INFORMATION AND COMMUNICATION TECHNOLOGY ADOPTION AND SUPPLY CHAIN PERFORMANCE AMONG COOPERATIVE SOCITIES IN EMBU COUNTY IN KENYA.

NKATHA RAHAB PHINEAS

A Management Research Project submitted in partial fulfilment of the degree of Master of Business Administration, School of Business, University of Nairobi.

NOVEMBER, 2014

DECLARATION

This Research Project is my original work and has not been presented for an award of degree in any university**.**

Signature …… Date……..

NKATHA RAHAB PHINEAS
D61/78993/2012

This Research Project has been submitted for examination with my approval as a university supervisor.

Signature…… Date……

Mr. Joel Lelei
Department of Management Science
School of Business,
University of Nairobi.

Signature…….. Date……

Mrs. Salome Kinyua
Department of Management Science
School of Business,
University of Nairobi.

DEDICATION

This project is dedicated to my family for their moral support and to Teachers Service Commission for granting me study leave that enabled me carry out the study with ample time.

ACKNOWLEDGEMENT

Am very much grateful to Almighty God for His enabling power to complete this report. I owe much gratitude to my Supervisors; Mr Joel Lelei and Mrs Salome Kinyua for their guidance throughout the period of carrying out this project. Their knowledge in research projects and the advise and corrections offered and made were of great help towards my completion of this project.

My sincere thanks goes to Mr. David Mwiti, my children Nathan Mutugi, Purity Karimi and Eric Bundi for their moral support and encouragements during difficult moments when working on this projects.

Special gratitude to the Commissioner for Cooperative Embu County Mr Njamweah for his assistance in providing me with the list of Cooperatives in Embu County.

Finally and not least, am grateful to Mr Njeru from the DCO's office for his help in offering his time to help me locate the selected Cooperatives in the study. Without his help, it would have taken me a little more time than I took.

I take pleasure to appreciate effort and concern of the managers of the visited Cooperative Societies who showed unlimited patience in providing the data required for this study.

To you all, I say God bless you abundantly.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

EDI:	Electronic Data Interchange
EOQ:	Economic Order Quantity
ERP:	Enterprise Resource Planning
FIFO:	First in First out
GPO:	General Purchase Order
HR:	Human Resource
ICT :	Information and Communication Technology
IRFs:	Internal Requisition Forms
ISO:	International organization for Standardization
KUSCCO:	Kenya union of savings and credit societies
MRP:	Material Resource Planning
RFID:	Radio Frequency Identification
SACCO:	Savings and Credit Co-operative Societies
SCP:	Supply Chain Performance
SD:	Standard Deviation
SME:	Small and Medium enterprises
TPM:	Total production Maintenance
TQM:	Total Quality Management

ABSTRACT

Poor or lack of integrated ICT in supply chain management and mechanisms for supply chain performance improvement has been a major drawback in the quest to ameliorate productivity in cooperative societies not only in Kenya but also in the larger developing world. Successful Supply Chain Performance results to a successful business in terms of its operations. However viable the business is, if its SC is not properly monitored, it may not yield the expected results. This success is mostly supported by the use of ICT. Adoption of ICT by most firms in this era of technological shift has brought positive progress in operations. Thus Cooperatives have integrated ICT in their supply chains operations in order to realize this success. The focus of this study is to determine the extent to which Cooperative Societies in Embu County have adopted ICT, to establish the relationship between ICT adoption and Supply Chain Performance and to determine the Factors affecting ICT adoption by the Cooperative Societies. The sector of Cooperative was selected because it represents the lowest economies at the grass root by very ordinary entrepreneurs and the need to make them function effectively to benefit their members by adopting ICT to enhance their Supply Chain Performance. The respondents included managers of the Societies because they have the knowledge in terms of Cooperative operations. The study was descriptive in nature. The researcher used structured questionnaires and administered them by herself to 30 cooperative societies with varied activities. Data was collected and analyzed using descriptive and inferential statistics involving frequencies and percentages, mean and standard deviation and factor analysis. The findings found out that ICT plays a key role in the successful performance of the supply chain among Cooperative societies in Embu County in Kenya. The study concluded that Cooperatives in Embu have moderately adopted ICT in their supply chain functional areas of procurement, production Scheduling, Inventory control, interlink ages, Decision Making and Risk Management. It was also noted that various factors contributed positively to this ICT adoption. The management, together with the ministry of cooperatives should aim at increasing the extent of ICT usage by indentifying and mitigating the underlying challenges towards this achievement.

CHAPTER ONE: INTRODUCTION

1.1 Background

The integration of information and communication technology (ICT) systems within the firm and across the value chain has become a necessary condition for organizations seeking to effectively manage their operations. Most of them have considered the integration of this ICT in their most critical areas that involve a lot of cost management in order to reap the expected profits or benefits. Thus Co-operative movement in Kenya with the aim of improving the governance, efficiency and performance of cooperatives and their higher level structures need to adopt the use of this ICT in order to strengthen their operations in various aspects of; capacity to access markets, create jobs, generate income, reduce poverty and provide social protection and give their members a voice and representation in society (Inkeri, 2009).

Over the last two decades there has seen significant transformations in the adoption and use of ICT by firms seeking to gain competitive advantage. The current competition is on how well the firms are able to handle their supply chain issues to be responsive to their customers' needs Provision of services such as email, the World Wide Web and internet browsers has enhanced this progress (Holtgrewe, 2014).

Corporate competitiveness and the company's ability to innovate and develop competitive advantages largely hang on its supply chain operation function. SCP is a tactical function that needs to adjust itself to changes in the market and to apply a lot of innovations to fit the prevailing conditions Walker Schotanus Bakker, & Harland (2011).

Poor or lack of integrated ICT in supply chain management and mechanisms for supply chain performance improvement has been a major drawback in the quest to ameliorate productivity in cooperative societies not only in Kenya but also in the larger developing world. One of the ways in which to reduce system inefficiencies is by stimulating and/or enforcing more collaborative supply chain performance among its players. In this context the adoption of ICT in supply chain performance among cooperative societies has provided the main avenue for supply chain restructuring and performance improvement.

Information and communication technology platform is critical for efficient operations of cooperative societies (Gweyi, 2013).

1.1.1 ICT Adoption

ICT means information and communications technologies including cell phone and Internet services, radio, and a wide range of digital devices and related tools including cameras, GIS, and a wide range of hand-held computing devices. ICT enhances the integration and expansion of value chains and workflows beyond organizational boundaries.ICT is significantly valued in its capacity to bring up linkages and collaborations among the business world. Adoption of ICT by Cooperative Societies in their supply chain enables them to use information appropriately (Kotla and Prasad, 2012).

According to Crowson (2011) there are a good number of theories and models employed in studying individuals' ICT adoption and post-adoption behaviors. Social psychology and its applied theories and models have been mainly used in this strand of research. These theories and models focus on people's intention to engage in a certain behavior (i.e., adopt and use ICT) as a major theoretical foundation. Example used in this research include, Theory of Reasoned Action (TRA) which has been used in ICT adoption and use research as a fundamental theoretical framework. Theory of Planned Behavior (TPB) sheds light on the importance of the perceived difficulty of the behavior and the person's perceived ability to act out the behavior. Technology Acceptance Model (TAM) explains the determinants of user acceptance of a wide range of end-user computing technologies. Unified Theory of Acceptance and Use of Technology (UTAUT assumes that there are three direct determinants of intention to use (performance expectancy, effort expectancy, and social influence) and two direct determinants of usage behavior; intention and facilitating conditions.)

Lucas model acknowledges that factors other than appropriate use of an effectively designed technology may influence firm performance (e.g. competitor reaction).Markus and Soh – 'IT Assets' Model decomposes into two sub-models The first explains how IT investments do or do not become IT assets and the second sub-model explains how IT investments do or do not yield improved organizational performance.

Three primary motives for ICT adoption have been recognized as increased efficiency and increased predictability and reduction of waste in the supply chain. ICT applications are viewed in the perspectives of applications that assist in the management of supplier networks, applications that facilitate traceability and applications that assist input supply companies to manage their distribution networks.(Croom et al,2005)

1.1.2 Supply Chain Performance

According to Kashmanian (2013) Supply Chain can be defined as a network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of ultimate customer.ICT adoption by organisations have opened up new opportunities in integration and management of all aspects of supply chains, including for example; procurement, production, inventory control, communication and logistics (Groco and Gillian, 2011).

Supply chain performance can be considered as the extent to which the chain is able to realize its predetermined goals at the sacrifice of a minimum of the organization's resources Hence the four dimensions which measurement and evaluation of supply chain activities can be based on are price/cost, product/quality, logistics and organization (Tutu and Manu, 2010. The objectives of ICT adoption in Supply Chain Performance include 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 (Boraya ,2013).

In order for an organization to achieve its goals to satisfy its customers, the two most fundamental dimensions of performance are efficiency and effectiveness.ICT adoption by Cooperative Societies is taken to realize this efficiency by effective information sharing for successful decision making. So the performance of the entire supply chain is affected by how well ICT has been adopted and used in their operations to achieve its desired output (Gordon, 2008).

The adoption and integration of ICT in firms has created new opportunities for inter-firm collaboration and network. Technological advances have opened up new opportunities in

integration and management of all aspects of supply chains, including for example; procurement, production, inventory control, communication and logistics (Groco and Gillian, 2011).

There are a number of factors that make ICT adoption to succeed the absence of which means challenges. These factors are referred to as the Critical Success Factors (CSF). CSFs are defined as those few key areas where things must go right for any positive results (Rockart, 1979). If management does not pay attention to these factors, organizational performance will suffer. . Bottlenecks in the adoption of ICT in any organization arise when these factors are ignored by management (Niaz, 2007).

1.1.3 Cooperative Societies in Embu

The structure of the cooperative movement in Kenya places individual members at the bottom of a pyramidal organizational structure. The Cooperative Alliance of Kenya (CAK), formerly known as Kenya National Federation of Cooperatives (KNFC), is at the top as the apex body. SACCOs fall under KUSCCO (Kenya union of savings and credit societies) under a similar structure. The cooperative movement in Kenya is vertically organized into a four-tier pyramidal structure that links up primary cooperatives at the local (lower) level to the national (higher) level.ICT adoption in the structure therefore is of vital importance to ensure information sharing is effective. The flow of activities in the supply chain is made possible by effective intergration and linkages. The structure consists of primary cooperatives at the bottom, district/ commodity cooperative unions, national cooperative organizations and one confederation, CAK, whose membership includes national cooperative organizations as well as some cooperative unions and primary cooperatives not affiliated to any union.

Cooperatives command 45 per cent of Kenya's gross domestic product (GDP), the highest proportion in percentage points of GDP attributed to cooperatives in the world. New Zealand comes in a distant second at 22 per cent. About 60 per cent of the Kenyan population earn a living from cooperatives. There are 3,280 Saccos, and considered the fastest growing sub—sector in the cooperative movement, this sub-sector is the fastest growing in Africa. It accounts for about 60 per cent, 64 per cent, and 63 per cent of the country's savings, loan, and assets respectively. The cooperatives movement in

Kenya now boasts of an annual turnover of Kshs 436 billion ($4.4 billion) equivalent to 45 per cent of the national GDP. This is a huge impact as the movement plays a key role in financial deepening and intermediation in industry (Kenya's Economic Survey, 2012).

According to Barasa (2013) Cooperative societies have been dogged by inefficiency, corruption and redundancy since independent. Cooperative societies in Embu have been characterized by low productivity and mismanagement. The failure of most of the cooperative societies can be linked to inability to adopt ICT and other technological approaches in their operations, Lack of Collaboration among the unions Poor marketing channels and Mismanagement coupled with corruption. Over the years Co-operative societies have been facing many problems that have made them unable to deliver services to their members. The common problems include poor leadership, corruption, poor world coffee prices, lack of finances, poor roads, and lack of government support.

Ademba (2012) further outlines the major problem areas facing cooperative societies as Inadequate Legal and Regulatory framework, Lack of a Development Strategy framework for Sacco Societies, Low adoption of International Performance Standards, Lack of Disclosure requirement standards, Low adoption of Information and computer technologies, Poor Human Resource Management leading to high staff-turn over, Capital deficiency and wanting capital structuring models are identified as key challenges facing the regulated cooperative Societies in Kenya.

This situation is made worse by unstable Macro-economic environment coupled with stringent prudential requirement on capital adequacy and liquidity standards. In addition to the above, drastic climatic changes coupled with environmental degradation have further aggravated the plight of agricultural cooperative societies since they negatively affect farm productivity. Farmers are now using more fertilizer and pesticides due to the deteriorating climatic conditions particularly in Sub-Saharan Africa (Kuria, 2013).

ICT adoption (hardware and software), has provided solutions to the above repercussions by way of economically utilizing time and money to its maximum productivity by making the following interventions in their supply chain, reducing costs of coordination (collection of production and distribution of inputs), increasing transparency in decision

making between partners, reducing transaction cost, disseminating market demand and price information, disseminating weather, pest, and risk-management information disseminating best practices to meet quality and certification standards, collecting management data from the field and ensuring traceability (Kunaka, 2010). Other benefits that cooperative societies are likely to gain by adopting ICT are time reduction, reduction of pilferage, reduced human errors, on the spot payments for farmers, wastage is reduced, transparency of operation, and operational integration (Prasad, 2011).

1.2 Statement of the Problem

Cai (2009) points out that, without a foundation of effective supply chain relationships, any efforts to manage the flow of information across the supply chain are likely to be unsuccessful hence the need for adopting IT technology. He further asserts that, effective supply chains coupled with operations efficiency and effectiveness is vital in risk management and that this is only possible with the adoption of ICT and related technology. ICT will thus create a mutual alignment of operations, supply chain management and IT strategies of cooperative societies. It is in this endeavor that this study sought to establish the extent to which Cooperative Societies have adopted ICT in their supply chain performance.

Cooperative societies play a critical role in designing and implementing distribution channels for farm produce; identifying and securing markets; transportation of the produce to markets; educating the farmers and other stakeholders; and ensuring that government policy is implemented at the grass root level. Cooperative societies act as the intermediary between the ministry of agriculture and the farmers in the country and are therefore important channels through which the government implements strategies to increase farm productivity as enshrined in the development plan of the country. From the ensuing discussion, it is apparent that there is need to investigate the vital role of ICT adoption in the business of the cooperative societies in Kenya.

A number of studies have been carried out on ICT adoption on Supply chain performance in both the public and private sector. Basole and Bellamy (2012) in their study found out that successful adoption of ICT is still a challenge. The study however falls short of

establishing the extent of adoption by the said organization which is the domain of the current study.

Bititci et al (2011) in their study found out that currently emerging, predicted future ICT trends and current knowledge on performance measurement may deal with the emerging context in Supply chain performance and proposes that the specific areas of performance measurement should be handled within a holistic systems-based framework. It is on this note that the current study is set to deal with the particular aspects of performance measurement by considering six areas that may affect supply chain performance. Muthigani (2011) in her study revealed that a number of factors affect the implementation of ICT and in particular e-procurement system ranging from the individual level, organization and national level especially the legal framework. She however fails to identify the factors that must be addressed for successful ICT adoption in supply chain performance. The current study thus aimed at identifying the factors affecting ICT adoption among cooperative societies.

Jennifer (2013) in her study found out that implementation of ICT is unfeasible due to lack of enabling factors particularly top management support. She however fails to establish whether there exists any relationship between successful adoption and implementation of ICT and Supply Chain performance which is the focus of the current study.

While past studies have unravelled the role of ICT in enhancing operations and supply chain efficiency, most of them have not exhaustively investigated the impact of ICT on Supply chain performance. It is against this backdrop that this study sought to establish the link between ICT adoption and Supply Chain performance among cooperative societies in Embu County.

The study sought to answer the following questions: To what extent had Cooperative Societies in Embu County Adopted ICT in their Supply Chain? What was the relationship between ICT Adoption and Supply Chain Performance among Cooperative Societies in Embu County? What were the Factors influencing ICT Adoption in Supply Chain among Co-operatives in Embu County?

1.3 Research Objectives

General Objective

To evaluate the extent ICT adoption in SCP among Cooperative Societies in Embu County.

The Specific Objectives of the Study included;

1. To determine the extent to which ICT has been adopted in supply chain by Co-operatives societies in Embu County.
2. To establish the relationship between ICT Adoption and supply chain performance among cooperative societies in Embu County.
3. To determine the factors affecting ICT adoption in supply chain among co-operatives in Embu county.

1.4 Value of the Study

The study contributes to theory by supporting the Lucas and Markus theory of ICT impact on organization's performance. The findings have shown that ICT adoption in the key areas played a great role in supply chain performance. The findings of the study would be also of importance to policy makers and stakeholders in the ministry of cooperative development and other relevant state organs. By establishing the relationship between ICT adoption and supply chain performance, the findings of the study would be a key ingredient in the planning and designing operations of a sound supply chain performance system that would align itself to the overall economic strategy.

The study would equally benefit private enterprises that are interested in adopting ICT for sound supply chain performance. Thus the study would fill the existing literature gap on the relationship of ICT and Supply chain performance among cooperative societies in Embu County.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews theoretical and empirical literature from past studies on the subject of ICT and Supply chain performance among cooperative societies. The chapter focuses on the following issues: theoretical framework of ICT adoption, ICT adoption and Supply chain performance and Factors t influencing ICT adoption in supply chains.

2.2 Theoretical Framework of ICT Adoption

Theories and models in ICT adoption and use research play a critical role by providing frameworks to guide the design and implementation of ICT projects. Eisenhardt (1989) identifies three distinct uses of theory as an initial guide to research design and data collection, as part of an iterative process of data collection and analysis, and as a final product of the research. Since ICT adoption and use research mainly employ positivist approach, theories and models have always taken a central place (Punch, 2005).

2.2.1 Technology Acceptance Model

While Theory of Reasoned Action and Theory of Planned Behaviour mainly focus on the adoption and use of ICT, the TAM theory explains the determinants of user acceptance of a wide range of end-user computing technologies. TAM identifies two theoretical constructs including Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) that affect the intention to use a system. There are a number of studies that have used TAM as their theoretical background for explaining ICT adoption and use especially on the factors affecting its adoption. Scholars already confirmed that PU has a positive relationship with both adoption intention (Davis, 1989) and continuance intention (Ritu and Agarwal, 2000).

In post adoption studies, PU has been found to influence satisfaction and attitude toward the technology. PEOU has been found to influence both PU and adoption intention (Davis, 1989). Even though TAM was found to be a valid theoretical framework in studying ICT adoption and use, it has been criticized for its several limitations including the original model's intended generality and parsimony (Dishaw and Strong, 1999), not considering non-organizational setting (Venkatesh and Davis, 2000), and overlooking the

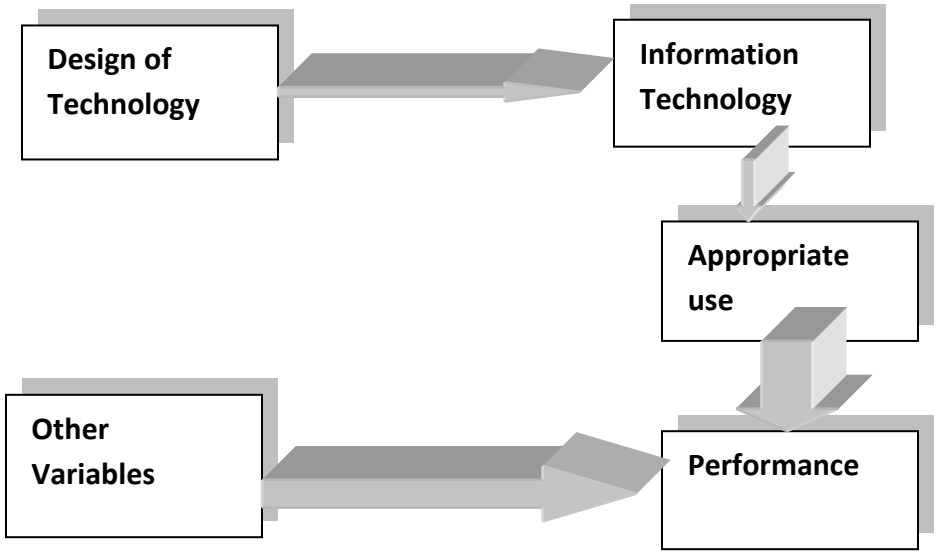
moderating effects of ICT adoption and use in different situations (Sun &and Zhang, 2006).

2.2.2 Lucas – 'Appropriate use' Model

Lucas model is concerned with how ICT enhances organization performance. Lucas model proposes two conditions occurring in a sequence that lead to business performance improvement. The first necessary but not sufficient condition is that IT be designed in such a way that, it fits the firm's task effectively. An effective IT design is not however sufficient for an organizational performance improvement because technology alone cannot improve performance unless technology is appropriately used. Therefore appropriate use of an effectively designed technology is also a necessary condition for organizational performance improvement (Treacy, 1986).

Lucas model acknowledges that factors other than appropriate use of an effectively designed technology may influence firm performance (e.g. competitor reaction). Lucas model ultimately decomposes into two sub-models. The first is a process theory explaining appropriate IT use. The second sub-model is a variance theory linking appropriate IT use to business value (Lucas, 1993).

Figure 2.1: Lucas –'Appropriate use' Model



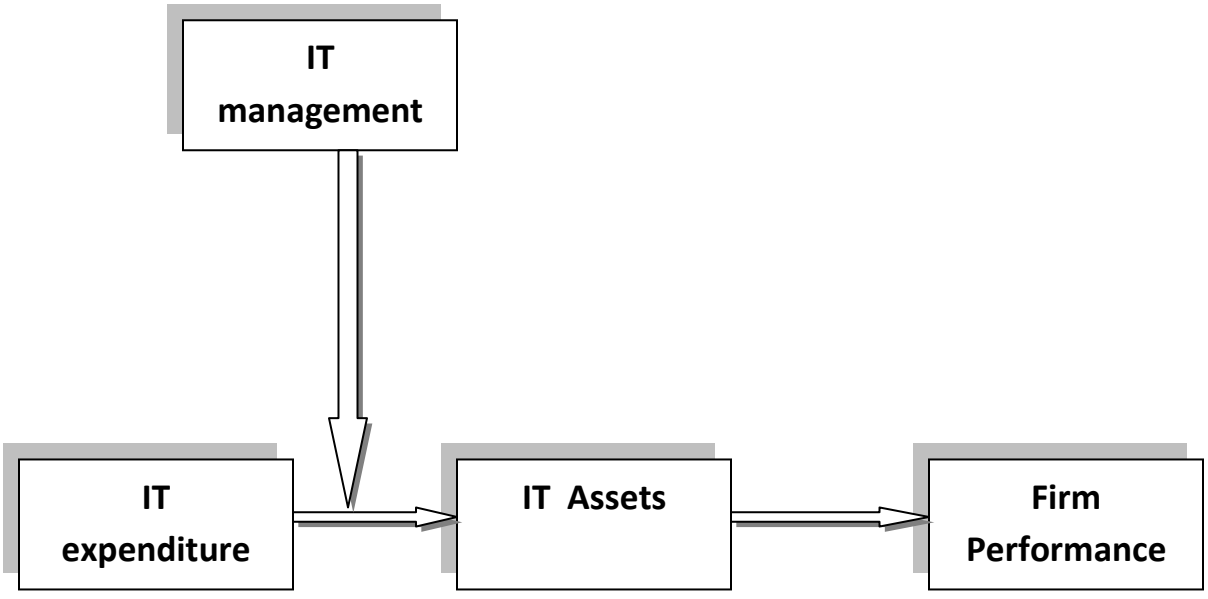
Source: Lucas (1993)

2.2.3 Markus and Soh – 'IT Assets' Model

Building on Weill's concept of IT conversion effectiveness, Markus and Soh argue that, there cannot be a necessary and sufficient relationship between investments in ICT and organizational performance because some to the investments may be wasted through internal IT management processes such as failure to select the right IT projects to pursue or failure to manage them effectively. Markus and Soh posit an intermediate outcome they call 'IT assets' between IT investments and organizational performance. IT assets are described as the result of a conversion process in which IT spending is a necessary but not a sufficient condition.

Like Lucas model they argue that structural factors such as firm size and industry information intensity will affect the ability of an organization to convert IT assets into organization performance. The model decomposes into two sub-models, how IT investments do or do not become IT assets and the how IT investments do or do not yield improved organizational performance.

Figure 2:2 Markus and Soh – 'IT Assets' Model



Source: Markus and Soh (1993)

2.3 ICT Adoption

The importance of ICT to trade varies between production systems, marketing systems, and the technology status of a country. It also varies according to the attributes of the product being traded. There is increasing focus on the adoption and effects of ICT on the trade flow particularly between farmer's cooperative societies in agricultural value chains (Chopra and Meindl, 2012).

An integrated Management Information System (MIS) is important to ensure accessibility, timeliness and, accuracy of data and information required for the growth and development of an organization. To achieve this, they must acquire modern standardized ICT hardware and software to enable them improve their management and interlink with others (Auramo et al., 2012).

ICT-based solutions enhances supply chain competitiveness in terms of; multi-tasking, expanding customer base, raising productivity, controlling cost, working remotely, fast and accurate decision-making and facilitating collaboration. This is achieved through automation and IT coupled with organizational change management (Inkeri, 2009).

According to Doan (2013), the benefits of ICT adoption in Supply chain performance include Quality controlled logistics, Integration and collaboration, Supply chain competitiveness, Risk management, planning collaboration and improved agility of the supply Chain network (Tanskanen, 2012).

According to Groco and Gillian(2011) ICT has created interlinkages leading to effectiveness and efficiency in areas of the supply chain including for example; procurement, production and scheduling, inventory control, collaborations, and Decision making and Risk Management.

2.3.1 Procurement

Procurement entails the steps that are used in the acquisition of goods and services and it is the most significant aspect characterizing an organization's supply chain as well as the aspect of supply chain performance which provides some of the most value-added benefits to the organization (Zott, 2001).

E-procurement is currently being embraced by almost all organizations across the globe. According to Chopra and Meindl (2001) E-business is the execution of business transactions over the Internet while E-procurement, is regarded as all purchasing and supply chain activities for which the Internet is used. Companies conducting e-business can perform such supply chain transactions as allowing customers to place and track orders or negotiating prices and contracts with suppliers over the Internet.

2.3.2 Production Scheduling and Inventory Control

Production is the process of transforming raw materials or purchased components into finished products to satisfy customers and consumers. Organizations are practicing lean production principle that requires a quality management system in order to maintain a constant quality level for the products in line with requirements to streamline processes and cut costs.ICT adoption in production results in Material Resource planning that ensures continuous flow and managed logistics aspects. In order to lessen the number of production routes and thus reduce superfluous transport movements, waiting times and adequate resource utilization, both production and inventory control should be closely monitored (Zott, 2001).

2.3.3 Inter-linkages and Collaborations

The motivation for implementing business processes within and across members of the supply chain might be to make transactions efficient and effective, or to structure inter-firm relationships in the supply chain.(Richey, 2012). As Firms become more dependent on their supply chain partners, more emphasis is given to opportunities and threats that emerge within the supply chain and how those events can have a critical impact on firm performance (Defee & Stank, 2005; Slone, Mentzer, & Dittmann, 2007).

Digital networks will provide linkages at both intra and inter-firm levels. One of the most significant types of inter-firm digital network is Electronic Data Interchange (EDI)—a specially formatted type of e-mail designed for the exchange of basic orders and invoices. In recent years, EDI has diffused down supply chains; the final assemblers in automotive, the supermarket chains in the case of retail (Cox and Ghoneim, 1996).

Collaborative relationships among supply chain partners enables resource pooling and hence competence operations. In order to manage supply chains activities effectively organizations are moving to adopt ICT which promotes resource sharing (Giunipero, 2004).

2.3.4 Decision Making and Risk Management

Fawcett (2011) posits that Strategic decision makers are primarily concerned with how firms achieve their targeted performance. How a firm's supply chain is managed affects its performance in terms of its efficiency and effectiveness (Mentzer, 2008). Information sharing enables effective communication and coordination among all elements of the supply chain which are essential to its success. Increasing the visibility of demand information across supply chain reduces the risks on both upstream and downstream. Cai (2009) points out that, without a foundation of effective supply chain relationships, any efforts to manage the flow of information across the supply chain are likely to be unsuccessful hence the need for adopting IT technology.

Today the key issues in supply chain performance (SCP) are the formation of the supply chain and its efficient coordination with goal of customer satisfaction and sustainability. Organizations are experiencing a continuously changing, unpredictable business environment which requires them to make concrete and accurate decision (Prater *et al.*, 2001).

Performance measurement is critical for companies to improve supply chains' effectiveness and efficiency. Decision-makers in supply chains usually focus on developing measurement metrics for evaluating performance. In practice, once the supply chain performance measures are developed adequately, managers have to identify the key areas that need to be closely monitored so as to result to the perforated performance (Liu, 2009).

2.4 Factors Affecting ICT Adoption

There are a number of factors that make ICT adoption to succeed the absence of which means challenges. These factors are referred to as the Critical Success Factors (CSF). CSFs are defined as those few key areas where things must go right for any positive

results (Rockart, 1979). If management does not pay attention to these areas organizational performance will suffer. The CSF method has been applied to different areas of IT and management and different studies have confirmed the value of the CSF (Maggie and Baptista 2006). Niaz (2007) identifies seven critical success factors for successful software process improvement (SPI) including: Top management support; Ability of IT staff to adapt to change; Quality and Training of IT staff; and ICT Investment drive/resource allocation. Bottlenecks in the adoption of ICT in any organization arise when management does not pay attention to the Critical Success Factors for its successful adoption and implementation, affecting organizational performance.

It is widely recognized that top management commitment and support is essential for any major process improvement initiative. Top management can take a leadership role and adopt a longer-range perspective of the benefits thus ensuring sufficient allocation of resources and overcoming organizational resistance (Thong, Yap, & Raman, 1996).

Ability of IT staff to adapt to change is very crucial. Given the critical relationships between employees' attitude and behavior and the quality of service they provide, it is thus imperative that the management of any organization ensures that the workers are ready to embrace change. Employees should not face any difficulty associated with learning the new system. There was limited on-site support to help them solve system-related problems. This is an important issue, particularly in the context of developing countries like Kenya where computer literacy is low (Hays and Hill, 2001).

Quality and Training of IT staff is inevitable if a firm is to consider successful adoption of ICT. Jung (2013) argues that successful adoption of ICT requires not only qualified but experienced staff that is willing to learn and adapt to new ideas. Without quality IT staff, even the best ICT model is subject to fail. The cooperative societies must therefore invest in training and recruiting of qualified IT expertise to counter the productivity paradox. Successful ICT adoption will call for the need to cultivate; well-designed environment, developed by multidisciplinary teams within well managed projects (Gordon, 2008). The need for continuous training and development programs organized

by the cooperative societies at the grass-root level will help all members in acquiring sufficient knowledge about the new system (Kotla, 2012).

ICT Investment success requires the management's willingness to allocate sufficient resources for successful implementation of ICT. Investments in hardware, ICT staff, and appropriate software can be quite huge There is also need for investments in complementary assets to create an enabling environment for an efficient ICT model (Karlsson, 2010). Investments related to creating suitable infrastructures that provide robust security, data protection, intellectual property protection as well as adequate data transmission and communication are crucial in successful adoption and implementation of ICT in cooperative societies (Caragliu, 2013).

2.5 Empirical Study on Supply Chain Performance

The most fundamental dimensions of performance are efficiency and effectiveness. Efficiency measures how successfully the inputs have been transformed into outputs while, Effectiveness measures how successfully the system achieves its desired output. According to Van Weele (2000) and Knudsen (1999), the performance measurement system must span the activities of the supply chain that it has control over. This part of the supply chain, spanning from suppliers to internal customers, is labeled the supply link. The supply link consists of three main actors: Suppliers, the purchasing department and the internal customer / users.

Supply chain performance measurement areas can be categorized into two: those that are derived from purchasing effectiveness; and purchasing efficiency. Measurement areas of purchasing Effectiveness include: Purchasing material cost/prices e.g. material price/cost; Quality measures e.g. purchasing pre-design involvement and purchasing post-design measures; Purchasing Logistics measures e.g. adequate requisitioning, order inventory policy, and supplier delivery reliability (Boraya, 2013).

The representation of the supply link is described in terms of its environment and structure, and what activities and flows take place in the supply link. Generic performance indicators of the supply link in terms of time utilization, quality of information, flexibility in operations and cost management are used to measure efficiency

and effectiveness. The efficiency in the supply link explains how well the resources are utilized. The effectiveness of the supply link explains how well the objectives are achieved (Kumar et al., 2005).

2.5.1 Measures of Supply Chain Performance

Fawcet (2010) proposes an expanded balanced scorecard model in establishing a set of the specific generic measures. The Proposed balanced scorecard has six perspectives including: customer; supplier; Process; IT system; learning & growth; and Overall. In the Customer perspective the outcome includes: Percentage of line items on back order to total line items (Average number of items on backorder/total number of line items); Cost per order per customer; and effectiveness of ordering time (Total expenditure of the department/Total IRF received); Effectiveness of ordering time (Actual average cycle time/targeted average cycle time).The outcomes in Supplier perspective Include: Quality of delivery (Number of reject or early or late shipments/Total number of items delivered); Cost per order to suppliers (total expenditure of the department/ Total number of purchases); Effectiveness of delivery time (Actual average cycle time/Targeted cycle time); supplier evaluation (Number of supplier evaluations that meet objectives/ Total number of evaluations).

In the Process perspective the outcomes include: Solvability rate (No. of cases solved within 6o days/No. of cases reported); Stock take discrepancy (Total variance / total stock value); Supply chain costs (Total expenditure of department / Total purchase value); Effectiveness of process time (Actual average of cycle time / Targeted average cycle time); GPO participation rate (No. of items under GPO/Total No. of items); requisition completion rate (No. of IRFs completed/ No. of IRFs received). Outcomes in the IT perspective include: Efficiency of IT system (No. of IRFs / No of employees handling the system); Effectiveness of the IT system (Total number of projects, policies or procedures no. of hours in operation).In the Learning and growth Perspective the outcomes include: Training utilization rate (No. of places utilized / Number of planned training); employee engagement index (No. of participants in the engagement survey/ Total No. of employees in the department).Outcomes in the overall perspective include: Effectiveness of the department (Total expenditure of the department/ Total budget of the department).

2.6 Relationship between ICT Adoption and Supply Chain Performance

Lucas and Markus and Soh (1993) noted that appropriate use of ICT by organisations can lead to positive performance. However, other factors may influence the outcome if not taken into control. For example competitor reaction. They may impose a lot of pressure on the extent and magnitude of use thus affecting performance. .Using the conceptual model in Figure 2.3, the study sought to confirm whether there is a direct relationship between ICT adoption in supply chain performance areas among cooperatives in Embu County.

2.7 Summary of Literature Review

The ensuing research is based on a summary of the literature thus presented. Much of the review considers empirical works published in academic journals from 1995 to 2014. The review started by looking at the theoretical perspective of ICT Adoption; an overview of the empirical findings on the relationship of ICT on Supply Chain performance ; the benefits of adopting ICT in Supply chain performance and it then presented divergent challenges in the application of ICT in supply chain performance among cooperative societies.

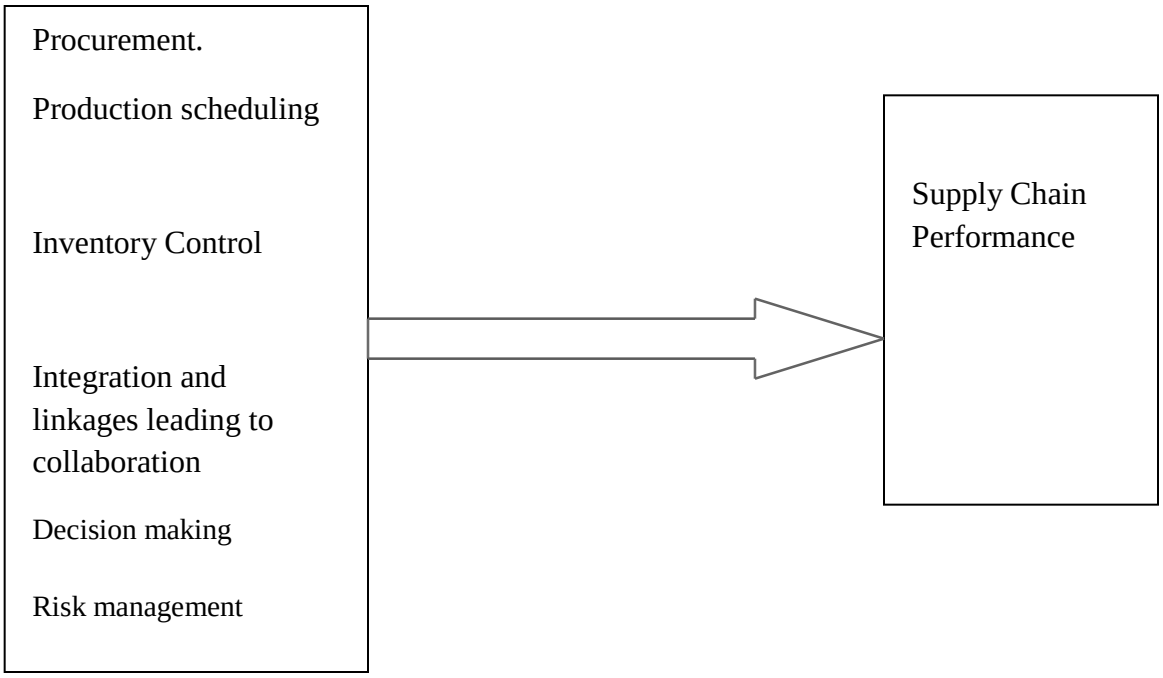
Empirical outcomes of past studies support the idea that organizations can enhance their supply chain performance by adopting ICT under the governance of facilitators to ICT integration. Most of the studies have however not exhaustively investigated the relationship between ICT and Supply Chain performance. The current study thus aims at filling this literature gap by establishing the link between ICT and Supply Chain performance among cooperative societies in Embu County.

2.8 Conceptual Frame Work

The Figure 2.3 is a conceptual framework showing the relationship between independent variables and the dependent variable.

Figure 2.3: The Conceptual Frame work of the Study

Independent variables **Dependent Variable**



Source: Researcher (2014)

The independent variables in the model includes the following practices: The cooperative's application of ICT in procurement; the cooperative's application of ICT in production scheduling inventory control; the cooperative's application of ICT in the enhancement of integration and linkages leading to collaboration; and the cooperative's application of ICT in supply chain decision making and Risk management. The dependent variable is Supply Chain Performance. The figure implies the relationship between the ICT adoption areas and the results in terms of the supply chain performance. The study intended to determine the extent in which ICT has been adopted in the given areas.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter introduces the logical framework followed in the process of conducting the study. It was divided into, research design, population and sample, data collection and data analysis.

3.2 Research Design

The study adopted a descriptive Survey. Descriptive survey involves an attempt to collect data from members of a population in order to determine the current status of that population with respect to one or more variables. Survey study is therefore a self-report study, which requires the collection of quantifiable information from the sample. This study took this perspective of approach to answer the research questions in data collection and analysis.

3.3 Population

The target population included the 75 cooperative societies in Embu County. The researcher intends to use random sampling of 30 co-operatives out of a total population of 75 co-operative which is 40% from the list provided. These 30 cooperatives were arrived at by generating a proportion of one-third in each category of cooperative from the total number of cooperatives in the County

3.4 Sample Size.

According to Mugenda and Mugenda (2003), a representative sample is one which is at least 10% of the population of more than 300. Thus the choice of 40% was considered as a good representative. Also most of the previous researches have used 30% of the total population. The respondents in the study included the managers of the cooperative societies. The researcher administered the questionnaire by herself to the respondents. The sample was generated as shown in the Table.

Table 3.4 : Target Population and Sample Size

Category of Cooperative	Total Population	Sample Size
SACCOs	30	12
Coffee	25	8
Marketing	4	2
Multipurpose	5	2
Housing	3	2
Irrigation	5	2
Dairy	2	1
Union	1	1
TOTAL	**75**	**30**

Source: Primary Data(2014)

3.5 Data Collection

Primary data was collected from the Cooperative managers since they had the experience and knowledge required. Structured questionnaire was used which was subdivided into Five sections. Section A concerned general information; Section B focused on, ICT adoption ; Section C was to establish the relationship of ICT adoption and Supply Chain performance; Section D indicated the Factors affecting ICT adoption; and Section E gave the overall view of ICT on Supply Chain Performance.

3.6 Data Analysis

The data was completed, cleaned and coded and then subjected to various analysis as follows; Section A; by frequencies and percentages; section B, means and standard deviation; Section C ;multiple regression; section D; Factor analysis; section E; means

and standard deviation by use of SPSS version 15. Descriptive statistics was used to describe (and analyze) the variables numerically.The multiple regression model was computed as follows;

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 \beta_5 X_5 + \beta_6 X^6 + \varepsilon$

Where;

Y = Supply Chain Performance (average of the areas of consideration)

β_0= Constant

$\beta_1, \beta_2, \beta_3, \beta_4 \beta_5, \beta_6$ = Coefficients of determination

X_1 = procurement

X_2 = Integration and Linkages leading to Collaboration

X_3 =Production Scheduling

X_4 =Inventory Control

X_5 = Decision making

X_6 Risk management

ε = Random error

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents the data analysis, results and discussion of the study results The study was intended to determine the extent of ICT adoption, to establish the relationship between ICT adoption and supply chain performance among cooperative societies in Embu County and to determine the factors that affect ICT adoption among cooperatives in Embu County.

The findings were presented Section A on demographic Characterization; by frequencies and percentages, Section B on extent of ICT adoption and E on the overall perspective of ICT adoption; by means and standard deviation, Section C on the relationship of ICT adoption areas and Supply Chain Performance; by multiple regression and Section D on factors affecting ICT adoption; by Factor analysis.

4.1.1 Response Rate

The respondents rate was 100% (30) of the sampled size. This rate was attained because the researcher administered the questionnaire by herself to the respondents and ensured that all of them were complete before leaving the respondent.

4.2 Demographic Characterization of Respondents

Demographic characteristics of the sampled respondents to this study included information on Age Bracket, and the Manager's working duration in the Society. The study was administered to managers of the thirty sampled cooperatives in Embu County.

4.2.1 Age Bracket

The respondents were expected to indicate their age bracket. The age gap was taken to be five years. The starting age was considered to be 30 years as this was implied a prime age for managers in Co-operative Societies. Also the age of 46 was taken as the minimum of the highest age .Their responses were analyzed using frequencies and percentages of all ages and the results were as shown in the Table 4.2.1.

Table 4.2.1: Age of the Respondents

Age	Frequency	Percentage(%)
Below 30years	8	26.7
30-35 years	5	16.7
36-40 years	8	26.7
41-45 years	3	10.0
over 46 years	6	20.0
Total	30	100.0

Source :Primary Data(2014)

Most of the respondents indicated they were aged below 40 years, 10% below 45 years and 20% over 46 years. Majority of those employees below forty years were employees of the newly formed societies. It was noted that many of those who were forty five and above were from the older societies.

4.2.2: Working Duration of the Employees

The respondents were required to indicate the duration they had worked for the Societies. The results were as indicated in Table 4.2.2.

Table 4.2.2: Working Duration

Working Duration	Frequency	Percent
0-5 years	15	50.0
5-10 years	3	10.0
10-15 years	7	23.3
15-20 years	1	3.3
over 20 years	4	13.3
Total	30	100.0

Source: Primary data (2014)

Majority 50% of the respondents indicated that they had worked for their cooperatives for a period of less five years, 23% 10 - 15 years, 13.3% for over 20 years, 10% 5-10

years and 3.3% 15-20 years. This shows that most employees had recently been employed by the Societies.

4.2.3 Membership of the Cooperative Society

The researcher was interested to know the Membership of the Societies. The results are shown in Table 4.2.3.

Table 4.2.3 Membership of the Cooperative Society

Membership	Frequency	Percentage (%)
Below 500	10	33.3
500-1000	7	23.3
1000-1500	3	10.0
1500-2000	3	10.0
over 2000	7	23.3
Total	30	100.0

Source: Primary Data(2014)

Majority of the respondents 33.3% had members below 500; followed by 23.3% 500 - 1000, 23.3% over 2000 and the rest had 1000 to 2000 members. Most of those with membership below five hundred included SACCOs, multipurpose, irrigation and housing which are newly formed. Dairy, Union and Coffee comprised of over five hundred members since these were the earliest Cooperatives.

4.2.4 Number of Employees in the Cooperative Society

The respondents were expected to indicate the number of employees that the cooperatives societies had employed. The results are indicated on Table 4.2.4

Table 4.2.4 Number of Employees in the Cooperative Society

Number	Frequency	Percentage (%)
Below 50	24	80.0
51 -100	2	6.7
101-150	2	6.7
151-200	2	6.6
TOTAL	**30**	**100.0**

Source Primary Data (2014)

Majority (80%) of the Cooperatives indicated that they had employed below 50 employees. 6.7% were between 51 – 100, 6.7% 101-150 and 6.6% 151 -200 employees. The data showed that those cooperatives with below fifty employees included SACCOs, Multipurpose, Irrigation and Housing with membership below five hundred. The few with above fifty employees included the other Categories of Societies with membership of above one thousand.

4.2.5 Category of the Cooperative Societies

The cooperatives were grouped into the following categories- Union, Coffee societies, SACCOs, Irrigation schemes, Marketing, Housing, Dairy societies and Multipurpose cooperatives .Data was collected from the sampled categories as indicated in Table 3.4 on sample size .The result were analyzed using frequencies and percentages as shown in Table 4.2.5.

Table 4.2.5 Category of the Cooperative Societies

Category of Societies	Frequency	Percentage (%)
Union	1	3.3
Coffee societies	8	26.7
SACCO	12	40.0
Irrigation schemes	2	6.7
Marketing	2	6.7
Housing	2	6.7
Dairy society	1	3.3
Multipurpose	2	6.7
Total	**30**	**100.0**

Source: Primary Data (2014)

The findings reviewed that 40% of the respondents were from SACCO, 26.7% coffee societies, 6.7 % Housing, 6.7 % Marketing, 6.7 % Irrigation, 3.3% Dairy Societies 3.3%, Multipurpose 6.7% and 3.3% Union co-operatives. There were more SACCO Societies in Embu than the other category of Cooperatives. Most of the SACCOs were found in the urban areas. It was found out that most of the organizations form themselves into SACCOs to create a pool of savings for their members. In most cases they centralize their offices in towns to enhance accessibility**.**

4.2.6 Duration which the Cooperative has been in Existence

The respondents were required to indicate the duration the Society had been in existence. Their respondents were as in Table4.2.6

Table 4.2.6 :Duration which the Cooperative has been in Existence

Duration	Frequency	Percentage(%)
1-5 years	12	40.0
5-10 years	7	23.3
10-15 years	5	16.7
15- 20 years	1	3.3
20 years	5	16.7
Total	**30**	**100.0**

Source: Primary Data (2014)

Most(40%) of the Cooperatives have been in existence for 1- 5 years, 23.3% 5- 10 years,16.7% 10- 15 years ,those over 20 years 16.7% and 3.3% for 15- 20 years. This shows that most of the cooperatives in Embu County are very young and recently started.

4.3 Extent of ICT Adoption in Supply Chain by Co-operatives Societies in Embu County.

The researcher sought the information on the Extent to which ICT has been adopted in the areas of supply chain by Co-operatives societies. The data was collected on areas of ICT adoption, analyzed and results are as shown.

4.3.1 Areas of Procurement

The respondents were required to rate the extent of ICT adoption in each of the activities that are involved in procurement of supplies. These are the key processes that comprise the procurement. For procurement process to be initiated, there must be ordering of supplies, tendering, awarding the tenders and paying for the ordered goods.ICT adoption in each of these transactions was rated on scale to determine the extent of its use. The results of each activity was analyzed and results were presented in a 5 point scale as shown in Table 4.3.1.

Table 4.3.1: Areas of Procurement

ICT adoption area-procurement	Mean	SD
E -payment	3.30	1.119
E-ordering	3.27	0.980
E- tendering	3.20	1.064
E- awarding	3.37	1.098
Mean	**3.28**	

Source: Primary Data(2014)

Information on Table 4.3.1 shows four areas of procurement of ICT adoption which were put on a 5 attributes point scale. The mean for a group of 30 respondents for e-payment were; 3.30 with a SD of 1.19, e-ordering 3.27 and SD 0.980, e-awarding; 3.20, 1.064 and 3.37, 1.098.Most of the areas of procurement were rated moderate extent with SDs (1.119, 0.98, 1.064 and 1.098) for e-payment, e-ordering, e- tendering and e- awarding respectively. The average mean for ICT adoption in the area of procurement is 3.28. This indicated that ICT had generally been moderately adopted in the procurement area. Standard Deviation of 1.119, 1.064 and 1.098 shows that the individual responses, on average, were a little over 1 point away from the mean , except 0.98 which was below 1. This means majority of the cooperatives have variably adopted ICT in the considered

areas. ICT adoption was more in e-payment, e- awarding and e-ordering than in e-tendering and this brought SD high.

4.3.2 ICT Adoption in Production Scheduling

The respondents were expected to indicate how ICT was adopted in Production Scheduling in the Supply Chain by Co-operatives Societies. The results were tabulated as on Table 4.3.2.

Table 4.3.2: ICT Adoption in Production Scheduling

ICT adoption area-**production scheduling**	Mean	SD
e-capacity scheduling	3.37	1.159
e-inspection of materials	3.30	1.149
e- quality control	3.30	1.066
Determining MRP	3.40	1.102
e -scheduling of production activities	3.50	1.075
Mean	**3.57**	

Source: Primary Data(2014)

The respondents were asked to rate production scheduling on a series of attributes on a 5 point scale. The mean for a group of 30 respondents for e -capacity scheduling were 3.37 with a SD of 1.159, , e-inspection of materials; 3.30, SD= 1.149, e- quality control; 3.30,SD=1.066, e- quality control; 3.30,SD=1.166, determining MRP 3.4,SD=1.102 and e -scheduling of production activities was 3.5 with SD of 1.075. Observing at the means only, it would seem that e -capacity scheduling, e-inspection of materials, e- quality control, and determining MRP was rated moderate extent. The average mean for Production and Scheduling ICT adoption is 3.57, which means that it was adopted to a

moderate extent. Large standard deviations 1.159, 1.149, 1.066, 1.102 and 1.1075 indicates that SDs were far from the mean. It pointed out that most areas in production and scheduling have not adequately adopted ICT in majority of the cooperatives. The mean of 3.57 showed that ICT use in the four processes in procurement was generally moderate.

4.3. 3: ICT Adoption in Inventory Control

The respondents were asked the Extent to which ICT had been adopted in the area of Inventory Control in the supply chain of Co-operatives societies. The results were indicated in Table 4.3.3.

Table 4.3.3: ICT Adoption in Inventory Control

ICT adoption area-**inventory control**	Mean	SD
Re-order level	3.87	1.042
reception of stock	3.97	1.066
determining EOQ	4.00	1.174
storage	4.07	1.048
Quality assurance	4.07	1.094
Issuance of stock	3.97	1.59
Mean	**4.00**	

Source: Primary Data (2014)

Data on table 4.3.3 indicates the means and SDs for a group of 30 respondents for inventory control. The mean of re-ordering was 3.87 with a SD of 1.042, reception of stock3.97, SD =1.066, determining EOQ 4.00,SD 1.17, storage 4.07,SD= 1.048, quality assurance and insurance of stock 4.07,SD=1.094 and issuance of stock 3.97, SD = 1.59.

The results also shows that inventory control was rated large extent "4" by considering the mean.. Further the high SDs of 1.042, 1.066, 1.17, 1.048, 1.094 and 1.59 Indicates the responses are far from the mean. The overall mean of 4.00 showed that ICT had been largely adopted in the activities of inventory control.

4.3.4: Integration and Linkages

When asked to rate the Extent to which ICT had been adopted in integration and linkages in supply chain by Co-operatives societies, the responses of the respondents were reflected on Table 4.3.4.

Table 4.3.4: Integration and Linkages

ICT adoption area-**integration and linkages**	Mean	SD
Internet	3.90	1.332
Use of mobile	4.87	0.346
Email	4.47	0.860
Tracking device	3.5	1.306
Mean	**4.18**	

Source: Primary Data (2014)

Data on Table 4.3.4 shows the rating of four main areas of integration and linkages in ICT adoption area, mainly Internet, use of mobile, Email and tracking device on a series of attributes on a 5 point scale. The mean for a group of 30 respondents for "internet "were 3.90 with a SD of 1.332, use of mobile 4.87,SD=0.346, Email 4.47, SD=0.860, tracking device 3.5 and SD of 1.306. In interpretation it seemed that use of mobile, internet and email by the cooperatives was rated large extent and hence adequately adopted. However in tracking, the adoption was moderate. Varying SD 0.346 and 0.860

indicated that variation of usage of the two services, where most respondents had used email, internet and use of mobile adequately while ICT in tracking devices were moderately adopted by cooperatives General perspective derived from the mean of 4.18 is that ICT was largely adopted in this area of interlinkages/collaborations.

4.3.5: Decision Making

The study sought to establish the extent of adoption of ICT in decision making in supply chain of the Society. The information was indicated on Table 4.3.5

Table 4.3.5: Decision Making

ICT adoption area-Decision Making	Mean	SD
Waste reduction	4.13	0.973
Resource pooling	4.30	0.837
Maintaining competitive advantage	4.30	0.952
HR- planning	4.30	1.877
Demand forecasting	4.33	0.802
Mean	**4.27**	

Source: Primary Data (2014)

The respondents were asked to rate ICT in decision making on a series of attributes on a 5 point scale. The mean for a group of 30 respondents for waste reduction were 4.13 with a SD of 0.973, resource pooling 4.30 SD =0.837, maintaining competitive advantage 4.30 SD=0.952, HR- planning 4.30 SD =1.8 and demand forecasting 4.33 and SD of 0.802. Considering the average mean only, it would seem that ICT in decision making was rated

large extent and is highly adopted by cooperatives. The SDs (0.973, 0.837,0.952,1.877 and 0.802) indicated that decision making had most of the areas used ICT. The Standard Deviation of 1.877 (HR- planning) shows that the individual responses, on average, were a little over 1 point away from the mean, hence shows most cooperatives had issues in comprehensively using ICT in HR planning. Howeve,the overall mean of 4.27 indicated that ICT was generally largely adopted in the activity of decision making.

4.3.6 Risk Management

The study sought to establish the extent of adoption of ICT in Risk management in supply chain of the Cooperatives. The information was indicated on Table 4.3.6.

Table 4.3.6 Risk Management

ICT adoption area- Risk Management	Mean	SD
Ensuring safety of goods on transit	4.50	0.861
Manage expiry date	4.33	0.944
Monitoring operational processes	4.47	0.900
Training of staff	4.40	1.814
Research and Development	4.43	0.728
Mean	**4.44**	

Source: Primary Data(2014)

Data on Table 4.3.6 indicates ratings of ICT adoption in Risk Management in Supply Chain of the 30 cooperatives. The responses were put on a series of attributes of 5 points scale. The mean for a group of 30 respondents for "ensuring safety of goods on transit

"were 4.50 with a SD of 0.861, manage expiry date 4.33 SD =0.944, monitoring operational processes 4.47 SD=0.900, training of staff 4.40 SD =1.814 and research and development 4.43 and SD of 0.728. Considering the means only, it would seem that risk management was rated large extent and ICT had been well adopted in risk management of the supply chain. The SDs 0.861, 0.944, 0.900, 1.814 and 0.728 indicated that responses were concentrated together close to the mean, hence less variation .The average mean of 4.44 indicates that ICT has been adopted in this section to a large extent.

4.4: Summary of Overall ICT Adoption in the Supply Chain Areas

The overall mean results of the independent variables of supply chain performance were calculated as per each area and showed in Table 4.4.

Table 4.4: Summary of Overall ICT Adoption in the Supply Chain Areas

ICT Adoption Area	Mean
Procurement	3.28
Production Scheduling	3.57
Inventory Control	4.00
Integration and Linkages	4.18
Decision Making	4.27
Risk Management	4.44

Source: Primary Data(2014)

4.5: Relationship of ICT Adoption and SCP

The respondents were required to rate the relationship of ICT adoption and SCP in a 5 point scale. The results were analyzed as shown in Table 4.5 using multiple regression.

The results of multiple coefficients indicated that there is no equal explanatory power of the dependent variable. The four areas showed variations in ICT Adoption and their influences to the supply chain performance among cooperative societies according to the unstandardized beta coefficient (beta = 1.132, p=0.110) which was not statistically significance at 5% level.

Variation of Procurement in ICT Adoption influences most the variance in the inclusion Supply chain performance among cooperative societies according to the unstandardized beta coefficient (beta = .104, p=0.367) which was not statistically significance at 5% level.

This was followed by Variation of inventory control in ICT Adoption influences most the variance in the inclusion Supply chain performance among cooperative societies according to the unstandardized beta coefficient (beta =0 .432, p=.016) which was statistically significance at 5% level.

Table 4.5: Relationship of ICT Adoption and SCP- Multiple Regressions Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.132	.680		1.664	.110
	ICT- adoption in supply chain areas- Procurement	.104	.113	.153	.922	.367
	ICT- adoption in supply chain areas-Inventory control	.432	.166	.573	2.603	.016
	ICT- adoption in supply chain areas-Production Scheduling	.063	.113	.092	.557	.583
	ICT- adoption in supply chain areas-Integration and linkages/collaboration along the supply chain	-.031	.143	-.042	-.214	.832
	ICT- adoption in supply chain areas- Risk management	-.011	.020	-.110	-.533	.599
	ICT- adoption in supply chain areas -Decision making	.113	.166	.157	.679	.504

Source: Primary Data(2014)

(a) Dependent Variable: Supply Chain Performance

Production scheduling in ICT Adoption influences and Supply chain performance among cooperative societies according to the unstandardized beta coefficient (beta =0.063, p=0.583) which was statistically not significance at 5% level.

Integration and linkages/collaboration along the supply chain Supply chain performance among cooperative societies according to the unstandardized beta coefficient (beta =-0.031, p= 0.832) which was statistically not significance at 5% level.

Variations of risk management in ICT Adoption influences most the variance in the inclusion Supply chain performance among cooperative societies according to the unstandardized beta coefficient (beta =- -.011, p= 0.599) which was statistically not significance at 5% level.

The last parameter was decision making which shown Variation in decision making in ICT Adoption and influences the variance in the inclusion of Supply chain performance among cooperative societies according to the unstandardized beta coefficient (beta =-0.113, p= 0.504) which was statistically not significance at 5% level.

As per the SPSS generated results shown in Table 4.13, the Equation;

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_{5+} \beta_6 X_{6+} \varepsilon$

Becomes; $1.132+0.104X_1+0.432X_2+0.063X_3-0.031X_4-0.011X_5+0.113X_6+ \varepsilon$

Where;

Y = Supply Chain Performance

β_0= Constant

$\beta_1, \beta_2, \beta_3, \beta_4, , \beta_5 , \beta_6$ = Coefficients of determination

X_1 = procurement

X_2 = integration and linkages leading to collaboration

X_3 =Production, scheduling

X_4=Inventory control

X_5 = Decision making and

X_6 = Risk management

ε = Random error

Table 4.5.1: Multiple Regressions

Model Summary

					Change Statistics				
Model	R	R Square	Adjusted Square	R Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.772[a]	.595	.485	.466	.595	5.398	6	22	.001

a. Predictors: (Constant), ICT adoption in: Procurement, Production Scheduling, Interlinkages and Collaborations, Inventory control, Risk Management and Decision Making.

b. Dependent Variable: Supply Chain Performance

Source: Primary Data (2014)

Multiple regression indicates that there is a strong correlation between independent variables and dependent variable (adjusted R=0.772, p=0.001) which is statistically significance at 5%. In addition, the influence of six explanatory variables explains the variation by 48.5% (adjusted R^2=48.5%) implying that ICT Adoption in the areas affects Supply chain performance among cooperative societies.

Table 4.5.2 : ANOVAb

Model		Sum of Squares	d.f	Mean Square	F	Sig.
1	Regression	7.023	6	1.170	5.398	.001[a]
	Residual	4.770	22	.217		
	Total	11.793	28			

a. Predictors: (Constant), ICT adoption in: Procurement, Production Scheduling, Interlinkages and Collaborations, Inventory control, Risk Management and Decision Making.

b. Dependent Variable: Supply Chain Performance

Source: Primary data (2014)

Table 4.5.2 shows the output of the ANOVA analysis and whether we have a statistically significant difference between our group means. We can see that the significance level is 0.001 (p = .001), which is below 0.05 and, therefore, there is a statistically significant difference in the relationship between ICT Adoption and Supply chain performance among cooperative societies.

4.6: Factor Analysis (Communalities)

The study sought to determine the factors affecting ICT adoption in supply chain among co-operatives in Embu County. Reponses collected on factors affecting ICT were subjected to factor analysis. This analysis reduces data into key information by selecting latent variables that are reflected in the manifested variables. Communalities is the proposition of variants that each item has in common with other items. The proposition of variant that is unique to which items are then taken as respective item's total variant minus the communality. The extraction method used was the principal component analysis.

Table 4.6. Factors Affecting ICT Adoption- Factor Analysis (Communalities)

Factors Affecting ICT Adoption		
Cooperative has effective governance through top management support	1.000	.640
Cooperative submits to clear mission statements and common ICT goals among the staff members	1.000	.790
Agency has implemented cross functional processes among members and the ICT team	1.000	.692
Transition from traditional delivery methods to the adoption of e-learning environment involving the management of change	1.000	.661
Agency has established software to enhance interdependency between its functional areas	1.000	.774
Cooperatives maintains cooperative and effective communication mechanisms among the staff members	1.000	.935
cooperative undertakes information sharing among the staff members	1.000	.955
The cooperative society is engaged in sharing of technical expert among the staff members	1.000	.954
Cooperative management ensures efficient project approach to integrate an support the dialogue between the group	1.000	.889
Cooperative society applies standard procedures geared towards ICT process integration in the work force	1.000	.889
Cooperative acquires and maintains appropriate ICT Training resources	1.000	.935
Cooperative recruits qualified and experienced ICT staff	1.000	.917

IT staff-ICT staff is willing to learn and adapt to new ideas	1.000	.903
Cooperative management has cultivated well designed environment for all departments participation within well managed ICT projects	1.000	.897
There is continuous training and development programs organized by the cooperative societies at the grass root level	1.000	.957
Cooperative follows normative guidelines in managing and selecting ICT staff	1.000	.955
There is investments in quality ICT assets	1.000	.902
The management is willing to allocate sufficient resources for implementation of ICT	1.000	.856
The cooperative is willing to make investments in complementary assets to create an enabling environment for an efficient ICT model	1.000	.856
The cooperative is willing to adopt new technology and innovations	1.000	.812

4.6.1 Factor Extraction (Total Variance)

Table 4.6.1 shows the results of principle analysis component with twenty extract factors. The Eigen values indicate the relative importance of each factor accounting for a particular set and those with small Eigen values were excluded.

Table 4.6.1: Factors Affecting ICT Adoption -Total Variance explained

Component	Initial Eigen values			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	17.441	77.444	77.444	17.441	77.444	77.444
2	2.208	9.805	87.249	2.208	9.805	87.249
3	1.179	5.235	92.484	1.179	5.235	92.484
4	.613	2.723	95.208			
5	.438	1.944	97.151			
6	.203	.903	98.054			
7	.146	.649	98.703			
8	.115	.513	99.216			
9	.079	.350	99.566			
10	.056	.249	99.815			
11	.022	.096	99.912			
12	.020	.088	100.000			
13	2.66E-015	1.18E-014	100.000			
14	8.94E-016	3.97E-015	100.000			
15	2.99E-016	1.33E-015	100.000			
16	-1.40E-017	-6.23E-017	100.000			
17	-8.77E-017	-3.89E-016	100.000			
18	-1.95E-016	-8.68E-016	100.000			
19	-2.18E-016	-9.69E-016	100.000			
20	-4.98E-016	-2.21E-015	100.000			

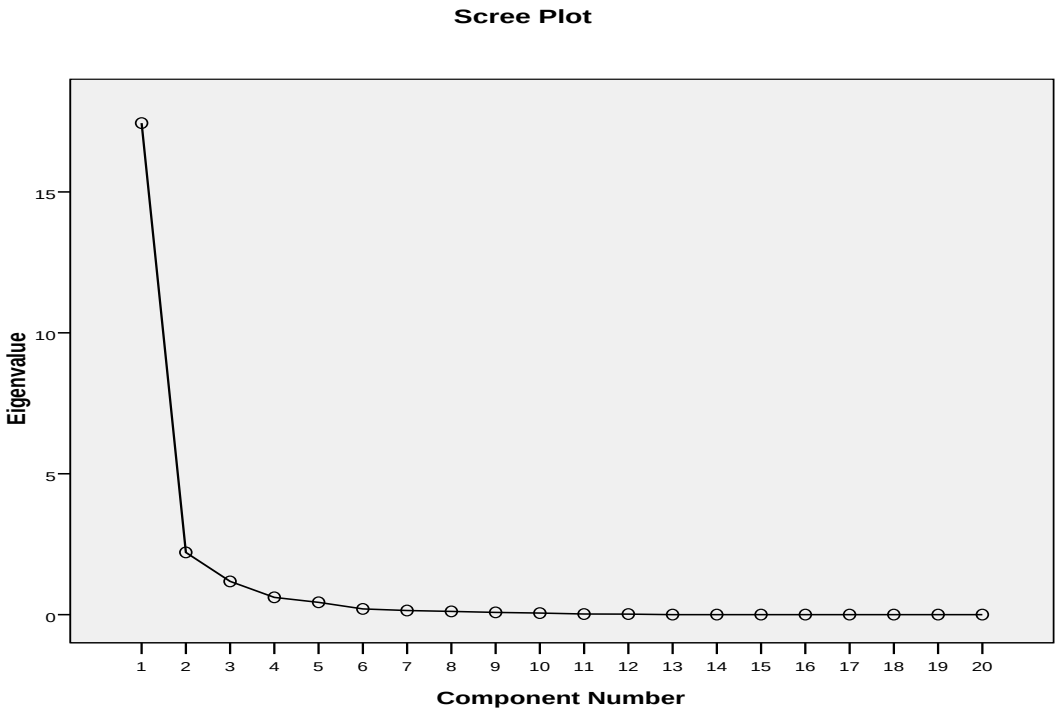
Extraction Method: Principal Component Analysis.

The results in Table 4.6.1 indicate the strength of the influence of the factors affecting ICT adoption on the total variation. Top management support most influential factor accounting for 77.444 %of the total variation. The ability of the ICT staff to adopt to ICT changes in the supply chain the next most useful factor accounting for 9.805% of the variation. Investment in ICT assets the next important factor at (5.235).The results above also indicate that, three of the factors affecting ICT adoption account for 92.484 of the total variances.

4.6.1.1 Scree Plot

The scree plot is a plot of the factor Eigen values against the component numbers. In figure 4.1 only 3 factors were considered because the curve tend to flatten from the third component onwards, meaning very low Eigen values.

Figure 4.1 Scree plot on the Factors Affecting ICT Adoption



Source: Primary Data (2014)

4.6.2: Component Matrix

Component matrix involves the relative Eigen values in respect to each factor. Each factor belongs to one of the set of factors extracted and is determined by the Eigen values of the factors in relation to each set. Table 4.6.2 shows the sets.

Table 4.6.2: Factor Analysis –Component Matrix

Factors Affecting ICT adoption in supply chain.	**Components**		
	1	**2**	**3**
Cooperative has effective governance through top management support	0.977	0.005	-0.098
Cooperative submits clear mission statements and common ICT goals among the staff	0.977	0.005	-0.098
Agency has implemented cross functional processes among staff and the ICT team	0.974	0.094	-0.080
Transition exist from traditional delivery methods to the adoption of e-learning environment involving the management of change	0.972	0.098	-0.071
Agencies has established software to enhance interdependency between its functional areas	0.964	0.073	-0.055
Cooperatives maintains cooperative and effective communication mechanisms among the staff members	0.964	0.069	-0.152
Co-operative undertakes information sharing among the staff members	0.957	0.016	-0.136
The cooperative society is engaged in sharing of technical expert among the staff members	0.949	-0.045	-0.087
Cooperative management ensures efficient project approach to integrate an support the dialogue between the group	0.947	0.036	-0.125
Cooperative society applies standard procedures geared towards ICT process integration in the work force	0.943	0.019	-0.192
Cooperative acquires and maintains appropriate ICT training resources	0.943	0.019	-0.192
Cooperative recruits qualified and experienced ICT staff	0.913	-0.260	0.207
ICT staff is willing to learn and adapt to new ideas	0.889	-0.255	0.360
Cooperative management has cultivated well designed environment for all departments participation within well managed ICT projects	0.889	-0.255	0.360
There is continuous training and development programs organized by the cooperative societies at the grass root level	0.877	0.073	-0.037
Cooperative follows normative guidelines in managing and selecting ICT staff	0.858	-0.275	0.396
There is investments in quality ICT assets	0.801	0.141	-0.073
The management is willing to allocate sufficient resources for implementation of ICT	0.728	0.402	-0.101
The cooperative is willing to make investments in complementary assets to create an enabling environment for an efficient ICT model	0.535	0.710	0.134
The cooperative is willing to adopt new technology and innovations	0.378	0.705	0.428

Source: Primary Data(2014)

In the first component, all factors influence ICT adoption in supply chain among cooperative hence high correlation. However in the second components the only factor only concerning willingness to adopt new technology and innovations became significance. Each component represents the relationship between item and the unrotated factor(example in considering the factor that Cooperative has effective governance through top management support are implemented and factor 1 is 0.977).These relationships guide in deriving meanings of the factors of components. This is realized by looking for a common thread among the variables that have large loadings for a particular factor or components

From the results in Table4.6.2, the variables that measured factors influencing ICT adoption in supply chain performance among cooperative societies in Embu county are in a way highly related with the factor under consideration.

4.6.2.1 Rotated Component Matrix

From the results in Table 4.6.2.1 the variables that measured factors affecting ICT adoption in supply chain performance among cooperative societies in Embu county in one way or the other are highly correlated.

Table 4.6.2.1. Rotated Component Matrix

Factors Affecting ICT Adoption	**COMPONENTS**		
	1	2	3
Cooperative has effective governance through top management support	0.857		
Cooperative submits to clear mission statements and common ICT goals among the staff members	0.857		
Agency has implemented cross functional processes among members and the ICT team	0.852		
Transition from traditional delivery methods to the adoption of e-learning environment involving the management of change	0.832		
Agency has established software to enhance interdependency between its functional areas	0.825		
Cooperatives maintains cooperative and effective communication mechanisms among the staff members	0.825		
cooperative undertakes information sharing among the staff members	0.819		
The cooperative society is engaged in sharing of technical expert among the staff members	0.807	0.539	
Cooperative management ensures efficient project approach	0.804	0.541	

to integrate an support the dialogue between the group			
Cooperative society applies standard procedures geared towards ICT process integration in the work force	0.794		
Cooperative acquires and maintains appropriate ICT Training resources	0.786	0.540	
Cooperative recruits qualified and experienced ICT staff	0.712		
IT staff-ICT staff is willing to learn and adapt to new ideas	0.677		
Cooperative management has cultivated well designed environment for all departments participation within well managed ICT projects	0.649		0.508
There is continuous training and development programs organized by the cooperative societies at the grass root level		0.881	
Cooperative follows normative guidelines in managing and selecting ICT staff		0.865	
There is investments in quality ICT assets		0.865	
The management is willing to allocate sufficient resources for implementation of ICT	0.574	0.778	
The cooperative is willing to make investments in complementary assets to create an enabling environment for an efficient ICT model			0.890
The cooperative is willing to adopt new technology and innovations			0.820

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

A Rotation converged in 3 iterations.

4.6.2.2 Factor Isolation

Factor analysis involves isolation each of the variable factors and grouping them by the two extracted factors based on the factor loading on each set.

Table 4.6.2.2 Factor Isolation

Factor group	Factors Affecting ICT Adoption
Factor 1	**Top management support** • Cooperative has effective governance through top management support. • Cooperative submits to clear mission statements and common ICT goals among the staff members. • Agency has implemented cross functional processes among members and the ICT team. • Transition from traditional delivery methods to the adoption of e-

	learning environment involving the management of change. • Agency has established software to enhance interdependency between its functional areas. • Cooperatives maintains cooperative and effective communication mechanisms among the staff members. • cooperative undertakes information sharing among the staff members. • The cooperative society is engaged in sharing of technical expert among the staff members. • Cooperative management ensures efficient project approach to integrate an support the dialogue between the group. • Cooperative society applies standard procedures geared towards ICT process integration in the work force. • Cooperative acquires and maintains appropriate ICT Training resources. • Cooperative recruits qualified and experienced ICT staff. • IT staff-ICT staff is willing to learn and adapt to new ideas. • Cooperative management has cultivated well designed environment for all departments participation within well managed ICT projects. • The management is willing to allocate sufficient resources for implementation of ICT.
Factor 2	**IT Staff Training** • There are continuous training and development programs organized by the cooperative societies at the grass root level. • Cooperative follows normative guidelines in managing and selecting ICT staff. • There is investments in quality ICT assets. • The management is willing to allocate sufficient resources for implementation of ICT.
Factor 3	**ICT Innovation** • The cooperative is willing to make investments in complementary assets to create an enabling environment for an efficient ICT model. • The cooperative is willing to adopt new technology and innovations. • Cooperative management has cultivated well designed environment for all departments participation within well managed ICT projects.

Source: Primary Data (2014)

Table 4.6.2.2 shows that there are three extracted groups on the factors affecting ICT adoption in the supply chain performance among cooperatives societies in Embu county. Top management support, IT Staff Training and ICT innovation are the extracted group factors 1, 2 and 3 respectively.

The following Elements were seen to appear in both factor 1 and 2 (i) The cooperative society is engaged in sharing of technical expert among the staff members (ii) Cooperative management ensures efficient project approach to integrate an support the dialogue between the group (iii) Cooperative acquires and maintains appropriate ICT Training resources (iv) Cooperative management has cultivated well designed environment for all departments participation within well managed ICT projects; (v) and the management is willing to allocate sufficient resources for implementation of ICT are the extracted group appear both in factor 1 and 2 which contains the most number of variable components.

Factor 1 isolated top management support variables, as listed in Table 4.6.2.2.Factor 2 elements comprises (i)There are continuous training and development programs organized by the cooperative societies at the grass root level (ii) Cooperative follows normative guidelines in managing and selecting ICT staff (iii)There is investments in quality ICT assets (iv)The management is willing to allocate sufficient resources for implementation of ICT (v) Cooperative management ensures efficient project approach to integrate an support the dialogue between the group (vi) Cooperative acquires and maintains appropriate ICT Training resources and ; (vii) The cooperative society is engaged in sharing of technical expert among the staff members.

Factor 3 elements comprises of (i) the cooperative willing to make investments in complementary assets to create an enabling environment for an efficient ICT model (ii) The cooperative is willing to adopt new technology and innovations and (iii) Cooperative management has cultivated well designed environment for all departments participation within well managed ICT projects.

The results show that most of the 20 factors listed in the questionnaire were grouped together by their correlation and clustered into three main group factors. The most number of factors were in1 and 2 were few elements fell in factor group three.

4.6.3 Factors Affecting ICT Adoption - Descriptive analysis

The respondents were required to rate the factors affecting ICT adoption on a point 5 scale. The results are analysed using descriptive analysis as shown in Table 4.6.3.

Table 4.6.3: Factors Affecting ICT Adoption - Descriptive analysis

Factors Affecting ICT Adoption in Supply Chain.	MEAN	SD
Cooperative has effective governance through top management support	1.80	1.448
Cooperative submits clear mission statements and common ICT goals among the staff	1.37	0.964
Agency has implemented cross functional processes among staff and the ICT team	1.20	0.610
Transition exist from traditional delivery methods to the adoption of e-learning environment involving the management of change	1.27	0.691
Agencies has established software to enhance interdependency between its functional areas	1.33	0.884
Cooperatives maintains cooperative and effective communication mechanisms among the staff members	1.47	0.008
Co-operative undertakes information sharing among the staff members	1.53	0.074
The cooperative society is engaged in sharing of technical expert among the staff members	1.50	0.009
Cooperative management ensures efficient project approach to integrate an support the dialogue between the group	1.40	0.932
Cooperative society applies standard procedures geared towards ICT process integration in the work force	1.40	0.932
Cooperative acquires and maintains appropriate ICT training resources	1.50	1.106
Cooperative recruits qualified and experienced ICT staff	1.47	1.042
ICT staff is willing to learn and adapt to new ideas	1.50	1.106
Cooperative management has cultivated well designed environment for all departments participation within well managed ICT projects	1.57	1.165
There is continuous training and development programs organized by the cooperative societies at the grass root level	1.53	1.074
Cooperative follows normative guidelines in managing and selecting ICT staff	1.53	1.074
There is investments in quality ICT assets	1.70	1.179
The management is willing to allocate sufficient resources for implementation of ICT	1.77	1.194
The cooperative is willing to make investments in complementary assets to create an enabling environment for an efficient ICT model	1.77	1.194
The cooperative is willing to adopt new technology and innovations	1.77	1.223
Mean of factors affecting ICT adoption	1.51	

Source: Primary Data(2014)

The results in Table 4.6.3 indicate that all the listed down factors had facilitated ICT adoption in the areas of SCP among cooperative societies in Embu County. The average mean of 1.51 was labeled 'strongly agree' in the 5 point scale. The findings above imply that the level of investment in enabling factors in the implementation of ICT adoption varies considerably among organization of different undertakings. This supports Walker, et al. (2011) who concluded that enabling factors are crucial to organizations need to enhance integrated linkages in supply chain performance.

4.7 Overall Perspective of Independent and Dependent Variables

The researcher sought to establish in a perspective the overall view of ICT adoption among the Cooperative Societies. The results are indicated in Table 4.7.

Table 4.7 An Overall Extent to which ICT Adoption Affects Supply Chain Performance in the Cooperative Society.

	Frequency	Percentage	Mean	SD
Moderate extent	11	36.7	3.73	0.640
Large extent	16	53.3		
To very large extent	3	10.0		
	30	**100.0**		

Source: Primary Data(2014)

Data on Table 4.7 indicates the overall extent to which ICT adoption has affected the supply chain performance in the cooperative society. The responses were put on a series of attributes of 5 points scale. The mean for a group of 30 respondents were 3.73 with a SD of 0.640. The Standard Deviation of 0.640 shows that the individual responses, on average, were a below 1 point, hence indicates that ICT adoption in the Supply Chain areas affects the Supply Chain Performance.

4.8 Discussions of the Findings

As pointed out in the statement of the problem, there are various perspectives into which ICT has been looked into with regards to performance. Literature gap covered in this study was to establish the relationship between ICT adoption and the supply chain performance. The resultant concept from the study established that there must be factors to be considered for a successful adoption of ICT. The most factor being top management support and ICT staff training.

It was also found out that ICT has been moderately adopted by cooperative societies in Embu County. Most of the areas had adopted ICT on a larger level than others. These include inventory control, decision making and risk management areas. The overall average mean from the results indicated '3.73' which is moderate adoption from the 5-point scale. It is also clear that several factors have contributed to the success of ICT adoption. This is noted from the factor analysis carried out which indicated high correlation from the responses.

Stephan and Ascalon (2011) in their study found out that adequate use of ICT in small businesses also brought about success in its operations. Markus and Soh (1993) evaluated the idea of expensing in ICT implementation on all operations of an organization. They found out that ICT is an Asset that can be used for efficiency and effectiveness in business performance. Kollbergand Dreyer (2006) in their study found out that ICT integration brought about success in supply chain control. This was as result of on time response to customers and effective internal management information. Niaz (2007) found out that for this ICT adoption to work, there must be some factors that support its successful implementation. These seven critical success factors should be well balanced in any organization if ICT adoption and its results were to be experienced.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The study sought to carry out the following objectives: To determine the extent to which ICT had been adopted in the Supply Chains of Cooperative Societies in Embu County, to establish the relationship between ICT adoption and Supply Chain Performance and the Factors affecting ICT adoption by Cooperative Societies in the SCP. This chapter presents the summary of the study, conclusions, recommendations, limitations of the study and suggestion for further studies.

5.2. Summary

This study sought to investigate the extent to which ICT had been adopted in the Supply Chain areas among Cooperative Societies in Embu County. The focus was on Procurement, Production Scheduling, Inventory Control, Integration and Linkages, decision making and risk Management. The overall view to which the ICT and been adopted was indicated as moderate extent with a mean of 3.73. This implies that majority of the cooperatives have adopted adequate use of ICT in their supply chain practices.

Multiple regression indicated that there was a strong a relationship between independent variables and dependent variable (adjusted R=0.772, p=0.001) which is statistically significance at 5%. The findings also revealed that the independent variables contributed to only 48.5% of the Supply chain performance among cooperative societies. 51.5% could be contributed by other underlined variables. The study established that the indicated factors affected ICT adoption in the supply chain performance among cooperatives society with an average mean of 1.51 which means strongly agree.

5.3 Conclusion

From a series of a 5 point scale, based on the 40% (30) of the total filled and retuned questionnaires, it concluded that all areas of supply chain performance had adopted the use of ICT to a generally moderate extent. It can also be concluded that ICT adoption affects supply chain performance of Cooperative Societies in Embu County. Underlined variables also have an influence on adoption on supply chain. The listed factors showed a

positive influence on ICT adoption in supply chain areas among cooperatives societies in Embu County.

5.4 Recommendations

The government through the ministry of cooperatives should enhance cooperatives sensitization on adoption of ICT in their Supply Chains. This will help them cut on extra costs and practice lean Supply Chain. The Registrar of cooperatives in collaboration with procurement team should develop a strategic plan of adopting ICT in SC of the existing and upcoming cooperatives. This will enhance effectiveness in service delivery. The government to consider formulating policy on e- procurement adoption by all public organizations in Kenya. The Management of Cooperatives should employ the Managers and other support staff based on their expertise on both Supply Chain Management and Cooperative Management and ICT knowledge. Also the ministry of Cooperatives, Agriculture and Industrialization should create an ICT team of Software developers in line with the activities of Cooperatives. This team should also carry out installation, education, Training and maintenance on use.

5.5 Limitations of the Study

The study aimed to evaluate the extent of ICT adoption in the Supply Chain Performance areas among Cooperative Societies in Embu County. The Societies considered were 30 out of 75. It would have been more prudent if the whole lot of 75 was considered in the study. However, due to restraint of material resources and time this was not possible. Also more variables would have been considered were it not for the mentioned constraints

5.6 Recommendations for Further Research

A similar study could be replicated to a larger sample in the fourty seven counties to enable comparisons of results and establish more variables of ICT adoption that may affect the Supply Chain Performance among Cooperative Societies. A study could be done also to establish the challenges faced by cooperatives in adopting ICT in their supply chain. More extension of the study could be done to establish the other underlying variables affecting supply chain performance.

REFERENCES

Bellamy, B. and Basole, R. (2013). Network analysis of supply chain systems: A systematic Review and future research. *Systems Engineering*, 16(2), 235-249. DOI: 10.1002/sys.21238

Bitici, U.; Ndurupati, S.; Dolfer, V. and Garengo, P. (2012). Performance Measurement: Challenges for Tomorrow. International Journal of Management Reviews, 14(3), 305-327. DOI: 10.1111/j.1468-2370.2011.00318.x

Boraya, N. (2013). Collaborative Public Procurement and Performance among State Corporations in Kenya. *Unpublished MBA project, University of Nairobi.*

Cai J , Liu X , Xiao Z , Liu J 2009 Improving supply chain performance management: A systematic approach to analyzing iterative KPI accomplishment Journal *of Decision Support Systems 46 (2009) 512–521 doi:10.1016/j.dss.2008.09.004*

Choi.,Y Mena, C. Humphries A (2013). Toward a theory of multi-tier supply chain Management *Journal of Supply Chain Management* Vol49(2)

Fleming, E., Chung, K.; and Paulin, F. (2013). The impact of Information and Communication Technology on international trade in fruit and vegetables in APEC. *Asia Pacific Economic Literature*, 27(2), 117-130. DOI: 10.1111/apel.12028

Fugate, B.; Mentzer, J. and Sahin, F. (2006). Supply Chain Management Coordination mechanisms. Journal of business Logistics, 27(2), 129-169. DOI: 10.1002/j.2158-1592.2006.tb00220.x

Gordon J., Murray, J. & Rentell, G. and Geer, D. (2008). Procurement as a shared service in English Local Government. *International Journal of Public Sector Management,* 21(5), 540-555. DOI: 10.1108/09513550810885822.

Gweyi, O Karagu, M, Ndwiga M (2013). An Investigation of the Impact of Co-Operative Movement in Rural Development in Kenya. *International Journal of Business and Commerce.* Vol. 3 (2),1-13. www.ijbcnet.com

Holtgrewe, U. (2014). New technologies: the future and the present of work in information and Communication Technology. *New Technology, work and employment,* 29(1), 9-24. DOI: 10.1111/ntwe.1202

Inkeri, T Puhakainen, J; Nissilä J (2009). Coopworks – a case study on an information system meant to enhance the capacities of agricultural co-operatives. *Unpublished degree project, Dubai school of management.*

Jennifer, M. (2013). Implementation challenges of technology as a change management programme at Standard chartered bank. *Unpublished MBA project, University of Nairobi.*

Jung, N. (2013). Relational Governance and the Formation of a New Economic Space: The Case of Teheran Valley, Seoul, Korea. *International Journal of Urban and Regional Research*, 34(4), 1468-2427. DOI:10.1111/j.1468-2427.2012.01147.x

Kashmanian, R. and Lee, (2013). Supply Chain Sustainability: Compliance- and Performance-Based Tools. *Environmental Quality management*, 22(4), 1-23. DOI: 10.1002/tqem.21340

Kestenbaun, M. and Straight, R. (1995). Procurement Performance: Measuring Quality, Effectiveness, and Efficiency. *Public Productivity & Management Review*, 19, (2), 200-215. retrieved from: http://www.jstor.org/stable/3380498 .Accessed: 14/08/2013 06:44.

Kollberg, M and Dreyer ,H (2006). Exploring the impact of ICT on integration in supply chain control: a *research model* .Unpublished thesis, University of Science and Technology

Kotla, A., Prasad, R. and Bowonder, B. (2012). ICT application in a dairy industry: The e- experience of Amul, *International Journal of management*, 6(2), 256-695.doi: 11.1250/0582155425/x.

Kumar, A., Ozdamar, L., and Ng, C.P (2005). Procurement Performance Measurement System in the Health care industry. *International Journal of Health Care Quality Assurance*, 18 (2),152-166. Doi: 10.1108/09526860510588179.

Maggie, P. Baptista, M. and (2006). Organizational issues for e-learning: Critical success Factors as identified by HE practitioners. *Unpublished, University of Leeds, UK.* DOI : 10.1108/0951354061704645/J

Markus, M. and Soh, C. (1993). How IT creates Business value: A process theory synthesis. *Strategic Management Journal, 6(2), 369-456. Doi:11.0089/c.15623-45692-56321.1993.*

Mentzer, J., Myers, M., Sramek, B. and Omar, A. (2012). A Global Analysis of Orientation, Coordination and Flexibility in Supply Chains. *Journal of Business Logistics, 23(1), 124-148.* DOI: 10.1111/j.0000-0000.2012.01045.x

Muthigani, A. (2011). Electronic procurement implementation: case study of selected firms in Kenya. *Unpublished MBA project, University of Nairobi*.

Niaz, M. and Dirdar, Z. (2006). Critical Success Factors for Software Process Improvement Implementation: An Empirical Study. Software process improvement and practice, 11(10, 193 211. DOI: 10.1002/spip.261

Richey, R., Adams, F. and Dalela, V., (2012). Technology and Flexibility: Enablers of Collaboration and Time-Based Logistics Quality. *Journal of Business Logistics, 23(1), 34-49.* DOI: 10.1111/j.0000-0000.2011.01036.x

Stephan, U. and Ascalon, M. (2011). Small Business Owners' Success Criteria, a Values

Approach to Personal Differences. *Journal of small business management*, 49(2), 207-232. DOI: 10.1111/j.1540-627X.2011.00322.x

Thun, J. (2010). Angles of Integration: An empirical analysis of the alignment of internet-based information technology and global supply chain integration.

Journal of supply Chain Management, 46(2), 30-44. DOI: 10.1111/j.1745-493X.2010.03188.x

Tutu, O. Badu, E. &Manu,. O (2010).Exploring corruption practices in public procurement of. infrastructural projects in Ghana. *International Journal of Managing Projects in Business* 3(2), 236-256.Doi: 10.1108/17538371011036563.

Wairimu, M. (2011).Implementing enterprise resource planning system at Kenya Revenue Authority. *Unpublished MBA project, University of Nairobi*.

Walker, H., Schotanus, F., Bakker, E., & Harland, C. (2013). Collaborative Procurement: A Relational View of Buyer–Buyer Relationships. *Public Administration Review*, 73 (4), 588 598.doi: 10.1111/puar.12048.

Wynarczyk, P. (2002). The role of digital networks in supply chain development. *New Technology, Work and Employment,* 15(2), 123-127. DOI: 10.1111/1468-005X.00069.

Zott, C. and Amit, R. (2001). Value creation in e-business. *Strategic Management Journal, 22(2), 493-520. DOI: 10.1002/smj.187*

Mentzer, J., Funda, S. and Fugate, B. (2012).Supply chain management coordination mechanisms. *Journal of Business Logistics*, 27(2), 129-161. DOI: 10.1002/j.2158-1592.2006.tb00220.x

Appendix I: Letter of Introduction

Nkatha Rahab P.
School of Business,
University of Nairobi
P. O. Box 30197
NAIROBI

July, 2014

Dear Respondent,

RE: COLLECTION OF SURVEY DATA

I am a postgraduate student of the University of Nairobi, School of Business, Nairobi campus. In order to fulfill the degree requirement, I am undertaking the above project as part of the academic requirements towards completion of the course. You have been selected to form part of this study. This is to kindly request you to assist me collect the data by filing in the accompanying questionnaire, which I will give you personally. The information that you are going to provide will be used exclusively for academic purposes and will be treated with strict confidence. A copy of the final paper will be availed to you upon request.

Your co-operation will be highly appreciated.

Thank you in advance.

Yours faithfully,

Nkatha Rahab P.
MBA Student

Appendix II: Questionnaire

Section A: General Information

i. Name of your Cooperative society……..……Optional

ii. What is the membership of this co-operative society?

Below500〔 〕 500-1000 〔 〕 1000-1500〔 〕 1500-2000〔 〕 over 2000 〔 〕

iii. How many employees are in this co-operative society?

Below 50〔 〕 51-100〔 〕 101-150 〔 〕 151-200〔 〕 over 200〔 〕

iv. Your position in the cooperative…….**.....**optional

v. What is your age bracket?

Below 30 Years 〔 〕 30-35Years 〔 〕 36-40Years 〔 〕 41-45Years 〔 〕

over 46Years 〔 〕

vi. What Main activity is carried out by this co-operative?

SACCO〔 〕 Multipurpose 〔 〕 Coffee 〔 〕 Housing 〔 〕

Marketing〔 〕 Dairy 〔 〕 Irrigation 〔 〕 Union 〔 〕

vii. For how long has your cooperative been in existence?

1-5 years 〔 〕 5-10 years 〔 〕 10-15 years 〔 〕 15-20 years〔 〕

over 20 years 〔 〕

viii. For how long have you been working with this cooperative?

0-5years 〔 〕 5-10 years 〔 〕 10-15years 〔 〕 15-20 years 〔 〕

over 20 years 〔 〕

Section B

To what extent has ICT been adopted in the following Supply Chain areas in your Co-operative Society? Please indicate on a Scale of 1 – 5 where: 1 = To Avery Small Extent; 2 = Small extent 3: Moderate Extent; 4 = Large Extent; 5 = Very Large Extent

No	ICT ADOPTION AREAS	(1)	(2)	(3)	(4)	(5)
	Procurement					
	- e-payment					
	e-Ordering					
	e-Tendering					
	e-Awarding					
ii	**Production Scheduling**					
	e-capacity scheduling					
	e-inspection of materials					
	e- quality control					
	-Determining MRP					
	e-scheduling of production activities					
iii	**Inventory Control**					
	-Re-order level					
	-Reception of Stock					
	-Determining EOQ					
	- storage					
	-Quality Assurance					
	- Issuance of Stock					

iv	**Integration and Linkages /Collaboration along the Supply Chain.**					
	- Internet					
	- Use of Mobile Phone					
	- email					
	- Tracking device					
v	**Decision Making**					
	- Waste Reduction					
	- Resource Pooling					
	-Maintaining Competitive advantage					
	- HR Planning					
	-Demand Forecasting					
vi	**Risk Management**					
	-Ensuring Safety of Goods on Transit					
	-Manage Expiry Date					
	-Monitoring Operational Processes					
	-Training of Staff					
	-Research and Development					

Section C

To what extent has the adoption of ICT in the following Supply Chain areas in the co-operative society affected its Supply Chain Performance? Please indicate for each area of application the extent of impact by ticking on a Scale of 1 – 5 where: 1 = To Avery Small Extent; 2 = Small extent; 3 = Moderate Extent; 4 = Large Extent; 5 = Very Large Extent

No	Issue	(1)	(2)	(3)	(4)	(5)
	ICT ADOPTION IN SUPPLY CHAIN AREAS					
i.	Procurement					
ii.	Inventories Control					
iii.	Production Scheduling					
iv.	Integration and Linkages /collaboration along the Supply Chain					
v.	Risk Management					
vi.	Decision Making					

SECTION D

To what degree do you agree with each of the following statements as being the factors that have affected ICT adoption in supply chain in your co-operative society? Please indicate the degree of agreement for each statement on a Scale of 1 – 5 where: 1 = strongly agree 2: agree 3: moderately agree 4: disagree 5: strongly disagree

	C. FACTORS AFFECTING ICT ADOPTION IN SC	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
	Top management support					
	The cooperative has Effective ICT governance through top management support					
	The cooperative submits to clear mission statements and common ICT goals among the staff members.					
	The agency has Implemented cross- functional processes among members and the ICT team					
	There has been a transition from traditional delivery methods to the adoption of e-learning environment involving the management of change					
	The agency has established software to enhance inter-dependency between its functional areas.					
	Ability of IT staff to adapt to change					
	The Cooperative maintains Cooperation and effective communication mechanisms among the staff members					
	The Cooperative undertakes Information sharing among the staff members					
	The Cooperative Society is engaged in Sharing of technical expertise among the staff members					
	The Cooperative management ensures efficient project approach to integrate and support the dialogue between the groups.					

	The Cooperative Society applies Standard procedures geared towards ICT process integration in the workforce					
	Quality and Training of IT staff					
	The Cooperative acquires and maintains appropriate ICT training resources					
	The Co-operative recruits qualified and experienced ICT staff					
	ICT staff is willing to learn and adapt to new ideas					
	The Cooperative management has cultivated well-designed environment for all departments' participation within well managed ICT projects.					
	There is continuous training and development programmes organized by the Cooperative societies at the grass-root level					
	The Cooperative follows Normative guidelines in managing and selecting ICT staff					
	ICT Investment drive					
	There is investment in quality ICT assets					
	The management is willing to allocate sufficient resources for implementation of ICT.					
	The Cooperative is willing to make investments in complementary assets to create an enabling environment for an efficient ICT model					
	The Cooperative is willing to adopt new technology and innovations					

SECTION E

Overall, to what extent has the ICT adoption affected supply chain performance in the cooperative society? Please indicate the extent of impact by ticking in the Scale of 1 – 5 where: 1 = To Avery Small Extent; 2 = Small extent; 3 = Moderate Extent; 4 = Large Extent; 5 = Very Large Extent

(1)	(2)	(3)	(4)	(5)

THANK YOU VERY MUCH FOR YOUR VALUABLE TIME!

Appendix III: List of Cooperative societies in Embu County by their Categories.

SACCOs

S/NO	NAME OF SOCIETY	LOCATION	STATUS
1.	Yoken Sacco	Gachuriri	Active
2.	Gachuriri Business	Gachuriri	Active
3.	Kigari Sacco	Kigari college	Active
4.	Kiritiri Emanuel Sacco	Kiritiri	Active
5.	Karaba BodaBoda	Karaba	Active
6.	Daima Sacco	Manyatta	Active
7.	Semo Sacco	Siakago	Active
8.	Mbeere Muguuka Sacco	Siakago	Active
9.	Gastameco	Manyatta	Active
10	Ketno Sacco	Kiritiri	Active
11.	Emakiga	Kianjokoma	Active
12	Nawiri Sacco	Embu Town/ Runyenjes	Active
13.	County	Runyenjes	Active
14.	Runyenjes	Runyenjes	Active
15	Neno Sacco	Embu Town	Active
16.	Ekmo	Kibugu	Active
17	Kemo	Kianjokoma	Active
18.	Eemo Sacco	Embu	Active
19.	2KM Sacco	Njukiri	Active
20.	Winas	Embu Town	Active
21.	Tuungane Tujinjenge	Embu Town	Active
22.	Walton Sacco	Embu Town	Active
23.	Penda	Embu Town	Active
24	Benyouth	Ishiara	Active
25	Karwikikimu Sacco	Embu Town	Active
26	Unity Boda Boda Sacco	Embu Town	Active
27	Vijana Sacco	Runyenjes	Active
28	Rwika Riunii Kiingudu	Rwika	Active
29	Eastern Connection	Embu Town	Active
30	Universal Sacco	Embu Town	Active
TOTAL			**30 Societies**

COFFEE

31	Nembure FCS	Karingari	Active
32	Kirurumwe	Makengi	Active
33	Gatondo	Muthatari	Active
34	Mikiki	Kithimu	Active
35	New Kapingazi	Kangaru	Active
36	Ivinge	Kanjikeru	Active
37	Rianjagi	Mutunduri	Active
38	Gakundu	Manyatta	Active
39	Muruwe	Kavutiri	Active
40	Thambana	Kiriari	Active
41	Central Ngandori	Kairuri	Active
42	Muramuki	Kathangariri	Active
43	Kibugu	Kibugu	Active
44	Kithungururu	Kangaru	Active
45	Kagaari South	Runyenjes Town	Active
46	New Runyenjes	Runyenjes Town	Active
47	New Kirimiri	Mukuuri	Active
48	Kagaari North	Kanja	Active
49	Kiangagwa	Gatumbi	Active
50	Kiviuvi	Gitare	Active
51	Kanjugu	Mufu	Active
52	Kirindiri	Kigumu	Active
53	Kamurai	Kigumo	Active
54	New Kyeni	Kathanjuri	Active
55	Embu County Coffee Mill Society	Muruwe Co-op. Society	Active
TOTAL			**25 Societies**

IRRIGATION

56	Kiruki Kiende	Rukira	Active
57	Kiaga	Gatituri	Active
58	Nthamari Gachichori FCS Ltd	Kavangua	Active
59	Gatunduri	Gatunduri	Active
60	Ena Irrigation	Ena	Active
TOTAL			**5 Societies**

MULTIPURPOSE

61	Mwiria M.C.S.L.	Mwiria	Active
62	Embu East Agribusiness	Runyenjes	Active
63	Mbenwom	Siakago	Active
64	Mwireri Multipurpose	Kiritiri	Active
65	Evurori FCs	Evurori	Active
TOTAL			**5 Societies**

MARKETING SOCIETIES

66	Makima FCS	Makima	Active
67	Mt. Kenya Timber	Embu Town	Active
68	Mwangaza CS	Makima	Active
69	Ena Tobbacco Growers	Ena	Active
TOTAL			**4 Societies**

HOUSING COOPERATIVES

70	Embu Gaturi Housing	Nemburi	Active
71	Runyenjes Juakali Housing	Runyenjes	Active
72	Grokasha Housing	Embu Town	Active
TOTAL			**4 Societies**

DAIRY SOCIETY

73	Mukulima Bora	Runyenjes	Active
74	Mburugu Dairy FCS LTD	Mbeere	Active
TOTAL			**2 Societies**

UNION COOPERATIVE

75	Embu District Cooperative Union	Embu Town	Active
TOTAL			**1 Union society**

Source: Embu County Commissioner of Co-operatives office (June, 2014)