IMPACT OF INFORMATION TECHNOLOGY ON INVENTORY MANAGEMENT IN SUPERMARKETS IN NAIROBI CITY COUNTY

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A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION (MBA), SCHOOL OF BUSINESS, UNIVERSITY OF NAIROBI

OCTOBER 2015

DECLARATION

This is my original work and has not been submitted for any degree in any other university

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Supervisors Declaration

This project has been submitted with my approval as university supervisor.

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ACKNOWLEDGEMENT

I thank the Almighty God for the strength and countless blessings granted to me to have been able to start and finish the MBA programme.

I wish to express my gratitude to my supervisor Mr. J.T Kariuki and moderator Mr. Michael Chirchir for their professional guidance and advice when I was writing this project. I wish to acknowledge their generosity with their time when it came to discussing matters involved with this project.

To my colleagues with whom we encouraged each other throughout the programme, thank you Agnes Njakai for always helping each other with coursework and assignments and Joshua Mwenda for always alerting me on proposal and project deadlines.

To my husband James Kirimi and family both nuclear and extended who have always encouraged me to work hard and shine thank your support by keeping me on my toes by constantly enquiring of my graduation and the support you accorded me.

I also take this opportunity to thank the staff of all the supermarkets operating within Nairobi for the assistance they accorded me during data collection period. The objectives would not have been achieved were it not for you

DEDICATION

I dedicate this project to my mother, Magdalene Kinanu for the sacrifices you made to ensure I got the best education as per your capability.

ABSTRACT

Information technology in inventory management acts as a tool for enhancing efficiency and cost reduction. Some supermarkets that have implemented IT in inventory management have succeeded while others have failed. The study sought to determine the impact of information technology on inventory management in supermarkets in Nairobi. The objectives of the study were: to establish the extent of usage of IT systems in inventory management in supermarkets in Nairobi and to determine the impact of IT used on inventory management performance in the supermarkets in Nairobi. The study used a descriptive research design. The study had a response rate of 70%. Data analysis was done using descriptive statistics and regression analysis. The study concludes that vendor managed inventory systems and warehouse management systems were implemented to a greater extent by supermarkets in Nairobi. Supermarkets should invest more in modern technologies for example information communication technology in order to achieve integration, minimize communication costs, enhance efficiency and increase sharing of information which will eventually lead to improved performance. The regression results reviewed that IT adoption in inventory management was positively related to performance of supermarkets in Nairobi. The study therefore recommends that the supermarkets in Kenya should invest in modern technologies in order to integrate their supply chain management systems. This would minimize communication costs and increase sharing of information leading to improved efficiency and performance of supermarkets in Kenya. The findings of a survey based on other sources of information and the use of absolute data could provide additional findings. The researcher faced significant time and cost constraints which limited the scope of the study. The study limited itself to supermarkets that are concentrated within Nairobi County; it would have been more useful if the researcher collected data in another town outside Nairobi County in order to have some comparative findings and to draw conclusive results. Future researchers might consider investigating the impact of IT used on inventory management performance in large supermarkets in Kenya like Nakumatt, Naivas, Tuskys, Uchumi and Ukwala. This is because their level of adoption and implementation of information technology is relatively high as compared to other categories of supermarkets in Nairobi. The findings obtained in this study might be used to make a comparison with all the supermarkets in Kenya.

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ABBREVIATIONS AND ACRONYMS

ARP	Automatic Replenishment Programs
CIPS	Chartered Institute of Purchasing and Supplies
CPFR	Collaborative Planning, Forecasting and Replenishment
EDI	Electronic Data Interchange
EPOS	Electronic Point-Of-Sale
ERP	Enterprise Resource Planning
ICT	Information Communication Technology
QR	Quick Response
RBV	Resource Based View
RFID	Radio Frequency Identification
SPSS	Statistical Package for Social Sciences
TCE	Transaction Cost Economies
VMI	Vendor Managed Inventory
WMS	Warehouse Management Systems

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Today's volatile global business environment is characterized with supply chains that are increasingly longer and more intricate, with more interconnected links, higher stakeholders' expectation, and more sources of supply chain competition (Gunasekaran, Patel, & Tirtiroglu, 2001). Successful supply chain management relies on organizations working together and collaborating effectively (Lazzarini et al., 2001). Due to the global span and impact of the supply chain, firms instinctively understood that the synchronized flow of materials and services, information, knowledge, and finance had the potential to produce desirable outcomes. In cognizance of the need to coordinate and integrate these flows both within and among companies, firms have continually integrated modern information technology tools in Supply Chain Management (SCM) which has resulted in the improved business efficacy to a level never imagined before.

One of the most common problems in Supply Chain (SC) is the so-called bullwhip effect. Even small fluctuations in demand or inventory levels of the final company in the chain are propagated and enlarged throughout the chain. Because each company in the chain has incomplete information about the needs of others, it has to respond with a disproportional increase in inventory levels and consequently an even larger fluctuation in its demand relative to others down the chain (Forrester, 1958, 1961).

The integration of IT in SCM and in particular inventory management holds great potential to unlocking the efficacy of inventory management in today's supply chains by improving information sharing, increasing predictability, reducing waste in value

chains, better monitor demand for certain products and place orders to prevent an out-of-stock situation, hence reducing bullwhip effects and lead time. Information Technology (IT) continues to be one of the most important enablers of effective supply chain management (Jack et al, 2006) and improves supply chain agility, reduces cycle time, achieves higher efficiency and deliver products to customers in a timely manner (Radjou, 2003).

A great deal of interest in supply chain management stems from the availability of information and the methods to analyze this information to reach meaningful results. (Haag & Stephen, 2010) assert that the increasing importance of electronic business brings to fore new opportunities and the widespread use of internet makes IT tools a source of competitive power for many companies. Further, IT has been adopted in inventory management processes by firms as a competitive edge and to build strategic long term relationships along the supply chain.

The swift development of IT, as well as the declining prices for its use, has considerably enhanced its diffusion during the last few years. As a consequence, the impact of IT on productivity has become a broadly discussed topic in management sciences, and several studies find empirical evidence for the positive productivity effects of IT at the firm level (Brynjolfsson & Hitt, 2000; Licht & Moch, 1999). Nevertheless, IT adoption may increase organizational flexibility and competitiveness (Patterson, Grimm & Corsi, 2003).

1.1.1 Inventory Management

Inventory management is pivotal in any effective and efficient organization. The principal goal of inventory management involves having to balance the conflicting economics of not wanting to hold so few or too much stock. Such a golden balance is

important in two ways; firstly as it saves the organization from having to tie up inactive capital, incurring huge costs in storage, spoilage, pilferage and obsolescence of inventory and secondly to avert the cost of not meeting customer requirements. According to the Official Dictionary of Chartered Institute of Purchasing and Supplies (CIPS) inventory is a list of items held in stock or on the asset register of an organization often used to mean the stock itself.

An inventory management system is a system that encompasses all aspects of managing a firm's inventories; purchasing, shipping, receiving, tracking, warehousing and storage, turnover, and reordering. (Abernathy et al, 2000) hold that retail firms can obtain massive benefits by integrating its inventory management systems with both logistics and its upstream supply chain. This would thrust inventory system to 'just-in-time' demand-pull supply systems which implies essentially linking reordering to real-time electronic point-of-sale (EPOS) - record consumer demand, allow tracking of orders consequently substantial reductions in both retailer inventory holdings and the amount of capital tied up in those holdings.

1.1.2 Information Technology

IT in SCM refers to the use of interorganizational systems that are used for information sharing and/or processing across organizational boundaries. These IT tools includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning (www.techopedia.com). Information Communication Technology (ICT) systems provide a supportive role for human resource activities to improve organizational (or personal) efficiency and

effectiveness (Cohen et al, 2002). They help to execute activities faster, support autonomous decision-making processes, and enable distributive operations (Huang & Nof, 1999) in order to achieve higher logistics efficiency (Jack et al, 2006). In away, the effective use of ICT makes the processes more transparent to the stakeholders, which in turn, could lead to adoption of better business practices to meet the customer service levels (Bharadwaj, 2000). The desire of any organization is to have ICT tools facilitating the production process, marketing, supply chain integration and customer feedback which help it to better outreach and eventually in reducing the business costs and reaps high costs.

Supply chain covers all activities related to the flow and transformation of products from the raw materials point (extraction), through to the consumer as well as the related information flows (Effy & Jones, 2008). As observed by (Fine, 1998), in a usual supply chain, supplies are procured and items are produced at one or more factories, shipped to warehouses for transitional storage space and then forwarded to retailers or end users. Supply chains encompass the companies and the business activities needed to plan, create, transport, and use a goods or service. Businesses expect their supply chains to provide them with the necessary information so as to carry on and succeed. Inaccuracy problems in inventory management are important in supply chain management. Although many companies have automated their inventory management using ICT tools, inventory levels in information systems and the real physical inventory levels often do not match. The difference between these inventory levels is called inaccuracy and can deeply affect the performance of the firms.

In today's highly competitive business environment, organizations are striving to achieve effectiveness, cost efficiencies and economies of scale. Supermarkets hold inventory so as to meet their customers' needs which are greatly diverse. However,

managing customer demand for inventory in order to achieve their objectives is a challenge especially owing to the huge volumes of inventory transacted through the stores. The innovations in information communication technology present a basket of ICT solutions which can be applied in varying degree and business contexts sometimes at very huge costs. However, these technologies are costly to adopt and will influence inventory management differently as well as the firms' performance. Notwithstanding the array of inventory management technologies available the adoption of certain technologies though modern may not provide commensurate benefits to justify the huge cost outlays borne by the retail firms. For instance, in 2013, Uchumi supermarkets installed an Enterprise Resource Planning system that took a period of 18 months and a cost of over USD 1.2 million for license and an additional USD 2 million for implementation and an annual maintenance cost of USD 150,000. Besides improvement in coordination and communication, there were no immediate benefits noted from this installation (Balancing Act, 2013).

1.1.3 Impact of IT on Inventory Management

Supply chain management emphasizes the long-term benefit of all parties on the chain through cooperation and information sharing. This confirms the importance of IT in SCM which is largely caused by variability ordering (Yu et al, 2001).

There have been an increasing number of studies of IT's effect on supply chain and interorganizational relationships (Grover et al, 2002). IT appears to be an important factor for collaborative relationships. A popular belief is that IT can increases the information processing capabilities of suppliers, thereby enabling or supporting greater relationship in addition to reducing uncertainty (Subramani, 2004.). IT decreases transaction costs between buyers and suppliers and creates a more

relational/cooperative governance structure, leads to closer buyer-supplier relationships (Bakos & Brynjyoolfsson, 1993) may decrease trust-based interorganizational partnerships and removes a human element in buyer-supplier interaction, while trust is built on human interaction (Carr & Smeltzer, 2002).

1.1.4 Supermarkets in Nairobi City County

At the moment, the total number of supermarkets operating in Nairobi, (See Appendix), according to the Official Yellow Pages Kenya are one hundred and thirty six (136) (yellowpageskenya.com, 2015) out of which 12 have more than one branch. Majority of these supermarkets are locally founded and largely family owned with Uchumi supermarket co-owned with the government while a handful are international affiliates. Only three supermarkets; Nakumatt, Tuskys and Uchumi have opened branches in East African Countries with Nakumatt leading the foray. Kenya's formal retail industry is the second largest in Sub-Saharan Africa at 30% behind South Africa at 60% and accounted for 8.1 per cent to the country's total Gross Domestic Product (GDP) in 2014 according to the Kenya Economic Survey (KNBS 2015). In addition, a study by Consumer Insight (2014), a leading market research firm estimated the average value of a shopper's basket to be $20, making Kenya's retail industry, Africa's fastest-growing retail market. Kenya's retail industry is a fiercely contested market, dominated by the Nakumatt, Tuskys, Uchumi, Naivas and Ukwala supermarket chains and three foreign-based supermarket chains.

ICT has redefined inventory management in many retail firms by adopting new ways to store, process, distribute and exchange information both within companies and with customers and suppliers in the supply chain. Initiatives such as Vendor Managed Inventory (VMI) and Collaborative Planning, Forecasting and Replenishment (CPFR)

are based on an increased level of automation in both the flow of physical materials and goods and the flow of information between companies to improve the efficiency in the entire supply chain. Irungu and Wanjau (2011) assert the adoption of Vendor Managed Inventory (VMI) system by Nairobi-based supermarkets improved stock management, cash flows and risk management. ICT has been recognized as an enabler for information sharing which is a key component in automatic replenishment programs (ARP). (Lee et al, 1997; Daugherty et al, 1999).

The adoption of ICTs in retailing firms has enormous benefits to the firm and these benefits are best expressed in terms of company performance such as efficiency and effectiveness (Sriram & Stump, 2004; Sanders & Premus, 2005). According to (Daugherty et al, 1998) customer requirements drive the need for networked organizations hence networked inventory management which requires a lot of information processing within and between the networked organizations. Networked organizations must have automated information systems for them to succeed.

A key influence of ITs on inventory management is the change it has over business relationships for instance the Vendor Managed Inventory (VMI) shifts responsibility on inventory replacement/replenishing from retailer to the vendor through collaborative planning and information sharing. ICTs contribute to improved communications patterns, an increased demand for coordination of joint activities and new organizational and societal structures through its ability to store, transmit and process information and speed up inter-organizational activities (Clemons & Row, 1992, 1993; Nidumolu, 1995; Sriram & Stump, 2004).

1.2 Statement of the Problem

Inventory is often the largest asset after fixed assets. Inventory costs are often the biggest costs in businesses (Harrington, 1996) and these costs if reduced would yield the greatest benefit in strengthening the firm's competitive edge. Effective inventory management which involves integrating modern ICT allows an organization to fulfill customers' expectations of product availability while enhancing the retailer to achieve the golden balance of not holding too much stock thus minimize inventory costs.

Supermarkets and other retail firms face the impossible task of physically monitoring the inventory levels of each stock item. Using ICT solutions to automate an organization inventory processes optimizes efficiencies (accuracy and flexibility) and achieves greater coordination of the activities of inventory management of the organization.

There is a significant amount of research demonstrating the adoption of ICT in supermarkets in Kenya and beyond. Yu & Ramanathan, (2008) studied ICT adoption in UK firms and found out that out of 41 retail businesses that included supermarkets, 20 had installed high technology in ICT and had achieved significant operational efficiency. Otiso, Chelangat, & Bonuke (2012) carried out a research that aimed at establishing effectiveness of ICT in service quality delivery at Kenya Power and Lighting Company. The study found out that ICT boosted service quality and improved customer satisfaction.

Omwansa (2013) in his study on ICTs and operational efficiency in supermarkets in Nairobi found out that the supermarkets with largest extent of ICT application in their premises had the highest operational efficiency. However, the impact of ICT on

inventory management on supermarkets in Nairobi has not been given appropriate attention by scholars. Irungu and Wanjau (2011) carried out a research on the effects of Vendor Managed Inventory (VMI) technology on supermarkets in Kenya. They found out that utilization of VMI systems increased effectiveness in stock management and cash flow management. Majority of the existing studies do not address the impact of information communication technologies adopted in inventory management by supermarkets in Nairobi. The study sought to answer the question; what is the impact of ICT on inventory management in supermarkets in Nairobi, Kenya?

1.3 Objectives of the Study

The aim of this research was to establish the impact of ICT on inventory management in supermarkets in Nairobi.

1.3.1 Specific Objectives

The specific objectives of the study were to:-

i. Establish the extent of usage of IT systems in inventory management in supermarkets in Nairobi.

ii. Determine the impact of IT used on inventory management performance in the supermarkets in Nairobi.

1.4 Value of the Study

The study will be of importance to large scale retailers/supermarkets to know the suitable ICT which they can adopt in inventory management. This study is of great importance to supermarkets owing to the highly competitive environment and the huge investment in inventory these firms transact in.

Academicians will benefit from this study as it will serve as a platform for further research, review and critiques which will notably help bring to fore new knowledge in inventory management in Kenya. Additionally, new insights can also be drawn from the comparison of inventory management processes across economies as shall be presented in the paper hence new knowledge.

The government as a facilitator of ICT adoption through regulations and provision of appropriate infrastructure will find this paper useful as it can inform its decisions and policy papers especially on integrating inventory management to include tracing and tracking of consumer goods. This is necessary to increase safety to consumers.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter describes integration of ICTs in inventory management systems and their potential benefits. Further the conceptual framework necessary to address the research question will be discussed.

2.2 Theoretical Framework

The impact of ICT on inventory management can best be explained by two theories namely the Transaction Cost Economics (TCE) theory (Maltz, 1993; Skjott-Larsen, 2000) and Resource Based View (RBV) theory of the firm (Barney, 2011; Pandza, 2003)

2.2.1 Transaction Cost Economics (TCE) Theory

The Transaction Cost Economics (TCE) theory argues that the use of ICT will lead to reduced transaction costs associated with the management of transactions (Coase, 1937; Alchian & Demsetz, 1972; Williamson, 1975) and by efficient coordination. Explicitly recognizing the costs of coordination among economic entities in markets, TCE stresses that a firm's central task is to coordinate transactions efficiently (Williamson, 1985). ICT can lower coordination costs, and in supply chain contexts, digitally enabled integration capability can substantially improve transactional efficiencies through increased information sharing and communications capabilities, resulting in improved supply chain performance (Zhu & Kraemer, 2005). Furthermore, as argued by (Lopez, 2013), ICT resources impact on communication improvement; this includes internal and external communication and coordination of activities and this enables a faster and more efficient use of information both within

the firm and with external agents, such as customers and suppliers. TCE sheds light on the role of the digitally enabled supply chain management in competitive environments.

An important feature of a competitive environment is the extensive competitive actions in the markets, such as competitive entry, price change, supplier alliances, and new product introduction (Ferrier, 2001). To improve performance or even survive in competitive environments, a firm needs to adapt its businesses to respond to competitive actions (Sambamurthy et al, 2003). If a manufacturer's operation is frequently affected by competitors' actions, it may face greater needs to coordinate with supply chain partners. For example, a manufacturer that needs to modify the design of its product, because of market entry or new products launched by competitors, also needs to modify the design of upstream components that constitute the product; it may also need to rearrange downstream channels for new product distribution. These may induce considerable coordination tasks (Bensaou, 1997). Accordingly, technologies that help reduce coordination costs are more valuable in intensely competitive markets.

2.2.2 The Resource Based View (RBV) Theory

This theory states that to transform a short-run competitive advantage into a sustained competitive advantage requires that these resources are heterogeneous in nature and not perfectly mobile. Effectively this translates into valuable resources that are neither perfectly imitable nor substitutable without great effort. If these conditions hold, the bundle of resources can sustain the firm's above average.

Barney (2011) argues that the RBV approach has evolved from a nascent, upstart perspective to one of the most prominent and powerful theories for describing,

explaining, and predicting organizational relationships. The RBV theory attempts to explain how technology creates value (Zhu & Kraemer 2002, 2005). The RBV theory attributes improvement in firm performance to valuable resources or resource bundles (Barney 1991, Peteraf 1993). ICT creates value to the firm indirectly as it affects other resources or processes which in turn lead to performance improvement and hence competitive advantage. Therefore, researchers may find it particularly beneficial to use intermediate-level dependent variables at the business process, department, or project level (Wade & Hulland 2004, pp. 129–130). In light of this logic, the study will particularly address the impact of ICT on inventory management by focusing on the inventory management practices; supplier relationships, inventory operations, procurement and ordering processes, warehousing and storage management process, and customer relationships through which such impact can be felt in the organization. Revenue generation and cost reduction are the two major dimensions of process performance improvements through supply chain integration

ICT adoption is aimed at process improvement primarily cost reduction and revenue generation ((Mukhopadhyay & Kekre, 2002). Such improvements, seen from the RBV, stem from resource synergy along the supply chain. Effective SCM aims to synchronize supply, production, and delivery (Lee et al, 2000). For this to happen, firms needs to leverage the connectivity of the Internet to create an inter-firm digital platform, enabling real-time information sharing, and improving coordination of allocated resources across the supply chain (Lee, 2004). The digital platform helps establish connections among separate resources owned by supply chain partners, thus translating them into bundles of coexisting resources responsive to each other (Zhu & Kraemer, 2002). This is consistent with the notion of creating resource synergy as advocated by the RBV (Conner, 1991).

In inventory management, such value enhancement is manifest in the adoption of innovative techniques such as vendor managed inventory and business models that rely heavily on information sharing and collaborative planning. One such model is the Collaborative Planning, Forecasting and Replenishment (CPFR) model which takes a holistic approach to supply chain management and combines the intelligence of multiple trading partners in planning and fulfilling customer demand by using common metrics, language and firm agreements to improve efficiency for all participants. CPFR links sales and marketing best practices – category management, supply chain planning and execution processes to increase availability while reducing inventory, merchandizing, transportation and logistics costs.

2.3 Information Technology

Development of IT is increasing at a rapid pace in effort to fill gaps in the market that are identified and which promise to meet needs of users in various fields. New software and matching equipment have been developed and adapted to daily lives of people. Examples of developments in ICT tools include smartphones, tablet computers, cloud computing, fast internet speeds now in Fourth Generation (4G) stage among others. These can be adopted to fit into operations of supermarkets to increase operational efficiency. Some of the areas where ICT is applied in a business context include linking business partners and players through network, fast generation of information and seamless decision making by multiple stakeholders.

Today, some organizations are dependent on ICT for deploying e-commerce platforms to increase business presence and link to customers, data mining where patterns can be used to guide firms to make timely decisions and simplification of tasks that otherwise could be unwieldy to manage by humans. Because businesses are

dependent on ICT in improvement of service delivery, they have incorporated it into their strategic plans to give it deserved attention (Kodama, 2013). Applications of ICT are as wide as are the needs of an organization; they can range from simple point of sale unit to a whole organization where Enterprise Resource Planning system is installed to manage almost every aspect of the organization. Some of these areas include supply chain management, human resources, customer management and accounts (Duggan, 2012).

2.4 Inventory Management

The inventory management is regarded as a key element for the reduction and control of total costs and improvement of the level of service provided by the companies (Wanke, 2004). For (Roy, 2012), the area plays very important role in the overall cost of operations and supply chain of any business big or small. For (Han, 2007), inventory is used as a cushion against the supply and demand uncertainties. In the same vein, for Khunagornniyomrattana et al (2007), inventory is a double edged weapon, since the lack of inventory leads to loss of productivity, while excess inventory leads to loss of profitability. Thus, (Oliveira & Rodriguez, 2008) argue that inventory management has direct and significant effects on operational efficiency (performance) and company finances and (Roy, 2012) points out that an effective inventory management will always give a competitive advantage to the business over its competitors.

2.4.1 Economic Order Quantity Model

Economic order quantity (EOQ) is the level of inventory that minimizes total inventory holding costs and ordering costs. It is one of the oldest classical production scheduling models developed by Harris F. W. in 1913, but Wilson, R. H. a consultant

who applied it extensively, is given credit for his in-depth analysis (William, 2007). EOQ only applies when demand for a product is constant over the year and that each new order is delivered in full when the inventory reaches zero. There is a fixed cost charged for each order placed, regardless of the number of units ordered. There is also a holding or storage cost for each unit held in storage sometimes expressed as a percentage of the purchase cost of the item (William, 2007). EOQ is used to determine the optimal number of units of the product to order so that to minimize the total cost associated with the purchase, delivery and storage of the product The required parameters to the solution are the total demand for the year, the purchase cost for each item, the fixed cost to place the order and the storage cost for each item per year. Note that the number of times an order is placed will also affect the total cost; however, this number can be determined from the other parameters (Heikkila, 2002).

According to Periasamy (2009), the EOQ model assumes that, the ordering cost is constant, the rate of demand is constant, the lead time is fixed, the purchase price of the item is constant i.e. no discount is available, the replenishment is made instantaneously, the whole batch is delivered at once. The overall aim of the EOQ model is thus to determine the optimal number of units to order in order to minimize costs associated with the procurement process of purchase, delivery, and storage. However, EOQ essentially a trade-off between the ordering cost and inventory holding cost is based on unrealistic assumptions which are no longer plausible and in the face of modern inventory management technologies, the "optimization" outcome bears little or no sense.

2.4.2 Inventory Control systems

An inventory system controls the level of inventory by determining how much to order (the level of replenishment), and when to order. There are two types of inventory control systems; the continuous or perpetual inventory system and the periodic inventory system. In a periodic inventory accounting system, the inventory account is updated periodically, usually daily, monthly or quarterly. GAAP standards require companies to record inventory purchases in a separate account, possibly titled "Purchases," continually. However, under the perpetual inventory system, inventory accounts are updated automatically and continuously. Advances in computer and network technology make perpetual inventory systems possible, and implementing this type of system requires an extensive technology expense. Point-of-Sale systems tied directly into accounting software packages can update accounting records and other inventory records on the fly using information from barcode scanners, radio frequency identification tags or cashier input. Such a system is not only quick and accurate but provides management with continuously updated information on the status of inventory levels.

2.5 IT and Inventory Management Systems in Supermarkets

Modern inventory control systems often rely upon barcodes and radio-frequency identification (RFID) tags to provide automatic identification of inventory objects. To record an inventory transaction, the system uses a barcode scanner or RFID reader to automatically identify the inventory object, and then collects additional information from the operators via fixed terminals (workstations), or mobile computers. Efficient inventory management is based on an inventory management information system which is a database for storing and administering all types of data required for efficient and accurate inventory management. This may include modules or fields for

keeping track of all items and locations, requisitions, back orders, required levels of inventory on hand, reorder points, lead times, inventory error tracking, and more. This type of system may interface with an Enterprise Resource Planning (ERP) and other applications. An ERP management information system integrates areas such as planning, purchasing, inventory, sales, marketing, finance, human resources, etc. (www.investopedia.com). ERP has been used extensively in inventory management with a varied of techniques applied innovatively ranging from Vendor Managed Inventory, Materials Resources planning and Distribution Resources planning. An equally important system is a warehouse management system (WMS) which does not contain customer data or prices as ERP rather; a functioning inventory management system needs the continuous exchange between WMS and ERP.

2.5.1 Enterprise Resource Planning

ERP is a process by which a company (often a manufacturer) manages and integrates the important parts of its business. ERP is designed to replace paper-based systems by analyzing data from all areas of a company's resources. ERP covers all functions of a business such as purchasing, manufacturing, distribution, and inventory management. ERP is designed around a number of modules each of which can stand alone or combined with others that include finance, logistics, manufacturing, supplier management and human resources (Stevenson, 2007).

Modern retail systems integrate Point of Sale and ERP system to provide more accurate and reliable information and better cost control benefits. The use of barcode technology to capture and share data almost instantly through the supply chain reduces inventory costs, eliminates errors, improves document tracking and effectively streamlines business processes. The Electronic Point of Sale (EPOs),

commonly used in supermarket, whereby sales are recorded by scanning a product's barcode at the checkout tills also enables the supermarkets raise reliable end-user information which is vital the firms planning purposes. The EPOs systems verifies, checks and charges transactions, provides instant sales reports, monitors and changes prices and sends intra- and inter stores messages and data. With the integration of Electronic Data Interchange (EDI) at the electronic point of sale, communication between suppliers and the supermarkets can be more effective. This is by making stock replenishment effective due to interchange of information. Barcodes will usually represent a product identification that a computer will recognize when scanning the code. This will enable the retailer to know how much has come into the store, how much has been left the store as sales and by extension, how much should be left in the shelves. It alerts them on when to reorder and informs them on which items are selling well (Lysons, 2006).

ERP system plays a vital role in improving supply chain performance. There is faster inventory turnover because the manufacturers and distributors may increase inventory turns tenfold and reduce inventory costs by 10 to 40 per cent (Jack and Samuel (2006). There is improved customer service, in many cases, and ERP system can increase the production to a higher rate by providing the required products at the required place within the required time thus achieving customer expectation and satisfaction. ERP facilitates better inventory accuracy with fewer audits thus, reducing the need for physical audits. It also reduces the set-up time by ensuring coordination of people, tools and machinery together with efficient use of equipment and minimizing downtime by virtue of efficient maintenance. ERP management systems can improve costs, productivity, reduce time lags, reduce waste, improve customer service and improve overall efficiency (Jack & Samuel, 2006).

During the 1990's, the concept of supply chain management (SCM) gained increased support, suggesting that business competition takes place between supply chains rather than individual companies (e.g. Cooper et al., 1997, Mentzer et al., 2001). SCM is about efficient integration of suppliers, manufacturers, warehouses and stores so that goods are produced and distributed at the right quantities, to the right location and at the right time in order to minimize system wide costs whilesatisfying service level requirements (Simchi-Levi et al., 2003).

As a consequence, joint or collaborative planning and control approaches for matching demand and supply in supply chains have been developed (e.g. Stadtler & Kilger, 2008). These joint approaches have had major implications for the complexity of planning and control tasks; as the scope of operations expands from being concentrated to one single company to include operations of several companies in a supply chain, planning and control activities, information flows, decisions and so on, need to be coordinated between multiple partners. Recent developments in IT have revolutionalized SCM with a new range of opportunities to handle information between partners in a supply chain (Turban et al., 2010).

2.5.1.1 Vendor Managed Inventory

Inventory replacement decisions are centralized with upstream manufacturers or distributors in this JIT technique. It enables manufacturers or distributors to eliminate the need for customer to reorder, reduce or exclude inventory and stock outs. Under such an agreement, the vendors obtain warehouse or point-of-sale information from the retailer and use that information to make inventory-restocking decisions. This point of sale could be facilitated by the use of Electronic Data Interchange (EDI) systems at the supermarket at the EPOS (Bailey et al, 2005). In a VMI partnership, the

supplier, usually the manufacturer but sometimes a reseller or distributor, makes the main inventory replenishment decisions for the consuming organization. The purchase order acknowledgement from the vendor may be the first indication that a transaction is taking place: an advance shipping notice informs the buyer of materials in transit. The arrangement transfers the burden of asset management from the consuming organization to the vendor, who may be obliged to meet a specific customer service goal (usually some kind of stock target).

The newest trend in the area of inventory control and management are vendor-managed inventory (VMI) systems and agreements. In a VMI system distributors and/or manufacturers agree to take over the inventory management for their customers. Based on daily reports sent automatically from the customer to the distributor, the distributor replenishes the customers stocks as needed. The distributor or manufacturer sees what is selling and makes all necessary arrangements to send the customer new products or parts automatically. No phone calls or paperwork are necessary allowing the supply chain process to remain uninterrupted.

The benefits that can accrue to both parties in a VMI arrangement are noteworthy. Both parties should experience a savings of time and labor. The customer is able to maintain fewer items in stock and can rely upon a steady flow of products or parts. The vendor or distributor benefits in two ways. First, a supplier is able to better anticipate production requirements. Second, the supplier benefits from a strong relationship with the customer, one that is more difficult to alter than would be a vendor-customer relationship in which such automated systems did not exist.

The tracking of inventory can be possible by use of Radio Frequency Identification (RFID) which enhances the efficiency of inventory management and replenishment

practices. Substantial benefits in the form of reduced interruptions in production or lost sales due to items being out of stock will accrue to the supermarket. RFID enables bulk reading where many tags can be read in a short space of time –a typical read rate is hundreds of tags per second, the tags can be read over a very long range – many hundreds of metres in the case of specialized tags. RFID tags are durable because they can be ripped, soiled and performance is not impaired. They can do bulk reading in a short space of time. All these benefits enhance effectiveness of inventory management processes and hence the overall the supply chain (Gerald & David, 2000). RFID and sensor data is real-time, high volume and operational in nature. RFID technology is designed to inform and enrich systems and processes, not be an end in itself

As with all outsourcing arrangements, there are potential negatives to a VMI system. The first is the partial loss of control experienced by the customer in managing his or her own inventories. Second is the problem this type of system poses on a vendor in the case of volatile sales periods. It is very difficult for a distributor or manufacturer to hold large inventories for one customer on a VMI system who is experiencing a slowdown in sales while having to ramp up for another customer who is experiencing rising demand. Both parties to a VMI agreement must weigh the pros and cons of such a system thoroughly and be sure to include in any VMI agreement prearranged methods for dealing with periods of volatile sales patterns.

2.5.1.2 Materials Resources Planning

This is a technique that assists in the detailed planning of production and its characteristics are that; it is geared specifically to assembly operations, it is a dependent demand technique and it is a computer based information system. The aim of MRP is to make available either purchased or company manufacturing assemblies

just before they are required by the next stage of production or for delivery. It enables orders to be tracked throughout the entire manufacturing process and assist purchasing and control departments to move the right supplies at the right time to manufacturing or distribution points (Lysons & Farrington, 2006).

Using barcode technology integrated with the MRP system saves time, increases efficiency and, above all, improves accuracy. It can help maximize productivity for warehouses, distribution centers and manufacturers alike. Businesses also have their pick of a wide variety of barcode solutions, each offering different levels of automation, allowing them to find the right fit.

MRP plays a vital role in supply chain by helping coordination efforts of production, engineering, purchasing, marketing and human resource to achieving a common strategy or business plan (Gerald & David, 2000). It also helps the supply chain managers to analyze implications of their decisions, the changes can easily be factored into the system as they arise, such as rush orders and coordination of production with purchasing, marketing and human resources in such away as timing of supplies deliveries, using sales forecast to determine master budget and planning recruitment or run-down of personnel.

2.5.1.3 Distribution Requirements Planning

Distribution requirements planning (DRP) is scheduling technique the controls inventory control and applies MRP principles to distribution inventories. It can also be considered as a method of handling replenishment of the stock in an organization. DRP is useful for both manufacturing organizations, such as car manufactures that sell their car via several distribution points, such as regional and local distributors, and purely merchandising organizations, such as supermarkets (William, 2009).

2.5.1.4 Warehouse Management System

A warehouse management system (WMS) is a key part of the supply chain and primarily aims to control the movement and storage of materials within a warehouse and process the associated transactions, including shipping, receiving, putaway and picking. Warehouse management systems often utilize automatic identification and data capture technology, such as barcode scanners, mobile computers, wireless LANs and potentially radio-frequency identification (RFID) to efficiently monitor the flow of products.

2.6 Summary

This chapter has reviewed literature pertaining to the impact of IT on inventory management. The literature has demonstrated how the advancement in IT and the plethora of ICT tools where adopted have transformed supply chain management and of interest inventory management. In the context of a highly volatile global business environment, high customer expectations, it is imperative for retail firms to improve their product and service offering to remain competitive. To ensure such agility and customer responsiveness, adoption of modern IT cannot be gainsaid.

There is significant development in IT in the general retail sector that if applied effectively, a business can gain in improving inventory management performance. The use of ICT tools such as barcodes, RFID and EDI is a necessary integration with modern IT systems as they facilitate information capture, aggregation and sharing. Various IT systems been used in retail sector are largely modules of ERP system such as VMI, MRP and DRP. However, functioning inventory management system needs the continuous exchange between WMS and ERP.

However, most of the literature on impact of IT on inventory management has focused on operational efficiency and customer satisfaction. Even so, these studies have been conducted in developed countries that have significant differences in IT infrastructural development from the current scenario in the country. Whereas there is documented literature of IT application in retail sector, it is assumed that level of adoption and its impact on inventory management is the same for all regions. Further, the impact of IT adoption on inventory management performance is beyond improving operational efficiency and as the literature opines it affects decision and activity points involved in the overall process of inventory management including supplier relationship, warehousing and storage, procurement and ordering, sales process and customer relationships. However, there is little attention accorded to this end by all existing literature. Through this research the impact of IT on inventory management would fill this gap.

2.7 Conceptual Framework

A conceptual framework is a research tool that purposes to develop an understanding of the situation under investigation. According to (Atkinson, 2006) a conceptual framework considers the theoretical and conceptual issues surrounding research work and form a coherent and consistent foundation that will underpin the development and identification of existing variables.

This study seeks to establish the impact of IT on inventory management by supermarkets in Nairobi. The researcher identifies the independent variables in this study as the IT systems and the depended variables are the consequences these IT systems have on inventory management performance in supermarkets in Nairobi City County as presented in Figure 2.1.

IT in Inventory Management by Supermarkets

Independent Variables

IT Systems

Dependent variables

Inventory Management Performance Areas

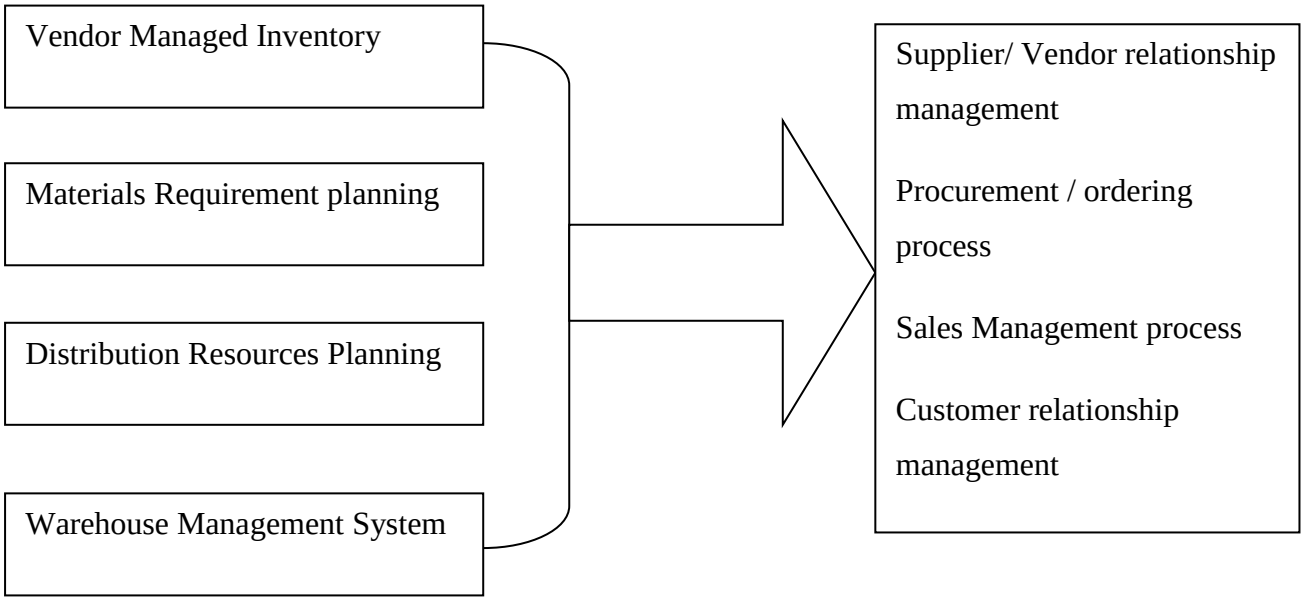


Figure 2.1: Conceptual Framework

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Research Design

The study used a descriptive research design. Orodho (2003) indicates that a descriptive survey is used to establish the relationship between the variables. In this study, descriptive survey was used to explain the relationship between use of information technology systems in inventory management and performance of supermarkets in Kenya.

3.2 Target Population

In this study, the population comprised all the supermarkets operating within Nairobi City County. There were 136 supermarkets operating in Nairobi, (See Appendix III).The researcher chose Nairobi because this is where most supermarkets are concentrated in Kenya (136 supermarkets out of 314) according to the Official Yellow Pages Kenya (yellowpageskenya.com, 2015).

3.3 Sample Size and Sampling Design

Owing to the heterogeneous nature of supermarkets in Nairobi, the study used stratified random sampling technique to determine the sample units that were representative of the population. According to Kaplan (2012) stratified random sampling is a viable alternative to simple random sampling because it enables the researcher to obtain a high number of observations for one key category or stratum. Yamane (1967) formula, a simplified version of the Cochran (1963) formula for finite populations for proportions was applied to calculate the sample size.

$n=N/ [1+N (e)^2]$

Where; n is the sample size,

N is the size of the population, and

e is the level of precision.

The researcher used a 95% confidence level, thus the level of precision is = 0.05.

The researcher identified two strata of the supermarkets; those with branches and those without branches. Thus two sub-samples were determined one for each stratum and units selected randomly.

Out of the 136 supermarkets in total, 12 supermarkets had multiple branches totaling to 74 while 62 are "Single shop" supermarkets.

The sub-samples were determined as follows;

Multiple branch supermarkets sample size

n= 12 which is the total number of all supermarkets with multiple branches.

Single shop supermarket sample size

n=62/ (1+62*(0.05) ^2) = 53.68

The sample size obtained is thus; 12+54 = 66 supermarkets

3.4 Data and Data Collection

The research used primary data in which two-part questionnaires were administered to inventory managers, officers or store managers of similar functional roles in the supermarkets who were randomly selected. This is because inventory management decisions are at the core of the duties and responsibilities of the procurement managers/officers or store managers hence they had the information relevant for this study.

Part one of the questionnaire sought business information of the supermarket; years in operation, volume of sales and inventory, IT and applications used in inventory management, inventory management systems adopted among others while part two of the questionnaire sought information necessary to answer to the research objectives. The questions were structured in a Likert scale model (0 to 4) with 'strongly disagree,'' ''disagree,'' ''neither agree nor disagree,'' ''agree,'' and ''strongly agree'' as the choices. The main method of administration of questionnaires was 'drop and pick later' at an agreed time with the researcher. However, mail survey method was adopted where the sampled respondents suggested so.

3.5 Data Analysis and Presentation

Data analysis was done using both descriptive statistics and regression analysis.

Mean and standard deviation were used to show the extent of adoption of IT systems in inventory management in supermarkets in Nairobi.

A linear regression model was used to determine the impact of IT used on inventory management performance in the supermarkets in Nairobi. The regression model was as follows:

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

Where: Y = Inventory Management Performance Index

β_0 = Constant Term;

β_1, β_2, & β_3 = Beta coefficients;

X_1= Vendor Managed Inventory;

X_2= Materials Resources planning;

X_3= Distribution Resources planning; and

X_4 =Materials Requirement planning

ε = Error term.

Presentation of findings was done using appropriate tables and charts addressing the research objectives.

CHAPTER FOUR

DATA ANALYSIS, FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents the study findings. The objectives of the study were to establish the extent of usage of IT systems used in inventory management in supermarkets in Nairobi and to determine the impact of IT used on inventory management performance in the supermarkets in Nairobi.

4.2 Response Rate

Out of the 66 questionnaires that were administered, 46 questionnaires were filled and returned successfully. This represents a response rate of 70 percent which was considered sufficient forming a good representation of the whole population. This response rate is well above the 50 percent recommended by (Mugenda & Mugenda, 2003).

4.3 General Information

This section provides the demographic information of the respondents and the organization.

4.3.1 Number of Branches in Supermarkets

The respondents were requested to indicate the number of branches in their supermarkets in order to establish whether growth in branch network was linked to adoption and use of IT systems in inventory management performance. The results are shown in Table 4.1

Table 4.1 Number of Branches in Each of the Supermarket

Branches	Frequency	Percentage
1	39	84
1-5	3	7
5-10	3	7
Above 10	1	2
Total	**46**	**100**

Source: Field work

From the findings in Table 4.1, 84% of the respondents indicated that most supermarkets in Nairobi had 1 branch; 7% of the respondents indicated that the supermarkets had 1-5 branches another 7% of the respondents indicated that the supermarkets had 5-10 branches in Nairobi. Only 2% of the respondents indicated that the supermarkets in Nairobi had more than 10 branches.

4.3.2 Duration of Operation

The study sought to determine the duration that the supermarkets had been in operation as shown in the Table 4.2

Table 4.2 Duration of Operation of the Supermarket

Duration of operation	Frequency	Percentage
Below 1 year	2	4
Between 1-5 years	24	52
Between 5-10 years	15	33
Between 11-15 years	4	9
Above 15 years	1	2
Total	46	100

Source: Field work

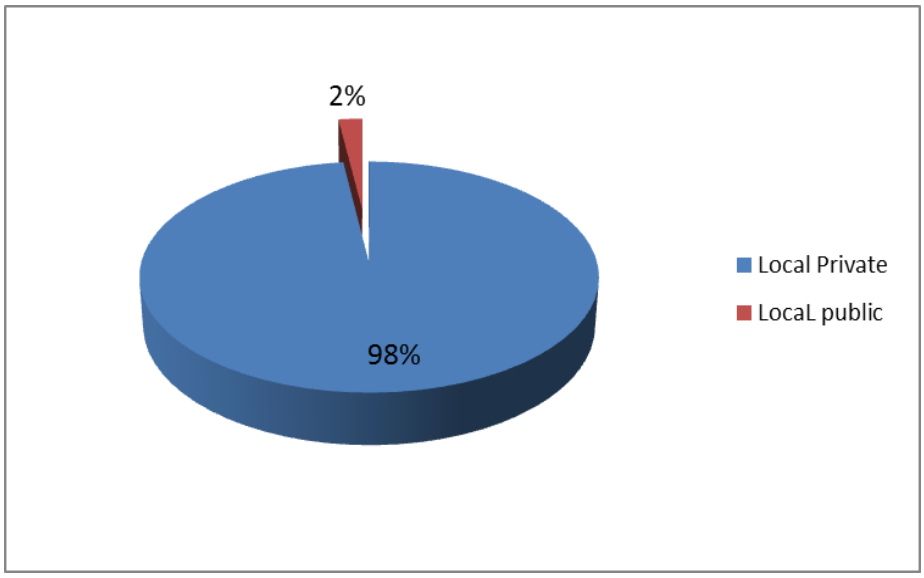
From Table 4.2, the findings show that 52% of the respondents indicated that most supermarkets had been in operation between 1-5 years. Further, 33% of the respondents noted that supermarkets had been in operation for a period between 5-10 years while 9% of the supermarkets had been in operation for a period between 11-15

years. Only 2% of the supermarkets had been in operation for a period above 15 years. The findings therefore conclude that most of the supermarkets had been in operation for a period above 5 years.

4.3.3 Ownership of the Supermarkets

The respondents were requested to indicate the ownership of their supermarket to establish if the supermarkets were privately owned, publicly owned or both. The results were as shown in Figure 4.1

Figure 4.1 Ownership of the Supermarkets



Source: Field work

As shown in Figure 4.1, the findings revealed that 98% of the supermarkets were privately owned while only 2% of the supermarkets were locally public.

4.3.4 Functional Position of the Respondents

The respondents were requested to indicate their functional position that they served to determine if they were qualified to give reliable and accurate information in regard

to information technology systems in inventory management of supermarkets in Nairobi. The findings are presented on Table 4.3

Table 4.3 Functional Position of the Respondents

Functional position	Frequency	Percentage
Inventory manager	4	9
Inventory Officer	35	76
Store Manager	7	15
Total	46	100

Source: Field work

The results in Table 4.3 show that 76 percent of the respondents were inventory officers, 15 percent served as store managers while only 9percent of the respondents served as inventory managers.

4.4 Adoption of Information Technology in Inventory Management of Supermarkets in Kenya

The study sought to determine the extent of usage of IT systems used in inventory management in supermarkets in Nairobi. The results are shown in the Table 4.4.

Table 4.4 Extent of Usage of IT systems in Inventory Management in Supermarkets in Nairobi City County.

IT usage in Inventory management	N	Mean	Std. Deviation	Coefficient of variation(CV)
Vendor Managed Inventory	46	2.708	.924	.754
Warehouse management system	46	2.543	.752	.525
Materials Resources planning	46	1.804	.582	.470
Distribution resources planning	46	.760	.673	.565

Source: Field work

As shown in Table 4.4, vendor managed inventory (VMI) and warehouse management system (WMS) were used to a greater extent. Their mean scores were as

follows: 2.708 and 2.543 respectively. However, there was a high variability in vendor managed inventory (CV=0.754) as compared to warehouse management system (CV=0.525). Materials resources planning and distribution resources planning were implemented to a very small extent. Their mean scores are 1.804 and .761 respectively. The findings concluded that vendor managed inventory and warehouse management systems were used to a greater extent in supermarkets in Nairobi as compared to materials resources planning and distribution resources planning which were used to a little extent.

4.4.1 Other Inventory Management Systems Used by Supermarkets in Nairobi

The respondents were asked to indicate other inventory management systems that they were aware of. The results are shown in the Table 4.5.

Table 4.5 Other Inventory Management Systems used by Supermarkets in Nairobi City County.

Other Inventory Management Systems	Mean	Std Deviation	Coefficient of variation(CV)
AX systems	3.881	.772	.714
SIM (stock inventory management systems)	3.824	.872	.564

Source: Field work

Table 4.5, the findings indicated that AX systems and SIM (stock inventory management systems) were popular in small supermarkets operating in Nairobi. Their mean scores were as follows: 3.881 and 3.824. It was further revealed that these systems were quite inexpensive as compared to other systems like vendor managed inventory system which requires a huge capital investment.

4.4.2 Extent to which IT Adoption in Supermarkets influenced inventory management cycle.

The study sought to determine the extent to which information technology adoption in supermarkets influenced inventory management cycle activities. The results are shown in the Table 4.6.

Table 4.6 Extent to which IT adoption in Supermarkets influenced the following activities of Inventory Management Cycle

Influence of IT Adoption in inventory management cycle	N	Mean	Std. Deviation	Coefficient of variation CV)
Makes it easy to share of information	46	3.022	.683	.556
Managing supplier relationship.	46	2.867	.806	.705
Enhancing procurement and ordering processes.	46	2.848	.419	.298
Aids in collaborative planning and replenishment decisions.	46	1.696	.662	..491
Warehousing and storage management (stock identification)	46	1.522	.691	.520
Sales process management (Accurate inventory information, service time per customer)	46	1.196	.453	.305
Customer relationship management.	46	.369	.572	.401

Source: Field Work

As shown in Table 4.6, IT adoption in supermarkets influenced the following activities of inventory management cycle: sharing of information, managing supplier relationship and enhancing procurement and ordering processes. These practices had the highest mean scores as follows: 3.022, 2.867 and 2.848 respectively. It was revealed that enhancing procurement and ordering processes had the lowest variability (CV=0.298) compared to other aspects.

4.5 The impact of IT Systems in inventory management performance in the supermarkets in Nairobi City County.

To achieve the second objective of the study which was to determine the impact of IT used in inventory management of supermarkets in Nairobi, regression analysis was done. The independent variables were as follows: Vendor managed inventory system, material resources planning, distribution resources planning and warehouse management system. The dependent variable is inventory management performance. The results are shown in the Table 4.7

Table 4.7 Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.736[a]	.541	.496	.53423

a. Predictors: (Constant), Warehouse management system, Materials Resources planning, Vendor Managed Inventory, Distribution resources planning

The coefficient of determination is 0.541 which implies that IT used in inventory management explains 54.1% of the variability in performance of supermarkets in Nairobi City County.

4.5.1 F-Test

To test the significance of the model, F statistic and p-values were used. The results are shown in the Table 4.8.

Table 4.8 Analysis of Variance (ANOVA)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.798	4	3.450	12.087	.000[b]
	Residual	11.702	41	.285		
	Total	25.500	45			

a. Dependent Variable: inventory management performance

b. Predictors: (Constant), Warehouse management system, Materials Resources planning, Vendor Managed Inventory, Distribution resources planning

The regression model had an F- value of 12.087 and P<0.05 and hence the model was significant.

Table 4.9 Model Coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.866	.368		7.783	.000
	Vendor Managed Inventory (x_1)	.048	.084	.061	.566	.574
	Materials Resources planning (X_2)	-.056	.070	-.090	-.799	.429
	Distribution resources planning (X_3)	.394	.120	.377	3.287	.002
	Warehouse management system (X_4)	.499	.105	.528	4.763	.000

a. Dependent Variable: inventory management performance

The regression model obtained for this study is as follows;

$Y= 2.866+.394X_3 +.499X_4$

Where Y = inventory management performance

X_3= Distribution resources planning

X_4 =Warehouse management system

From the results vendor managed inventory and materials resources planning were excluded from the regression model since they were statistically insignificant since P>0.05. On the other-hand, distribution resources planning and warehouse management system were statistically significant in explaining the impact of IT used in inventory management and performance, P<0.05.

4.6 Discussion of Results

The study findings show that vendor managed inventory and warehouse management system were used to a greater extent with mean scores: 2.708 and 2.543 respectively. On the other-hand, materials resources planning and distribution resources planning were implemented to a very small extent. Their mean scores are 1.804 and .761 respectively. The findings concluded that vendor managed inventory and warehouse management systems were used to a moderate extent in supermarkets in Nairobi as compared to materials resources planning and distribution resources planning which were used to a little extent. These findings are consistent with Omwansa (2013) concluded that vendor managed inventory systems and warehouse management systems were moderately used in enhancing operational efficiency among supermarkets in Nairobi County.

AX systems and SIM (stock inventory management systems) were popular in small supermarkets operating in Nairobi. Their mean scores were as follows: 3.881 and

3.824 respectively. These systems were quite inexpensive as compared to other systems like vendor managed inventory system which requires a huge capital investment.

IT adoption in supermarkets influenced the following activities of inventory management cycle: sharing of information, managing supplier relationship and enhancing procurement and ordering processes. These findings are consistent with a study by Otiso, Chelangat & Bonuke (2012) who concluded that ICT adoption led to improved information sharing at Kenya Power.

The regression results found that 54.1% of the variability in performance of supermarkets in Nairobi was explained by information technology used in inventory management. The regression model was statistically significant in explaining the relationship between variables. This is because its probability value was below 5%. These findings are consistent with a study by Omwansa (2013) who concluded the regression model was statistically significant in explaining the relationship between ICT and performance of supermarkets in Nairobi County.

The regression results concluded that vendor managed inventory and materials resources planning were excluded from the regression model since they were statistically insignificant. This is because their p-values were above 5%, p=.574 which is 5.74 percent and below 5 percent, p=.429 (5.29percent) respectively. On the other-hand, distribution resources planning and warehouse management system were statistically significant in explaining the impact of IT used in inventory management and performance. This is because their p-values obtained from the regression model above were below 0.05 (5%). P=0.002 and p=0.000 respectively.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter consists of a summary of findings and results obtained in chapter four. It gives a clear picture of the conclusion that was drawn, the limitations that the researcher faced during data collection, recommendations and areas for further studies. This is guided by the following objectives; to establish the extent of usage of IT systems used in inventory management in supermarkets in Nairobi and to determine the impact of IT used on inventory management performance in the supermarkets in Nairobi.

5.2 Summary of Findings

Vendor managed inventory and warehouse management system were used to a greater extent. On the other-hand, materials resources planning and distribution resources planning were implemented to a very small extent.

AX systems and SIM (stock inventory management systems) were popular in small supermarkets operating in Nairobi. These systems were quite inexpensive as compared to other systems like vendor managed inventory system which requires a huge capital investment. IT adoption in supermarkets influenced a number of activities of inventory management cycle namely: sharing of information, managing supplier relationship and enhancing procurement and ordering processes.

The regression results found that 54.1% of the variability in performance of supermarkets in Nairobi was explained by information technology used in inventory

management. Vendor managed inventory and materials resources planning were the only variables which were statistically insignificant in the regression model.

5.3 Conclusion

The study concludes supermarkets in Nairobi should invest more in modern technologies for example information communication technology in order to achieve integration, minimize communication costs, enhance efficiency and increase sharing of information which will eventually lead to improved performance.

5.4 Recommendations

The study recommends that supermarkets in Kenya should invest in modern technologies in order to integrate their inventory management systems. This would minimize communication costs and increase sharing of information which leads to improved efficiency and performance of supermarkets in Kenya.

The study proposes the need for investigating on appropriate ways to increase formalization of information technology adoption in order to enhance adoption of modern technologies in inventory management as a tool to boost performance. This will enable firms to understand the benefits of information technology in managing their inventory systems in order to create a need for adoption.

5.5 Limitations

That primary data was collected using a Likert-scale approach which limits the ability to access information. The response was based on self- reported data comprising the perceptions of the respondent, as opposed to absolute values. In addition, although the choices of each question adopted were from previous studies, all possible alternatives might not have been considered. The findings of a survey based on other sources of information and the use of absolute data could provide additional findings.

The researcher faced significant time and cost constraints which limited the scope of the study. The study limited itself to supermarkets that are concentrated within Nairobi County; it would have been more useful if the researcher collected data in another town outside Nairobi County in order to have some comparative findings and to draw conclusive results.

5.6 Suggestions for Further Research

Future researchers might consider investigating the impact of IT used on inventory management performance in large supermarkets in Kenya like Nakumatt, Naivas, Tuskys, Uchumi and Ukwala. This is because their level of adoption and implementation of information technology is relatively high as compared to other categories of supermarkets in Nairobi. The findings obtained in this study might be used to make a comparison with all the supermarkets in Kenya.

This study was limited to Nairobi County; a similar study should be conducted in other counties across the country to establish the extent of adoption of IT in inventory management and how it contributes to improved performance of supermarkets. This will provide a platform to compare and identify areas of weaknesses and thus recommend areas of improvement.

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APPENDICES

APPENDIX I

INTRODUCTION LETTER

FRIDAH MUKIRI KITHINJI

P.O. BOX 58893- 00200

NAIROBI.

UNIVERSITY OF NAIROBI

SCHOOL OF BUSINESS

To the respondent,

Dear Sir/Madam,

I am a post graduate student at the University of Nairobi conducting a research on Impact of Information Communication Technology on Inventory management in supermarkets in Nairobi as a partial fulfillment of the requirement of degree of master of Business Administration.

Declaration - *The information collected through this interview guide as well as your identity shall be treated as confidential and will only be used for academic purposes only*.

Your assistance in the completion of this interview guide will be highly appreciated. Thank you

Yours Sincerely,

Fridah Mukiri

Thank you

APPENDIX II

QUESTIONNAIRE

The questionnaire is divided is divided into two sections, the introductory part and the second part with questions on effects of IT in the supermarket.

Kindly answer by ticking (√) against the correct response that represents appropriately your situation

SECTION I

Background Information: Business Profile

1. Name of supermarket ……
2. Number of operational branches of your supermarket in Nairobi.

- 1
- 2-5
- 6-10
- Above 10

3. How long has the supermarket been in operation in the Kenyan market?

Below 1 year	1-5 years	5-10 years	11-15 years	Above 15 years

4. Please tick appropriately on the ownership of your supermarket

a) Local ( )

b) International/Foreign ( )

c) Both local and international/foreign ( )

5. Please tick **(√)** your functional position in your supermarket

a) Inventory Manager: ( )

b) Inventory officer: ( )

c) Store manager: ( )

SECTION II

Impact of IT on inventory management

This section seeks to assess your rating on the various statements about Information Communication Technology in use by your supermarket for inventory management. Kindly tick against the correct level number you feel most appropriately represents your situation.

1. **Please indicate by ticking (√) to what extent the following IT has been adopted in your supermarket for inventory management**

IT systems used in Inventory Management	**Very Great Extent**	**Great Extent**	**Moderate Extent**	**Little Extent**	**Not adopted at all.**
Vendor Managed Inventory					
Materials Resources planning					
Distribution resources planning					
Warehouse Management System					

2. **To what extent have the IT adopted in your supermarket influenced the following activities of inventory management cycle**

	Very Great Extent	**Great Extent**	**Moderate Extent**	**Little Extent**	**Very Low Extent.**
Enhancing procurement and ordering processes.					
Managing supplier relationship.					
Makes it easy to share of information					
Aids in collaborative planning and replenishment decisions.					
Warehousing and storage management (stock identification)					
Sales process management (Accurate inventory information, service time per customer)					
Customer relationship management.					

3. **Rate the level of agreement to the following statements.**

The following key is a guide to provide your response by ticking against your level of agreement to the statement as given

Impact of IT on Inventory Management	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Managing supplier relationships					
IT has enhanced information sharing with suppliers.					
IT has improved the supplier relationships					
IT has enhanced streamlining of supply chain by removal of inefficient intermediaries					
IT has made it possible to enter into long-term commitments with suppliers					
Warehousing and Storage					
IT has enabled tracking movement of stock units in the warehouse/stores					
IT has made stock taking in the warehouse easier					
IT has provided greater data accuracy on inventories					
IT has enhanced the receipt and dispersal of inventory entering or leaving warehouse					
IT has reduced pilferages of inventory					
Procurement and Ordering process					
IT has improved coordination of inventory management decisions between departments involved in inventory management					
There is reduction in the lead time in					

replenishing inventory					
IT systems have reduced cost of ordering stock					
IT has improved order processing					
Sales Management process					
IT has made it possible to recognize stock outs and to replenish stock in display					
IT has enabled generation of real time inventory reports for effective inventory management processes					
IT has enabled the connection of employees with a single process streamlining inventory control processes					
Customer relationship management					
IT has improved speed of service to customers					
IT has enhanced ability of supermarkets in dealing with goods returned and product warranties by customers					
IT has enhanced stock availability to customers					
IT has enhanced provision of accurate inventory information to customers					
IT has generally improved customer service experience					

Thank you

APPENDIX III

List of Supermarkets in Nairobi

Name	Branches
Acacia Supermarket Ltd, Nairobi	1
Aflose Supermarket Ltd, Nairobi	1
African Grocers Ltd, Nairobi	1
Amal Supermarket Ltd, Nairobi	1
Armed Forces Canteen Organization, Nairobi	1
Betccam Savers Supermarket, Nairobi	1
Bluemart supermarket, Nairobi	1
Broadway Supermarket, Nairobi	1
Builders Supermarket Ltd, Nairobi	1
Buru Buru Mini Market, Nairobi	1
Cash and Carry Ltd, Nairobi	1
Centaline Supermarket, Nairobi	2
Chandarana Supermarkets Ltd, Nairobi	8
City Mattresses Ltd, Nairobi	1
Clean Way Ltd, Nairobi	1
Continental Supermarket Ltd, Nairobi	1
Cosby Supermarket, Nairobi	1
Country Mattresses Ltd, Nairobi	1
Deepak Cash and Carry Ltd, Nairobi	1
Eagles Supermarket, Nairobi	1
Eastleigh Mattresses Ltd, Nairobi	3
Eastmatt Supermarket, Nairobi	1
Ebrahim And Company Ltd, Nairobi	1
Elipa Supermarket , Nairobi	1
Esajo Supermarket, Nairobi	1
Galmart Supermarket	1
General Foods (Kenya) Ltd 1	1
Gigiri Supermarket Ltd	1

Fairdeal Shop and Save Ltd, Nairobi	1
Happy Valley Supermarket Ltd, Nairobi	1
Home choice Supermarket, Nairobi	1
Horizon Supermarket, Nairobi	1
Jack and Jill Extravaganza Ltd, Nairobi	2
Janamu Supermarket, Nairobi	1
Jawa's Supermarket Ltd, Nairobi	1
Jeska Supermarket Ltd, Nairobi	1
Jopampa Provision Store, Nairobi	1
Joster Mini Market, Nairobi	1
Juja Road Fancy Store Ltd, Nairobi	1
K and A Self Selection Store Ltd, Nairobi	1
Kaaga Mini Market Ltd, Nairobi	1
Kaka Self Services Ltd, Nairobi	1
Kalumos Trading Company Ltd, Nairobi	1
Kamindi Self Ridges, Nairobi	1
Karen Supermarket, Nairobi	1
Karrymatt Ltd Moi Avenue	1
Kikuyu Selfridges Supermarket 1	1
Leestar Supermarket 1	1
Lumumba Drive Supermarket	1
Leestar Supermarket 1	1
Market way Ltd, Nairobi	2
Mesora Supermarket Ltd, Nairobi	1
Metro Cash and Carry (K) Ltd, Nairobi	1
Muthaiga Mini Market, Nairobi	1
Naivas Supermarket ltd, Nairobi	8
Naivasha Self Service Stores, Nairobis uplands	1
Nakumatt Holdings Ltd, Nairobi	18
New Westland Stores Ltd, Nairobi	1
Quickmart Supermarket, Nairobi	2
Rikana Supermarkets, Nairobi	1

Safeway Hypermarkets Ltd, Nairobi	1
Satellite Supermarket Ltd, Nairobi	1
Savannah Selfridge Supermarket, Nairobi	1
Shoppers Paradise, Nairobi	1
Stagen Enterprises Ltd, Nairobi	1
Sunshine Supermarket, Nairobi	1
Superbargains Cash and Carry Ltd, Nairobi	1
Tesco Corporation Ltd, Nairobi	1
Tumaini supermarket, Nairobi	2
Tuskys Supermarket Express Branch, Nairobi	10
Uchumi Supermarkets Ltd, Aga Khan Walk, Nairobi	14
Ukwala Supermarket, Nairobi	3
Vantage Supermarket Ltd, Nairobi	1
Westlands General Stores Ltd, Nairobi	1
Total	**136**