FACTORS INFLUENCING ADOPTION OF DIGITAL WEIGHING SCALES AMONG COFFEE CO-OPERATIVE SOCIETIES IN IMENTI NORTH SUB- COUNTY, MERU, KENYA.

BY

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2017

DECLARATION

I declare that this research project report is my own original work and has not been presented in this University or any other institution for the award of a Master's Degree.

Signature: …… Date: …….

Peter Wambua Mutiso

L50/84596/2016

This research project report has been presented for examination with my approval as the University Supervisor.

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DEDICATION

I dedicate this research project report to my beloved wife Francisca Ndugwa Wambua, my children Mary Mueni, Nicholas Mutiso and James Muindi for their moral support and encouragement during my study period. Their contribution towards my success is invaluable.

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ABBREVIATIONS AND ACRONYMS

ETAM- Extension of Technology Acceptance Model

ICT-Information communication technology

NACOSTI- National Commission for Science, Technology and Innovation

OECD- Organization for Economic Co-operation and Development

PU- Perceived Usefulness

RoK - Republic of Kenya

SPED- Special Education

SPSS- Statistical Package for Social Sciences

TAM-Technology Acceptance Model

TRA - Telecommunications Regulatory Authority

ABSTRACT

Cooperative societies are responding to customer's demand by becoming more innovative in many ways in response to rapidly changing business environment. With the rapid technological changes, innovation has become inevitable for the firms to position themselves and gain a competitive edge. Digital weighing scale is one of the key factors for improving the competitiveness and productivity in cooperatives. The purpose of this study was to determine the factors that influence the adoption of digital weighing scales within Imenti North Sub-County. This study objectives were; to determine how user perception influences the adoption of digital weighing scales, to find out how user convenience influence adoption of digital weighing scales, to assess how initial investment cost influence adoption of digital weighing scales and to establish how initial investment cost influence adoption digital weighing scales among coffee cooperative societies in Imenti North Sub-County. The study adopted a descriptive research design. The target population for this study was 2502 management committee members of coffee cooperative societies and affiliated coffee farmers within Imenti North Sub-County, Meru County with a sample size of 232. The open-ended structured questionnaires used generated descriptive statistics, frequencies, percentages, mean score and Standard deviation. Quantitative variables are presented inform of tables while inferential data analysis was done using multiple regression analysis. The findings are in frequency tables. The findings revealed that improved competitiveness in the speed and reliability of transactions influenced adoption of technology. Findings further show that increased transparency in view of balances and logs of transactions done positively influence adoption of weighing scales. On the service efficiency, the findings indicate minimal errors reading influenced organization decision in adopting new technology. The user perception had a positive and significant influence on the adoption of digital weighing scales among coffee cooperative societies. User convenience positively influenced adoption of digital weighing scales among coffee cooperative societies. The initial investment cost had a positive and significant influence on the adoption of digital weighing scales among coffee cooperative societies. Finally, the study concluded that service efficiency positively and significantly influences adoption digital weighing scales among coffee cooperative societies. The study findings reveal that all the four variables have a positive correlation with adoption of digital weighing machine in cooperative societies in Meru North Sub County. They study therefore recommends training of farmers through organised seminars as well as workshops to instil skills and knowledge to the farmers and also enable smooth transition from the old to the new technology as well as influencing adoption of the digital weighing scales. The study also recommends that digital weighing machine made in such a way that a farmer can easily use them. The modified scales are easily readable and easy to interpret. On initial investment cost the study recommends that the pretesting cost as well as initial set-up cost should be set as low as possible to allow the low-income farmers to be able to adopt the digital weighing scales. This will make it cheap and affordable for the farmers to be able to adopt without any constraints. The study recommends that the weighing scales made should be of high speed since majority of users commented more on the importance of speed in their choice of digital weighing scales.

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

The emergence of the information and communication technologies has resulted in considerable changes in business, which has led to the so-called Information Society. The Information Society is a social paradigm that offers a great opportunity, as most people connected through an electronic device to telecommunications systems, and more specifically to the Internet (Heeks, 2010). The emergence of the information and communication technologies empowers knowledge sharing (Avgerou, 2012). The environment in which organizations and more specifically cooperative societies, operate is constantly changing with different factors such as technology advancement for their operations.

Since the turn of the millennium, the general business environment has become more volatile, unpredictable and very competitive. Coping with the increasingly competitive environment has called on firms to rethink their customer approach and satisfaction (Pearce & Robinson, 2005). Cooperatives are responding to customer's demand by becoming more innovative in their new ways of approaching the changed business environments (Aosa & Wainaina, 2014). They adopt strategies such as improved customer services, credit facility, post-paid cards and provision of convenience in supply of goods and services. With the rapid technological changes, innovation has become inevitable such as the adoption of digital weigh scales. Measuring weight is a vital and essential part of many industrial manufacturing and processing operations. Njihia (2012) observed that assessment by weighing and measuring is a prime necessity of life in a human society. It is essential to the making and exchange of goods, erection of building and to the devices of transport. There is no trade or industry of human beings, which does not tend to depend on it, no dealing in property, which is not defined by it (Aosa & Wainaina, 2014)

According to Kamau (2016), the law expressly prohibits use of inaccurate weighing and measuring instruments because inaccuracies in weighing and measuring instruments may cause serious economic loss to the consumer. In the development process of weighing scale system, worldwide the focus is on precision and accuracy. Das, Dutta and Guha (2015) observed that it is very difficult to measure weight with proper accuracy because of errors that causes losses. A

load cell is a transducer used to convert a force into electrical signal. The sensor used in weighing scale, which gives out digital out-put, is load cell (Das, Dutta & Guha, 2015).

Agricultural cooperatives societies are an important part of economic activity in the Agri-food sector in the whole world. These cooperatives provide employment, mostly in rural areas, making them a real economic, social and cultural engine in rural and less populated areas in the country (Monzón & Chaves, 2012). Marcuello and Sanz (2008) argue that the characteristics of cooperative societies, based on the formula of ownership and democratic control supported in cooperative principles and values, provide a type of management that is in accord with the demands of the Society of Knowledge. Kiiza and Pederson (2012) indicated that the specific features of cooperative companies, derived from cooperative principles, could provide additional opportunities for the positive effects of digital weigh scale used in obtaining competitive advantages.

In Kenya, cooperative societies create an important component of the economy. Vision 2030 of Kenya recognizes cooperatives as a prime mover in financial resource mobilization to create a vibrant and globally competitive financial sector in Kenya (Olando, Jagongo & Mbewa, 2013). The cooperatives societies are democratic and designed to meet the social and the economic needs of their members. The cooperative societies provide livelihood to 63% of Kenyans both directly and indirectly (Githinji, 2014). The sector continues to grow at 20% per annum while at the same time, cooperative institutions contribute to the direct employment of over 250,000 people and indirectly through establishment of linkages between firms, farms, markets and through provision of collective and individual investments. Meru County has the second highest number of cooperatives in Kenya (56), following Nairobi which has a total of (85) cooperatives (Olando *et al*., 2013). Imenti North Sub-County has 13 registered cooperatives (Mwangi, 2013).

1.2 Statement of the Problem

Weighing scale machines have evolved from manual to electronic digital machines. However, farmers having been facing a challenge in accessing weighing scale machines that are transparent and reliable to measure accurately the value of their produce. Montegut-Salla, Cristóbal-Fransi and Gómez-Adillón (2013) carried out a study on understanding the situation and factors of ICT adoption in agricultural cooperatives. Chaddad and Iliopoulos (2013) studied control rights,

governance, and the costs of ownership in agricultural cooperatives. Walsh and Charlton (2014) investigated the association between the development of weighing technology, possession and use of weighing scales and self-reported severity of disordered eating while Kumar, *et. al.* (2015) evaluated the reliability of a digital weighing scale relative to the measuring limb load asymmetry.

Therefore, with all these extra ordinary features, this Embedded System based Digital weighing scale will prove to be great miracle for consumer. In addition, the use of digital scales is one of the key factors for improving the competitiveness and productivity in cooperatives. However, the adoption of digital weigh scales by cooperative societies in Imenti North Sub-County of Meru County has not been very impressive with only a few using digital weighing scales. This study seeks to to establish the factors that influence the adoption of digital weighing scales within Imenti North Sub-County. The research findings suggest that whereas the digital gap on material access is closing in the region, the gap on access to skills, usage and utilization is still wide and requires intervention. The proposed framework for adoption indicates that government and infrastructure, human capital development and social perspectives are the main dimensions that weigh heavily on digital inclusion

Wangui (2011) conducted a research on process and challenges of digitization in Kenya in study in the road transport department of Kenya Revenue Authority. Njihia (2012) challenges facing the use of technology on legal metrology in Meru municipality. Mwangi (2013) evaluated factors influencing dairy cooperative society's performance in Mathira and Kieni Constituencies, Nyeri County. In addition, Motanya (2013) studied the strategic responses by weighing scale dealers in Kenya to changes in external environment. However, none of the reviewed scholars has studied the factors that influence the adoption of digital weighing scales. This study will seek to fill this gap by answering the question: what factors influence the adoption of digital weighing scales within Imenti North Sub-County, Meru County.

1.3 Purpose of the Study

The purpose of this study was to establish the factors influencing the adoption of digital weighing scales among coffee cooperative societies in Imenti North Sub-County, Meru County.

1.4 Objectives of the Study

The study sought to achieve the following objectives

i. To determine how user perception influences the adoption of digital weighing scales among coffee cooperative societies in Imenti North Sub-County.
ii. To examine how user convenience, influence the adoption of digital weighing scales among coffee cooperative societies in Imenti North Sub-County.
iii. To assess how initial investment cost influence adoption of digital weighing scales among coffee cooperative societies in Imenti North Sub-County.
iv. To establish how service efficiency influence adoption digital weighing scales among coffee cooperative societies in Imenti North Sub-County.

1.5 Research Hypotheses

The study tested the following hypotheses

$H_{01;}$ User perception does not significantly influence the adoption of digital weighing scales among coffee cooperative societies in Imenti North Sub-County.

$H_{02;}$ User convenience does not significantly influence the adoption of digital weighing scales among coffee cooperative societies in Imenti North Sub-County.

$H_{03;}$ Initial investment cost does not significantly influence the adoption of digital weighing scales among coffee cooperative societies in Imenti North Sub-County.

$H_{04;}$ Service efficiency does not significantly influence the adoption of digital weighing scales among coffee cooperative societies in Imenti North Sub-County.

1.6 Research Questions

The study sought answers to the following research questions:

i) To what extent does user perception influence the adoption of digital weighing scales among coffee cooperative societies in Imenti North Sub-County?
ii) How does user convenience influence adoption of digital weighing scales among coffee cooperative societies in Imenti North Sub-County?

iii) To what extent does initial investment cost influence the adoption digital weighing scales among coffee cooperative societies in Imenti North Sub-County?
iv) How does service efficiency influence the adoption of digital weighing scales among coffee cooperative societies in Imenti North Sub-County?

1.6 Significance of the Study

The study will provide useful information and knowledge to the coffee co-operatives societies in Imenti North sub-county on the influence the adoption of digital weighing scales. The study will also help the weights and measures department staff on how to solve the challenge of coping with adoption of global and technological changes. To other stakeholders like investors, members, employees, pressure groups, consumer associations, among others, the study will provide invaluable information that will allow them to provide useful suggestions to the improvement in service delivery in their respective organizations.

In addition, Academicians will also benefit from this study as reference for thoughts and ideas on similar studies and research in future. This study contributes to the existence literature relating to the factors influencing adoption of digital weighing scales by co-operatives societies. The findings of this study will therefore shed light on how to satisfy customers in co-operatives societies. This study will also add to the university repository of knowledge available for research. Other researchers may use the findings of this study to advance in their research.

1.7 Delimitation of the Study

The focus of the study was to establish factors influencing adoption of digital weighing scales by co-operatives societies within Imenti North Sub-County. The study therefore focused on coffee cooperative societies that engage in weighing or measuring of coffee produce within Imenti North Sub- County, Meru County. This included fresh produce cooperative societies and factories. A sample size of 232 from the target population 2502 management committee members of coffee cooperative societies and coffee farmers within Imenti North Sub-County, Meru County . The study also focused on the weights and measures officers in the area as well as the authorized weights and measures technicians within Imenti North Sub- County. The study considered data for a period of five years from 2011 to 2016.

1.8 Limitations of the Study

The researcher anticipated encountering some hindrances when conducting the study. First, the reliability of the information obtained may largely depend on the attitudes and the extent to which the respondents will be willing to provide accurate and honest information. Secondly, certain cooperative societies especially the ones that engage in dubious may not be willing to allow their employees to interact with strangers.

Some respondents may fear that the enumerator is an agent from Kenya bureau of standards masquerading as a researcher to identify the non-compliant cooperative societies. Therefore, they were unwilling to respond to questionnaires due to fear. To address this issue, the researcher sought permission from the authorities before meeting the respondents. In addition, an introductory letter from the university was also be produced to prove that the enumerator is a student and that the data collected was for academic purposes only.

The researcher also encountered challenges in obtaining information regarding the business adoption of digital weighing scales by co-operatives societies. Therefore, the researcher-experienced experienced delays in collecting data about the cooperative societies. The researcher however convinced the respondents that the data collected for academic purposes only.

1.9 Basic Assumptions of the Study

The study assumed that the respondents will cooperate in giving accurate, adequate data and answer questions correctly that would produce the relevant information the research is intended to use in the study. No respondent errors are expected and this involved both intentional and unintentional respondent errors hence there was less or no data collection biasness and good response rate from the chosen areas of study.

The respondents gave accurate and valid data. The respondents spared their time to participate in the study and give their views without prejudice. Further, the respondents had adequate knowledge on the subject to give meaningful responses relevant to the study. The sample of the study is appropriately determined such that it is a complete representative of the whole population.

1.10 Definition of Significant Terms Used in the Study

Adoption: Acceptance of a new product or innovation, according to the demographic and psychological characteristics of defined adopter groups

Co-operative societies: An autonomous association of people united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically controlled business

Digital Weighing scale: Electronic weighing machine used to measure weight or calculate mass

Initial investment cost: Total cost associated with the purchase and installation of an asset. The costs may include purchase price, commissions, transportation, appraisals, warranties and installation.

Service Efficiency: Level of performance that describes the lowest amount of inputs to create the greatest amount of outputs

User Convenience: Fitness or suitability for performing an action or fulfilling a requirement by the user

User Perception: Impression, awareness or consciousness about product advertising, reviews, public relations, social media, personal experiences and other channels affect user perception.

1.11 Organization of the Study

The study has five chapters. Chapter One contains the introduction to the study. It presents background of the study, statement of the problem, purpose of the study, objectives of the study, research questions, significance of the Study, delimitations of the study, limitations of the Study and the definition of significant terms. On the other hand, Chapter Two reviews the literature based on the objectives of the study. It further looked at the conceptual framework and finally the summary. Chapter Three covers the research methodology of the study. The chapter describes the research design, target population, sampling procedure, tools and techniques of

data collection, pre-testing, data analysis, ethical considerations and finally, the operational definition of variables. Chapter Four presents analysis and findings of the study as set out in the research methodology. The study closes with chapter five, which presents the discussion, conclusion, and recommendations for action and further research.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter reviews both empirical studies in relation to the factors influencing the adoption of digital weigh scales among cooperative societies as well as theoretical framework. The chapter has analyzed the literature review in accordance to the stated research questions in the first chapter. The chapter has described the empirical reviews followed by theoretical review and conceptual framework. The study also presents the summary and knowledge gap the chapter seeks to fulfil.

2.2 Adoption of Digital Weighing Scales

In this constantly changing industry, third world countries do not possess enough resources for designing, programming, installing, configuring and maintaining digital weighing scales. Lack of competent and globally advanced technology professionals is extremely obstructing digital weighing scales adoption and expansion in most businesses in developing countries (Mathews, 2007). The technological changes harnessed by organizations particularly in developing countries in spite of the vast profits of ICTs as a means of delivering quality customer services is inadequate. This is due to difficulties of infrastructure access. Alam (2009) argues that intra- and inter-organizational networks in some innovative countries act as a digital neural system of a firm. Alam (2009) said that weighing scales for corporate tenacities have migrated from largely manual or physical documentary method to digital.

Despite the efforts by the government and development partners, levels of technology adoption remain low (Ogada et al. 2010). While average adoption rates of improved weighing scales appear impressive, great variations exist across regions in Kenya. Given the link between technology adoption and cooperative societies performance and the desire by the Government of Kenya to promote development and adoption of agricultural technologies understanding the factors that influence adoption of new and/improved technologies across households and communities is of urgent interest (Republic of Kenya 2015).

2.3 User Perception and adoption of digital weighing scales

Innovative organizations may avoid using advanced technology perceived as complex to use. Long and MacGregor (2016) asserted that lack of skills amongst workforce affects the use of new products. Thus, it is very important for an organization to determine its employee's knowledge or skills on digital platform because this knowledge or previous experiences may influence organization decision in adopting new technology. In addition, organization's managers are unlikely to adopt sophisticated technologies if they are not familiar with it (Reynolds, Savage & Williams, 2007).

Generally, the primary motivation for the adoption of new technologies such as the digital weigh scale is the anticipated benefits these technologies will bring to the user (Premkumar & Roberts, 2014). Several studies by (Giovanni & Mario, 2013), have found that ICT in general offers an organization a wide range of possibilities for improving their competitiveness. (OECD, 2004), found out that technology is able to improve information and knowledge management inside the firm and increase the speed and reliability of transactions.

Though there are many perceived benefits through adoption of ICT, there are still many organizations, which have not taking advantage of advanced technology. According to (Davis, 2009), perceived ease of use and usefulness influences in a significant way the attitude towards acceptability and use a technology. Other considerations may include decision for change, application and benefits of new technology to the organization.

When users understand or learn the new technology quicker, the user efficiency and accuracy increased. Besides, the employees are able to complete the filing easier if the service provider offers a more user-friendly weigh scale machine (Ramayah, Chiun, Rouibah & May 2014). The possibility of using digital weigh scale in other cooperative societies increased at the same time. Hence, higher perceived ease of use will produce perceived behavioural control. On the other hands, users will know the advantages of the system only if it is easy to operate (Warkentin, *et al*., 2012). They will also have a positive attitude toward the system. When users perceive that the system is easy to operate, they will have more positive attitude.

2.4 User Convenience and adoption of digital weighing scales

Technology improves increased transparency by enabling the user to view their balances and logs of transactions done during a certain period. Digital weighing scales increase consumer opportuneness in reweighing since users can easily use them even at their homes and increasing the efficiency possibilities (Coursaris & Hassanein, 2012). Convenience implies accuracy of weigh machine. Consistency and ease of use and objectivity that user perceives cognitively the ratio of benefits and sacrifice. For instance, a consumer who perceives that new technology saves time compared to previous technology forms the perception of efficiency (Laukkanen, 2016). Therefore, whereas convenience is a multi-dimensional construct, it relates to economic ratio between benefits and sacrifice. Nguyen, DeWitt & Russell-Bennett (2012) defined efficiency as an aspect of convenience. On the contrary, Holbrook (2009) has placed convenience under the concept of efficiency. However, these authors agree that efficiency refer to the perceived benefits customers receive in relation to the sacrifice or costs.

Huang *et al*. (2015) observed that digital technology is one of the most effective transaction methods because it possesses many advantages which analogue channels cannot offer. Based to a certain extent on reasons offered by Lee (2008), there are two main types of perceived benefits, categorized as direct and indirect advantages. Direct advantages refer to immediate and tangible benefits that customers would enjoy by using digital scales. For example, customers can benefit from faster weighing speed, and increased transparency.

Indirect advantages are those benefits that are less tangible and difficult to measure. Digital scales allows cooperatives to perform consistent transactions. In digital weighing scales, convenience can result from using the new technology in objectively weighing the quantity of farmers produce or distributions to the farmers. When compared to security, cost, efficiency and privacy, convenience influenced the adoption of digital weighing scales (Mohamed & Kathy, 2008).

2.5 Initial Investment Cost and adoption of digital weighing scales

The cost of adoption is an important factor in the adoption and utilization of the technology based innovation (Ernst and Young, 2011). The higher the cost of adoption of the innovation, the slower the pace of innovation expansion is likely to be (Mansfied, 2008). Two autonomous

studies conducted by Seyal and Rahim (2016), concurs that there is a direct and significant relationship between cost and adoption of technology. The lower the cost of adoption the higher the innovation such as the digital weighing scales by a cooperative and vice versa.

Organizations are less likely to adopt digital weighing scales when its initial set-up cost is high. (Donaldkiso, 2009), noted that the investment costs in digital weighing scales include purchase price, transportation and handling, insurance on the equipment during transport, the cost of special bases for them, the costs of assembly, installation and costs of testing startup. The digital weighing scales also require training on staff (Ernst & Young, 2011). As a result, huge training costs to understand the use digital weighing scales on a continuous basis because newer types of hardware and software to ensure efficient and effective use of new technology. Lymer (2015) however, emphasis that technology adoption in an organization has the potential to reduce costs and increase productivity level. Overall ICT improves efficiency through cheaper and faster communications, better customer and supplier relations, more effective and efficient marketing, product and service development and better access to information and training.

2.6 Service Efficiency and adoption of digital weighing scales

Service efficiency has two facets namely navigation and transaction processing efficiencies (Limayem, Khalifa & Frini, 2010). Navigational efficiency is important, as the restrictive visual interface is a major hindrance for its adoption (Lee, 2008). One way to address this challenge is to leverage multi-media input or output components such as speech interfaces (Fan, Saliba, Kendall & Newmarch, 2015). Another important way of enhancing efficiency is personalization. Drummond, Anderson, Straus, Vogel and Perez (2012) notes that digital weighing scales are generally complex than analogue weighing scales however, he observes that customers can be good about accepting a little complexity for accuracy.

The reduced threat of miss weighing a delivery makes digital weighing scales more acceptable. Other findings (Ernst & Young, 2011) reveal that convenience is the most important factor in making the decision to technological advancement. Supporting the recent findings in Australia, Garrido, Fort and Muriel (2016) study suggests that convenience means much more to consumers than access and saved time. Some users saw digital weighing scales convenience as

an extension of overall weighing convenience. Convenience described in terms of lifestyle, workplace use, housebound use, not having to travel, personal safety, not having to wait. Garrido *et al.* (2016) also found time saving dominated digital weighing scales convenience perceptions. An interesting observation was that digital weighing scales users believed digital weighing scales to be faster than analog scales. Also of interest was that slowness of weighing was a concern by several users. These findings suggest the influence of habit and channel self-efficacy in perceptions of convenience. Not surprisingly, the majority of users commented more on the importance of speed in their choice of digital weighing scales (Lymer, 2015). In addition to highlighting the speed issue, several users and non-users referred to the unpleasantness of waiting for the readings while using the analogue scale. However, analogue users also perceived it as convenient since the rate of breakdown and errors reading are minimal.

2.7 Theoretical Framework

This study will adopt Technology Acceptance Model and Schumpeter's theory. Technology Acceptance Model introduced by Davis (2009), is an adaptation of the Theory of Reasoned Action specifically tailored for modelling user acceptance of information systems. The goal of TAM is to provide an explanation of the determinants of technology acceptance that is in general, capable of explaining user behaviour across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified.

A key purpose of technology acceptance model is therefore to provide a basis for tracing the impact of external factors on internal beliefs, attitudes, and intentions. Technology acceptance model formulated in an attempt to achieve these goals by identifying a small number of fundamental variables suggested by previous research dealing with the cognitive and affective determinants of technology acceptance, and using TRA as a theoretical backdrop for modelling the theoretical relationships among these variables (Mohamed & Kathy, 2008). Technology acceptance model posits that two particular beliefs, perceived usefulness (PU) and perceived ease of use are the primary relevance for technology acceptance behaviour. Perceived usefulness is the degree to which a prospective user believes that using a particular system would enhance his or her job performance.

This follows from the definition of the word useful: capable of being advantageously. Within an organizational context, people reinforced for good performance by raises, promotions, bonuses, and other rewards (Wallace & Sheetz, 2014). A system high in perceived usefulness, in turn, is one for which a user believes in the existence of a positive use-performance relationship. Thus, farmers in cooperative societies would be willing to adopt new digital weigh scales if they are more useful than the traditional weigh scales. Perceived ease of use refers to the degree to which a prospective user believes that using a particular system would be free of effort. This follows from the definition of ease: freedom from difficulty or great effort. Effort is a finite resource that a person may allocate to the various activities for which he or she is responsible (Cheung & Vogel, 2013). All else being equal, an application perceived to be easier to use than another was. Consequently, co-operatives societies in Imenti north sub-county would adopt digital weighing scales...

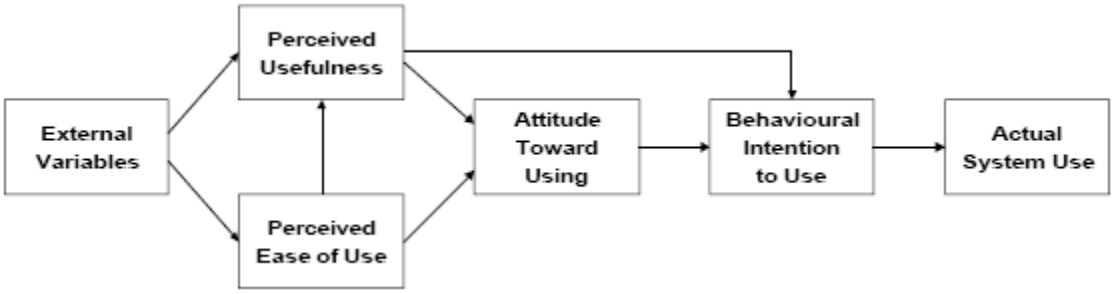


Figure 1: Technology Acceptance Model, Source: Davis, 2009

However, one criticism of the current technology acceptance model is that there are very few investigations target at the study of the factors that affect the PU and perceived ease of use. In order to address this issue, Venkatesh and Bala (2013) used three experiments to investigate the determinants of Perceived Ease of Use. The results showed that general Computer Self-Efficacy significantly affects Perceived Ease of Use at all time, while Objective Usability of the system affects users' perception after they have direct experience with the system.

Furthermore, Venkatesh (2014) developed and tested a technology acceptance model by including a number of determinants to Perceived Usefulness into the new model. It is a theoretical extension of the Technology Acceptance Model that explains Perceived Usefulness and Usage Intentions in terms of social influence processes (Subjective Norm, Voluntariness,

and Image) and cognitive instrumental processes (Job Relevance, Output Quality, Result Demonstrability and Perceived Ease of Use).

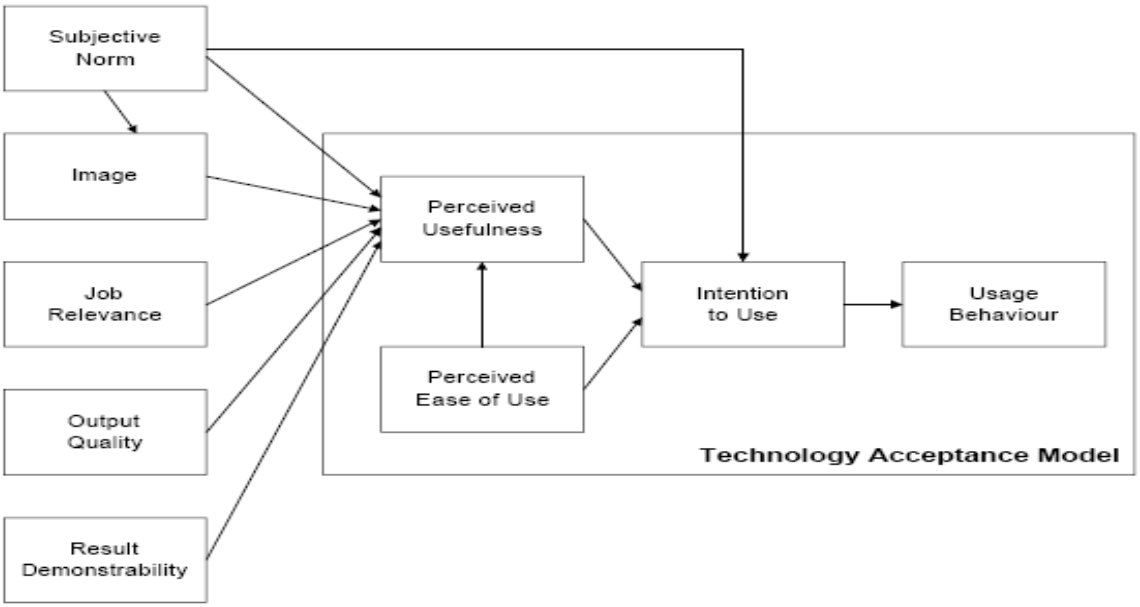


Figure 2: Extension of Technology Acceptance Model (ETAM), Source: Venkatesh and Davis, 2000

The Schumpeter's theory of innovation highlights the role of innovation in the entrepreneurial process. Schumpeter (1965) describes a process of creative destruction where wealth creation occurs through disruption of existing market structures due to introduction of new goods and/or services that cause resources to move away from existing firms to new ones thus allowing growth. Accordingly, Schumpeter calls innovation the specific tool of entrepreneurs, the means by which entrepreneurs exploit change as an opportunity for a different business or a different service. Schumpeter (1965) stressed the role of entrepreneurs as primary agents effecting creative destruction, and emphasized to the entrepreneurs the need to search purposefully for the sources of innovation, the changes and their symptoms that indicate opportunities for successful innovation, as well as their need to know and to apply the principles of successful innovation.

Successive scholars and researchers (Aghion, Akcigit & Howitt, 2013) have carried this Schumpeterian line of thinking forward. On his part, Drucker (2014) held out the entrepreneur always searching for change, responding to it, and exploiting it as an opportunity, and engaging by this means in purposeful innovation. Lumpkin and Dess (2015) saw the process of creative

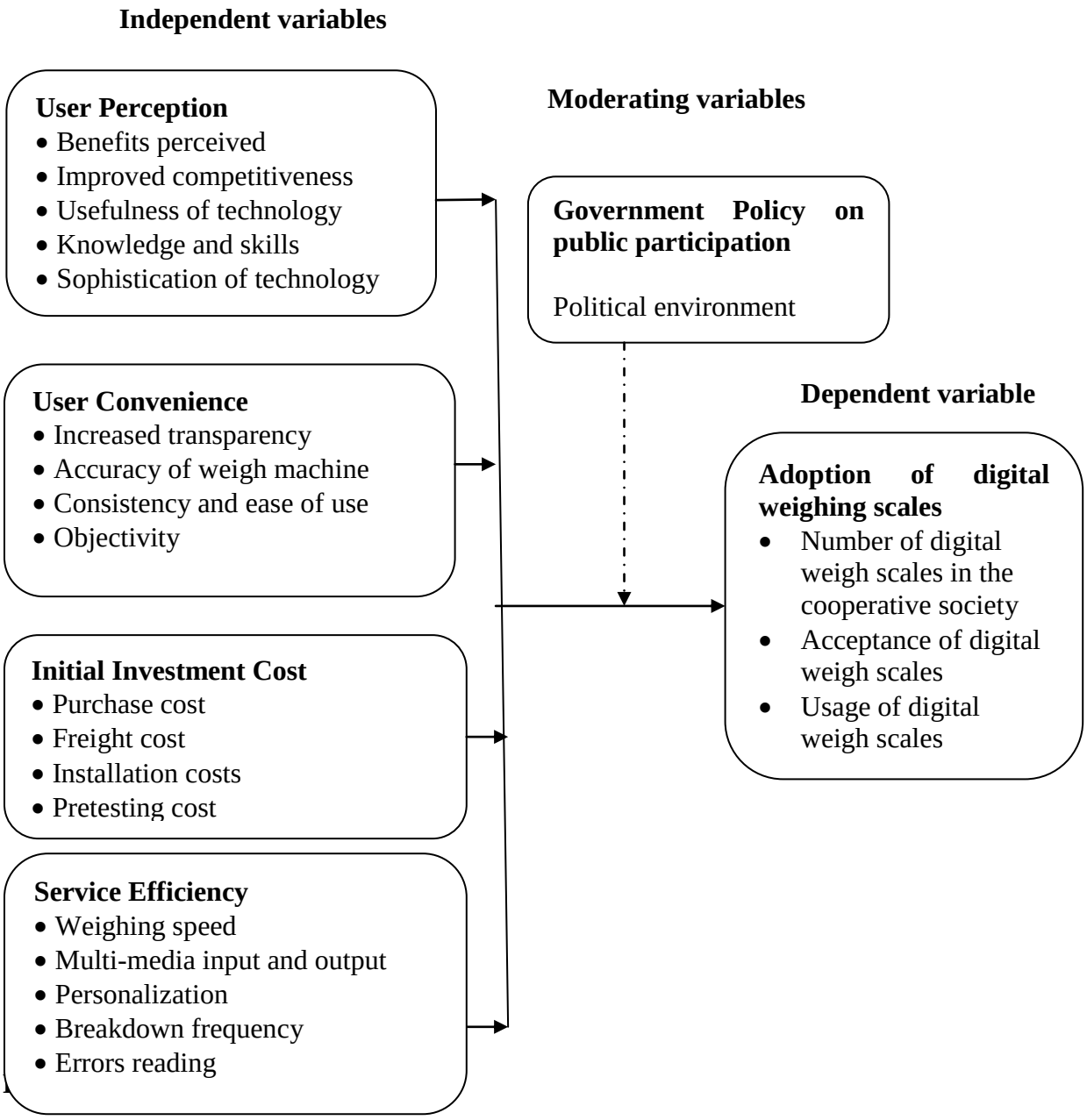
destruction as initiated by an entrepreneur, which makes innovation an important success factor within EO. Furthermore, the link between entrepreneurship and innovativeness is supported by the results of Kisker (2016), who found that innovation is among the key motives to start Entrepreneurial pro-activeness can also be seen as alertness of the organization.

The innovative organization focuses on the past, the present and the future with equal zeal, using history to explain and fully understand the present and to challenge and create its own proactive future. Innovation is vital to cooperative societies since it helps them satisfy customer and member's needs. Societies with the highest turnover can be associated with great commitment to innovation and research (Alvearez & Barney, 2013). EL-Annan (2013) posits that in an external setting that is ever changing, innovation and entrepreneurial conduct are processes that are holistic, vibrant and complementary fundamental to an organization's sustainability and success.

Technology acceptance model is relevant to this study as it helps in understanding particular beliefs, perceived usefulness (PU) and perceived ease of use that are the primary relevance for technology acceptance behaviour. Schumpeter's theory is relevant to this study as it focuses entrepreneurial process that is of interest in adoption of digital weighing scales by coffee co-operatives societies in Imenti North sub- county, Meru County.

2.8 Conceptual Framework

A conceptual framework considers the theoretical and conceptual issues surrounding research work and form a coherent and consistent foundation that will underpin the development and identification of existing variables. This study will be on the factors influencing adoption of digital weighing scales by coffee co-operatives societies in Imenti North sub- county, Meru County, Kenya. The independent variables in this study are user perception, user convenience, initial investment cost and service efficiency. This study will therefore establish the influence of the independent variables on the dependent variable, which will be adoption of digital weighing scales



2.9 Summary of empirical literature review

Antônio, Luciano and Marco (2016) studied on the factors that influence the adoption and implementation of public digital accounting according to the evaluation by managers of Brazilian companies. This study aimed to identify the factors that influence the adoption and implementation of the public digital accounting system according to the evaluation of managers

of Brazilian companies, expressed in response to a survey, based on the criteria established by the TOE framework, considering technological, organizational and environmental dimensions. The results show that although other factors influence decisions about the adoption and implementation of the SPED, government requirement, as a component of the environmental dimension, is the main factor driving those decisions. This seems to result from the fact that the government is a major, if not the main, actor in the regulatory environment. We also identified big expectations of companies regarding the possibility of reducing the volume of ancillary tax obligations (record-keeping and reporting obligations). The ranking generated from the survey is a contribution to the improvement of strategies for implementation of e-government projects, both by governments and companies.

Nadim and Noorjahan (2008) established the role of perceived usefulness, perceived ease of use, security and privacy, and customer attitude to engender customer adaptation in the context of technology. This research intended to propose a conceptual framework that will investigate the effects of perceived usefulness, ease of use, and security and privacy on customer adaptation mediated through customer attitude. To test the framework, structural equation modelling techniques applied to data collected from 227 customers of private commercial banks in Bangladesh. Primarily this study aims to test the theoretical models to measure the causality whether perceived usefulness, ease of use, security and privacy, and customer attitude can foster customer adaptation. The initial results of the study indicated that perceived usefulness, ease of use, security, privacy, and customer attitude are significant and positively related to customer adaptation.

Wambugu (2016) established a framework towards digital inclusion in Kiambu County. This study bridged digital divide by developing a framework for adoption to promote digital inclusion. To achieve this objective, the researcher adopted a descriptive survey that purposively targeted rural respondents to understand causes of digital divide. The researcher used questionnaires and document analysis guide as the main research instruments and structured interview. The gathered data was descriptively analysed and presented in the form of frequencies, charts and graphs. This formed the basis for the discussion, findings and recommendations of the study.

The data coding and analysis using qualitative and quantitative methods. The research findings suggest that whereas the digital gap on material access is closing in the region under study, the gap on access to skills, usage and utilization is still wide and requires intervention. The proposed framework for adoption indicates that government and infrastructure, human capital development and social perspectives are the main dimensions that weigh heavily on digital inclusion.

Njihia (2012) conducted a study on challenges facing the use of technology on legal metrology: the case of Meru municipality, Kenya. The study had the objectives, to establish the influence of cost of digital/electronic weighing and measuring instruments on legal metrology. To assess the influence of operation of electronic weighing and measuring instruments on legal metrology; to establish the extent to which technical knowledge and training on electronic weighing and measuring instruments influence legal metrology; to establish how standardization of electronic weighing and measuring instruments influence legal metrology. The study targeted traders, weights and measures officers, licensed weights and measures repairers in Meru region from Meru Municipality. The researcher used stratified random sampling procedure and then adopt descriptive research design. The data gathered from the traders in Meru, weights and measures Officers in Meru region and of Meru Municipality. The questionnaires structured focused on the objectives of this study. Data required for analysis was collected from the respondents and analyzed using Statistical Packages for Social Service

2.10 Summary and literature gap

The reviewed literature supports that lack of skills amongst workforce affects the use of new products. Thus, it is very important for an organization to determine its employee's knowledge or skills on digital platform because this knowledge or previous experiences may influence organization decision in adopting new technology. Further, the existing literature has proved that the greater the benefits perceived by the organization the higher the possibility of technology-based innovation such as the digital weigh scale. Efficiency perception implies that user perceives cognitively the ratio of benefits and sacrifice. Digital technology is one of the most effective transaction methods because it possesses many advantages which analogue channels cannot offer. Technology improves convenience by enabling the user to view their balances and logs of transactions done during a certain period. Digital weighing scales increase consumer

convenience by reducing the need for reweighing since users can easily use them even at their homes and increasing the efficiency possibilities

Literature review has also established that there is a direct and significant relationship between cost and adoption of technology. The lower the cost of adoption the higher the innovation. Thus, organizations are less likely to adopt digital weighing scales when its initial set-up cost is high. Finally, the study has established that service efficiency has two facets namely navigation and transaction processing efficiencies. Navigational efficiency is particularly important in as the restrictive visual interface as a major hindrance for its adoption. The reduced threat of miss weighing a delivery makes digital weighing scales more acceptable. Other findings reveal that convenience is the most important factor in making the decision to technological advancement. Incorporate this in the table of empirical ligature review

Although several researchers have carried out studies on digitization and digital weighing scales, none of them has established the factors that influence the adoption of digital weighing scales within Imenti North Sub-County, Meru County. Walsh & Charlton (2014) investigated the association between the development of weighing technology, possession and use of weighing scales, and self-reported severity of disordered eating while Kumar, et. al., (2015) evaluated the reliability of a digital weighing scale. Wangui (2011) conducted a study on process and challenges of digitization. Njihia (2012) evaluated the challenges facing the use of technology on legal metrology in Meru municipality while Motanya (2013) studied the strategic responses by weighing scale dealers in Kenya to changes in external environment. This study will seek to fill this gap.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the procedures and techniques used in the collection, processing and analysis of data. Specifically, the following subsections are included; research design, target population and sampling, data collection instruments, data collection procedures and finally data analysis.

3.2 Research Design

The study adopted a descriptive research design. A descriptive design is concerned with determining the frequency with which something occurs (Bryman & Bell, 2011). Thus, this approach is suitable for this study, since the study intended to collect comprehensive information. Bryman and Bell (2011) assert that a descriptive design seeks to get information that describes existing phenomena by asking questions relating to individual perceptions and attitudes.

3.3 Target population

According to Sekaran and Bougie (2010), a population is the total collection of elements about which we wish to make inferences. The target population for this study composed of 2502 management committee members of cooperative societies and coffee farmers within Imenti North Sub-County, Meru County as shown in Table 3.1.

Table 3. 1: Target Population

Management level	Frequency	Percentage
Senior cooperative manager	56	2
Mid-level cooperative manager	83	4
Lower level cooperative manager	122	5
Coffee farmers	2231	89
Total	**2502**	**100.00**

3.4 Sample size and Sampling Procedures

Ngechu (2004) underscores the importance of selecting a representative sample through making a sampling frame. From the population frame the required number of subjects, respondents,

elements or firms selected in order to make a sample. Stratified proportionate random sampling technique method selected the sample. Sampling is a deliberate choice of a number of people who were to provide the data from which study draw was to conclusions about some larger group whom these people represent. The section focuses on the sampling size and sampling procedures.

3.4.1 Sample Size

The sample size is a subset of the population that is representative of the entire population (Kumar, 2011). A sample population of 232 was arrived at by calculating the target population of 2502 with a 95% confidence level and an error of 0.05 using the below formula taken from Kothari (2014)

$$n = \frac{z^2.N.\partial_p^2}{(N-1)e^2 + z^2\partial_p^2}$$

Where; n = Size of the sample,

N = Size of the population and given as 2502

e = Acceptable error and given as 0.05,

∂p = the standard deviation of the population and given as 0.5 where not known,

Z = Standard variate at a confidence level given as 1.96 at 95% confidence level.

Table 3. 2: Sampling Frame

Management level	Population	Sample
Senior cooperative manager	56	5
Mid-level cooperative manager	83	8
Lower level cooperative manager	122	11
Coffee farmers	2231	207
Total	**2502**	**232**

3.4.2 Sampling Procedures

The study selected the respondents using stratified proportionate random sampling technique. Stratified random sampling is unbiased sampling method of grouping heterogeneous population into homogenous subsets then selecting within the individual subset to ensure representativeness (Kumar, 2011). The goal of stratified random sampling is to achieve the desired representation from various sub-groups in the population. In stratified random sampling subjects are selected in

such a way that the existing sub-groups in the population are more or less represented in the sample (Kothari, 2004). The study used simple random sampling to pick the respondents in each stratum.

3.5 Research Instruments

The questionnaire had of both open ended and closed ended questions. The open-ended questions encouraged the respondent to give an in-depth and felt response without feeling held back in illuminating of any information and the closed ended questions allowed respondent to respond from limited options. According to Saunders (2011), the open ended or unstructured questions allow profound response from the respondents while the closed or structured questions are generally easier to evaluate. The use of questionnaires was an effort to conserve time and money as well as to facilitate an easier analysis as they were in immediate usable form.

3.6 Pilot Testing

Pilot testing refers to putting of the research questions into test to a different study population but with similar characteristics as the study, population to be studied (Kumar, 2011). Pilot testing of the research instruments using staff working in randomly selected cooperative societies not selected into the sample. At least 32 questionnaires administered to the pilot survey respondents chosen at random. After one day, the same participants had to respond to the same questionnaires but without prior notification in order to ascertain any variation in responses of the first and the second test. This is very important in the research process because it assists in identification and correction of vague questions and unclear instructions. It is also a great opportunity to capture the important comments and suggestions from the participants. This helped to improve on the efficiency of the instrument. This process done until the researcher is satisfied that the instrument does not have variations or vagueness.

3.7 Validity of Research Instruments

According to Golafshani (2012), validity is the accuracy and meaningfulness of inferences, based on the research results. One of the main reasons for conducting the pilot study is to ascertain the validity of the questionnaire. The study used content validity, which draws an inference from test scores to a large domain of items similar to those on the test. Content validity is concerned with sample-population representativeness. Gillham (2011) stated that the knowledge and skills

covered by the test items should be representative to the larger domain of knowledge and skills. Expert opinion to comment on the representativeness and suitability of questions and give suggestions of corrections to the structure of the research tools. This helped to improve the content validity of the data. Content validity by asking for the opinion of the supervisor, lecturers and other professionals on whether the questionnaire will be adequate.

3.8 Reliability of Research Instruments

Instrument reliability on the other hand is the extent to which a research instrument produces similar results on different occasions under similar conditions. It is the degree of consistency (Bell, 2011). Reliability is concerned with the question of whether the results of a study are repeatable. The pilot group of 32 randomly selected respondents from the target population and their responses used to check the reliability of the tool. This comprises 10% of the sample size. A construct composite reliability co-efficient (Cronbach alpha) of 0.7 or above, for all the constructs, was adequate for this study (Rousson, Gasser and Seifer, 2012). Reliability coefficient of the research instrument using Cronbach's alpha (α) computed as follows:

$\alpha = k/k\text{-}1 \times [1 - \sum (S^2)/\sum S^2 sum]$

Where:

α= Cronbach's alpha

k = Number of responses

$\sum (S^2)$ = Variance of individual items summed up

$\sum S^2 sum$ = Variance of summed up scores

3.9 Data Collection Procedures

The researcher obtained an introduction letter from the university and need a research permit from NACOSTI, which presented to each stakeholder. The drop and pick method was preferred for questionnaire administration to give respondents enough time to give well thought out responses. The researcher booked appointment with respondent organizations at least two days before visiting to administer questionnaires. The researcher personally administered the research instruments to the respondents. This enabled the researcher to establish rapport, explain the purpose of the study and the meaning of items that may not be clear as observed by Best and Khan (2003).

3.10 Data Analysis Techniques

Data analysis using Statistical Package for Social Sciences (SPSS Version 22.0) software. All the questionnaires received had a reference and items coded to facilitate data entry. After data cleaning which entailed checking for errors in entry, descriptive statistics such as frequencies, percentages, mean score and standard deviation. The qualitative data from the open ended questions was analyzed using conceptual content analysis and presented in prose

Inferential data analysis using multiple regression analysis. Multiple regression analysis was to establish the relations between the independent and dependent variables and to test research hypotheses. Multiple regression is the procedure that uses two or more independent variables to predict a dependent variable. Since there are four independent variables in this study the multiple regression model generally assumed the following equation.

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

Where:-

Y= Adoption of digital weighing scale

β_0=constant

β_1, β_2, β_3 and β_4 = regression coefficients

X_1= User perception

X_2= User convenience

X_3= Initial investment cost

X_4= Service efficiency

ε=Error Term

3.11 Ethical Considerations

The researcher observed the following standards of behaviour in relation to the rights of those who become subject of the study. First, in dealing with the participants the objective of the study and the confidentiality of information; through a letter to enable them give informed consent. The participants maintained their right, which entails but is not limited to withdraw or decline to take part in some aspect of the research. Rights not to answer any question or set of questions and/or not to provide any data requested; and to withdraw data they have provided. Secondly, the study adopted quantitative research methods for reliability, objectivity and independence of the

researcher. While conducting the study, the researcher ensured that research ethical. Participation in the study was voluntary

3.12 Operationalization of Variables

The operationalization of variables in Table 3.3.

Table 3. 3: Operationalization of variables

Objectives	Variable	Type of variable	Measuring of Indicators	Scale	Tools of analysis	Type of analysis
To determine the influence of user perception on the adoption of digital weighing scales within Imenti North Sub-County	User Perception	Independent	• Benefits perceived • Improved competitiveness • Usefulness of technology • Knowledge and skills • Sophistication of technology	Interval Ordinal Ordinal Ordinal Ordinal	Percentages Mean score	Descriptive statistics Regression analysis; eg
To find out the influence of user convenience on the adoption of digital weighing scales within Imenti North Sub-County	User Convenience	Independent	• Increased transparency • Accuracy of weigh machine • Consistency and ease of use • Objectivity	Interval Interval Ordinal Ordinal	Percentages Mean score	Descriptive statistics Regression analysis:eg
To assess the influence of initial investment cost on the adoption of digital weighing scales within Imenti North Sub-County	Initial Investment Cost	Independent	• Purchase cost • Freight cost • Installation costs • Pretesting cost	Interval Interval Interval Interval	Percentages Mean score	Descriptive statistics Regression analysis

To establish the influence of service efficiency on the adoption of digital weighing scales within Imenti North Sub-County	Service Efficiency	Independent	• Weighing speed • Multi-media input and output • Personalization • Breakdown frequency • Errors reading	Ordinal Ordinal Ordinal Interval	Percentages Mean score	Descriptive statistics Regression analysis
	Adoption of digital weighing scales	Dependent	• Number of weigh scales in the cooperative society	Interval Ordinal	Mean score	Descriptive statistics Regression analysis

CHAPTER FOUR
DATA ANALYSIS, INTERPRETATION AND ANALYSIS

4.1 Introduction

This section of the study evaluates the outcomes of the study findings of data analysis. Questionnaires used to collect the data for the study. Statistical package for social sciences assisted in the analysis process. The study used tables with frequencies, percentages, means and standard deviation to present the study findings.

4.2 Response Rate

The response rate was of keen interest to the study considering that the study obtained a sample of 232 respondents from a target population of 2502 respondents. Out of the 207 questionnaires issued to coffee farmers in within Imenti North Sub-County, Meru County, 155 questionnaires responses. Out of the 11 to Lower level cooperative managers, eight responded. The researcher finally issued 14 questionnaires to senior and middle level cooperative managers out of which nine responded. The total number of questionnaires returned was 172 representing a cumulative response rate of 74. Percentage, which was adequate for analysis and conformed to Kumar (2011) stipulation that in a research a response rate of over 70% is acceptable for generalization of results.

4.3 Reliability Analysis

Reliability is concerned with the question of whether the results of a study are repeatable. The questionnaires to a pilot group of 32 randomly selected respondents from the target population and their responses used to check the reliability of the tool.

Table 4. 1: Reliability Analysis

Coefficients Scale	Cronbach's Alpha	comments
User perception	0.899	Reliable
User convenience	0.735	Reliable
Initial investment cost	0.773	Reliable
Service efficiency	0.843	Reliable
Composite reliability coefficient	**0.8125**	

The findings of the pilot study shows that all the four variables were reliable as their reliability values exceeded the prescribed threshold of 0.7 with a composite reliability coefficient of 0.8125 as shown in Table 3.3.

4.4 Background Information

The aimed to established background information of the respondents who were interviewed in the study. The findings are as presented in subsequent sections.

4.4.1 Highest Level of Education of the Respondent

Data on the highest level of education of the respondents were as illustrated in table 4.2.

Table 4. 2: Highest Level of Education of the Respondent

	Frequency	Percent
Certificate	131	76.2
Diploma	27	15.7
Undergraduate	9	5.2
Post Graduate	5	2.9
Total	**172**	**100**

Certificate holders in the list of the respondents involved in this study were the majority as indicated by 76.2%. On the other hand, those who had highest level of education as diploma were 15.7% of the respondents and undergraduates were 5.2% of the respondent whereas postgraduates were 2.9% of the respondents. This finding infers that respondents were literate enough to interpret the topic of the study.

4.4.2 Number of Years Working in the Cooperative Society

Findings on period worked in the cooperative society are as shown in Table 4.3**.**

Table 4. 3: Number of Years Working in the cooperative society

	Frequency	Percent
1-4 years	45	26.2
5-8 years	20	11.6
9-12 years	78	45.3
13-16 years	24	14
17 years and above	5	2.9
Total	**172**	**100**

Those who had worked in the society for 9 to 12 years were 78(45.3%). On the other hand, those who had worked for 1 to 4 years were 45(26.2%), for 13 to 16 years were 24(14%) and for 5 to 8 years were 20 (11.65) whereas 5(2.9%) had worked for a period of 17 years and above. The finding implies that majority of the respondents had worked in the cooperative for long enough and were well conversant with factors influencing adoption of digital weighing scales by coffee co-operatives societies. Therefore, they gave relevant information for the study.

4.5 Factors Influencing Adoption of Digital Weighing Scales

Presented in this section are the factors influencing adoption of digital weighing scales by coffee co-operatives societies.

4.5.1 User Perception

Several statements on the influences of user perception on adoption of digital weighing scales were carefully developed. The respondents indicated the extent of their agreement with each of the statement.

Table 4. 4: User Perception

	Mean	Std. Dev.
Benefits perceived influences in a significant way the attitude towards acceptability and use a technology	4.285	0.607
Improved competitiveness in the speed and reliability of transactions influence adoption of technology	4.442	0.594
Usefulness of technology motivates its adoption	4.111	0.671
Knowledge and skills influence organization decision in adopting new technology	4.163	0.793
Organization's managers are unlikely to adopt sophisticated technologies	2.279	0.450

As implied by mean of 4.442 and a standard deviation of 0.594, improved competitiveness in the speed and reliability of transactions influence adoption of technology. Again, a mean of 4.285 and a standard deviation of 0.607 indicate that benefits perceived influences in a significant way the attitude towards acceptability and use a technology. In addition, as indicated by a mean of 4.163 and a standard deviation of 0.793, knowledge and skills influences organization decision in adopting new technology. Finally as shown by a mean of 4.111 and a standard deviation of 0.671, it was clear that usefulness of technology motivates of digital weighing scales.

Organization's managers however are likely to adopt sophisticated technologies as illustrated by a mean of 2.279 and standard deviation of 0.450.

4.5.2 User Convenience

On various statements on user convenience's influence on adoption of digital weighing scales, the respondents gave their opinion on the level of agreement with each of the statement.

Table 4. 5: User Convenience

	Mean	Std. Dev
Increased transparency in view of balances and logs of transactions done influence adoption of weighing scales	4.459	0.500
Accuracy of weighing machine increase the efficiency of transaction	3.849	0.622
Consistency and ease of use of digital weighing machine influence its adoption	4.273	0.702
Objectivity highly increase the efficiency of transaction	2.558	0.564

As shown by mean of 4.459 and a standard deviation of 0.500, increased transparency in view of balances and logs of transactions did influence adoption of weighing scales. Further, an average of 4.273 and a standard deviation of 0.702 indicated that consistency and ease to use the digital weighing machine influence its adoption. In addition, as illustrated by a mean of 3.849 and a standard deviation of 0.622 it was clear that accuracy of weighing machine increase the efficiency of transaction. Objectivity however, highly makes the efficiency of transaction constant as shown by a mean of 2.558 and a standard deviation of 0.564.

4.5.3 Initial Investment Cost

On the level of agreement with the various statements on Initial Investment Cost influence on adoption of digital weighing scales by coffee co-operatives societies, the respondents gave their opinion on each of the statements.

Table 4. 6: Initial Investment Cost

	Mean	Std. Dev.
The higher the cost of adoption of the innovation, the slower the pace of innovation expansion	4.116	0.763
Freight cost influence organization decision in adopting new technology	2.477	0.626
Organizations are less likely to adopt digital weighing scales when its initial set-up cost is high	4.169	0.780
Pretesting cost influence organization decision in adopting new	3.954	0.763

technology

The findings from this research showed that organizations were less likely to adopt digital weighing scales when its initial set-up cost is high as shown by a mean of 4.169 and standard deviation of 0.780. They further showed that the higher the cost of adoption of the innovation, the slower the pace of innovation expansion as shown by a mean of 4.116 and standard deviation of 0.763. In addition, the research findings revealed that pretesting cost influence organization's decision in adopting new technology as illustrated by an average of 3.954 and a standard deviation of 0.763. Freight cost however were found not to influence organization decision in adopting new technology as depicted by a mean of 2.477 and a standard deviation of 0.626.

4.5.4 Service Efficiency

The study used various statements on Service Efficiency influence on adoption of digital weighing scales by coffee co-operatives societies to obtain the respondents opinion on the level of agreement with each statement.

Table 4. 7: Service Efficiency

	Mean	Std. Dev.
Weighing speed is an important factor in making the decision to technological advancement	4.047	0.665
Multi-media input and output minimizes slowness of weighing machines	2.314	0.465
Personalization increase the efficiency of transaction	3.785	0.952
Greatly reduced breakdown frequency influence organization decision in adopting new technology	3.936	0.781
Minimal errors reading influence organization decision in adopting new technology	4.093	0.711

On the service efficiency, the research findings showed that minimal errors reading influence organization decision in adopting new technology as shown by a mean of 4.093 and standard deviation of 0.711. Again, the findings revealed that weighing speed is an important factor in making the decision to technological advancement as illustrated by a mean 4.047 and a standard deviation of 0.665. In addition, as indicated by a mean of 3.936 and a standard deviation of 0.781, greatly reduced breakdown frequency influenced organization decision in adopting new

technology. Personalization increases the efficiency of transaction as shown by a mean of 3.785 and a standard deviation of 0.952. Finally, the research findings showed that multi-media input and output maximises slowness of weighing machines as indicated by an average of 2.314 and a standard deviation of 0.465.

4.5.5 Adoption of Digital Weighing Scales

The study examined the extent to which the respondents' organization rated various aspects of adoption of digital weighing scales for the last five years and came up with the findings in table 4.8.

Table 4. 8: Adoption of Digital Weighing Scales

	Mean	Std. Dev.
Number of digital weigh scales in the cooperative society	4.180	0.569
Acceptance of digital weigh scales	3.186	0.602
Usage of digital weigh scales	4.372	0.685

For the last five years usage of digital weigh scales has been on the rise as indicated by a mean of 4.372 and a standard deviation of 0.685, number of digital weigh scales in the cooperative society have improved as shown by an average of 4.180 and a standard deviation of 0.569. However, acceptance of digital weigh scales has been constant as shown by a mean of 3.186 and standard deviation of 0.602.

4.6 Multiple Regression Analysis

Table 4.9: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.820	0.672	0.664	0.112

R-Squared is a commonly used statistic to evaluate model fit. R-square is 1 minus the ratio of residual variability. The adjusted $R^{2,}$ also called the coefficient of multiple determinations, is the percent of the variance in the dependent explained uniquely or jointly by the independent variables. 66.4% of the changes in the dependent variable are attributed to the combined effect of the predictor variables.

Table 4. 10: Summary of One-Way ANOVA results of the regression analysis

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	4.342	4	1.086	85.388	0.000
1	Residual	2.123	167	0.013		
	Total	**6.465**	**171**			

F calculated (85.388) being greater than F critical (2.14) as well as a p-value (0.000) less than 0.005 indicated that regression relationship was highly significant in predicting how adoption of digital weighing scale is affected by user perception, user convenience, initial investment cost and service efficiency.

The Regression coefficients for the relationship between the four independent variables and dependent variable were as shown In in Table 4.11.

Table 4. 11: Regression coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.036	0.155		6.684	0.0000
User perception	0.766	0.271	0.572	2.827	0.0050
User convenience	0.619	0.146	0.397	4.240	0.0000
Initial investment cost	0.815	0.232	0.602	3.513	0.0005
Service efficiency	0.573	0.221	0.432	2.593	0.0104

The established multiple regression equation for predicting adoption of digital weighing scales from the four independent variables was:

$Y = 1.036 + 0.766X_1 + 0.619X_2 + 0.815X_3 + 0.573X_4$

Where, Y= Adoption of digital weighing scale

X_1= User perception

X2= User convenience

X3= Initial investment cost

X4= Service efficiency

The research findings revealed that adoption of digital weighing scale would be 1.036 if user perception, user convenience, initial investment cost and service efficiency held constant. The research findings also implied that there would be a 0.766 increase adoption of digital weighing scale when user perception increased while holding other factors constant. The study findings also revealed that adoption of digital weighing scale would increase at a rate of 0.619 if user convenience increased while other factors held constant.

The research findings further found that while other factors held constant, adoption of digital weighing scale is 0.815 if initial investment cost was increased and that aadoption of digital weighing scale will be 0.573 if service efficiency was increased. All variables were significant since their p-values were less than 0.005.

CHAPTER FIVE
SUMMARY, DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The study examined the factors influencing adoption of digital weighing scales by coffee co-operatives societies in Imenti north sub- county, Meru County, Kenya to come up with the findings in chapter four. Therefore, this chapter presents the summary of findings, the conclusion and recommendations of the study based on the findings in chapter four.

5.2 Summary

5.2.1 User Perception

The study results revealed that improved competitiveness in the speed and reliability of transactions influence adoption of technology. Again, the study findings showed that benefits perceived influence the attitude towards acceptability and use of a technology in a significant way. In addition, knowledge and skills influenced organization decision in adopting new technology. Finally, it was clear that usefulness of technology motivates of digital weighing scales and that organization's managers however are likely to adopt sophisticated technologies.

5.2.2 User Convenience

The study results revealed that increased transparency in view of balances and logs of transactions done influence adoption of weighing scales. Further, the findings indicated that consistency and ease to use the digital weighing machine influence its adoption. In addition, it was clear that accuracy of weighing machine increase the efficiency of transaction. Objectivity however, highly makes the efficiency of transaction constant.

5.2.3 Initial Investment Cost

The findings from this research showed that organizations were less likely to adopt digital weighing scales when its initial set-up cost is high. They further showed that the higher the cost of adoption of the innovation, the slower the pace of innovation expansion. In addition, the research findings revealed that pretesting cost influence organization's decision in adopting new

technology. Freight cost however were found not to influence organization decision in adopting new technology.

5.2.4 Service Efficiency

On the service efficiency, the research findings showed minimal errors reading influence organization decision in adopting new technology. Again, the findings revealed that weighing speed is an important factor in making the decision to technological advancement. In addition, greatly reduced breakdown frequency influenced organization decision in adopting new technology. Personalization increases the efficiency of transaction. Finally, the research findings showed that multi-media input and output maximises slowness of weighing machines.

5.3 Discussion

This section of the report discusses the findings and compares them with literature reviewed in chapter two.

5.3.1 User Perception

The study results revealed that improved competitiveness in the speed and reliability of transactions influence adoption of technology. This conforms to several studies by (Giovanni & Mario, 2013) which found that ICT in general offers an organization a wide range of possibilities for improving their competitiveness. Again, the study findings showed that benefits perceived influence the attitude towards acceptability and use of a technology in a significant way. This corresponds to Reynolds, Savage and Williams (2007) who claims that organization's managers are unlikely to adopt sophisticated technologies if they are not familiar with it.

In addition, knowledge and skills influenced organization decision in adopting new technology. This was in line with Long and MacGregor (2016) who asserted that lack of skills amongst workforce affects the use of new products. Finally, it was clear that usefulness of technology motivates of digital weighing scales and that organization's managers however are likely to adopt sophisticated technologies. This was according to Davis (2009) who perceived that ease of use and usefulness influences in a significant way the attitude towards acceptability and use a technology.

5.3.2 User Convenience

The study results revealed that increased transparency in view of balances and logs of transactions done influence adoption of weighing scales. This correlate with Huang *et al*. (2015) who observed that digital technology is one of the most effective transaction methods because it possesses many advantages which analogue channels cannot offer. Further, the findings indicated that consistency and ease to use the digital weighing machine influence its adoption. This is similar to Laukkanen (2016) who said that a consumer who perceives that new technology saves time compared to previous technology forms the perception of efficiency.

In addition, it was clear that accuracy of weighing machine increase the efficiency of transaction. This concurs with Mohamed and Kathy (2008) who claim that when compared to security, cost, efficiency and privacy, convenience influenced more on adoption of digital weighing scales. Objectivity however, highly makes the efficiency of transaction constant. This was in line with Coursaris and Hassanein (2012) who argued that digital weighing scales increase consumer opportuneness in reweighing since users can easily use them even at their homes and increasing the efficiency possibilities

5.3.3 Initial Investment Cost

The findings from this research showed that organizations were less likely to adopt digital weighing scales when its initial set-up cost is high. This was similar to Donaldkiso, 2009) who noted that the investment costs in digital weighing scales include purchase price, transportation and handling, insurance on the equipment during transport, the cost of special bases for them, the costs of assembly, installation and costs of testing start up. They further showed that the higher the cost of adoption of the innovation, the slower the pace of innovation expansion. This concurred with Mansfied (2008) who claimed that the higher the cost of adoption of the innovation, the slower the pace of innovation expansion is likely to be. In addition, the research findings revealed that pretesting cost influence organization's decision in adopting new technology. Freight cost however were found not to influence organization decision in adopting new technology. These were similar to Lymer (2015) who emphasised that technology adoption in an organization has the potential to reduce costs and increase productivity level thus cost-effectiveness is a motivating factor for adoption.

5.3.4 Service Efficiency

On the service efficiency, the research findings showed minimal errors reading influence organization decision in adopting new technology. This was similar to Fort and Muriel (2016) whose study suggests that convenience means much more to consumers than access and saved time. Again, the findings revealed that weighing speed is an important factor in making the decision to technological advancement. This conformed to Lymer (2015) who argued that majority of users commented more on the importance of speed in their choice of digital weighing scales.

In addition, greatly reduced breakdown frequency influenced organization decision in adopting new technology. Personalization increases the efficiency of transaction. Finally, the research findings showed that multi-media input and output maximises slowness of weighing machines. These were similar to Lee (2008) who suggests that navigational efficiency is particularly important in as the restrictive visual interface regarded as a major hindrance for its adoption.

5.4 Conclusion

The study concluded that user perception positively and significantly influenced the adoption of digital weighing scales among coffee cooperative societies. In this case, the improved competitiveness in the speed and reliability of transactions influence adoption of technology, that benefits perceived influence the attitude towards acceptability and use of a technology in a significant way and that organization's managers however are likely to adopt sophisticated technologies.

Concerning the user convenience, the study concluded that it positively influences adoption of digital weighing scales among coffee cooperative societies. The study deduced that increased transparency in view of balances and logs of transactions done influence adoption of weighing scales, that consistency and ease to use the digital weighing machine influence its adoption and that accuracy of weighing machine increase the efficiency of transaction.

About initial investment cost, the study concluded that it positively and significantly influences adoption of digital weighing scales among coffee cooperative societies. Under this the study deduced that organizations were less likely to adopt digital weighing scales when its initial set-up

cost is high, that higher the cost of adoption of the innovation and that Freight cost don't influence organization decision in adopting new technology.

Finally, the study concluded that service efficiency positively and significantly influences adoption digital weighing scales among coffee cooperative societies. The study under this deduced minimal errors reading influence organization decision in adopting new technology, that weighing speed is an important factor in making the decision to technological advancement and that greatly reduced breakdown frequency influenced organization decision in adopting new technology.

5.5 Recommendations

Concerning the user perception, the study found that knowledge and skills influence organization decision in adopting new technology. They study therefore recommends measures to ensure all the farmers have the required. This is through organised seminars as well as workshops to instil skills and knowledge to the farmers on how the new technology works. This will hence ensure smooth transition from the old to the new technology as well as influencing adoption of the digital weighing scales.

Concerning user convenience, the study found that consistency and ease of use of digital weighing machine influence its adoption. The study therefore recommends that digital weighing machine made in such a way that a farmer can easily use them. The modified scales are easily readable and easy to interpret.

Further, the study on initial investment cost recommends that the pretesting cost as well as initial set-up cost should be set as low as possible to allow the low-income farmers to be able to adopt the digital weighing scales. This will make it cheap and affordable for the farmers to be able to adopt without any constraints.

Finally, on service efficiency, the study found that weighing speed is an important factor in making the decision to technological advancement. Therefore, the study recommends that the weighing scales made should be of high speed since majority of users commented more on the importance of speed in their choice of digital weighing scales.

5.6 Recommendations for Further Studies

Since this study was only limited to coffee co-operatives societies in Imenti north sub- county, Meru County, the study therefore recommends that the same study should be done on other sub counties in Meru as well as in other counties in Kenya.

The study also recommends that the same study based on other cooperative such as tea cooperative societies in Kenya to establish how various factors influencing adoption of digital weighing scales in the respective cooperative societies.

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APPENDICES

Appendix I: Letter of Transmittal

Peter Wambua Mutiso

P.O. Box 5848-00200.

NAIROBI.

Dear Sir/ Madam,

RE: ACADEMIC RESEARCH PROJECT

I am a Master of Arts in Project Planning and Management student at University Of Nairobi. I wish to conduct a research entitled Factors Influencing Adoption of Digital Weighing Scales by Coffee Co-Operatives Societies in Imenti North sub- county, Meru County, Kenya. A questionnaire used to gather relevant information to address the research objective of the study. The purpose of writing to you is to kindly request you to grant me permission to collect information on this important subject from your organization.

Please note that the study is an academic research and the information provided will be in strict confidence. Confidentiality and the study outcomes and reports will not include reference to any individuals.

Your acceptance will be highly appreciated.

Yours faithfully,

MUTISO, PETER WAMBUA

L50/84596/2016

Appendix II: Research Questionnaire

Kindly answer the following questions by writing a brief answer or ticking in the boxes provided.

PART A: BACKGROUND INFORMATION

1. Which is your highest level of education?

   Post Graduate [ ]

   Undergraduate [ ]

   Diploma [ ]

   Certificate [ ]

   Any other (specify)……

2. How long have you worked in this cooperative society?

   1-4 years [ ]

   5-8 years [ ]

   9-12 years [ ]

   13- 16 years [ ]

   17 years and above [ ]

PART B: User Perception

3. What is your level of agreement with the following statements on User Perception influence on adoption of digital weighing scales by coffee co-operatives societies in Imenti North Sub-County?

   Where: 5- Strongly agree 4-Agree 3-Neutral

   2- Disagree 1- Strongly disagree

	1	2	3	4	5
Benefits perceived influences in a significant way the attitude towards acceptability and use a technology					
Improved competitiveness in the speed and reliability of transactions influence adoption of technology					
Usefulness of technology motivates its adoption					
Knowledge and skills influence organization decision in adopting new technology					
Organization's managers are unlikely to adopt sophisticated technologies					

4. In your opinion, how does user perception influence adoption of digital weighing scales within Imenti North Sub-County in your cooperative society?

……

……

PART C: User Convenience

5. What is your level of agreement with the following statements on User Convenience influence on adoption of digital weighing scales by coffee co-operatives societies in Imenti North Sub- County?

Where: 5- Strongly agree 4-Agree 3-Neutral

2-Disagree 1- Strongly disagree

	1	2	3	4	5
Increased transparency in view of balances and logs of transactions done influence adoption of weighing scales					
Accuracy of weighing machine increase the efficiency of transaction					
Consistency and ease of use of digital weighing machine influence its adoption					
Objectivity highly increase the efficiency of transaction					

6. In your own opinion, how does user convenience influence adoption of digital weighing scales cooperative society?

……

……

……

PART D: Initial Investment Cost

7. What is your level of agreement with the following statements on Initial Investment Cost influence on adoption of digital weighing scales by coffee co-operatives societies in Imenti North Sub- County?

Where: 5- Strongly agree 4-Agree 3-Neutral

2-Disagree 1- Strongly disagree

	1	2	3	4	5
The higher the cost of adoption of the innovation, the slower the pace of innovation expansion					

Freight cost influence organization decision in adopting new technology					
Organizations are less likely to adopt digital weighing scales when its initial set-up cost is high					
Pretesting cost influence organization decision in adopting new technology					

8. In your own opinion, how do the facets of initial investment cost above influence adoption of digital weighing scales in your cooperative society?

……

……

……

PART E: Service Efficiency

9. What is your level of agreement with the following statements on Service Efficiency influence on adoption of digital weighing scales by coffee co-operatives societies in Imenti North Sub- County?

Where: 5- Strongly agree 4-Agree 3-Neutral

2-Disagree 1- Strongly disagree

	1	2	3	4	5
Weighing speed is an important factor in making the decision to technological advancement					
Multi-media input and output minimizes slowness of weighing machines					
Personalization increase the efficiency of transaction					
Greatly reduced breakdown frequency influence organization decision in adopting new technology					
Minimal errors reading influence organization decision in adopting new technology					

10. In your own opinion, how do the facets of service efficiency above influence adoption of digital weighing scales in your cooperative society?

……

……

……

PART F: Adoption of Digital Weighing Scales by Coffee Co-Operatives Societies in Imenti North Sub- County

11. To what extent is your organization rated in the following aspects of adoption of digital weighing scales for the last five years?

	Greatly Improved	Improved	Constant	Decreased	Greatly decreased
Number of digital weigh scales in the cooperative society					
Acceptance of digital weigh scales					
Usage of digital weigh scales					

THANK YOU FOR YOUR PARTICIPATION