship management were found to be satisfactory variables in the performance of financial market intermediaries in Kenya. This is supported by coefficient of determination also known as the R square of 68%. This means that Material flow, information flow, supervision and control and relationship management explain 68% of the variations in the dependent variable which is performance of financial market intermediaries in Kenya. This results further imply that the model applied to link the relationship of the variables was satisfactory.

Table 4.49: Model of Fitness

Indicator	Coefficient
R	0.824
R Square	**0.679**
Adjusted R Square	0.671
Std. Error of the Estimate	0.31084

Table 4.50 provides the results on the analysis of the variance (ANOVA). The results indicate that the overall model was statistically significant as supported by a p value of 0.000 which is lesser than the critical p value of 0.05. Further, the results imply that the independent variables are good predictors of firm performance. This was supported by an F statistic of 87.071 and the reported p value (0.000) which was less than the conventional probability of 0.05 significance level.

Table 4.50: Analysis of Variance

Indicator	Sum of Squares	Df	Mean Square	F	Sig.
Regression	33.651	4	8.413	87.071	0.000
Residual	15.942	165	0.097		
Total	49.593	169			

Regression of coefficients results in table 4.51 shows that material flow processes have a positive and significant effect on firm performance(r=0.935, p=0.000). The table further indicates that information flow processes and firm performance are positively and significantly related (r=0.151, p=0.004). It was further established that supervision and control processes and firm performance were positively and significantly related (r=0.225, p=0.001). Relationship management processes had a positive and significant effect on firm performance (r=0.458, p=0.000).

These findings agree with those of Tanchoco (2012), who concluded that management and control of material flow is an important method of increasing firms' profitability, more so given the process' centrality in matching supply of materials, production of goods, warehousing on the one hand, and consumer demand and marketing on the other. This implies that increase in material flow processes by 1 unit would increase the performance of financial market intermediaries by 0.437 units.

Therefore, the regression results imply that there is a positive and significant relationship between supply chain processes and performance of Financial Market Intermediaries in Kenya. As such, an improvement in supply chain processes would lead to a corresponding improvement in performance of Financial Intermediaries in Kenya.

Table 4.51: Regression of coefficients

Variable	B	Std. Error	t	sig
(Constant)	-1.273	0.342	-3.724	0.000
Material Flow	0.935	0.097	9.645	**0.000**
Information Flow	0.151	0.020	7.512	**0.004**
Supervision and Control	0.225	0.061	3.689	**0.001**
Relationship Management	0.458	0.085	5.375	**0.000**

The model before moderation is;

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

Firm Performance=*-1.273+0.935X1 +0.151X2 +0.225X3 +0.458X4*

Where,

Y= Firm Performance

X_1 = Material flow

$X_{2=}$ Information flow

X_3= Supervision and Control

X_4= Relationship Management

4.14 Overall Regression Model after Moderation

Results in table 4.52, shows the moderating effect of automation on the relationship between the supply chain processes and performance of financial market intermediaries in Kenya. The findings reveal a significant moderating effect of automation on the interaction between material flow and performance as supported by a p value of (0.000).

Results also reveal a significant moderating effect of automation on the interaction between information flow and performance as supported by a p value of (0.013). Further, results reveal a significant moderating effect of automation on the interaction between supervision and control and performance as supported by a p value of (0.019). Finally, results reveal a significant moderating effect of automation on the interaction between relationship management and performance as supported by a p value of (0.015).

Overall, results indicate that automation has a significant moderating effect on the interaction between supply chain processes and performance of financial market intermediaries. This can be supported by the p value of 0.000 which is less than the critical p value of 0.05. This depicts that we reject the null hypothesis: *Ho_5:* supply

chain automation has no significant effect on performance of financial market intermediaries in Kenya.

Further, the results indicate a coefficient of determination also known as the R square of 85%. This implies that automation increases that explanatory of the supply chain processes. The R square before moderation was 68% while after moderation it is 85%. The new R square of 85% implies that automated supply chain processes explain 85% of the variations in performance of financial market intermediaries in Kenya.

Table 4.52: Moderating Effect of Supply Chain Automation

	B	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	1.918	0.097		19.694	0.000
X_1*Z	-0.088	0.013	-0.578	-6.885	**0.000**
X_2*Z	0.116	0.047	0.638	2.498	**0.013**
X_3*Z	0.04	0.017	0.254	2.362	**0.019**
X_4*Z	0.096	0.039	0.553	2.453	**0.015**
R^2	0.852				
Adjusted R^2	0.848				
F statistics	237.030				
P value	0.000				

The model after moderation is;

$$Y = \beta_o + Z(\beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4) + e$$

Therefore, the optimal model is as follows:

$$\text{Firm Performance} = 1.918 + -0.088\, X_1 * Z + 0.116 X_2 * Z + 0.04 X_3 * Z + 0.096 X_4 * Z$$

Where,

Y= Firm Performance

X_1*Z = Material flow*Automation

X_2*Z = Information flow*Automation

X_3*Z = Supervision and Control*Automation

X_4*Z = Relationship Management*Automation

4.15 Summary of Hypotheses

This section presents the summary of hypotheses testing of the study variables. The rule of thumb was to reject the null hypothesis if the independent variable had a significant relationship with the dependent variable. The significance level was tested at a critical P value of 0.05.

Table 4.53: Hypothesis Testing and Discussion

Objective No	Objective	Hypothesis	Rule	P value Financial Performance	P value Overall	Comment
Objective 1	To establish the effect of material flow on the performance of financial market intermediaries in Kenya.	Ho_1: material flow has no significant effect on the performance of financial market intermediaries in Kenya.	Reject H_{01} if p value for all material flow aspects <0.05	0.000	0.000	The null hypothesis was rejected; therefore material flow processes influence the performance of financial market intermediaries in Kenya.
Objective 2	To determine the effect of information flow on performance of financial market intermediaries in Kenya.	*Ho_2:* information flow has no significant effect on performance of financial market intermediaries in Kenya.	Reject H_{02} if p value for all aspect of information flow <0.05	0.000	0.000	The null hypothesis was rejected; therefore information flow processes influence the performance of financial market intermediaries in Kenya.
Objective 3	To establish the effect of supervision and control on performance of financial market intermediaries in Kenya.	*Ho_3:* relationship management has no significant effect on performance of financial market intermediaries in Kenya.	Reject H_{03} if p value for all aspect of supervision and control<0.05	0.000	0.000	The null hypothesis was rejected; therefore supervision and control processes influence the performance of financial market intermediaries in Kenya.
Objective 4	To establish the influence of relationship management on performance of financial market intermediaries in Kenya.	*Ho_4:* Supervision and control has no significant effect on performance of financial market intermediaries in Kenya.	Reject H_{04} if p value for all aspects of relationship management <0.05	0.000	0.000	The null hypothesis was rejected; therefore relationship management processes influence the performance of financial market intermediaries in Kenya.
Objective 5	To determine the moderating effect of supply chain automation on performance of financial market intermediaries.	*Ho_5:* supply chain automation has no significant effect on performance of financial market intermediaries in Kenya.	Reject H_{05} if p value for all aspect of automation<0.05	0.000	0.000	The null hypothesis was rejected; therefore automation influences the relationship between supply chain processes and performance of financial market intermediaries.

4.16 Revised Conceptual Framework

Based on the results in Table 4.54 a model optimization was conducted. The aim of model optimization was to guide in derivation of the final model (revised conceptual framework) where only the significant variables are included for objectivity. Results in Table 4.54 were arrived at through running multiple regressions. No variable was dropped since all the variables were significant. The variables were arranged in order of significance as follows; material flow, relationship management, supervision and control and lastly supervision and control. Further, the constructs in each of the independent variables were aligned in order of their significance. That is, how best each of the constructs explains the firms' performance.

The figure 4.12 below shows the contributory linkages of variables for supply chain processes and firm performance. The sub-variables and variables are arranged in terms of their regression coefficients (**β**).

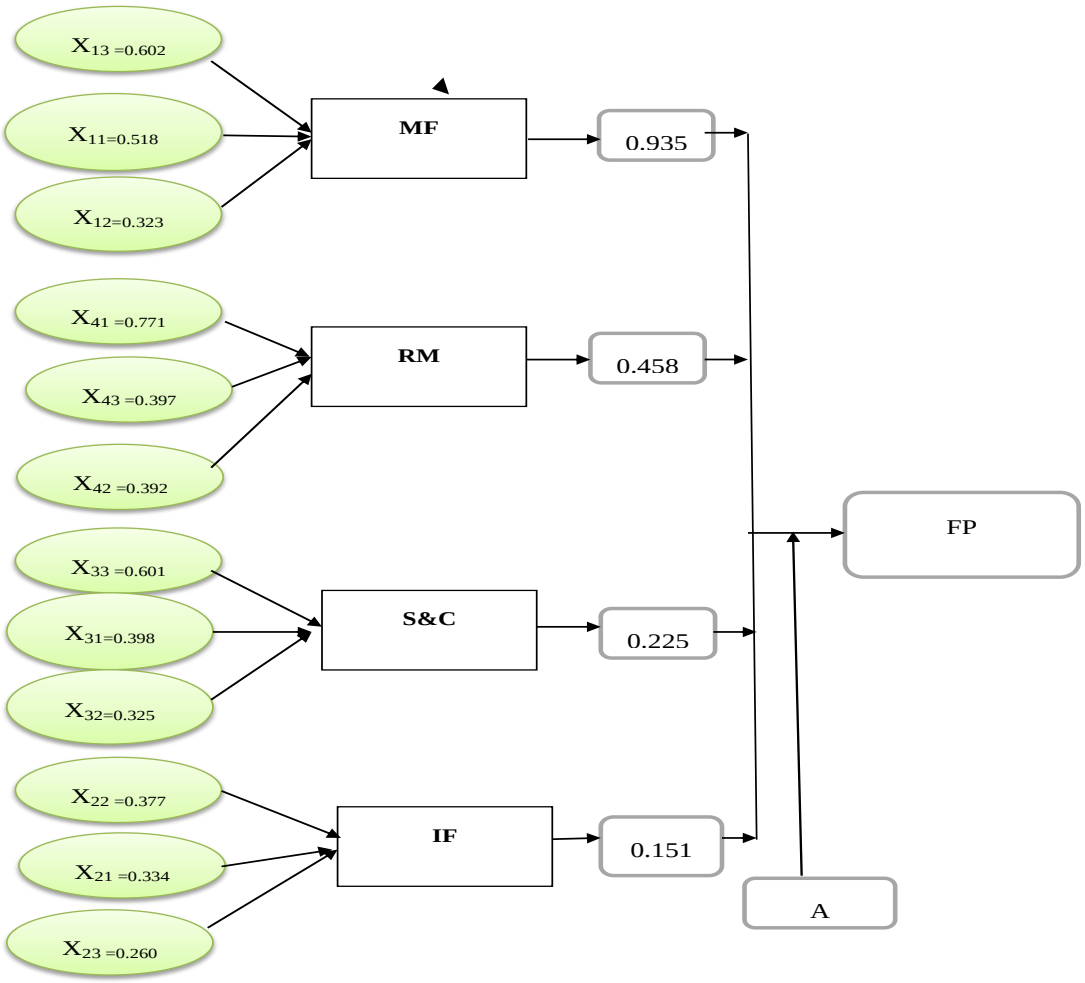

Figure 4.12: Contributory Linkages of Variables for Supply Chain Processes and Firm Performance

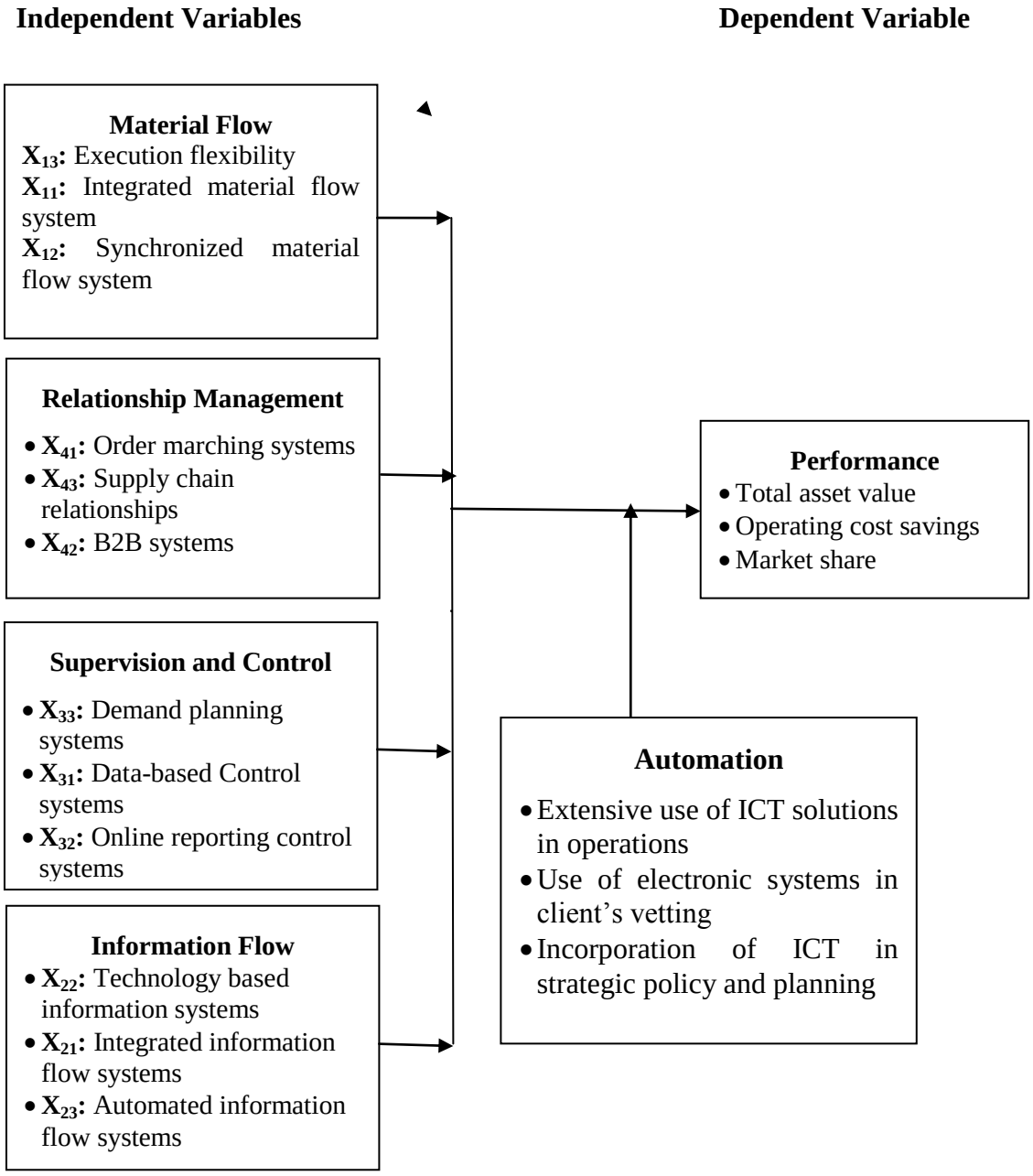

Figure 4.13: Revised Conceptual Framework

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter deals with the summary of the findings, the conclusion and recommendations. This was done in line with the objectives of the study. Areas of further research were suggested and limitations of the study were taken into account.

5.2 Summary

This section summarizes the findings obtained in chapter four in line with the study objectives.

5.2.1 Material Flow Processes

The first objective was to establish the effect of material flow on the performance of financial market intermediaries in Kenya. Results revealed that the financial market intermediaries have an integrated material flow system. In addition, results revealed that the firms use synchronized material flow system which is cost effective. Further, the study findings showed that the firms' material flow systems are integrated using the ICT solutions, and that the firms' material flow systems can handle the required volumes.

Further, based on the beta coefficients, Execution flexibility (X_{13}) was ranked first, integrated material flow system (X_{11}) second and synchronized material flow system (X_{12}) third. This implied that Execution flexibility best explains firm performance, followed by integrated material flow system and lastly synchronized material flow system.

Correlation analysis showed that material flow and performance of financial market intermediaries are positively and significantly associated. Regression analysis indicated material flow has a positive and significant effect on performance of financial market intermediaries. The hypothesis results indicated that there is a

significant relationship between material flow and performance of financial market intermediaries in Kenya.

5.2.2 Information Flow Processes

The second objective was to determine the effect of information flow on performance of financial market intermediaries in Kenya. Results revealed that the financial market intermediaries have automated their information flow systems. In addition, results revealed that the firms perceive getting access to information first as a source of strategic edge. Further, the study findings showed that the firms have technology based information systems and that they have integrated information systems with their partners.

Further, based on the beta coefficients, Technology based information systems(X_{22}) was ranked first, integrated information flow systems(X_{21}) second and automated information flow systems (X_{23}) third. This implied that Technology based information systems(X_{22}) best explains firm performance, followed by integrated information flow systems (X_{21}) and lastly automated information flow systems (X_{23}).

Correlation analysis showed that information flow and performance of financial market intermediaries are positively and significantly associated. Regression analysis indicated information flow has a positive and significant effect on performance of financial market intermediaries. The hypothesis results indicated that there is a significant relationship between information flow and performance of financial market intermediaries in Kenya.

5.2.3 Supervision and Control Processes

The third objective was to establish the effect of supervision and control on performance of financial market intermediaries in Kenya. Results revealed that the financial market intermediaries have control systems based on the data they receive. In addition, results revealed that the firms reporting system to all stakeholders are very effective. Further, the study findings showed that the firms have a sales data repository they use to determine their performance metrics, they have online

reporting and control systems, they have demand planning systems and their control systems allow for joint scheduling for orders with partners in the supply chain.

Further, based on the beta coefficients, Demand planning systems (X_{33}) was ranked first, Data-based Control systems (X_{31}) second and online reporting control systems (X_{32}) third. This implied that Demand planning systems (X_{33}) best explains firm performance, followed by Data-based Control systems (X_{31}) and lastly online reporting control systems (X_{32}).

Correlation analysis showed that supervision and control and performance of financial market intermediaries are positively and significantly associated. Regression analysis indicated supervision and control has a positive and significant effect on performance of financial market intermediaries. The hypothesis results indicated that there is a significant relationship between supervision and control and performance of financial market intermediaries in Kenya.

5.2.4 Relationship Management Processes

The fourth objective was to establish the influence of relationship management on performance of financial market intermediaries in Kenya. Results revealed that the financial market intermediaries have order matching systems that allow for faster ordering. In addition, results revealed that the firms ordering systems help reduce the lead time.

Further, the study findings showed that the firms can communicate to stakeholders and change contract terms flexibly, their supply chain relationships enhance supply chain visibility and business partners apply win-win concepts.

Further, based on the beta coefficients, Order marching systems(X_{41}) was ranked first, Supply chain relationships (X_{43}) second and B2B systems (X_{42}) third. This implied that Order marching systems(X_{41}) best explains firm performance, followed by Supply chain relationships (X_{43}) and lastly B2B systems (X_{42}).

Correlation analysis showed that relationship management and performance of financial market intermediaries are positively and significantly associated. Regression analysis indicated relationship management has a positive and significant effect on performance of financial market intermediaries. The hypothesis results indicated that there is a significant relationship between relationship management and performance of financial market intermediaries in Kenya.

5.2.5 Supply Chain Automation

The fifth objective of the study was to determine the moderating effect of supply chain automation on performance of financial market intermediaries in Kenya. Results revealed that firms use extensively ICT solutions in their operations; firms have adapted the new technologies in the stock market within their systems; operations have been simplified using ICT solutions; registration of accounts is done using ICT technologies; firms vet their clients based on electronic systems and firms' online reporting systems have enhanced our market brand and customer service.

Regression results revealed that the interaction between the independent variables and moderating variable (Automation) is statistically significant therefore supply chain automation moderates the performance of financial market intermediaries and thus moderation is supported. Since the calculated p value of the interaction is $0.000<0.05$, the null hypothesis was rejected and thus supply chain automation had a significant moderating effect on performance of financial market intermediaries in Kenya.

5.3 Conclusion

5.3.1 Material Flow Processes

Based on the findings the study concluded that material flow processes influenced the performance of financial market intermediaries in Kenya. This can be explained by the regression results which showed that the influence was positive and also showed the magnitude by which material flow processes influenced the performance of financial market intermediaries. The univariate regression results showed that

material flow processes influenced the performance of financial market intermediaries by 0.426units. Further, the overall regression results revealed that material flow processes influenced the performance of financial market intermediaries by 0.935units.

This shows that the individual influence of material flow processes on the performance of financial market intermediaries is less than the corporate influence (all the supply chain processes). This is an indication that the presence of other supply chain processes increases the influence of material flow processes.

5.3.2 Information Flow Processes

Based on the findings the study concluded that information flow processes influenced the performance of financial market intermediaries in Kenya. This can be explained by the regression results which showed that the influence was positive and also showed the magnitude by which information flow processes influenced the performance of financial market intermediaries. The univariate regression results showed that information flow processes influenced the performance of financial market intermediaries by 0.169units. Further, the overall regression results revealed that information flow processes influenced the performance of financial market intermediaries by 0.151units.

This shows that the individual influence of information flow processes on the performance of financial market intermediaries is greater than the corporate influence (all the supply chain processes). This is an indication that the presence of other supply chain processes reduced the influence of information flow processes.

5.3.3 Supervision and Control Processes

Based on the findings the study concluded that supervision and control processes influenced the performance of financial market intermediaries in Kenya. This can be explained by the regression results which showed that the influence was positive and also showed the magnitude by which supervision and control processes influenced the performance of financial market intermediaries. The univariate regression results

showed that supervision and control influenced the performance of financial market intermediaries by 0.221units. Further, the overall regression results revealed that supervision and control processes influenced the performance of financial market intermediaries by 0.225 units.

This shows that the individual influence of supervision and control processes on the performance of financial market intermediaries is less than the corporate influence (all the supply chain processes). This is an indication that the presence of other supply chain processes increases the influence of supervision and control processes.

5.3.4 Relationship Management Processes

Based on the findings the study concluded that relationship management processes influenced the performance of financial market intermediaries in Kenya. This can be explained by the regression results which showed that the influence was positive and also showed the magnitude by which relationship management processes influenced the performance of financial market intermediaries.The univariate regression results showed that relationship management processes influenced the performance of financial market intermediaries by 0.333units. Further, the overall regression results revealed that relationship management processes influenced the performance of financial market intermediaries by 0.458units.

This shows that the individual influence of relationship management processes on the performance of financial market intermediaries is less than the corporate influence (all the supply chain processes). This is an indication that the presence of other supply chain processes increases the influence of relationship management processes.

5.3.5 Supply Chain Automation

Based on the findings, the study concluded supply chain automation influenced the relationship between supply chain processes and the performance of financial market intermediaries in Kenya. This was supported by the regression results which revealed that supply chain automation has a significant moderating effect on the relationship

between supply chain processes and performance of financial market intermediaries in Kenya. This was supported by a p value of 0.000.

5.4 Recommendations

The study recommendations are in line with the objectives, findings and conclusions of the study.

The study recommended for fully automation of material flow systems in the financial market intermediaries. This is because management and control of material flow systems is an important method of increasing firms' profitability, more so given the process' centrality in matching supply of materials, production of goods, warehousing on the one hand, and consumer demand and marketing on the other. Further, automation of material flow systems decreases the cost of logistics and inventory, while increasing the efficiency of material sources and information, in order to satisfy market requirements.

Also, the study recommended that financial intermediaries should adopt several models of automation. This will enhance efficiency of the process. Some of the models include Material Requirements Planning (MRP), Just in Time (JIT) delivery, and Lean Manufacturing.

The study recommended for complete automation of information flow systems in the financial intermediaries. This will enhance making of informed decisions based which largely depends on the quality of information given. Also, information flow coordination among the trading partners is essential. The key to enhanced supply chain operations does not lie solely in efficient information transfer and sharing, but also in information availability and timeliness. Additionally, the quality of shared information has a clear impact on the planning outcome and is critical to the effectiveness of decision-making.

The study also recommended that data should be accurate and objective and the decision maker should have a single version of the information. The data should be in such a form that it can be used efficiently and effectively, and at the right time and

place for the right purpose. Some of the information flow models that can be used include electronic data interchange (EDI), electronic fund transfer (EFT), bar codes, point of sale systems (POS), fax, automated voice mail, CD-ROM catalogues, and a variety of others.

The study recommended that supervision and control systems of the financial intermediaries should be fully automated. This will lead to efficient supervision and control of firm's operations. The move will also empower workers and managers to evaluate their own work. Also, the study recommended that firms should adopt various supervisions and control models. For instance, a model-predictive control (MPC) framework is developed to dynamically manage inventories and meet customer requirements in a demand network such as supply chains.

The study recommended that the financial intermediaries should fully automate their relationship management processes. This will lead to improvement of the firm's performance. For instance, in a supply-chain network, there are multiple players including first, second, and third-tier suppliers, contract manufacturers, original equipment manufacturers (OEMs), distributors, and retailers. These can however be broadly categorized as suppliers and customers. For successful supply chain operations and profitability, there is need for coordination between all these players in order to enhance efficiencies in forecasting demand, and hence conducting joint scheduling, and joint product development.

Further, the study recommended that financial intermediaries should adopt several relationship management models, for example customer relations management (CRM) systems. Majority of CRM solution frameworks include: multimedia 24 × 7 customer interactions, intelligent work and customer contact routing, data mining decision making, and tracking tools that link into legacy systems. This new solutions framework creates new operational efficiencies through the alignment of front office and back office processes in direct support of the promises to customers and the business goals for growth, relationships, and efficiency. Automating supplier relations involves use of Partner-relationship management (PRM) systems, which

use the Internet to provide integrated solutions to the challenges of vendor/partner communication.

5.5 Suggested Areas for Further Study

The study recommends that a similar study should be conducted in the private sector for comparison purposes. The study also recommends that a study seeking to establish the effect of automating other processes, such as human resource management on firm performance should be conducted. This would help to give insight to the financial intermediaries and other organizations on what other processes they should automate in order to improve their performance.

Further, the study recommends that a study on the influence of demographic factors on supply chain processes should be conducted. This would help to establish whether there is a certain aspect such as gender, age and education that influences a particular type of supply chain process. This would help to categorize the employees with regard to the supply chain process they are best at and this would assist to maximize the performance.

In addition, the study recommends that future studies should explore more on the impact of modern technology on firm performance. It is evident that technology plays a key role in enhancing organization performance. However, most firms are not able to adopt the appropriate technology. In particular, future studies should focus on identifying factors that determine the adoption technology by firms.

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APPENDICES

Appendix I: Introduction Letter

SUPPLY CHAIN MANAGEMENT PRACTICES, THE PERFORMANCE OF FINANCIAL MARKET INTERMEDIARYFIRMS AND STOCK MARKET AUTOMATION IN KENYA

Dear Respondent,

You are herewith invited to participate in an academic research study conducted by Dennis Gachibu Chege, a student at Jomo Kenyatta University of Science and Technology who is pursuing a PHD in Business Administration. The purpose of the study is to investigate 'Effect of supply chain automation on the performance of financial market intermediary firms in Kenya'**.** All your answers will be treated as confidential, and you will not be identified in any of the research reports emanating from this research.

The results of the study will be used for academic purposes only and may be published in an academic journal.

Yours sincerely

Dennis Gachibu Chege

Appendix II: Questionnaire

QUESTIONNAIRE ON THE EFFECT OF SUPPLY CHAIN AUTOMATION ON PERFORMANCE OF FINANCIAL MARKET INTERMEDIARY FIRMS

PART A: Background Information

What is the number of years you have served in the company…….....?

What kind of organization are you in the financial markets supply chain

Broker

Regulator

Investment bank

Fund management firm

Other

How long has the firm been in existence?

Less than 1 year [ ] 1 – 5 years [ ] 6 – 10 years [ ] over 10 years [ ]

What type of software/ automated systems do you use the most in your daily operations? (You may pick more than one option)

☐ Enterprise Resource Planning

☐ Customer Relations Management

☐ Supplier Relationship Management System

☐ Proprietary software specifically developed for your company

☐ Stock market trading specific software

☐ Interbank trading system

Is supply chain automation good for your company?

Yes ☐ No ☐

Explain why:

.....
.....
.....
.....

To what extent has the use of automated systems aided the performance of your team/department?

Very Much ☐

Significantly ☐

Not at all ☐

PART B: Material Flow

This section uses statements that may represent your firm. Please tick appropriately in the corresponding box. Use a scale of 1 to 5.

(Where; 1 = strongly disagree; 2 = disagree; 3 = moderately agree; 4 = agree and 5 = strongly agree)

NO	STATEMENT	Strongly Disagree	Disagree	moderately agree	Agree	Strongly Agree
		1	2	3	4	5
1	The firm has an integrated material flow system					
2	We have control systems in our material flow system					
3	The firm uses synchronized material flow system which is cost effective					
4	We have a lean material flow system					
5	Our material flow system has execution flexibility					
6	The material flow is integrated using the ICT solutions					
7	Our material flow system can handle volumes needed by the firm					

Do material flow systems improve performance?

Yes: [ ] No: [ ]

Explain your answer above:

……
……

Does automation affect material flow systems?

Yes: [ ] No: [ ]

Explain your above answer:

……
……

PART C: Information flow

This section uses statements that may represent your firm. Please tick appropriately in the corresponding box. Use a scale of 1 to 5.

(Where; 1 = strongly disagree; 2 = disagree; 3 = moderately agree; 4 = agree and 5 = strongly agree)

'In general the firm favors…….'

NO	STATEMENT	Strongly Disagree	Disagree	moderately agree	Agree	Strongly Agree
		1	2	3	4	5
1	Automated systems of flow					
2	Getting access to information first as a source of strategic edge					
3	Fast ordering processes with minimal down time					
4	Technology based information systems					
5	Information integration systems with our partners					

Does information flow influence performance of your firm?

Yes: [ ] No: [ ]

Kindly explain:

…….

…….....

.....

Does automation and ICT capabilities influence information flow?

Yes: [ ] No: [ ]

Kindly explain:

…….

……

……

PART D: Supervision and control

This section uses statements that may represent your firm. Please tick appropriately in the corresponding box. Use a scale of 1 to 5.

(Where; 1 = strongly disagree; 2 = disagree; 3 = moderately agree; 4 = agree and 5 = strongly agree)

NO	STATEMENT	Strongly Disagree	Disagree	moderately agree	Agree	Strongly Agree
		1	2	3	4	5
1	we have control systems based on the data we receive					
2	Our reporting system to all stakeholders is very effective					
3	We have a sales data repository we use to determines our performance metrics					
4	We have online reporting and control systems for our firm					
5	We have demand planning systems					
6	Our forecasting strategies are based on online generated reports					
7	Our control systems allow for joint scheduling for orders with our partners in the supply chain					

Does supervision and control practices affect the firms overall performance?

Yes: [ ] No: [ ]

Kindly explain:

……
……

Does automation affect the supervision and control processes in your firm?

Yes: [ ] No: [ ]

Kindly explain

……
……
……

PART E: Relationship management

This section uses statements that may represent your firm. Please tick appropriately in the corresponding box. Use a scale of 1 to 5,

Where; 1 = strongly disagree; 2 = disagree; 3 = moderately agree; 4 = agree and 5 = strongly agree

NO	STATEMENT	Strongly Disagree	Disagree	moderately agree l	Agree	Strongly Agree
		1	2	3	4	5
1	We have order matching systems that allow for faster ordering for our firm					
2	Our ordering systems help reduce the lead time					
3	We can communicate to stakeholders and change contract terms flexibly					
4	Our B2B systems have contributed to our performance					
6	Our supply chain relationships enhance supply chain visibility					
7	Our business partners apply win-win concepts					

Does relationship management influence firm's performance?

Yes: [ ] No: [ ]

Kindly explain

……
……
……

Does automation improve or deter managing relationships?

Yes: [ ] No: [ ]

Kindly explain

……
……

PART F: Automation

This section uses statements that may represent your firm. Please tick appropriately in the corresponding box. Use a scale of 1 to 5,

Where; 1 = strongly disagree; 2 = disagree; 3 = moderately agree; 4 = agree and 5 = strongly agree

NO	STATEMENT	Strongly Disagree	Disagree	moderately agree	Agree	Strongly Agree
		1	2	3	4	5
1	Our firm uses extensively ICT solutions in its operations					
2	The firm has adapted the new technologies in the stock market within its system					
3	The operations have been simplified using ICT solutions					
4	Registration of accounts is done using ICT technologies					
5	We vet our clients based on electronic systems					
6	ICT strategy is a part of the firm's strategic policy and planning					
7	Our online reporting systems have enhanced our market brand and customer service.					

In your own opinion how would you rate the performance of the firm before automation?

a) Best performance [ ] b) Average performance [ ] c) poor performance [ ]

In your own opinion how would you rate the performance of the firm after automation?

a) Best performance [ ] b) Average performance [ ] c) poor performance [ ]

Which of the following aspects can you say your company has benefited mostly from automation (tick where appropriate)

Financial performance [ ]

Customer relationship management [ ]

Client base [ ]

Data accuracy [ ]

Trading volume [ ]

Product development [ ]

Supply chain management [ ]

PART G: Performance

Has automation influenced the performance of the firm?

Yes: [ ] No: [ ]

Kindly explain……
……

……
……

If the answer to above question was yes, how would you rate the performance improvement using the given indicators?

		No impact	1- 20%	21 – 40%	41 – 60%	Above 60%
1	Improvement in Total assets value					
2	Improvement in Operating cost savings					
4	Improvement in Profit after tax					
5	Improvement in Sales					
6	Improvement in Market share					

Rank the following in terms of how well they have influenced performance.

(Use 1 for low and 5 for high)

		1	2	3	4	5
1	Leadership and governance					
2	Internal cohesion					
3	Use of ICT					
4	Strategic management strategies					
5	Good marketing					
6	Politics					
7	Macro economics					

What other reasons may have influenced the performance?

……
……

Appendix III: Census Population Table

Intermediary	Number of firms	Percentage taken	Proportion taken
Capital Market Authority	1	0.09%	2
Securities exchange(NSE)	1	0.09%	2
Central depositories(CDSC)	1	0.09%	2
Investment banks	10	9.17%	20
Banks with extended licenses	1	0.09%	2
Stock brokers	22	20.2%	44
Investment advisors	17	15.6%	34
Fund managers	21	19.3%	42
Collective investment schemes	16	14.7%	32
Authorized Depository custodians	15	13.8%	30
Credit rating agencies	2	1.83%	4
Venture capital companies	1	0.09%	2
Dealers	1	0.09%	2
Total	109	100	218

Appendix IV: Financial Intermediairies

	FINANCIAL MARKET INTERMEDIARIES
	FUND MANAGERS
1	African Alliance Kenya Investment Bank Ltd
2	African Banking Co-operation
3	Alpha Africa Asset Managers Ltd
4	Amana Capital Limited
5	Apollo Asset Management Company
6	British American Asset Managers Ltd
7	CBA Bank
8	CIC Asset Management Ltd
9	Dry Associated Limited
10	Fusion Investment Management Ltd
11	Genafrica Asset Management Co. Ltd
12	ICEA Lion Asset Management Limited
13	Kenindia Asset Management Co. Ltd
14	Old Mutual Investment Group Limited
15	Pine bridge Investment E.A Ltd
16	Stanlib Investments Ltd
17	UAP Investments Ltd
18	Zimele Asset Management Co.Ltd
	AUTHORIZED DEPOSITORY CUSTODIANS
19	African Banking Corporation
20	Bank of Africa
21	Barclays Bank of Kenya
22	CFC stannic Bank
23	Chase Bank
24	Co-operative Bank
25	Diamond Trust Bank
26	Equity Bank
27	Family Bank
28	I & M Bank
29	Imperial Bank Kenya
30	Kenya Commercial Bank
31	National Bank of Kenya
32	Oriental Commercial Bank
33	Paramount Universal Bank
34	Prime Bank Limited
35	Standard Chartered Bank
36	Trans National Bank

	INVESTMENT ADVISORS
37	Bora Capital Ltd
38	Burbidge Capital Ltd
39	Citidell Company Ltd
40	Cititrust Kenya ltd
41	Deloitte Financial Advisory Ltd
42	Liasison Financial Services ltd
43	Lifestyle Management
44	Meghraj Capital Ltd
45	Orchid Capital Limited
46	Price Waterhouse Coopers Associates
47	Regnum Consultants Ltd
48	Stratagem Capital Management Ltd
49	The Profin Group (K) Ltd
50	VFS International (K) Ltd
	COLLECTIVE INVESTMENTS SCHEMES
51	African Alliance Kenya Unit Trust Scheme
52	Amana Unit Trust Funds Scheme
53	British American Unit Trust
54	CIC Unit Trust Scheme
55	Commercial Bank of Kenya Unit Trust Scheme
56	Diaspora Unit Trust Scheme
57	Dyer and Blair Unit Trust Scheme
58	Equity Investment Bank Unit Trust Scheme
59	First Ethical Opportunities Funds
60	Genghis Unit Trust Funds
61	ICEA Lion Asset Unit Trust
62	Madison Asset Unit Trust
63	Nabo Unit Trust Fund
64	Old Mutual Trust Funds Scheme
65	Pan Africa Unit Trust
66	Standard Investment Trust Fund
67	Stanlin Unit Trust Scheme
68	UAP Investments Collective Investment Scheme
69	Zimele Unit Trust
	STOCK BROKERS
70	ABC Capitals
71	Africa Investment Bank
72	Apex Africa
73	CBA Capital Limited
74	Discount Securities

75	Dyer & Blair Investment Bank Ltd
76	Equity Investment Bank
77	Faida Investment Bank
78	Francis Drummond
79	Gengis Capital
80	Kestrel Capital (EA) Ltd
81	Kingdom Securities Ltd
82	Ngenye Kariuki & Co.Ltd
83	NIC Securities
84	Old Mutual Securities Ltd
85	Renaissance Capital (Kenya) Ltd
86	SBG Securities
87	Standard Investment Bank
88	Sterling Capital Ltd
89	Suntra Investment
	Investment Banks
90	Faida Investment Bank
91	Kestrel Capital
92	Ngenye Kariuki and Co
93	Renaissance Capital (Kenya)
94	Sterling Capital
95	Suntra Investment
96	Discount Securities
97	NIC Securities
98	Equity Investment Bsnk
99	Africa Investment Bank
100	Capital Market Authority
101	ABC Capital
102	African Alliance Kenya Investment Bank
103	SBG Securities
104	ApexAfric Capital
105	Dyer and Blair Investment Bank
106	Genghis Capital
107	Kingdom Securities
108	Standard Investment Bank
109	Old Mutual Securities

Appendix V: Secondary Data Template

Before Automation				During Automation	After Automation					
Years	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Firm										
Performance										

The secondary data was obtained from the annual financial records of the firms for the period from 2003 to 2012. The fact that this period represented a particular government regime (Kibaki regime) is justifiable. It is during this period, 2006 in particular, that the financial market intermediary firms automated their supply chain systems. The study, therefore, wanted to assess the firms' performance before, during and after supply chain automation but within the same government regime. In other regimes, various factors other than automation affected the performance of financial intermediary firms and thus the need for exclusion.