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Analysis of State of Electronic Commerce Adoption and Influencing Factors among Small and Medium Enterprises in Kenya

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DECLARATION

I, **Moses Odeo Okadapau**, do hereby declare that this PhD research is entirely my own work and where there's work or contributions of other individuals, it has been duly acknowledged. To the best of my knowledge, this thesis has not been previously presented to any other education institution or forum.

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DEDICATION

To my wife, Carolyne; you have been patient, prayerful and encouraging when I have had to be away from home on research assignments. Thank you for the love and support throughout this journey, may the Lord God reward you.

To my daughters, Julia, Martha and Susan; thanks for standing with me despite missed days and plays. You are my reward beyond compare.

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ABSTRACT

Small and Medium-sized Enterprises (SMEs) in Kenya contribute significantly to economic growth, social structure and employment as well as local and regional development. Consequently, they have become an important sector of the economy. The slow rate of electronic commerce (e-commerce) adoption and inadequate research on the same among SMEs in developing countries prompted this research. Many factors could be responsible for the present state of e-commerce adoption among the SMEs in Kenya. In order to understand the state of e-commerce adoption and determine the factors that influence the adoption, SMEs adopters of e-commerce were asked to indicate their status and factors influencing the adoption of e-commerce among SMEs in Kenya.

The research was informed by the Technological-Organizational-Environmental (TOE) framework, which address the decision to adopt e-commerce, as well as the adoption and non-adoption of different e-commerce technologies at organization. The research design adapted for this research study was a cross sectional survey approach using a questionnaire. This was chosen because it was intended to gather information from a large number of respondents in different industry sectors which are located in selected regions over a wide geographical area. The population included all SMEs in Kenya that were already using some e-commerce technologies. The sample size was one hundred and nineteen SMEs selected from five different regions. The data was analyzed using descriptive statistics, correlation, factor and regression analyses. Several hypotheses were tested empirically.

The result shows that SMEs have a moderate extent of e-commerce adoption at 59% and that a majority of them are at the two initial stages namely, promotion and provision. There are variations in e-commerce adoption among SME in different industry sectors. The SMEs rated the importance of the Attitude factors and the Social & cultural factors to e-commerce adoption as very high, showing that they were favorably disposed to adopt e-commerce in so far as attitude and social & cultural factors are concerned. In addition, five out of seven barrier factors studied were found to have a significant influence on e-commerce adoption including technical, financial, organizational, governmental and innovational barriers. Perceived risk and knowledge

were the only moderating factors in the relationship between barrier factors and extent of e-commerce adoption. The research concludes that there are variations in e-commerce adoption among SME in different industry sectors and that there is need to promote industry specific e-commerce applications based on their suitability in meeting the industry needs. It also concludes that there is need to encourage SMEs in Kenya to move to transaction and integration stages of adoption, since majority of them are at promotion and provision stages. The results also imply that more efforts are needed address barriers to e-commerce adoption in order to help and encourage SMEs speed up e-commerce adoption.

Key words:- E-commerce adoption, Small and Medium Enterprises, Survey, Kenya.

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LIST OF ABBREVIATIONS

B2B	Business to Business
B2C	Business to Consumer
BI	Behavioral Intention
CEO	Chief Executive Officer
C2C	Consumer to Consumer
CRM	Customer Relationship Management
CTA	Community Technology Access
DES	Digital Electronic Signature
DIT	Diffusion of Innovation Theory
EDI	Electronic Data Interchange
EFT	Electronic Funds Transfer
FAQ	Frequently Asked Questions
G2C	Government to Consumer
G2G	Government to Government
GDP	Gross Domestic Product
ICT	Information and Communication Technology
ISP	Internet Service Providers
IT	Information Technology
KMO	Kaiser-Meyer-Olkin
NPC	National Productivity Corporation
OECD	Organization for Economic Co-operation and Development
PC	Personal Computer
PEER	Perceived external e-Readiness
PEOU	Perceived Ease Of Use
PERM	Perceived E-readiness Model
PU	Perceived Usefulness
RA	Research Assistant
RFID	Radio Frequency Identification
SCM	Supply Chain Management
SME	Small and Medium-sized enterprise
SPSS	Statistical Package for Social Sciences
TAM	Technology Acceptance Model
TOE	Technology Organization Environment
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
UNCTAD	United Nations Conference on Trade and Development
UTAUT	Unified Theory of Acceptance and Use of Technology

CHAPTER ONE: INTRODUCTION

1.1 Background

The emergence of electronic commerce (e-commerce) has affected many industries and organizations. In many developing countries, SMEs account for a major share of production and employment, and are therefore directly connected to poverty alleviation and economic development (Garikai, 2011; Daniel et al. 2002; Tse et al. 2003, Rashid et.al, 2001). In Kenya, 90% of all enterprises are SMEs providing employment to over 60% of the total employed population. According to the Kenya Economic Survey, 2011, out of a total of 503,000 jobs created in the previous year, 440,400, or 80.6 per cent were in the SMEs.

The population of Kenya was 38.6 million according to the census conducted in 2009, but estimated to be 41.8 million in 2013 (KNBS, 2014). The country is a regional hub for finance and trade in East Africa (IMF, 2015) and according to Mckinsey (2013), the Internet sector contributed 2.9% of Kenya's GDP, with the country having spent 9.3% of its total ICT budget on computer software and services. The Information and Communication Technology (ICT) sector was a major contributor of economic growth in 2014 with an expansion of 13.4% from 12.3% in 2013. However, the sector's growth slowed to 7.3 per cent in 2015 (KNBS, 2016). The Government of Kenya recognizes that ICT provides an opportunity to exploit e-commerce and transform the economic and social welfare of its citizens. As a result it prepared the Kenya National ICT Master Plan, which covers the period 2013/14 - 2017/18, outlining the roadmap and implementation strategy to make ICTs more accessible and affordable to the wider population and therefore catapult Kenya into a knowledge and information society status. Gikandi and Boor (2010) studied the factors that influence the adoption and effectiveness of e-banking in retail banking in Kenya. They found an array of inhibiting factors including lack of resources, constant change in technology and time available to develop systems, and lack of spread of accessibility and use of Internet by the general population, particularly in the rural areas. A more recent research in Nairobi, Kenya revealed that while e-commerce was found to provide strategic value to adopters, it was noted that a good number of SMEs in Nairobi had not embraced the technology. It was established that e-commerce is not widespread, 43% of all the

firms surveyed had no functioning websites and 31% of the firms had static websites, while 22% of the firms had active websites that allowed interactive communication with customers (Mutua et al., 2013).

In another survey on SMEs and developing countries, Alemayehu (2005) concludes that the ability to be reachable worldwide and the creation and effectiveness of supply chain of industries were the two main benefits of SME adoption of e-commerce in developing countries. The availability of appropriate e-commerce applications, their effective usage and ability to individually tailor solutions can create opportunities across the various sectors. A significant amount of e-commerce in the global SMEs is done through organizational websites (Drew, 2003; Humphrey et al., 2003; Rao et al. 2003; Molla and Licker, 2005b; Uzoka et al., 2007; Eriksson & Naldi, 2008; Karakaya & Shea, 2008) as depicted by the previous studies particularly in developed countries. Some forms of e-commerce activities are accomplished through newer ICTs such as cloud computing; mobile commerce applications and social networking services (Constantinides, 2010; Scupola, 2010).

Medjedel (2013) found that most managers were not satisfied with dealing with e-commerce application in their companies. Some companies use e-commerce through e-mails only. The reasons behind not using e-commerce are technical, environmental, economical, financial, institutional and legal reasons. The success of technology adoption is heavily dependent on how it is used by adopters and this in turn is affected by the fit between the technology and the adopters (Unhelkar 2003). While many of the e-commerce benefits have been realized by organizations in developed countries, there is still skepticism in relevance of e-commerce and its benefits for developing countries (Odedra-Straub 2003).

1.2 Electronic Commerce

The concept of electronic commerce (e-commerce) has been broadly written and defined in various ways (Mutua, Oteyo, & Njeru, 2013). E-commerce is defined as the process of buying, selling, transferring or exchanging products, services and /or information through computer networks, including the Internet (Fraser, Fraser & MacDonald, 2000; Turban et al. 2006; Jelassi

& Enders, 2008; Turban et al. 2008). This involves the electronic trading of physical and digital goods, quite often encompassing all the trading steps such as online marketing, online ordering, e-payment for digital goods, online distribution and after-sales support activities. SMEs in kenya are now looking to social media as a competitive way to market their products and increase their sales volumes. Having a strong social media presence in business is no longer an added advantage but a requirement. Kaplan and Heinlein (2010) have formulated social media as "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content". Web 2.0 refers to Internet platforms where users can interactively participate in, and user generated content encompasses the possibilities in which people may use social media (Chan, et al., 2010).
E-commerce is developing in the world and influencing all industries. This phenomenon has been expanding because of using the Internet worldwide (Elahi et al, 2008). Electronic transactions between enterprises have the potential to positively change the way they operate, especially for SMEs whose needs are far more demanding than their counterparts – the large corporate (Oyelaran-Oyeyinka & Lal, 2006).

1.3 Small and Medium Enterprises

The definition of Small and Medium Enterprises (SMEs) varies in different countries and studies but is usually based on number of employees, assets or a combination of the two. For the purposes of this study, SMEs are defined as organizations with less than 251 employees (Seyal et al. 2004; Modimogale and Kroeze 2011). SMEs appear to encounter many challenges in adopting new technologies. The cost of implementation, security, perceived customer readiness, lack of knowledge of IT and e-business are some of the challenges encountered by SMEs in adopting electronic business technologies (Department of Enterprise, Trade and Employment, 2004) cited in Emma and Georgia (2009).

1.4 Factors Influencing the Adoption

The type of business enterprise influences the adoption of e-commerce. According to studies conducted by Olatokun and Kebonye (2010) on the relationship between various types of

businesses, the size, as well as the enterprise types of activities has an influence on the adoption of e-commerce. E-commerce adoption and utilization is determined by technological, political, social and economic factors where the technological factors refer to the degree to which telecommunication infrastructure is advanced which increases access to new technology for enterprises and consumers (Tasabehji, 2003). Various studies have reported that SMEs are generally lagging behind large organizations as far as the adoption and usage of e-commerce is concerned (Wohlmuth et al. 2004; Simpson M. & Docherty A., 2004). The research work done by Kapurubandara and Lawson (2006) identified a variety of factors that could be grouped into several categories. Also, Chau and Turner, 2001; OECD, 2002 identified factors relating to three major categories: owner /manager characteristics, firm characteristics and costs and return on investment (Akkeren and Caraye, 2000).

1.5 Statement of the Problem

The slow rate of e-commerce adoption among SMEs and the factors that influence its successful adoption have been a major source of concern among researchers (Mpofu et al. 2011; Olatokun & Kebonye, 2010; Wohlmuth et al, 2004). It has been demonstrated through various studies previously that the rate of e-commerce adoption in SMEs has been low, particularly in developing countries. This slow paced uptake of e-commerce technologies has been documented and researched widely, with results indicating that SMEs face inhibitors or barriers that prevent them from implementing and fully reaping the benefits of e-commerce. Literature also, points out that SMEs in developing countries generally have not capitalized on the power of the Internet to extend their business beyond traditional borders (Bai et al., 2008; Molla and Licker, 2005a) except in the application of simple technologies such as electronic mail. Some of the reasons given include: cost of acquiring and operating ICT, lack of ICT and e-commerce knowledge, owner/manager low literacy levels, inability to perceive e-commerce benefits, unfriendly regulatory policy and requirements, cultural issues and dependence on customer or supplier preferences.

A study on factors of e-commerce among Tour and travel firms in Kenya, found that despite the great opportunities envisaged from the adoption of e-commerce by SMEs, the general ICTs usage patterns continue to show slow progression particularly in commerce-oriented activities

(Wanjau et al., 2012). Another Kenya based study found that e-commerce application was limited to use of phones (Matambalya et al., 2001) while, the use of computers stood at 71.8% and Internet connectivity by SMEs stood at 52.2% (Esselaar, 2007).

The adoption of e-commerce by businesses is an important economic indicator of growth due to the perceived potential of the Internet in reducing transaction cost. However, the adoption of e-commerce in developing countries has fallen below expectations. For instance, it was established that 62% and 82% of small and medium enterprises respectively utilized e-mail while 14% of small enterprises and 37% of medium enterprises had website connections (Kashorda, 2009). The study went on to conclude that the low uptake of e-commerce in Kenya may not be directly related to laws but limited to internal readiness and use of ICT.

The SMEs in African countries face a number of problems including limited access to credit, poor management practices and limited access to technology (Regus, 2013; CTA, 2000). The differences between developed and developing countries (such as availability of infrastructure, social and cultural issues) do not support generalizing the findings for developed countries to developing countries. SMEs in developing countries are faced with barriers or inhibitors that are specific to them, some being more pronounced than would be in the case for SMEs in developed countries. To understand the slow uptake of e-commerce, it is appropriate to look into the environment in which they operate. There is still little knowledge about SMEs and e-commerce in developing countries in comparison to developed countries and so this study will assist in filling the gap. Furthermore, despite the need to address this slow rate of adoption and low usage of e-commerce by SMEs, there has been relatively little research into the factors that could have contributed to this in Kenya. This research sought to analyze the state of e-commerce adoption by investigating the extent of SMEs' e-commerce adoption, the barriers and facilitating factors that influence the adoption in Kenya.

1.6 Purpose

The goal of this research was to study the state of e-commerce adoption by investigating the extent of e-commerce adoption, barriers and facilitators as factors influencing e-commerce adoption among SMEs in Kenya.

1.7 General Objective

The aim of this research was to analyze the state and factors that influence electronic commerce adoption among Small and Medium sized Enterprises (SMEs) in Kenya.

1.7.1 Specific Objectives

The specific objectives of this research were:

(i) To investigate the extent of e-commerce adoption among SMEs in Kenya.

(ii) To compare the level of e-commerce adoption among different SME sectors in Kenya

(iii) To analyze the factors that influences the adoption of e-commerce among SMEs in Kenya.

(iv) To develop a model of the extent of e-commerce adoption among SMEs in Kenya.

1.8 Research Questions

The research questions for this study were as follows:

(i) What is the state of e-commerce adoption among SMEs in Kenya?

(ii) How does the state of e-commerce adoption compare among different SMEs sectors in Kenya?

(iii) What factors affect the adoption of e-commerce among SMEs in Kenya?

(iv) What adoption model explains the state of e-commerce adoption among SMEs in Kenya?

1.9 Significance of the Study

Many studies have revealed that SMEs have been looking for suitable solutions and methods of adopting and integrating e-commerce into their business process (Kartiwi and MacGregor, 2007; Dos Santos and Peffers, 1998). According to Mutula & Van Brakel (2007), in both developed and developing countries, SMEs are a significant component of many economies. This is because of the contribution they make in creating employment, and facilitating regional development, innovation and poverty alleviation (Jones & Beynon-Davies, 2011, Golding et al. 2008; Adekunle & Tella 2008)). Although there is a growing body of literature on the analysis of the technical and operational aspects of e-commerce, there is scanty research to date that examines the factors of e-commerce adoption and deployment in organizations of developing countries. In view of the low usage of e-commerce among SMEs in Kenya, there is need to analyze factors that could have contributed to the low adoption of ICTs that support e-commerce. Kshetri (2007) noted some impediments to e-commerce developments in developing countries in general such as the lack of ICT infrastructure; hostile environments; lack of macro policies to nurture local e-commerce structures; lack of perception of e-commerce benefits by managers; among other issues. According to Abebe (2014), e-commerce adoption has a significant, positive influence on SMEs' average sales growth rate and that adopters of e-commerce technology have significantly higher average sales growth rate than non-adopters.

The outcome of this study will help the ICT policy makers in Kenya, as well as other developing countries to direct the related activities towards the most effective local factors that will enable and leverage e-commerce potential and usage. On the other hand it will enable SME managers achieve better understanding of e-commerce adoption and implementation, and identify the promising local opportunities for e-commerce infrastructure providers. Understanding of the extent of, critical inhibiting factors of e-commerce adoption and implementation would provide

SMEs with the required knowledge to enable them respond appropriately to e-commerce and become more competitive.

1.10 Scope of the Study

In this research, the scope of e-commerce applications is limited to the utilization of information and communications technology (ICT) to enhance communication, information processing and integration of business processing among SMEs in Kenya. The research purposely focused on SMEs that using some form of e-commerce to carry out transactions and interactions that affect existing business relationships or pre-existing contractual relations between trading partners, i.e. business-to-business and business-to-customer e-commerce.

1.11 Organization of Thesis

Chapter 1 Introduction: This chapter looks into the importance of e-commerce and SMEs in brief, followed by a statement of the problem, purpose, significance and scope of the study, objectives and research questions, and how the dissertation is organized and the contents of each chapter.

Chapter 2 Literature Review: The chapter begins with a brief history of e-commerce, followed by characteristics of e-commerce and their business significance. The next section covers types of e-commerce applications; e-commerce models and e-commerce adoption categories. The third section is a review of the stages of e-commerce adoption, followed by the factors influencing e-commerce adoption and barriers of the adoption of e-commerce. The fourth section discusses the barriers to adoption of e-commerce, succeeded by a review of technology adoption theories, review of empirical literature frameworks and the importance of review of technology adoption theories. Finally, an analysis of the gap identified in the literature is provided, followed by the conceptual framework of factors of e-commerce adoption and hypotheses.

Chapter 3 Research Methodology: The chapter discusses the research methods used in the research. The first section provides the research philosophy; followed by the research design

covering research sites, population, sampling techniques, survey instrument, validity and reliability measurement, data collection and data analysis. The last section covers operationalization of variables including measurement of e-commerce adoption and definition of operational variables.

Chapter 4 Results and Findings: This chapter of the thesis provides detailed findings from the survey conducted in the research and observations made. It is organized as follows: the first section covers the organization profiles and adoption of e-commerce. The next section outlines the results of the social-cultural and attitude factors. The last section addresses results of factor analyses, test of hypotheses and moderating factors of e-commerce adoption factors.

Chapter 5 Discussion: This chapter of the thesis gives an in-depth discussion of the results and key findings from the survey conducted in the research and are discussed broadly with existing literature. It starts by examining the state of e-commerce adoption, followed by e-commerce adoption among industry sectors, barriers of e-commerce and hypotheses, the social-cultural factors of e-commerce, the attitude factors of e-commerce and finally, the moderating variables of e-commerce adoption factors.

Chapter 6 Conclusions and Recommendations: The chapter outlines the conclusions, research contributions, and further research areas. The thesis then ends with recommendations and limitations of the study.

CHAPTER TWO: LITERATURE REVIEW

2.1 A Brief History of E-commerce

The development of e-commerce started in the early 1960s, although many applications associated with innovations came up around 1970s in form of electronic funds transfer (EFT) (Turban, King, Lee, & Viehland, 2004). Later on, another innovation was introduced, called Electronic Data Interchange (EDI), which allows business transactions such as purchase orders or invoices to be passed electronically from one organization to another using standard procedures and documents (Turban et al., 2004; Papazoglou & Ribbers, 2006). The network of computer networks, Internet, started in 1969 by the US government to support academic and scientific research (Senn, 2004). The rapid evolution of the Internet and its graphical component, the World Wide Web (Senn, 2004) in the 1990s and thereafter (Hauben, 2004), enabled organizations to share and exchange information because it was more affordable than the previous medium of EDI (Turban et al., 2004). In year 2000, a revolution was experienced whereby several United States Internet-based firms collapsed (Teo & Ranganathan, 2004). Since that time, there has been hype amongst firms, governments and practitioners, on obtaining the best ways to deploy ICT with minimum loss and failure of systems.

2.2 Characteristics of E-commerce

As a backbone for business where transactions take place instantly over a telecommunication medium, e-commerce enables the fostering of business and value creation (Pearson and Saunders, 2006)**.** There are some unique features of e-commerce technology namely ubiquity, global reach, universal standard, richness, interactivity, information density and personalization / customization (Laudon and Laudon, 2007) that transform the traditional way of doing business and enhance companies. The features of e-commerce captured in Table 2.1 can be described in relation to their applications as follows:

a) Ubiquity in e-commerce allows customers to perform transactions almost from anywhere in the global sphere.

b) Global reach describes the expansion of transaction over national boundaries as it is more convenient than the traditional way of doing business. This facilitates reaching out to more customers worldwide.

c) Universal standards explain the ability of e-commerce to pursue a general standard of merchandise while maintaining these products at lower prices.

d) Richness makes markets accessible through information provided by more powerful selling and commercial environments.

e) Interactivity explains the ability of e-commerce to help effective communication between merchant and customers by cheap and faster means.

f) Information Density in e-commerce makes possible the location of relevant product information faster.

g) Personalization/Customization in e-commerce helps businesses to tailor the advanced technology to suit their business and to provide customized products and services for individuals (Laudon and Laudon 2007).

All these ascertain that e-commerce has changed the traditional way of doing business across the globe.

Table 2.1 Features of E-commerce and their Business Significances

FEATURES	BUSINESS SIGNIFICANCE
Ubiquity- Internet web is available everywhere.	The market place is extended beyond traditional boundaries and is removed from a temporal and geographical location
Global Reach-The technology reaches across national boundaries, around the world.	Commerce is enabled across cultural and national boundaries seamlessly and without modification
Universal Standards- There is one set of technology standards, namely Internet standards	With one set of technical standards across the globe, disparate computer systems can easily communicate with each other.
Richness- Video, audio, and text messages are possible	Video, audio, and text marketing messages are integrated into a single marketing message and customer experience
Interactivity- The technology works through interaction with the user.	Consumers are engaged in a dialogue that dynamically adjusts the experience to the individual, and makes the consumer a co-participant in the process of delivering goods to the market or from the rest of the consumers.
Information Density- The technology reduces information costs and raises quality.	Information processing, storage, and communication costs drop dramatically, while currency, accuracy, and timeliness improve greatly. Information becomes plentiful, cheap, and accurate.
Personalization/Customizations- The technology allows personalization which allows personalized messages to be delivered to individuals as well as groups.	Personalization of marketing messages and customization of products and services are based on individual characteristics.

Source: Laudon and Laudon, 2007

2.3 Types of E-commerce Applications

This section discusses the various e-commerce models and the e-commerce adoption categories.

2.3.1 E-commerce Models

A business model is a unit of analysis, offering a systemic perspective on how to do businesses, encompassing boundary-spanning activities and focusing on value creation as well as on value capture (Zott et al., 2011). The Internet has created a universal platform for buying and selling goods and services as well as driving important business processes inside the organization. E-commerce covers the business activities between company and customer via electronic media (Stair and Reynolds, 2008). E-commerce is not just another mechanism to sustain and enhance existing business practices but a paradigm shift that is radically changing traditional ways of doing business (MacGregor and Vrazalic, 2006). Every business needs at least one model that the company can use to structure its business behavior in order to generate revenue and sustain the business (Hawkins, 2003; Hawkins and Ballon, 2007; Rappa 2010; Turban, 2008). The model focuses on how all elements of the system fit into a working whole (Wu, 2005). According to literature, every business model consists of different elements called actors and their roles (Ballon, 2007; Clarke, 2004; Weill and Vitale, 2001).

The main product of online commerce is information (Michalak and Jones, 2003). There are other applications of e-commerce such as Internet-based order processing and fulfilment (NA Rahman et.al. 2013, Phau & Poon, 2000) and supply chain management which includes the use of Electronic Data Interchange (EDI) (Murilo, 2001) and e-procurement. Small and large companies that are using the Internet can make product information, ordering, and customer support immediately available and also can help buyers and sellers in making contact (Laudon & Laudon, 2013). The e-commerce applications could be categorised as electronic marketing, electronic advertising, customer support services, ordering and delivery and online payment (Sulaiman, 2000). A study by Thulani et al. (2010), in Gweru, Zimbabwe found that SMEs predominantly use e-commerce applications for informative purposes and to interact electronically with suppliers and customers.

2.3.2 E-commerce Adoption Categories

E-commerce can be divided into the following main categories:

i) Collaborative commerce (c-commerce) in which business partners collaborate electronically. Such collaboration frequently occurs between and among business partners along the supply chain (Wiley, 2015).

ii) Business to Business (B2B) is a form of commercial transactions that involve the exchange of products, services, or information between 'two separate business parties', such as between a manufacturer and a wholesaler or between a wholesaler and a retailer (Chong et al., 2011). B2B transactions cover all 'transactions that historically had been conducted using relational inter-firm exchanges' (Grewal et al., 2010).

iii) Business-to-Consumers (B2C) in which the sellers are organizations, the buyers are individuals. The Typical user is transformed into a computer user, and the physical store is transformed into a phenomenon that is information technology intensive such as a Web site (Koufaris et al., 2001).

iv) Consumers to Businesses (C2B) whereby consumers make known a particular need for a product or service, and organizations compete to provide the product or service to consumers (Turban, King, Lee, & Viehland, 2004). An example would be Priceline.com, where the customer names the price and suppliers try to fulfill it.

v) Consumer-to-Consumer (C2C) in which an individual sells products (or services) to other individuals. Examples of C2C include Taobao.com market place and auction websites such as eBay.com and Yahoo.com which are increasingly becoming popular (Jenamani et al., 2011, Du et al., 2012). For example, eBay.com had over 116.2 million registered users at the end of the first quarter in 2013 (Evans, 2013).

vi) Intra-business (or intra-organizational) commerce in which an organization uses e-commerce internally to improve its operations. A special case of this is known as B2E (business to its employees) e-commerce.

vii) Government-to-citizens (G2C) and to others in which the government provides services to its citizens through e-commerce technologies (Evans & Yen, 2005). Governments can do business with other governments (G2G) as well as with businesses (G2B).

viii) Mobile commerce (m-commerce) - where e-commerce is done in a wireless environment, such as; using cell phones to access the Internet.

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Each of the above types of e-commerce may have several business models. For example, in B2B, one can sell from catalogs or in auctions. Buying can be done in several models such as reverse auctions, group purchasing, or negotiations.

On the basis of reviewed literature, the use of e-commerce can be summarised as follows:

a) Online transaction which include order processing and fulfilment as well as payment, and banking.

b) Enterprise content management and supply chain management covering online procurement, which includes the use of EDI.

c) Marketing communication including email, instant messaging and websites for adverting products and services.

d) Relationship management which covers customer support and service for instance providing web-based Frequently Asked Questions (FAQ) and auto-feedback.

e) A social networking service which is a platform to build social networks or social relations among people who share interests, activities, backgrounds or real-life connections. A social network service consists of a representation of each user (often a profile), her social links, and a variety of additional services.

f) Newsgroups in which a message called a 'post' is sent for publication on a given theme, regarding anything a member chooses to discuss as on-topic.

g) Use of cloud computing services; Services based on cloud computing technology allow users to store and manage large files or use software on a server run over the internet. Cloud services are a relatively new phenomenon compared with web applications for social networking, listening to music or watching films

2.4 Stages of E-commerce Adoption

There are several steps that should be taken to adopt the Internet and e-commerce in general, although there are opinions that e-commerce will only be adopted as just for the sake of having e-commerce (Cater-Steel and Grist, 2004). The important fact however, is that e-commerce adoption is a process which is normally segmented into various phases and definitely not a once off event. They have been referred to as technologies that are easier to adopt, or adoption ladder with stages model showing that most SMEs only see value at the bottom of the ladder (Levenburg, 2002). Chong (2006) argues that in an organization e-commerce is always in one of the large number of possible "states of adoption". These states vary from less advanced to more advanced. It is believed that stages of growth models generally reflect on the maturing nature of the use of information systems (IS) in organizations and the maturing of models considered a popular approach to explain adoption while making use for descriptive or prescriptive purposes (Nolan, 1973; McKay et al., 2000).

Although the SMEs have adopted many types of e-commerce applications, they could be at different stages in terms of adoption of those applications as far as the level of complexity is concerned. In order to classify SMEs according to their stage of e-commerce adoption, a conceptual framework is needed. Ho (1997) proposed a model that he used to assess the value of the commercial web sites from different parts of the world. In his study he categorized the use of e-commerce as promotion of products and services, provision of data and information, and processing of business transactions. This model was later developed further by Lawson et al.

(2003) but with little modifications to study e-commerce adoption by SMEs in Australia. Table 2.2 provides the details of the three stages of e-commerce adoption.

Table 2.2: Stages of E-commerce Adoption

Stages	**Descriptions**
Promotion	Promotion of Products and Services
Provision	Online enquiry, Technical information, Email, FAQ and Value-Added Links
Processing	Online Sales, Online Orders, Online Payments, Order Status Enquiry, Links Warehouse and Links Distributors.

Source: Lawson et al. (2003)

This model has been referred to the Model of Internet Commerce Adoption (MICA) and it essentially describes the three stages of e-commerce adoption proposed by Ho (1997).

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In addition, three other models suggested in literature and reviewed were as follows:

Stone (2003) categorizes e-commerce adoption into the early stage; the integrating stage and the advanced stage. He also proposes the various states of adoption for each stage (Table 2.3).

Table 2.3: Stages and States of E-commerce Adoption

Stages	**States**	**Descriptions**
Early	Access	Uses the web for email and support a simple web page.
	Publish	Maintains a multi-age web site and use it for email and communication or publication of business information.
	Transact	Enables customers to conduct one-way or two-way transactions.
Integrating	Integrate Internally	Uses the web to integrate core business processes within the organization.
	Integrate Externally	Uses the web to integrate business processes across enterprises.
Advanced	Adapt Dynamically	Uses the web as the foundation for existing in a digital community.

Source: Stone (2003)

Rao, Metts and Monge (2003) proposed a model which divides the stages of e-commerce development into presence, portals, transactions integration and enterprises integration (Table 2.4)

Table 2.4: Stages of E-commerce Development

Stages	Descriptions
Presence	• Use web site to display information on products and services • One way communication • No integration with internal and external processes
Portals	• Uses web site for two-way communication with suppliers and customers • Provide services such as ordering, product feedback, product survey and customization but without financial transactions
Transactions Integration	• Online financial transactions and order fulfillment • Low level collaboration and e-market places
Enterprises Integration	• Complete B2B and B2C integration across value chains • Implementation of Customer Relationship Management (CRM) and Supply Chain Management (SCM) and full collaborations

Source: Rao et al. (2003)

NA Rahman et al. (2013) proposed a model which divides the stages of e-commerce development into pre-publish, publish, interact, transactions and integrations (Table 2.5)

Table 2.5: Stages of E-commerce

Stages	Descriptions
Pre-publish	• Involves the initial step taken by organizations to commit in the digital environment where companies have computer networks or Internet access and use email as medium of communication.
Publish	• Involves one-way communication achieved by owning a web site which provides company's profile and information on products and services offered.
Interact	• Is an introduction towards a two-way communication that includes the website and email usage to interact with suppliers and consumers.
Transaction	• Difference between transaction level and the interaction level is the presence of financial transaction over Internet. • High technical capabilities and sufficient Information Technology (IT) infrastructure is needed at this stage.
Integration	• Refers to complete business process integration up to the level which involves high cooperation among users and suppliers. • Includes a full integration between B2B and B2C, value chain integration, CRM and SCM.

Source: NA Rahman et al. (2013)

It is noted that the model suggested by NA Rahman et al. (2013) is similar to the one proposed by Rao et al. (2003), except for inclusion of the pre-publish stage and renaming the other stages.

Tables 2.2 through Table 2.4 provide a comprehensive illustration of the stages of e-commerce adoption and a basis for the design of measures of e-commerce utilization. However, due to the facts that the adoption of e-commerce among SMEs in Kenya may be in its early stages, a simpler adoption model was proposed. The conceptual model includes four stages namely, Promotion, Provision, Transaction and Integration (Figure 3.1). E-commerce applications were classified into six categories namely; electronic advertising, electronic marketing, customer support services, online payment system and order and delivery (Sulaiman, 2000) and mobile commerce.

2.5 Factors Influencing Electronic Commerce Adoption

Small and medium sized firms lack a general pattern on adoption of Internet technologies (Chavez et al., 2000) and the extent of adopting them varies widely (Kula and Tatoglu, 2003). The results of Irish study by Ramsey et al. (2008) revealed that there are seven factors that can induce companies in Ireland to adopt e-commerce. These factors are: e-commerce capability, willingness to change/rate of response to new technologies, technological opportunity recognition, customer orientation, and sensitivity to competitive/customer environment, perceptions of technology feasibility and e-skills development mechanisms. Depending on owner/manager orientation, increasing the impact of technology through advances in e-commerce can result in a range of perceptions, from the highly positive entrepreneurial viewpoint to change of stance found in other firms (Covin, 1991). Gary (2003) argues that whether the adoption is driven by business demand or technology push, the SMEs need to be individually ready before moving on to the next stage and that the process involves learning and new knowledge.

Shah Alam et al., (2011) and Infinedo (2011) found that relative advantages have the strongest impact on the adoption of SMEs in Canada, followed by competition's pressure and management

support respectively. Jean et al. (2006) in their study in Korea found that factors that can affect the adoption of e-commerce in the country are CEO's knowledge of IT/E-business, the relative advantages and benefits from adopting e-business, governmental support for e-business, using e-business as globalization strategy for market expansion and the aim to collaborate with North Korean companies. Olatokun and Kebonye (2010), state that factors such as the size of the enterprise and the type of business enterprise also influence its adoption. According to these studies, size, as well as the enterprises' activities has an influence on e-business adoption.

Propelled by factors such as falling regulatory country barriers to international trade and investment, and declining telecommunications cost (Prasad, 1999), among other factors, globalization is making the role of smaller firms prominent. Investigation of e-business decision making should uncover factors such as inertia and lack of interest, together with resource based issues such as the perceived lack of time available to develop new sets of competencies (Bridge et al., 1998; Stokes, 2000). In a study by the Organization for Economic Co-operation and Development (OECD) (Panagariya, 2000), it was realized that there are a number of factors critical to e-commerce adoption: lack of awareness; uncertainty about the benefits of e-commerce; concerns about lack of human resources and skills; set-up costs and pricing issues; and, concerns about security as the most significant factors to e-commerce for SMEs in OECD countries. The process of e-commerce adoption in SMEs is directly impacted upon by top management where all decisions from daily tasks to future investments are made by them (Ghobakhloo et al., 2011).

2.6 Barriers to the Adoption of E-commerce

The recent figures released by International Telecommunications Union (ITU, 2015) indicate that, Globally 3.2 billion people are using the Internet by end of 2015, of which 2 billion are from developing countries. For every Internet user in the developed world there are 2 in the developing world, however, 4 billion people from developing countries remain offline, representing 2/3 of the population residing in developing countries. Of the 940 million people living in the Least Developed Countries (LDCs), only 89 million use the Internet, corresponding to a 9.5% penetration rate. In Africa, one in 5 people use the Internet today, compared to almost

2 in 5 people in Asia & Pacific, and 3 in 5 people in the Commonwealth of Independent States (CIS). Africa is the only region where mobile broadband penetration remains below 20%. The literature reviewed identified, technical, financial, organizational, environmental, governmental and innovational barriers. Each of these barriers is highlighted in the subsequent sections.

2.6.1 Technical barriers

According to Ndyali (2013), technical barriers are the most important barriers to e-commerce followed by legal and regulatory barriers. Lack of Internet security is the highest barrier that inhibits the implementation of e-commerce in SMEs in Tanzania followed by limited use of Internet banking and web portals by SMEs. A survey of the existing literature on e-commerce adoption suggests that lack of technological infrastructure is the main barrier of e-commerce adoption and the key priority for developing countries is to ensure that their citizens have access to the Internet at affordable price (Aydemir, 2013; UNCTAD 2002a; Gibbs et al., 2002). Pease and Rowe (2003) listed inhibitors of e-commerce as lack of awareness and understanding of e-commerce, lack of skill and time to implement e-commerce, resistance to technological changes, cost of implementation, lack of awareness of the benefits associated with the adoption of e-commerce, worry about security and privacy, lack of suitable software standards, lack of easily accessible bandwidth and infrastructure issues. Most developing countries have a telecommunication infrastructure too unreliable and inefficient to support the conduct of e-commerce; and these factors play an important role when organizations make the decision to adopt e-commerce (Zhai, 2011).

In many developing countries, the lack of Internet and slow speed of telecommunication networks has greatly contributed to delays in adopting e-commerce (Oreku, Li, Kimeli & Mtenzi, 2009, Mutula & Van Brakel, 2007; Uzoka et al. 2007 Molla and Licker, 2005a). The technical barriers were described by Love et al. (2001) as problems related to acquiring suitable technologies to meet business requirements, lack of education and expertise about the system requirements and risks related to security and authentication. These barriers could prevent small business firms from adopting e-commerce applications. In developing countries, organizations' human, business, and technological resources, a lack of awareness and understanding of potential

opportunities, risk aversion and inertia often lead to a negative cognitive assessment of e-commerce (Pigato, 2000; Moodley et al.; 2004; Molla et al., 2005).

2.6.2 Financial barriers

Most SMEs adopt e-commerce in a 'just-by-chance' or casual manner, rather than as a consequence of systematic consideration and planning (Engsbo, 2001; Scupola 2002). SMEs have disadvantages related to the lack of technological and financial resources which can lead to problems in their ability to source technology but also in their capability to absorb it into their organization and diffuse it into their industrial sector (Jones-Evans, 1998, Goode and Stevens, 2000). Bandwidth availability is low in developing countries (Frontline.net., 2001). A lower bandwidth means that longer time is needed to transfer data and hence a lower relative advantage of Internet. Schmidt et al. (2001) suggests that the main e-commerce issues facing SMEs in Argentina are awareness, access to hardware, infrastructure, organizational culture, and financial issues. According to a survey in Kenya (Kenneth et al., (2012), SMEs failure to adopt e-commerce is due to limited resources whereby, financial, human and technological resources affect the adoption of e-commerce.

2.6.3 Organizational Barriers

For Al-Weshah and Al-Zubi (2012) the barriers of e-commerce adoption were organizational and technical barriers. Organizational culture has been identified in the literature as a key issue affecting the adoption and use of e-commerce in SMEs (Montazemi, 2006; Thatcher et al., 2006; Tan et al., 2007). Studies on the digital divide problem generally lead to the conclusion that the divisions that prevent productive utilization of ICTs are more than technology and also include cultural factors (Kling, 2000; Gurstein, 2003; Jussawalla, 2003; Tibben, 2003). For instance, while people assess each other's behavior and performance during an interaction to determine their trustworthiness (Wang and Benbassat, 2008), organizations assess market forces, and the supplier's behavior and performance in particular during an interaction in order to form trust. According to Kling (2000), overcoming the digital divide problem, means that both "technological infrastructure" and "social infrastructure" must be considered. The owner/manager plays an important role in decision making in SMEs, hence a number of factors

that affect the adoption of e-commerce relate to owner/manager characteristics (Iacovou et al., 1995; Quayle, 2002; Hashim, 2009).

2.6.4 Governmental barriers

The role of government in providing various forms of intervention has been cited as a catalyst for the development of e-commerce in SMEs (Southern & Tilley, 2000; Sarosa & Zowghi, 2003; Thatcher et al., 2006; Martinsons, 2008). Government initiatives are important in the adoption of e-commerce and other ICT in general (Molla, 2005). They can be in terms of promotion of ICT usage, education and the establishment of adequate regulatory framework for e-commerce including taxation and tariff for revenue generated through e-commerce and Intellectual Property protections. Shemi and Procter (2013) found that for e-commerce in SMEs to flourish in a developing country like Botswana, there needs to be improved e-commerce policy formulation. Government policies have been reported as an important determinant of IT adoption, especially those relating to improving telecommunications infrastructure, cost and service, a fair tax policy for online transactions, financial incentives, a national e-commerce strategy, enhancement of government e-commerce use, and the provision of e-commerce training (Zhu & Thatcher, 2010). The lack of confidence in the rule of law slows e-commerce adoption in the countries with unstable political and weak regulatory systems that are unable to adequately regulate rights and obligations in the electronic space (Boateng et al., 2008, Zhu & Thatcher, 2010). Additionally, corruption is one of the factors that inhibit the effective utilization/adoption of sophisticated ICT solutions among SMEs in developing countries (Apulu et al., 2011). Hashim, (2011) found that barriers can be the government grants as the government tends to support the implementation of new technology by SMEs. However, the grant is not sufficient and does not cover the costs after introduction. The result of the study carried out in Slovenia showed that government's activities played an important role in accelerating e-commerce adoption (Pucihar, 2006).

2.6.5 Environmental barriers

Raymond (2001) and Huy (2012) found that adoption of innovative technologies could be influenced by environmental and organizational factors. A study by Gibbs et al. (2003) showed

that the environmental factors such as characteristics of a market that include demographics and consumer preferences, as well as organizational environment, could encourage or inhibit e-commerce adoption by firms. Zahedi et al., (2013) proposed that trust is one of the most important factors for acceptance of e-commerce. Once trust is built, the transaction can be conducted. Another study of e-commerce in China found that there are many significant barriers to e-commerce adoption. Limited diffusion of computers, high cost of Internet access, and lack of online payment processes were found to directly inhibit e-commerce. Inadequate transportation and delivery networks, limited availability of banking services, and uncertain taxation rules indirectly inhibit e-commerce, (Cooray, 2003).

Consumer purchasing power and the country at large in terms of its Gross Domestic Product (GDP) are a key determinant of e-commerce diffusion rates across countries. Consumer size and the ability of an organization to convert habitual users of the Internet to customers are particularly important since size positively influences the development of e-commerce (Rodriguez-Ardura et al., 2008). Of course converting traditional non-web users into web users is a difficult task because e-commerce is still perceived by entrepreneurs and ordinary citizens as a luxury for highly industrialized countries. It is thus often perceived as a distant objective (AlNoor & Arif, 2011). This is partly due to a lack of awareness of its potential that has not yet been fully understood due to a failure to anticipate its implications. Some organizations have seen the need to integrate new technologies due to a perceived intense competition in the marketplace, especially SMEs who find competition as one of the main barriers to e-commerce adoption (Ghobakhloo et al., 2011). According to the Internet World statistics published in 2015, Kenya ranks third in terms of Internet usage with 9.3% share of the total Internet usage in Africa, and has a population penetration of 63.6% (Appendix IV).

2.6.6 Behavioral barriers

Fear of the unknown and lack of skills have also posited as reasons why the uptake of technology is less for small businesses (Barry & Milner, 2002; Darch & Lucas, 2002; Lewis, 2002). In Serbia a study conducted by Petrovic and Kovacevic (2012), it was found that distrust is one of the main direct reasons for low level of e-commerce adoption. An account from the study by Boston Consulting Group in 2000 (Reynolds, 2000), indicates that trust is an essential element in

establishing a brand for the electronic market. In Malaysia the factors that affect adoption were found to be relative advantage, compatibility, organizational readiness, manager's characteristic and security (Shah Alam et al., 2011). The behavioral barriers of e-commerce are related to attitudes of people within an organization. Seyal and Rahman (2003) and Rashid and Al-Qirim (2001) have studied the Chief Executive Officer (CEO) characteristics and attitudes towards adoption of Information Technology (IT) and found a direct link with the success of adoption process. Thulani et al. (2010), in their studies found that incompatibility between e-commerce and the way SMEs/their customers do business was a significant barrier. Findings from Bolongkikit et al. (2006), Ramsey et al. (2003) and Pracy and Cooper (2000) highlight this lack for suitability of e-commerce purposes. It is the 'extent to which people feel threatened by ambiguous situations, and have created beliefs and institutions that try to avoid these' (Hofstede, 1984). Uncertainty avoidance was the most influential national culture value affecting consumer e-commerce acceptance and had a direct effect on an intention to use it in China. It was found that in cultures with high uncertainty avoidance, people make less use of online shopping (Yoon, 2009).

2.6.7 Innovational barriers

The owner's lack of awareness of technology and perceived benefits is a major factor to a take up of electronic business (Iacovou et al., 2005). The lack of knowledge on how to use the technology and the low computer literacy are other contributing factors for not adopting electronic business (Knol and Stroeken, 2001). Alam et al. (2008) found that compatibility has a positive and significant influence on e-commerce adoption. Similar results were reported by Ghobakhloo et al. (2011) and AlNoor and Arif (2011). In another research, Van Huy et al. (2012) found that perceived compatibility is also an important predictor for e-commerce adoption by Vietnamese SMEs. Within the innovation factor, they included relative advantage, cost, complexity, and compatibility.

2.6.8 Social and cultural factors

The adoption of e-commerce depends on the cultural and social environment (Molony, 2008). According to Poorangi et al., 2013, the existing culture of a company affects the resistance of

employees, which in turn negatively affects the e-commerce adoption in Malaysia. In some countries, people consider shopping as a recreation, and therefore, B2C e-commerce is difficult to nurture (Boerhanoeddin, 2000). Likewise, the level of education, the availability of IT skills, the level of penetration of personal computers and telephone within the society affect the growth of e-commerce (Raffa et al. 2002). The majority of the content of the World Wide Web is produced in the English language, creating a barrier for many potential users in developing countries, especially those in African states whose first or second language is not English (Molla et al., 2006). There are attempts to have local content in these countries, for instance in Kenya a significant content is in Kiswahili (an official language along with English), but Jennex et al. (2004) warn that 'simply translating documents does not ensure the translation will contain the same cultural meaning as the original script'. Mansell (2001) and Gattiker et al. (2000) identify differences in language and work habits as a key barrier to people using e-commerce. Despite the global growth in e-commerce, most consumer-oriented e-commerce practices and conventions were developed for use in Western cultures. Culture-related IT adoption studies have included all of Hofstede's dimensions, with uncertainty avoidance being the most commonly applied (Leidner and Kayworth 2006). Typically, researchers have concluded that those in high uncertainty avoidance cultures are less accepting of IT innovations. Hofstede's national culture theory (Hofstede, 1997), has been widely used in research areas of IT adoption and e-commerce adoption. Hofstede's national culture theory is referenced in this research, having five dimensions. These include individualism, uncertainty avoidance, long-term orientation, power distance, and masculinity (Dwivedi et al., 2009). Table 2.6 shows the items of culture considered in this research based on the Hofstede's cultural dimensions theory.

Table 2.6: Items of Cultural Dimensions

Dimension of Culture	Description	Examples	Variable Item
Individual - Collectivism (IDV)	Focuses on the degree the society reinforces individual or collective achievement and interpersonal relationships	Whether recognition or reward is given to an individual or a group	• Personal innovation & creativity
Uncertainty Avoidance	It's concerned with the level of tolerance for uncertainty and ambiguity within society.	Level of emphasis placed on protecting firm image by strict behavioral codes, laws and rules	• Protection of company image
Long-term Orientation	It focuses on the degree that society embraces long-term devotion to traditional, forward thinking values.	Value attached to relationships with trading partners.	• Relationship with trading partners • Socializing in order to obtain contacts
Power Distance	It looks at the degree of equality or inequality between people in the society or organization.	Having a hierarchy in decision making	• Decision making process being executed in top down fashion

Considering that e-commerce is a new way of shopping in which the product cannot be touched, the sales person cannot be personally reached, payments are not in cash and there is no social interaction, it can be said that e-commerce involves high degrees of uncertainty and that it is an individual task. Based on these characteristics of e-commerce, four dimensions from Hofstede's dimensions of culture were selected to inform the research. They include; Individualism, Uncertainty Avoidance, Long-term Orientation and Power Distance. Among the social-cultural factors are; protection of firm image, inadequate trust in institutions, encouragement for creativity or innovativeness and limitations associated with personal contact and language or content on the website.

2.6.9 Attitude factors

The attitude factors researched on, incorporated the social behavior of individuals towards new technologies. This construct sought to establish the extent to which SMEs regarded e-commerce

as being of importance to them. The study by Jeon et al., 2006 in Korea reveals that the factors that could affect the adoption of e-commerce in the country were Chief Executive Officer (CEO)'s IT /E-business knowledge, the relative advantages and benefits from adopting e-business. According to Mohammed et al., 2013 and Poorangi et al. 2013, manager willingness and relative advantage are significant factors affecting the e-commerce adoption in Malaysia. The attitude factors studied were designed to capture perceived value and perceived viability of adopting e-commerce technologies.

2.7 Review of Technology Adoption Theories

There are many theories used in Information Systems (IS) research (Wade 2009). This section reviews the most commonly used theories that have been employed in technology adoption, especially e-commerce adoption research in SMEs. In review are the following theories: the Technology Acceptance Model (TAM) (Davis, 1986; Davis, 1989; Davis *et al.,* 1989) and its new version TAM2 (Davis, 2000), the Technology-Organization-Environment (TOE) framework (Tornatzky and Fleischer 1990), the Theory of Planned Behavior (TPB) (Ajzen, 1985; Ajzen, 1991), the Perceived E-readiness Model (PERM) (Molla, 2005), the Diffusion of Innovation Theory (DIT) (Rogers, 1995), and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003).

This research takes cognizance of the views from all the eight theories and borrows principles that fit. E-commerce adoption is a high involvement decision and thus the need for conscious effort to reduce perceived technical, financial, and social risks.

2.7.1 Technology Acceptance Model

Technology Acceptance Model (TAM) is the first and the foremost traditional adoption theory in the field of information technology (IT) (Awa et al., 2011; Urieto, & Inyang, 2011; Benbasat & Barki, 2007; Silva, 2007). It lays a foundation for understanding the impacts of external variables on adoption decisions with its basic postulates resting firmly on utilitarian, attitudinal and economic grounds. The proponents of TAM posit that perceived usefulness is influenced by perceived ease of use and both predict attitudes (Davis, 1993). Although TAM has received

empirical validation, application, and replication (Gounaris & Koritos, 2008), the model provides less meaningful information on user's opinions about adopting specific systems by narrowing its constructs to only PU and PEOU. Hence, the need to expand the factors or integrate with other IT acceptance models to improve TAM's explanatory and predictive utilities. TAM and the Theory of Planned Behavior (TPB) are routed to the theory of reasoned action (TRA). Though TAM and TPB neglected the influences of psychological, social, and interpersonal variables on IT adoption decision (Ukoha et al., 2011), TPB complemented TAM's constructs with subjective norms and perceived behavioural control to explain perceptions of ease or difficulty of performing an act given resource constraints. Figure 2.1 shows how the factors described in the TAM interact.

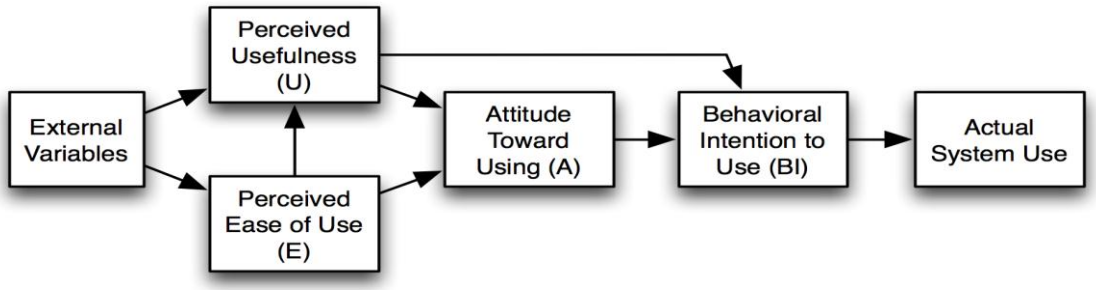


Figure 2.1: Technology Acceptance Model

Source: Davis, 1993.

Venkatesh and Davis (2000) proposed a new version of TAM called Technology Acceptance Model-2 (TAM2), which added new variables to the existing TAM model. TAM2 builds on TAM by modeling the determinants of perceived usefulness. The expanded model includes subjective norm as a causal antecedent of perceived usefulness and as a predictor of intention to use a technology system. In addition to subjective norm, TAM2 posits two other social forces (voluntariness and image) that influence perceived usefulness and behavioral intention. Moreover, TAM2 proposes four cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use), that influence perceived usefulness. Finally,

TAM2 excludes attitude toward use as an antecedent of behavioral intention (Venkatesh & Davis, 2000).

The TAM theory summarizes that an individual's behavioral intention to adopt a particular piece of technology is determined by the person's attitude toward the use of the technology. Attitude, in turn, is determined by eliminating of vulnerable risks which in this research are referred to as barriers. TAM suggests that perceptions or beliefs regarding an innovation are instrumental when developing attitudes that will lead to system utilization behavior. The relevance of TAM in this research is that the adoption of e-commerce among SMEs can be influenced by Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). Although TAM2 excludes attitude towards use as a direct determinant of Behavioral Intention (BI), but it expanded the determinants of PU to include subjective norm, the two social factors (voluntariness and image) and the four cognitive instrumental processes highlighted above. TAM2 may have excluded attitude because it has already been taken care of by social factors and cognitive processes. The relevance of TAM2 to the current study is similar to that of TAM except that it addresses PU in greater detail. Additional constructs found in TAM 3 were also considered including; Image, Perceptions of External Control, Computer Anxiety, Computer Self Efficacy & Social Influence. These constructs were used to derive Social & cultural factors, and Innovational, Technical, Environmental and Organizational barriers as shown in Table 2.7 (page 47).

2.7.2 Technology-Organization-Environment Framework

The Technology-Organization-Environment (TOE) framework was proposed by Tornatzky and Fleischer (1990). In this framework the factors influencing enterprises to adopt new information technology are divided into three dimensions: technology, organization, and environment. This assumes a generic set of factors which can be used to predict the likelihood of e-commerce adoption. The theory suggests that adoption is influenced by technology development (Kauffman et al., 2001), organizational conditions, business and organizational reconfiguration (Chatterjee et al., 2002), and industry environment (Kowath and Choon, 2001). Technological context describes adoption as depending on the pool of technologies inside and outside the firm as well as the application's characteristics, perceived relative advantage (gains), compatibility (both

technical and organizational), complexity (learning curve), trialability (pilot test/experimentation), and observability (visibility/imagination). Organizational context captures firm's business scope, top management support, organizational culture, complexity of managerial structure measured in terms of formal and informal linking structures: centralization, formalization, and vertical differentiation, the quality of human resource and communication processes, and size related issues such as internal slack resources and specialization (Jeyaraj et al., 2006; Sab-herwal et al., 2006; Tornatzky & Fleischer, 1990). Environmental context relates to facilitating and inhibiting factors in areas of operations. Significant amongst them are competitive pressure, trading partners' readiness, socio-cultural issues, government encouragement, and technology support infrastructures such as access to quality ICT consulting services (Al-Qirim, 2006; Jeyaraj et al., 2006; Scupola, 2009; Zhu et al., 2003).

The TOE framework underscores Rogers' (1995) three groups of adoption predicators namely, leader characteristics relating to change; internal characteristics (centralization, complexity, formalization, interconnectedness, organizational slack and size), and external characteristics (system's openness). The major snag of TOE as reported by some authors is that some of the constructs in the adoption predictors are assumed to apply more to large organizations, where clients are sure of continuity and less complaints, than to SMEs. However, there is evidence that TOE has been successfully used in research involving both large and small firms (Hoti, 2015). It has been suggested that integrating TOE with other models, such as TAM, with each adoption predictor offering a larger number of constructs than the original provides richer theoretical lenses to the understanding of adoption behavior.

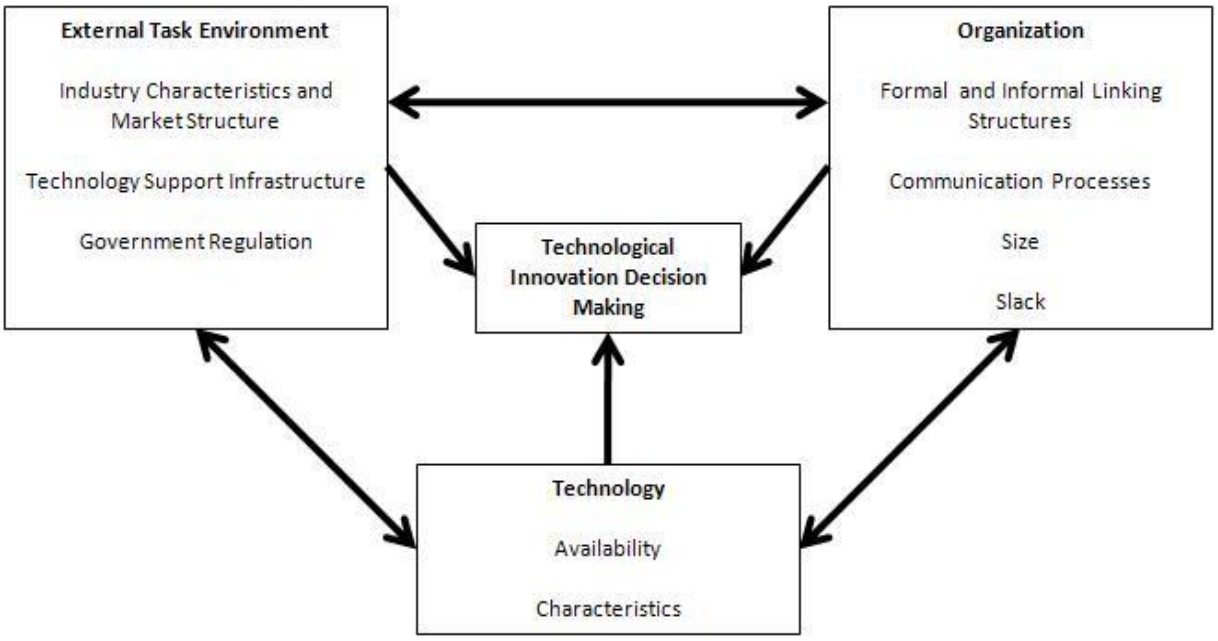


Figure 2.2: Technology Organization Environment Framework

Source: Tornatzky and Fleischer, 1990.

Figure 2.2 illustrates the TOE framework that shows the process by which a firm adopts and implements technological innovations. It is worth noting the following:

a) The technological context includes the internal and external technologies that are relevant to the firm. Technologies may include both equipment as well as processes.

b) The organizational context refers to the characteristics and resources of the firm, including the firm's size, degree of centralization, degree of formalization, managerial structure, human resources, amount of slack resources, and linkages among employees.

c) The environmental context includes the size and structure of the industry, the firm's competitors, the overall economic context, and the regulatory environment (Tornatzky and Fleisher 1990).

These three elements present "both constraints and opportunities for technological innovation" (Tornatzky and Fleisher 1990). Thus, these three elements influence the way a firm sees the need for, searches for, and adopts new technology. The application of TOE in the SME environment has been extended to include the role of the CEO (Thong, 1999) who in many circumstances is the main decision maker as well as the owner of the business. According to research on the Critical Drivers in Successful B2B E-commerce, TOE may be useful in the SME context if it can incorporate the whole spectrum of the stakeholders (Robertson, 2010). This assertion is quite applicable to SMEs in the present research since SMEs e-commerce adoption covers literally all the key players including; owner, manager, customer, supplier and vendors. Some of the generic set of factors which can be used to predict the likelihood of e-commerce adoption suggested in TOE were considered and adapted for this research with some modifications (Table 2.7).

2.7.3 The Theory of Reasoned Action

The theory of Reasoned Action was developed by Martin Fishbein and Icek Ajzen (1975, 1980), deriving from previous research that started out as the theory of attitude, which led to the study of attitude and behavior. The theory of reasoned action is a model for the prediction of behavioral intention, spanning predictions of attitude and predictions of behavior. The subsequent separation of behavioral intention from behavior allows for explanation of limiting factors on attitudinal influence (Ajzen, 1980).

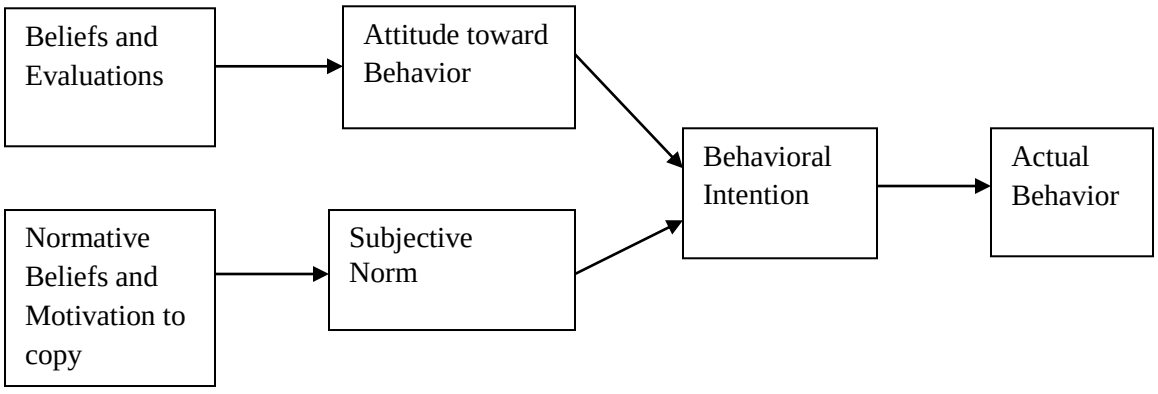


Figure 2.3: The Theory of Reasoned Action

Source: Ajzen, 1980

The components of TRA are three general constructs: behavioral intention (*BI*), attitude (*A*), and subjective norm (*SN*). TRA suggests that a person's behavioral intention depends on the person's attitude about the behavior and subjective norms ($BI = A + SN$). If a person intends to do a behavior then it is likely that the person will do it. Miller (2005) defines each of the three components of the theory as follows:

a) Attitude: the sum of beliefs about a particular behavior weighted by evaluations of these beliefs.

b) Subjective norm: looks at the influence of people in one's social environment on ones behavioral intention; the beliefs of people, weighted by the importance one attributes to each of their opinions, will influence one's behavioral intention.

c) Behavioral intention: a function of both attitudes toward a behavior and subjective norms toward that behavior, which has been found to predict actual behavior.

The significance of TRA in this research is that the adoption of e-commerce among SMEs can be influenced by Attitude towards Behavior and Subjective Norm, which are described in this research by Attitude factors and Social & cultural factors respectively.

2.7.4 The Theory of Planned Behavior

Ajzen (1991) proposed the Theory of Planned Behavior (TPB) from the social psychology background. The three constructs that predict intention to use an innovation according to TPB are attitude, subjective norm and perceived behavioral control. Attitude is formed from cognitive beliefs and refers to ‘an individual’s positive or negative feeling about performing the target behavior’ (Fishbein & Ajzen, 1975). Subjective norm represents the social influences on behavior and refers to the perception about whether others who are important to a person believe that he or she should engage in a particular behavior (Fishbein & Ajzen, 1975). Perceived behavioral control represents the constraints on behavior and refers to the ‘perceived ease or difficulty of performing a behavior’ (Ajzen, 1991).

The diagram below, Figure 2.4 shows the Theory of planned behavior

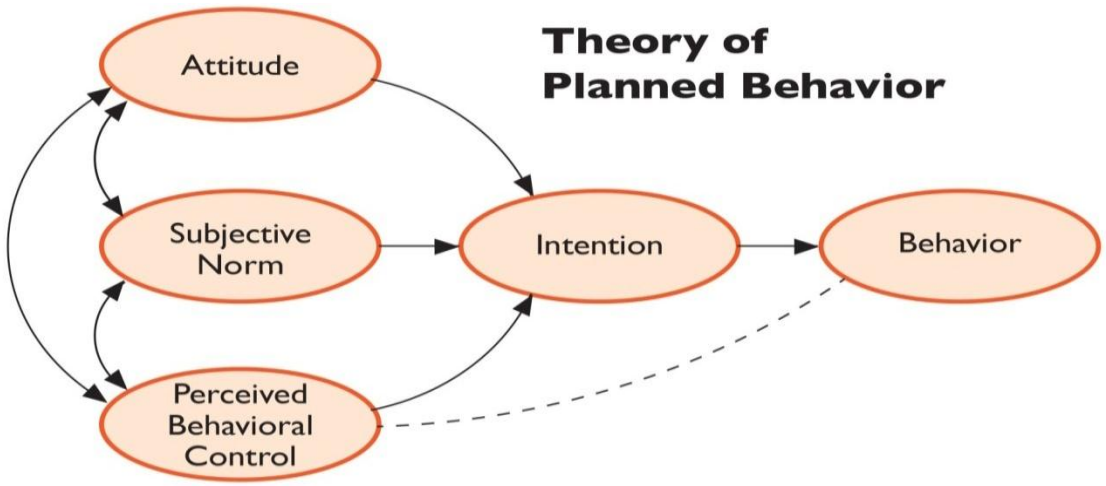


Figure 2.4: Theory of planned behavior

Source: *Ajzen*, I. (1991)

Riemenschneider et al., (2003) combined TPB and the Technology Acceptance Model to study small business executive's decisions to adopt the web. They found that the improved social contact with customers and vendors provided by the Internet was the driving force behind website adoption. Using the TPB in a developing country context, Uzoka et al., (2007) found that perceived advantages, Internet complexity, accessibility, and management support have a statistically significant influence on the adoption. It was also observed that the study results tend to agree with the TPB, but attitude of individuals seemed to weigh more than subjective norm and perceived behavioral control. The study also found that the decision to adopt e-commerce in Botswana was not significantly affected by facilitating conditions that usually affect organizations in the advanced stage of e-commerce adoption. They argue that this may be attributed to contextual issues that were internal and external to organizations in Botswana which are at the initial stage of e-commerce adoption. It may be possible to infer, following Thong (1999), that while owner / manager characteristics and information systems (IS) characteristics may influence the initial decision to adopt e-commerce in SMEs, they do not affect the extent of

e-commerce adoption subsequently. The focus of the current research is on both the initial decision making to adopt and extent of adoption.

The relevance of TPB in this research is that the adoption of e-commerce among SMEs can be influenced by Attitude, Subjective Norm and Perceived Behavioral Control, which are captured as Attitude factors, Social & cultural factors and barriers (constraints on or difficulty of performing a behavior) respectively.

2.7.5 The Perceived e-Readiness Model

Molla & Licker (2005a, 2005b) developed the Perceived e-Readiness Model (PERM) for developing countries context. The model considers some internal organizational factors, known as perceived organizational e-Readiness (POER), and external factors, identified as perceived external e-Readiness (PEER), as important for e-commerce adoption. The authors define POER to comprise the following:

a) the organization's perception, comprehension, and projection of e-commerce and its potential benefits and risks (innovation imperative attributes),

b) the commitment of its managers (managerial imperative attribute); and

c) key organizational components, such as its resources, processes, and business infrastructure (organizational imperative attributes).

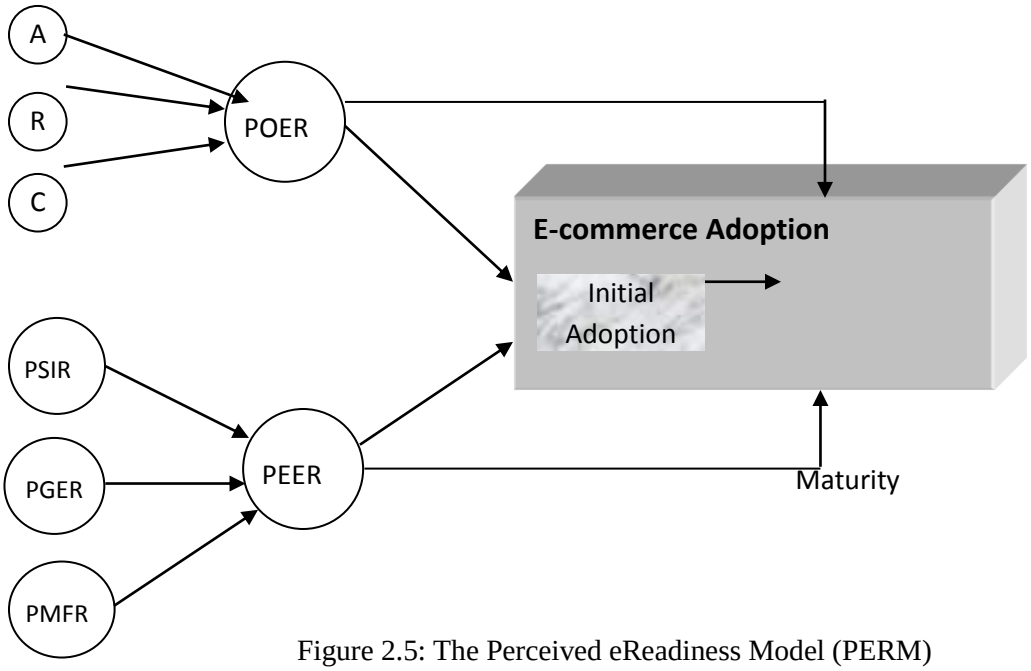


Figure 2.5: The Perceived eReadiness Model (PERM)

Source: Molla & Licker, 2005

KEY

A - Innovation imperative attributes
R - Managerial imperative attributes
C - Organizational imperative attributes
PSIR - Perceived Support Industries e-Readiness
PGER - Perceived Government e-Readiness
PMFR - Perceived Market Forces e-Readiness

PEER represents an organization's assessment and evaluation of relevant external environmental factors (environmental imperative attributes) such as Government e-Readiness, Market Forces e-Readiness and Support Industries e-Readiness (Molla & Licker, 2005a, 2005b). The authors further claim that PERM can assist organizations in developing countries to locate, measure and manage risks in e-commerce adoption activities. Tan et al., (2007) validated and tested the Perceived e-Readiness Model in China. They found that most problems of B2B e-commerce adoption are concerned with Perceived Organizational e-Readiness and social-cultural factors. Tan et al., (2007) gives credit to the PERM as being more comprehensive than earlier models, examines e-commerce institutionalization, and for its inclusion of extensive external environmental and internal organizational issues.

Further, they add that it is more relevant for the developing country context than previous models, since it was specifically designed to take into account contextual variables in developing countries (Molla & Licker, 2005a, 2005b). The inclusion of e-commerce institutionalization is well credited for PERM as few models have covered it (Zhu & Kraemer, 2005). However, Tan et al., (2007) point out that one of PERM's drawbacks is the exclusion of important industry descriptors, such as sector, and firm-size (Thong, 1999). Furthermore, the inability to capture educational background of employees is another issue when applying PERM (Aljifri et al, 2003 cited in Tan et al., 2007). PERM does not recognize the influence of individual factors in e-commerce adoption, but instead emphasizes organizational characteristics as being critical to the advancement of e-commerce in the organization. PERM is also unable to capture small firm idiosyncrasies (Parker & Castleman, 2009; Drew, 2003) that may be critical in determining e-commerce adoption in SMEs. Due to these limitations PERM was not used directly in this research.

2.7.6 Diffusion of Innovation Theory

Rogers (1995), proposed the Diffusion of Innovation Theory (DIT), often cited as one of the key proponents of diffusion and adoption in literature. The following three definitions are given in DIT: first, diffusion is 'the process by which an innovation is communicated through various channels over time among the members of the social system (Rogers, 1995)'; second, adoption is 'a decision to make full use of an innovation as the best course of action (Rogers, 1995)'; and third, Innovation is 'an idea, practice or object that is perceived as new by an individual or other unit of adoption (Rogers, 1995).'

The two terms diffusion and adoption seem to be synonymous in some literature, but they can also be understood to be different. Generally the term diffusion is applied at the macro level of analysis for instance a social system as found in the definition by Rogers, while adoption is applied at the micro level of analysis in a firm or at an individual level (Hultman, 2007; Iacovou et al., 1995). According to DIT, an innovation will be communicated over time through channels of communication within a particular social system (Rogers, 1995). Individuals are seen as possessing different degrees of willingness to adopt innovations and thus it is generally observed

that the portion of the population adopting an innovation is approximately normally distributed over time along an S-shaped curve (Rogers, 1995). The following five categories of individual innovativeness (from earliest adopters to laggards) and the rates of adoption are described: innovators, early adopters, early majority, late majority, laggards (Rogers, 1995).

Categories of Innovativeness

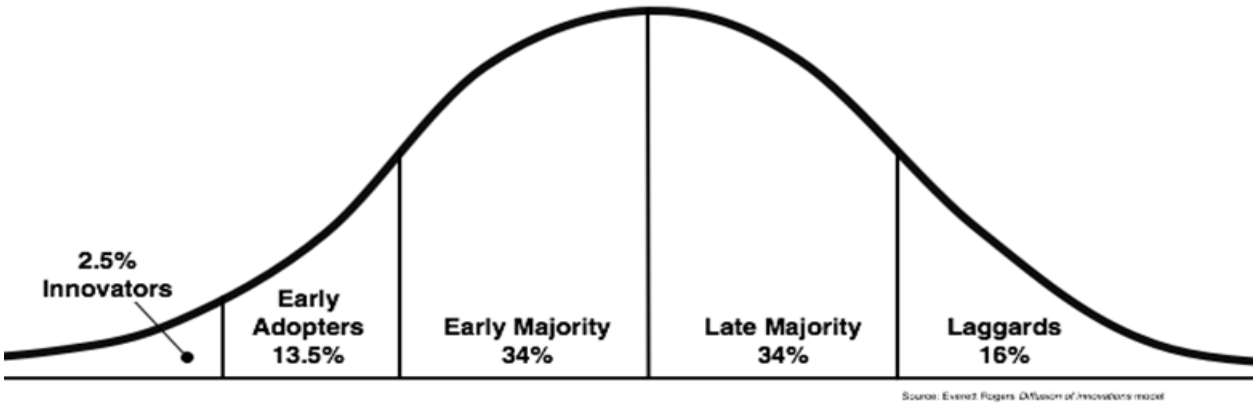


Figure 2.6: The Diffusion of Innovations

Source: Rogers, 1995

An individual's decision about an innovation is not an instantaneous act but a *process* that occurs over time (Rogers, 1995), consisting of a series of actions and decisions. Thus there are five stages of the innovation-decision process defined as follows:

i) Knowledge occurs when an individual (or other decision-making unit) is exposed to an innovation's existence and gains some understanding of how it functions.

ii) Persuasion occurs when an individual (or other decision-making unit) forms a favorable or unfavorable attitude toward the innovation.

iii) Decision occurs when an individual (or other decision-making unit) becomes involved in activities that lead to a decision to adopt or reject the innovation.

iv) Implementation occurs when an individual (or other decision-making unit) puts an innovation into use.

v) Confirmation occurs when an individual (or some other decision-making unit) seeks re-enforcement for an innovation-decision already made, or reverses a previous decision to adopt or reject

The modification of Roger's DIT model proposed by Hultman (2007) suggests a processual (Kurnia & Johnston, 2000) view of e-commerce adoption in SMEs. Hultman's model depicts a process that has four stages: Presentation, Evaluation, Decision and Implementation. The modified model also has a feedback loop that allows for re-evaluation of decisions to adopt or reject, and includes four secondary options that are introduced after the initial decision. In consideration of DIT's initial definition, e-commerce adoption can then be understood to be a process that involves actors at the individual and aggregate levels of the SME (Hultman, 2007; Lytinen & Damsgaard, 2001; Kurnia & Johnston, 2000).

2.7.7 Unified Theory of Acceptance and Use of Technology

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a technology acceptance model formulated by Venkatesh and others in "User acceptance of information technology: Toward a unified view" (Venkatesh *et al.* 2003). The UTAUT aims to explain user intentions to use an information system and subsequent usage behavior. The theory holds that four key constructs namely; performance expectancy, effort expectancy, social influence, and facilitating conditions; with the first three being direct determinants of usage intention and behavior, and the fourth a direct determinant of use behavior. Gender, age, experience, and voluntariness of use are posited to moderate the impact of the four key constructs on usage intention and behavior (Venkatesh *et al.* 2003).

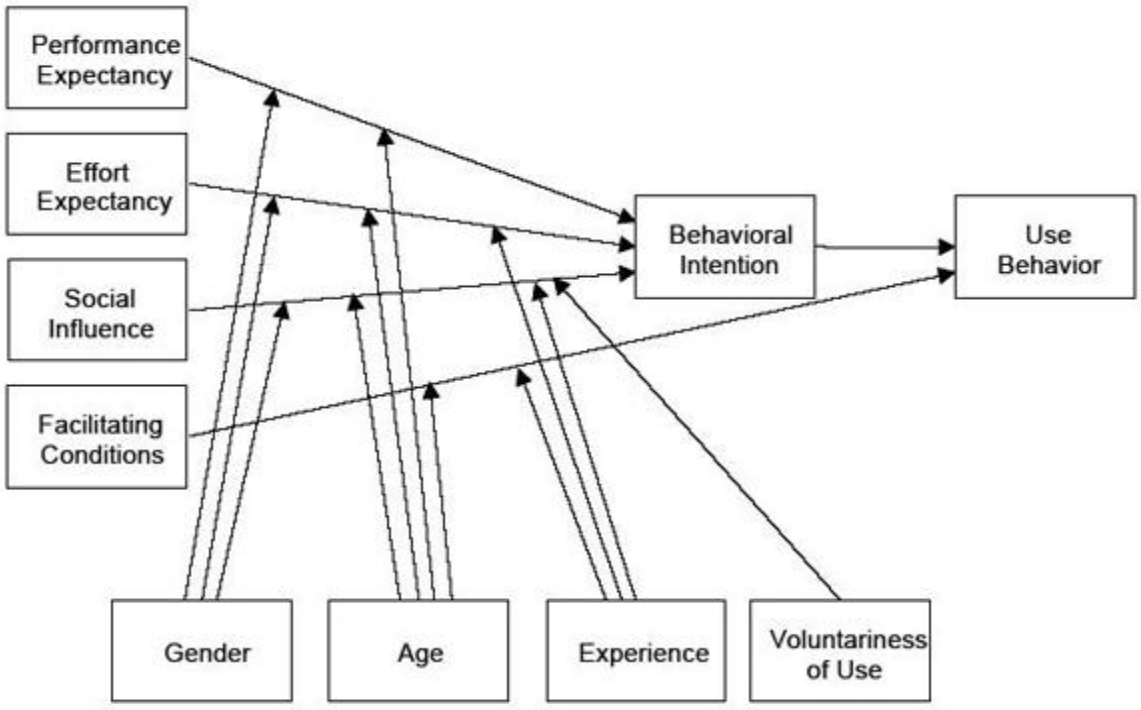


Figure 2.7: Unified Theory of Acceptance and Use of Technology

Source: Venkatesh, 2003

A review and consolidation of eight models that previous research had used to explain information systems utilization behavior was used to develop the theory. These are theory of Reasoned Action, Technology Acceptance Model, Motivational Model, Theory of Planned Behavior a combined Theory of Planned Behavior/Technology Acceptance Model, Model of Personal Computer Use, Diffusion of Innovations Theory, and social cognitive theory. Subsequent validation by Venkatesh et al. of UTAUT in a longitudinal study found it to account for an impressive 70% of the variance in behavioral intention (BI) and about 50% in actual use. Van Raaij and Schepers (2008) criticized the UTAUT as being less parsimonious than the previous Technology Acceptance Model and TAM2 because its high R^2 (Predictive value) is only achieved when moderating key relationships with up to four variables. They also called the grouping and labeling of items and constructs problematic because a variety of disparate items were combined to reflect a single psychometric construct.

In a further step, Venkatesh et al. (2012) expanded UTAUT into UTAUT2 by adding new determining factors that help in increasing the predicting capability of the user context. The three factors are: Hedonic Motivation (HM) -'the fun or pleasure derived from using a technology' (Brown and Venkatesh, 2005); Price Value (PV)-'users are responsible for the costs and such costs, besides being important, can dominate consumer adoption decisions'(Brown and Venkatesh, 2005) and Habit (HT) -'habit has a direct effect on technology use and/or habit weakens or limits the strength of the relationship between BI and technology use' (Venkatesh et al., 2012). These factors are responsible for modern mechanisms, that is, 'effect, monetary constraints, and automaticity' that have not been covered by UTAUT (Venkatesh et al., 2012). Moreover, Venkatesh et al. (2012) infer that applying UTAUT2 will achieve a considerable increase in the 'variance explained in behavioral intention from 56% to 74% and in technology use from 40% to 52%.

The significance of UTAUT in this research is that the adoption of e-commerce among SMEs can be influenced by Performance Expectance, Effort Expectance, Social Influence and Facilitating Conditions. Performance Expectation corresponds to PU in TAM and is captured by Attitude factors in this research. Effort Expectance corresponds to PEOU in TAM and is represented by Attitude factors. The Social Influence is represented by Environmental barriers and Facilitating Conditions represented by Organizational barriers of e-commerce adoption (Table 2.7). The UTAUT2's additional constructs that help in predicting capability of the user context were studied indirectly; Hedonic Motivation under Technical barriers, Price Value under Financial barriers and Habit under Behavioral barriers. The UTAUT model having introduced moderating variables Gender, Age, Experience and Voluntariness of Use to moderate its four key constructs, informed the use of moderation factors namely; Change, Risk, Knowledge and Uncertainty to moderate the impact of some barriers on extent of e-commerce adoption in this research. During the pilot study the respondents identified Change, Risk, Knowledge and Uncertainty as some of the underlying issues that influence their decision to adopt e-commerce.

2.7.8 Process Virtualization Theory

There has been a growing number of processes that previously relied on physical interaction between people, and between objects and people are being migrated to virtual environments in which physical interaction is not available Overby (2008). For instance, medical processes that have historically depended on physical interaction between patient and physician are conducted virtually through telemedicine, and shopping processes that have traditionally depended on physical interaction between shoppers and products are conducted virtually via e-commerce. We regard this migration to be process virtualization. Although the pace of process virtualization is accelerating, some processes have proven more suitable for virtualization than others. A more recently proposed theory designed to explain this phenomenon is Process virtualization theory.

The dependent variable in process virtualization theory is "process virtualizability," which describes how amenable a process is to being conducted without physical interaction between people or between people and objects. Operationally, process virtualizability can be measured either as adoption of the virtual process or the quality of the outcomes of the virtual process. For example, the adoption of e-commerce over the past decade has shown that certain shopping processes are amenable to virtualization. In shopping processes, it is important for the buyer to identify the seller as a legitimate provider of the goods/service. A barrier to virtualizing many shopping processes has been the difficulty in determining this and the resulting risk of fraud (Friedman and Resnick, 2001). With respect to quality of outcomes, if distance learning students demonstrate mastery of the subject material, then this would provide evidence that the formal education process is amenable to virtualization, at least under certain conditions and for certain subjects. The main constructs of process virtualization theory are sensory requirements, relationship requirements, synchronism requirements, and identification and control requirements. Each of these constructs is posited to have a negative effect on process virtualizability.

The relevance of PVT in this research is the recognition that e-commerce adoption can be defined as a process of virtualizability and this theory can be useful in future research on e-commerce adoption. This theory has not been used directly in this research.

2.8 Review of Empirical Literature Frameworks

The following models and frameworks were reviewed from empirical literature:

The study on B2B e-commerce posit that the main barriers affecting e-commerce implementation among non-adopters were security issues, customers as well as firms not ready for e-commerce, and lack of in-house competence (Wirtz and Wong, 2001). It was proposed that slackness in telecommunication infrastructure and lack of security in online transactions can be considered the technical barriers while lack of trust in ICT, lack of knowledge about e-commerce and lack of IT skills as well as lack of awareness could be grouped under the social barriers. Lawson et al. (2003) classified the barriers into technical and social. These barriers could fit quite nicely into Love et al.'s model (Figure 2.9) except that the social barriers need to be put under the organizational category, of the conceptual model (Figure 2.10).

A study implemented by Kshetri (2007) analyzed e-commerce barriers in respect to three categories: economic, social-political and cognitive. Whereas economic and social-political factors focus mainly on the environmental characteristics, the cognitive component reveals organizational and individual behaviors. The economic obstacles include several factors that affect the diffusion of e-commerce in developing countries such as slow Internet diffusion, unavailability of credit cards, low bandwidth availability and unavailability of a physical delivery system. The socio-economic barriers take account of government regulations like privacy and security, lack of business laws for e-commerce, lack of legal protection for Internet purchases; and people preference for face-to-face communication over emails. The cognitive hindrances contain a number of factors which lead to a negative cognitive assessment of e-commerce of individuals and organizations like adequate awareness, knowledge, skills, and confidence; a lack of awareness and understanding of potential opportunities; lack of confidence in service providers and the postal network; and computer literacy. This study provided some of the variables considered in this research such as concern for security for online credit, inadequate regulation for online transactions and lack of IT skills.

In another study Gibbs, Kraemer and Dedrick (2003), examined the national environment and national policy as two factors that could influence the adoption of e-commerce. In addition, Lawson et al. (2003) also found that absence of government incentives as one of the barriers to adoption of e-commerce. This study suggested the barrier on insufficient incentives from government and lack of government leadership in terms of national policy. In one of the recent studies, Ndyali (2013) in her research on adoption and barriers of e-commerce in Tanzania SMEs, developed a framework for e-commerce adoption barriers in SMEs. The framework is shown in Figure 2.8 below;

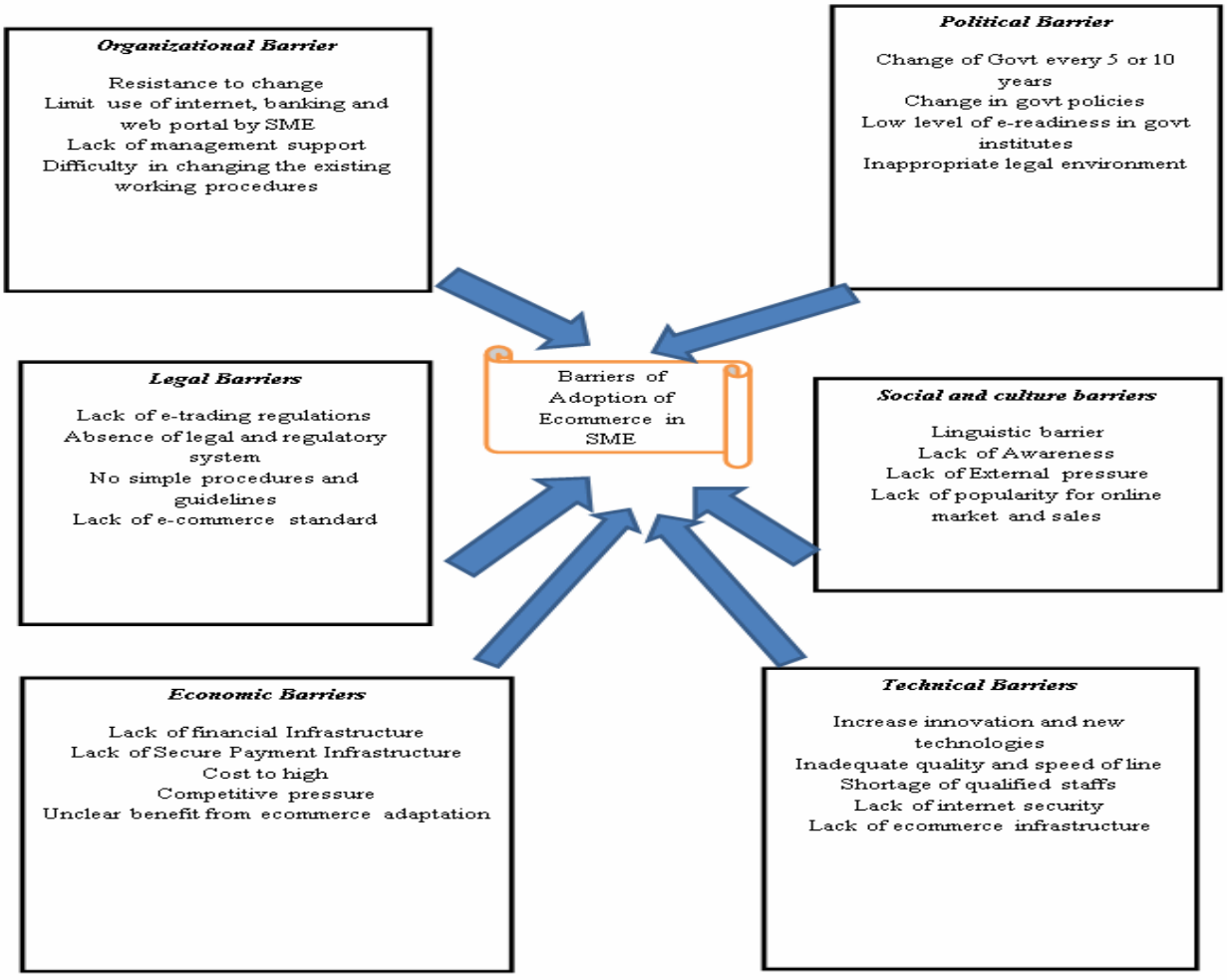


Figure 2.8: Framework for E-commerce Adoption Barriers in SMEs
(Source: Lyata Ndyali, 2013)

The framework is an aggregation of thirty six items which were grouped into six barriers. The results from her study revealed that most barriers had been solved except for cost and legal issues

that still need some improvements. The barriers studied by Ndyali were considered and borrowed appropriately while formulating the barriers in this study (Table 2.7). Companies of different sizes and sectors, worldwide seek new ways of conducting their business through some kind of innovation to stay ahead of competition (Laforet, 2008). Research has also shown that although large companies have enough resources for investing in innovation (Laforet, 2008), they also tend to create a bureaucracy unfavorable to creativity and so, tend to be less flexible than smaller firms. Studies have shown that new small firms continually enter the market with new ideas, products and processes (De Jong & Marsili, 2006), increasing their chances of survival and growth.

The relevance of empirical frameworks reviewed to this research is that they provided constructs that were used for benchmarking in the development of the conceptual framework.

2.9 The Importance of Review of Technology Adoption Theories

An attempt was made to review several relevant technology adoption theories for the sake of gaining knowledge and understanding the subject area more deeply. The review of the said theories and frameworks from existing literature was useful in three ways. Firstly, it helped in the conceptual understanding of the problem by providing a context & justification for the research. It enabled the researcher to refine the research topic by refocusing it to reflect where the research fits into the existing body of knowledge and ensuring the research had not been done before (or that it is not just a "replication study"). Secondly, providing a guide to the research study, by enabling the researcher to learn from previous theories on the subject, highlighting flaws in previous research and illustrating how the subject has been studied previously. Thirdly, showing how the work will add to the understanding and knowledge of the field. For instance, it was found that there had been little research on e-commerce adoption in Kenya: particularly in relation to the extent of e-commerce adoption and the factors influencing its adoption. Therefore there was need to fill that gap.

The table 2.7 summarizes the various theories studied and how they influenced the conceptual framework for this study.

Table 2.7: Source of Constructs of Conceptual Framework Variables

	Technology Adoption Theory	Model Constructs	Description	Conceptual Construct	Conceptual variables
1	Technological Organizational Environmental (TOE) Framework	Technological Context	Relevant Internal & External technologies	Technical Barriers	P7, P8, P10, P12, P21
		Organizational Context	Characteristics and resources of firm	Organizational Barriers	P9, P22, P23
		Environmental Context	External Task Environment	Environmental Barrier & Governmental Barrier	P6, P15 P13, P14, P16, P18, P27
2	Model of Barriers by Love et al.	Technical barriers		Technical barriers	P7, P8, P11, P12, P21
		Financial barriers		Financial barriers	P1, P2, P3, P10
		Behavioral barriers		Behavioral barriers	P19, P24, P25, P26
		Organizational barriers		Organizational barriers	P9, P22, P23
5	Framework for Barriers to EC Adoption by Ndyali	Organizational barriers		Organizational barriers	P9, P22, P23
		Legal barriers		Governmental barriers	P13, P14, P16, P18
		Economic barriers		Financial barriers	P1, P2, P3, P4, P10
		Political barriers		Governmental barriers	P17, P18
		Social and Culture barriers		Behavioral barriers	P4, P5, P19, P25, P26
		Technical barriers		Technical barriers	P7, P8, P10, P12, P20, P21

2.10 Gap Analysis from Literature

The analysis of literature done so far points to the following gaps:

1. The need to know the state and extent of e-commerce adoption among SMEs in Kenya.

According to Kolwale (2001) in his research on reinsurance companies in Kenya, because e-commerce involves buying and selling online with all sorts of pre-sale and post-sale activities traversing every functional field of business, this has necessitated emerging approaches to market research, advertising, customer support, public relations, product purchasing and distribution, production management, recruitment, knowledge distribution and financial transactions. The result of his research served to firstly, provide useful materials that would be of use to companies, of all sizes, that were about to take their first steps in e-commerce. Secondly, serve as a guide on how reinsurance companies could effectively develop and implement their e-commerce strategy. Kaburia (2004) examined the e-Payment alternatives that existed in Kenya and the world, and the extent of use of e-commerce and e-Payment methods in Kenya. This study found out that lack of suitable e-Payment alternatives was a critical challenge to the growth of e-commerce in Kenya.

According to the latest sector statistics report by the Communications Authority of Kenya (CA), the ICT sector in Kenya continues to grow exponentially, with mobile penetration rate hitting 80.5 per cent (CA, 2014). The success of technology adoption is heavily dependent on how it is used by adopters and this in turn is affected by the fit between the technology and the adopters (Unhelkar 2003). Following from the studies reviewed, it suffices to find out the state and extent of SMEs e-commerce adoption given the high mobile phone penetration and investigate the factors that could be influencing the said adoption in Kenya.

2. Need to understand the importance of the influence of user attitude, social and cultural factors on SMEs e-commerce adoption in Kenya.

The adoption of e-commerce in SMEs requires considerable effort from its users who need to learn how to use the system and optimize its functionality to deliver greater value (Korpelainen and Kira 2010). Nguyen (2009) argues that there are three main reasons for the slow rate of adoption and unsuccessful implementation of e-commerce in SMEs. Firstly, the management of firms are not clear about how and why their firms should adopt e-commerce in the first place

(Modimogale and Kroeze 2011; Chibelushi and Costello 2009). Secondly, managers of most SMEs do not understand the relationship between e-commerce and the firm. For instance, an older manager may be reluctant to take risks to try out new technology (Chuang et al. 2009). Thirdly, the ever-changing e-commerce environment requires regular update and training to remain abreast of developments and opportunities (Modimogale and Kroeze 2011; MacGregor and Vrazalic 2006).

The attitude of management in an organization plays a crucial role in the adoption of e-commerce as in most cases SME managers are the owners (Apulu and Latham 2009). Support from management of an organization, most especially top management, is essential for successful e-commerce adoption and implementation for SMEs (Matlay and Addis 2003). If the management is not disposed to its adoption and utilization, then SMEs will not be able to use e-commerce (Akpan-Obong, 2007). The manager/owner's weakness therefore becomes a limitation of the business (Modimogale and Kroeze, 2011). Social factors are concerned with informal regulations and are also implicated in the rapid adoption of e-commerce (Lin et al., 2011). For example, websites in Vietnam are perceived as being 'merely places for promotion; not for purchase' because 'Vietnamese consumers are used to the practice of seeing and touching before buying' (Van Huy et al., 2012). Mansell (2001) and Gattiker et al. (2000) identify differences in language and work habits as one of the barriers to people using e-commerce. The role of culture in the adoption of technology has been widely studied, revealing that many of its aspects are not culturally neutral (Sagi et al., 2004), it suffices therefore to investigate how culture and user attitude influences e-commerce adoption among SMEs in Kenya.

3. Need to understand the barriers of e-commerce adoption among SMEs in Kenya.

Small and Medium Enterprises are not a uniform or standardized set of businesses (Fawcett et al., 2008; Ihua, 2009). They are in essence a highly heterogeneous collection of businesses and vary substantially by sector, size, age, location and structure. These characteristics can directly influence the organization's adoption of e-commerce (Apulu et al., 2011). According to Gikandi and Bloor (2010), Kraemer et al. (2002) and Goyal (2006), there has been a lot of interest in research investigating factors influencing the adoption and effectiveness of e-commerce in retail

business. A study by Gikandi and Bloor (2010) on e-banking came up with an array of factors which tended to inhibit the adoption of e-commerce in Kenya. These included lack of resources, constant change of technology and lack of access to the Internet by general public. The study concluded by emphasizing the role of Kenya government in achieving a secure environment for e-banking activities. We note that this studies focused on e-business and e-banking, but not specifically on e-commerce and SMEs.

In a related study on the barriers to e-commerce, Ndyali (2013), identified technical barriers as the most important barriers followed by legal and regulatory barriers, while lack of Internet security is the highest barrier that inhibits the implementation of e-commerce in SMEs in Tanzania followed by limited use of Internet banking and web portals by SMEs. In Serbia, another study conducted by Petrovic and Kovacevic (2012), found that distrust is one of the main direct reasons for low level of e-commerce adoption. Research concerning factors affecting adoption of e-commerce among SMEs in developing countries is still at an exploratory stage, as e-commerce is still a relatively new business practice. It is notable that all the studies reviewed above are concerned with exploring the facilitating and/or hindering factors to the adoption and usage of e-business and e-banking both in Kenya and in other countries. The outcome shows various internal and external factors of diverse degrees of magnitude. However, there has been limited research undertaken on factors affecting e-commerce adoption among SMEs in Kenya.

2.11 Conceptual Framework of Factors of E-Commerce Adoption and Hypotheses

In order to investigate the factors that inhibit the adoption of e-commerce in Kenya, a conceptual framework was developed by adapting a model developed by Love, Irani, Li, Cheng and Tse (2001) as well as findings from other studies, in the literature reviewed. In their model, Love et al. (2001) classified the barriers under four categories, namely organizational, technical, financial and behavioral barriers. In addition, risk, uncertainty, change and knowledge were identified as the underlying factors that businesses considered as being the constraints to the ICTs support of an e-commerce infrastructure.

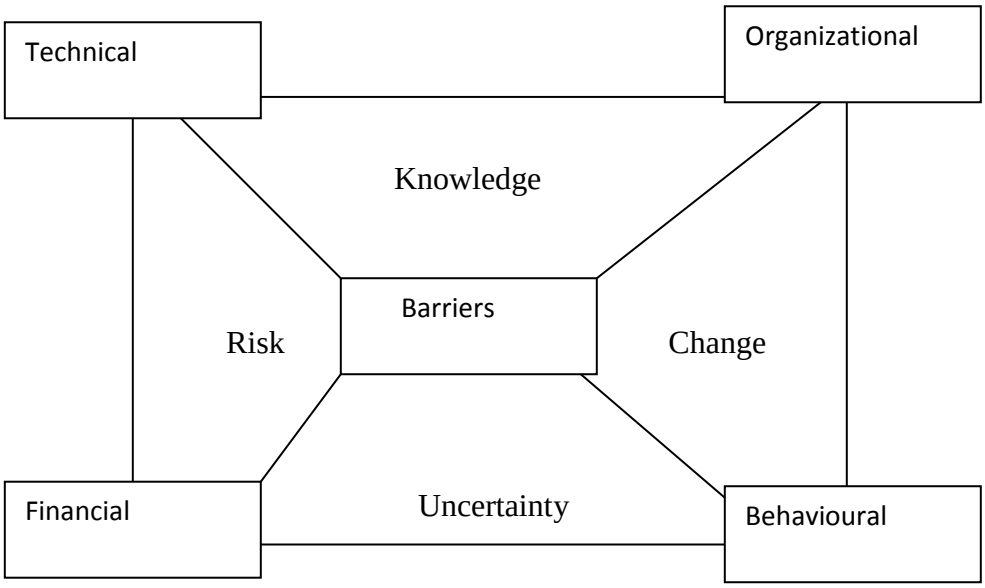


Figure 2.9: Barriers to Adoption of E-commerce

Source: Love et al. 2001

Figure 2.9 shows the barriers and the corresponding moderating factors as follows; Risk moderates Technical and Financial barriers, Knowledge moderates Technical and Organizational barriers, Change moderates Organizational and Behavioral barriers, and Uncertainty moderates Financial and Behavioral barriers. The conceptual framework is shown in Figure 2.10.

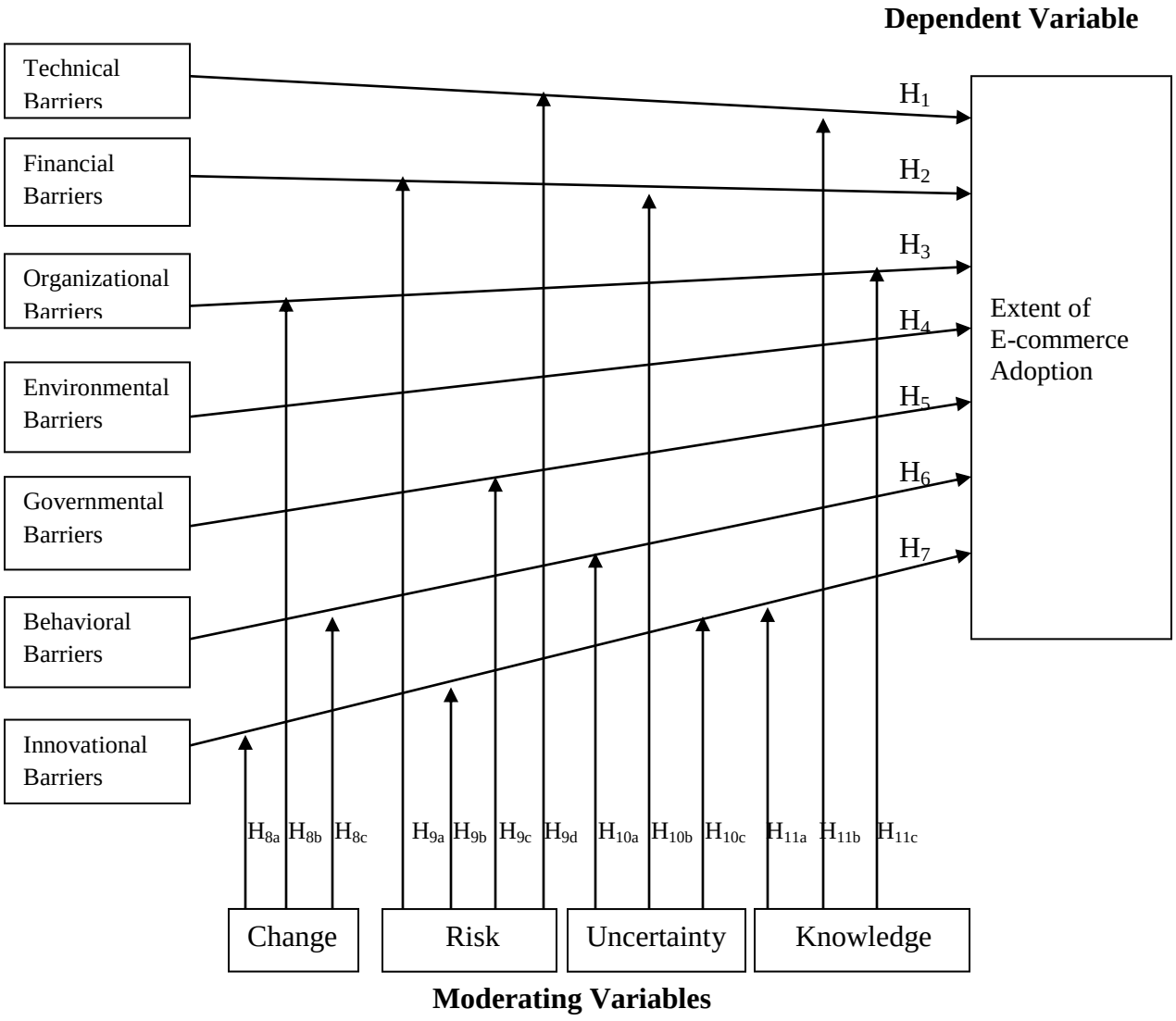


Figure 2.10: Conceptual Framework of Factors Influencing E-commerce Adoption

(Source: compiled by the author)

The proposed conceptual framework in Figure 2.10, illustrates the factors perceived to influence e-commerce adoption among SMEs in Kenya, these include facilitators as well as the barriers. In particular the barrier factors are; technical, financial, organizational, environmental, governmental, innovational and behavioral barriers. In addition, risk, knowledge, change and uncertainty respectively were identified as the underlying factors that SMEs considered as being the moderating factors to e-commerce adoption during the pilot study. The reason for inclusion of moderating variables was to increase the amount of information from the outcome of this research hence generating practical information about interventions as well as testing theory.

The barriers identified above map quite well into Love et al.'s model with an exception for the need of new categories for Environmental barriers, Governmental barriers and Innovation barriers. Fitting these new categories into Loves' model resulted into the conceptual framework as shown in Figure 2.10.

Hypotheses

The foregoing discussion suggests the following hypotheses:

H1: Technical barriers have a negative influence on e-commerce adoption among SMEs in Kenya

The technical barriers are those obtained from the nature and characteristics of the ICT that SME employs or intends to use for e-commerce adoption (Scupola, 2009). Technical barriers constitute the lack of Internet security, lack of e-commerce infrastructure, lack of technical knowhow or qualified staff, inadequate quality and speed line and new technologies (Abdel, 2012). These barriers could prevent small business firms from adopting e-commerce applications.

H2: Financial barriers have a negative influence on e-commerce adoption among SMEs in Kenya

A comparison of some two studies in Argentina and Egypt, (both developing countries) suggests that the key factors of e-commerce adoption in developing countries are: awareness, telecommunication infrastructure, and cost. Unavailability of credit cards is also a major hurdle, (Mercer, C., 2006; Charles, K., 2003; Miller R., 2001). Past studies have found similar problems for B2C e-commerce in Russia, India and Latin America, Hawk, S. (2004); Hilbert, M. (2001).

H3: Organizational barriers have a negative influence on e-commerce adoption among SMEs in Kenya

Through its strategy, the organization crafts patterns of activities which have an impact on the achievement of the organizational goals in relation to its environment (Hakansson and Snehota 2006). Cloete et al. (2002) in their study of SME adoption of e-commerce in South Africa found that adoption is heavily influenced by factors within the organization.

H4: Governmental barriers have a negative influence on e-commerce adoption among SMEs in Kenya

Many developing countries lack laws that provide legal validity of digital and electronic signatures (DES) (Stephens, 2001). Some developing countries treat ICT products as luxury items and impose import duty, value added tax, sales tax etc (UNCTAD, 2000). A survey conducted among Brazilian consumers indicated that the low e-commerce adoption rate was related to government regulations such as concern about privacy and security, lack of business laws for e-commerce, inadequate legal protection for Internet purchases and concern over Internet taxation (Tigre et al. 2004). In 2009, the Government of Kenya zero-rated ICTs among other basic goods and services in order to make them more affordable, however this decision was reversed in 2013 (World Bank Report, 2012).

H5: Environmental barriers have a negative influence on e-commerce adoption among SMEs in Kenya

The prevailing business culture has been cited as crucial for the development of e-commerce (Shemi & Procter, 2013). This has been found to be different from country to country even amongst developed countries (Scupola, 2009).

H6: Behavioral barriers have a negative influence on e-commerce adoption among SMEs in Kenya

Cultural barriers in some countries do exist to deter the adoption of e-commerce as a way of conducting business (Bingi, et al., 2000). A personal face-to-face interaction with sellers is a vital part of the shopping experience in some countries where shopping is a social activity such as Sri Lanka and India. Examples of cultural barriers in case of Kenya include; decision making process being executed in a top-down fashion, the need for protection of company image, and the need to socializing in order to obtain business contacts.

H7: Innovational barriers have a negative influence on e-commerce adoption among SMEs in Kenya

Innovation factors are attached to owner's perceptions of the degree to which the technology or the innovation will enhance the organizations performance, decrease transactional delays, and result in improved efficiencies and communication with business partners (Almaro et al., 2011; Teo et al., 2004; Grandon and Pearson, 2004).

The following hypotheses were set to test the effect of moderating factors on the relationship between the dependent variable and independent variables as specified:

Change

Cultural influence has been recognized as a key moderator of e-commerce adoption (Tan et al, 2007). The phenomenon of acculturation has emerged, which brings into view the possibility of

change through adopting the host organization's or country's cultural behavior. Thus it appears crucial to investigate whether such change could moderate innovational, organizational and behavioral barriers that influence the extent of e-commerce adoption. We, therefore, hypothesize as follows:

H_{8a} Change will negatively moderate the influence of innovational barriers on the extent of e-commerce adoption in Kenya.

H_{8b} Change will negatively moderate the influence of organizational barriers on the extent of e-commerce adoption in Kenya.

H_{8c} Change will negatively moderate the influence of behavioral barriers on the extent of e-commerce adoption in Kenya

Perceived risk

Consumers have shown reluctance to complete online transactions (Hoffman et al., 1999), primarily due to risk concerns (Jarvenpaa et al. 1999, Pavlou 2001). Therefore, perceived risk is posited as having a major influence to consumer acceptance of technology. Consumer perceptions of risks inherent in product adoption and usage have been studied for many years (Bauer 1967, Dowling and Staelin 1994). This immense literature on perceived risk however has not been applied specifically to e-commerce in an attempt to better predict evaluation and adoption. We, therefore, hypothesize as follows:

H_{9a} Perceived risk will negatively moderate the influence of financial barriers on the extent of e- commerce adoption in Kenya

H_{9b} Perceived risk will negatively moderate the influence of innovational barriers on the extent of e-commerce adoption in Kenya.

H_{9c} Perceived risk will negatively moderate the influence of governmental barriers on the extent of e-commerce adoption in Kenya.

H_{9d} Perceived risk will negatively moderate the influence of technical barriers on the extent of e-commerce adoption in Kenya.

Uncertainty avoidance

Uncertainty avoidance refers to the extent to which people feel threatened by uncertainty or ambiguity and try to avoid these situations (Hofstede, 1991). It can be assumed that the higher uncertainty avoidance an SME has, the more likely staff in the SME will think that it is difficult to use a new technology and learning to use it requires more effort. Thus, uncertainty avoidance may negatively moderate the expectation to spent finances. Also, for an SME with higher uncertainty avoidance, even though organizational and technical infrastructure exists to support use of new technology, staff in this SME may still be more likely to avoid using it, compared to staff in SMEs with lower uncertainty. We, therefore, hypothesize as follows:

H_{10a} Uncertainty will negatively moderate the influence of behavioral barriers on the extent of e-commerce adoption in Kenya.

H_{10b} Uncertainty will negatively moderate the influence of financial barriers on the extent of e-commerce adoption in Kenya.

H_{10c} Uncertainty will negatively moderate the influence of innovational barriers on the extent of e-commerce adoption in Kenya.

Knowledge

Studies have examined various aspects of IT adoption at an individual and organizational level (Carter et al., 2001). Organizational level research centers on the adoption and diffusion with respect to the adopting organization (Lai and Guynes, 1997). In particular, it has been suggested

that the significance of competitive pressure, CEO attitude, innovativeness and IT knowledge could have considerable influence on the adoption of IT. We, therefore, hypothesize as follows:

H_{11a} Knowledge will negatively moderate the influence of innovational barriers on the extent of e-commerce adoption in Kenya.

H_{11b} Knowledge will negatively moderate the influence of technical barriers on the extent of e-commerce adoption in Kenya.

H_{11c} Knowledge will negatively moderate the influence of organizational barriers on the extent of e-commerce adoption in Kenya.

2.12 Measures of barriers to E-commerce adoption

Measures of e-commerce barriers were adapted from the instrument designed by the Malaysia's National Productivity Corporation for the purpose of conducting a nation-wide e-commerce research in 1999 and modified appropriately using information obtained during literature review. These measures are the independent variables of the conceptual framework that was developed earlier in relation to factors influencing e-commerce adoption (Figure 2.10). These measures are categorised in Table 2.8.

Table 2.8 Measures of E-commerce barriers

Barriers	**Items**	**Item label**
Financial	High cost of setting up e-commerce	P1
	It is difficult to access credit facilities	P2
	Cost of Internet connectivity in terms of rate per minute is too high	P3
Environmental	Our management structure is well defined, with clear job description for everyone	
	There is a lot of pressure from suppliers/buyers demanding we use e-commerce applications	P6
		P15
Technical	Lack of employee knowledge/skills to use e-commerce	P7
	Our organization lacks adequate resources for e-commerce	P8
	Lack of adequate bandwidth/access speed for Internet	P10
	Lack of skilled developers of e-commerce	P11
	Problems between ISP and telecoms supplier taking responsibility for service failure/problems	P12
	The integration of e-commerce is quite complex	P21
Governmental	Lack of standards/regulations from government on e-commerce	P13
	Insufficient incentives from the government for e-commerce	P14
	Telecommunication Infrastructure is not adequate	P16
	Lack of government leadership	P18
Organizational	Insufficient security for online credit payment transaction	P9
	Weak support from top organization management	P22
	Lack of sufficient e-commerce knowledge in management	P23
Behavioural	Keeping up with changing technology	P24
	Mindset shift towards using e-commerce	P25
	Our sales/marketing requires high degree of human interaction	P26
Innovation	Electronic commerce is not as effective as traditional marketing channel	P4
	Electronic commerce applications are difficult to use	P5
	Market potential of electronic commerce user is too small	P17
	There is no perceived relative advantage in using e-commerce	P19
	Incompatibility with other existing technologies	P20
	It will upset existing distribution channels	P27

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Research Philosophy

It should be observed that e-commerce is multi-disciplinary and can be found in other fields such as marketing, agriculture and engineering. However, the philosophical tenets of e-commerce have been firmly grounded in information systems (IS) research. Philosophical assumptions in IS usually concern themselves with systematic studies of knowledge, that is what is known, acquired and appropriated by humans (Wyssusek, Schwartz & Kemberg, 2002). There are a number of research philosophies which could have been applied to this study. The positivist approach in e-commerce adoption assumes that an objective physical (an SME organization) and social world (interactions of SME actors with e-commerce) exists independently of humans, and whose nature can be relatively unproblematic, apprehended, characterized, and measured (Orlikowski & Baroudi, 1991). Most literature on e-commerce adoption research in SMEs has largely leaned on the ontological and epistemological tenets of the positivist approach which are characterized by large-scale sample surveys and models (Chen & Hirschheim, 2004).

Another research philosophy, the interpretive paradigm, holds that IS research can be classified as interpretive if it assumes that our knowledge of reality is gained only through social constructions such as language, consciousness, shared meanings, documents, tools, and other artifacts (Klein & Myers, 1999). The aim of all interpretive research is to understand how members of a social group, through their participation in social processes, enact their particular realities and endow them with meaning, and to show how these meanings, beliefs and intentions of the members help to constitute their social action (Orlikowski & Baroudi,1991). A third philosophy under consideration is the critical approach. This approach has received less discussion from literature in comparison to the positivist and interpretive paradigms. The works of Klein & Myers (1999), Hirschheim & Klein (1994) and Myers & Klein (2011) provide substantive information regarding critical research. In the Critical paradigm, the main job is seen as being one of social critique, whereby the restrictive and alienating conditions of the status quo are highlited (Klein & Myers, 1999). The Pragmatism philosophy is a deconstructive paradigm that advocates the use of mixed methods in research, "sidesteps the contentious issues of truth and reality" (Feilzer 2010), and "focuses instead on 'what works' as the truth regarding the

research questions under investigation" (Tashakkori & Teddlie 2003b). For pragmatists, reality indeed exists, but it is ever changing, based on performed actions.

According to Wyssusek, Schwartz and Kremberg (2003) the adoption of a paradigm is directly related to the interpretation of the information systems in the organization. Therefore, it is the research questions that point the direction of which research approach to follow (Chen & Hirschheim, 2004). This study's research questions seek an explanatory investigation into the issues of e-commerce adoption as follows:

i) What is the extent of e-commerce adoption among SMEs in Kenya?

ii) How does the state of e-commerce adoption compare among different SME sectors in Kenya.

iii) What factors influence the adoption of e-commerce among SMEs in Kenya?

iv) What adoption model explains the extent of e-commerce adoption among SMEs in Kenya?

This research used a positivist approach. This decision was informed by the perception that the world has a number of universal truths, and that these truths can be 'discovered' by carrying out 'objective' research in which the researcher does not interact with what is being researched (Healy & Perry, 2000). The positivist approach, allows researchers a certain amount of control over data collection and analysis through manipulation of research design parameters and statistical procedures to produce facts and figures (Orlikowski & Baroudi, 1991; Molla and Licker, 2005a, 2005b; Oates, 2006). The deterministic nature of positivist studies in e-commerce adoption would allow an objective environment for SMEs that is carried out through large surveys or experiments. For instance, Molla & Licker, (2005b) made use of models to derive and predict e-commerce adoption in developing countries.

3.2 Research Design

Survey research approach is a widely accepted and common strategy in business and management research (Saunders et al. 2007; Bryman and Bell 2011; Panneerselvam 2010). It is aimed at producing generalizations about a population by collecting information from samples. It is used for exploratory and descriptive research and is usually associated with the deductive approach (Thomas 2006; Saunders et al. 2009). Surveys are used as they allow for the collection of a large amount of data from a large population in a highly economical way (Bryman and Bell 2011).

The research purpose and questions of this study can be described as exploratory and confirmatory, a cross sectional survey approach was adopted. This design was suitable because the research intended to gather information from a large number of respondents in different industry sectors which are located in selected regions over a wide geographical area. It also intended to test several hypotheses empirically.

During the current research, responses were sought on each research question by formulating relevant questions. Data was later collected, analyzed and interpreted. The research questionnaire that had been used earlier during the pilot study was reviewed and improved based on the comments received from the Research Assistants (RA) and the respondents who had been involved. This was followed by recruitment of RAs, two for each of the five regions making a total of ten. The RAs were trained to understand the Questionnaire content and on how to administer the same to the respondents without influencing their choices and responses. The researcher had planning sessions with RAs from each region separately to plan logistics. Each RA was facilitated to obtain enough Questionnaires and exchanged telephone contacts for ease of communication. The researcher maintained regular contact with each RA to obtain regular feedback for the entire duration of the data collection process.

3.2.1 Research Sites

The main sources of the registered SMEs were the office of the registrar of companies, ministry of trade and local authorities like Nairobi, Kakamega and Machakos. This being a country wide

research, a representative sample was purposefully chosen from five regions across the country. The five regions chosen included Nairobi, Central, Eastern, Nyanza and Western. The research focused on SMEs that had already started utilizing some form of e-commerce applications. The sectors involved in the research were selected in advance to enable more focused data collection and analysis. We noted that Nairobi region has the highest number of registered SMEs, using purposive sampling we decided to include it and then select four other regions at random. We generated a random number for each of the remaining seven regions, and then sorted them in ascending order. Finally we selected the first four.

3.2.2 Population

The population for this research is defined as all SME registered and operating in Nairobi, Central, Eastern, Western, and Nyanza regions of Kenya that were using e-commerce during the sampling time frame. SME are often defined based on certain quantitative measures such as the number of staff, the amount of capital, the amount of assets and sales turnover. In Kenya the measure that would be most reliable will be the number of staff since it has no tax implications that may lead to falsification of data. For this research we consider the following criteria to define the SME.

Table 3.1: Definition of Terms: SME

Micro Enterprises	Within SMEs Category, micro enterprises are enterprises with fewer than 10 employees
Small Enterprises	Small enterprises have between 10 and 49 employees
Medium-sized Enterprises	Medium sized enterprises have between 50 fewer and 250 employees

(Adapted from European Union, 2015; Gamage, 2003)

One hundred and thirty five SME were selected from Manufacturing & Construction, Media & ICT, Health services, Sales and Marketing, Transport, Education, Hospitality, Finance &

Insurance, Agriculture & Food processing sectors. The sectors were selected based on expected high utilization of innovative technologies, as earlier established through the pilot study.

3.2.3 Sampling Techniques and Sample

Stratified sampling technique was chosen as the researcher's ease of access to the whole sample population (Agresti et al., 2008; Czaplewski, 2003). Research respondents included the SMEs Owner/Manager or the personnel responsible for the SMEs operations in the organization because they tend to make decisions to adopt such technologies and it was envisaged that more reliable results could be obtained. Surveys usually depend on statistical procedures to test hypotheses, aiming to generalize the findings (Oates, 2006). The objectives of this research are best suited to the nature of a survey research.

The research intended to compare the level of adoption among different industry sectors; therefore it was necessary to sample a significant number of SMEs per sector. There were over 98,078 Micro, Small and Medium Enterprises in Nairobi alone and approximately 1.6% of these enterprises employ at least ten workers translating to 1,569 firms (Kagwaini, 2008).

We purposed to sample between 10 and 20 SMEs chosen randomly from each sector. The choice of respondents was limited to either the SME owner or manager, therefore convenient sampling was used. The sample size was determined on the basis of the experience of the pilot study in which 31 firms were used and the KMO test for adequacy of the sample size showed that 31 was not adequate to give reliable results, we needed a sample size bigger than 50. Statistical testing based sampling adequacy on the number of variables being tested. Other researchers recommend that 10%-20% of population size is a sufficient sample size (Cooper & Schindler, 2008). There was no data on those SMEs that were currently using e-commerce therefore we depended on KMO measure of adequacy to determine the sample size. The industry sectors and number of SMEs to be sampled as per plan are shown in Table 3.2.

Table 3.2: Sampling of Distribution

		Nairobi	Central	Nyanza	Eastern	Western	Total
1	Manufacturing & Construction	4	3	3	3	3	16
2	Media & ICT	4	3	3	3	3	16
3	Health Services	4	3	3	3	3	16
4	Sale & Marketing	4	4	4	4	4	20
5	Transport	4	2	2	2	2	12
6	Education	4	3	3	3	3	16
7	Hospitality	4	2	2	2	2	12
8	Finance & Insurance	4	3	3	3	3	16
9	Agriculture & Food Security	3	2	2	2	2	11
	Total	35	25	25	25	25	135

The sample size of 135 was arrived at by considering a choice of 3 from each of the nine sectors, which makes 27. Adding up 27 from each of the five regions gives the sum of 135. In addition because Nairobi region has the highest registered SMEs, its number was increased by 1. Sales and marketing being a sector with information intensive activities was assigned 4 per sector. Agriculture and food processing, Hospitality and Transport sectors that had been found to have lower level of e-commerce adoption in the pilot study were assigned a lower value of 2.

3.2.4 Survey Instrument

The survey instrument used in this research was a modification of the one used for the pilot study conducted a year earlier. The lessons learned during the pilot were used to improve the Questionnaire. In order to investigate e-commerce adoption in SMEs in Kenya, a survey

instrument was developed to collect data in order to validate the conceptual framework. A questionnaire was the main instrument in this research and was designed after going through a few related research studies on SMEs in other countries. The variables in the conceptual framework were subjected to conceptual analysis/operationalization. They were broken down into dimensions, elements and indicators. The indicators were turned into questions in the questionnaire. Among the sources of information referenced to identify survey items is in the research instrument constructed by Dr. Ainin Sulaiman in a research on e-commerce applications in Malaysia in 1999 for National Productivity Corporation (NPC). Questionnaires were distributed only to SMEs actively engaged in e-commerce that make use of the Internet in conducting all or part of their business. Eligible respondents were owners, managers or individuals in each firm best qualified to speak about the firm's overall e-business activities.

They were asked to answer the questionnaire items. The first part consisted of dichotomous questions that required the respondent to highlight the types of e-commerce applications they were already in use and those that were not being used. The second part used a 5-point Likert scale that required the respondent to rate the extent to which they agree or disagree with the listed hindrances of e-commerce. The Likert scale ranged from 1 strongly disagree to 5 strongly agree for every with barrier factor variable. The third part of the questionnaires consisted of Likert scale items that measure the value of attitudes and perceptions towards e-commerce for the respondents, where 1 indicates very high value while 5 indicates virtually no value. The fourth part of the questionnaires consisted of Likert scale items that measure importance attached to the social and cultural issues by staff of the respondent's organization, where 1 indicates very high importance while 5 indicates virtually no importance.

The last part of the questionnaire consisted of questions about the profile of the SME that includes questions like what sector the SME is in, type of business or industry involved, size (number of employees) and amount of investment in e-commerce. Due to need for confidentiality, the names of the respondent SME organizations remain undisclosed.

3.2.5 Validity and Reliability of Measurement

All instruments used for measuring the variables are measured by using try-out method for their validity and reliability. Validity testing was conducted by using internal consistency in order to obtain high degree of reliability. Only those items with the score of significance in range of 0 to 0.05 are used in this research. All variables indicating the barrier factors to e-commerce adoption are, in fact, with significance of 0.05 and probabilities of 0.00, and the correlation degree above 0.5. Thus all are considered to have high internal consistency and can be measured in this research. Later on, for testing reliability of the variables (Malholtra, 2004; Sekaran, 2003), it uses alpha coefficient method, Cronbach Alpha. It is considered reliable when the value is >0.7 (Maholtra, 2004). Factor analysis was done using factors identified in the research. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO), which measures the sampling adequacy, should be greater than 0.5 for a satisfactory factor analysis to proceed (Kaiser, 1974). Bartlett's test gives an indication of the strength of relationship among variables. This tests the null hypothesis that the correlation matrix is an identity matrix. We want to reject the null hypothesis. To ensure validity, training of enlisters using the instrument was done two weeks in advance. Ensuring the enlisters went through the instrument one last time and understood each item in the questionnaire before departing for the field. A call was made back to confirm that each respondent to questionnaires was the one targeted.

3.2.6 Data Collection

In the period between March and May 2014, trained Research Assistants (RAs) were sent out with questionnaires to the selected SMEs and regions in Kenya. The questionnaires were accompanied with a cover letter, introducing the RA and explaining the purpose of the study, assuring them of the secrecy of their organization information. The RAs had sufficient knowledge to guide the respondents in completing the questionnaire without influencing their decisions. By final count 119 valid responses out of 135 were received with a response rate of 88.1% for SMEs. A total of 135 questionnaires were distributed to managers of SMEs in Nairobi, Central, Eastern, Western and Nyanza regions of Kenya. Each completed questionnaire was

examined section by section to verify and validate the marking made by the respondent before it would be submitted for further processing.

3.2.7 Data Analysis

The findings were tabulated, and frequency distributions were employed to describe the number as well as the types of e-commerce applications being implemented. Frequency distributions were also used to evaluate the stage of adoption of e-commerce by the respondents in the sample. Descriptive statistics were used to evaluate the social-cultural factors and attitude factors of e-commerce adoption as perceived by the SMEs surveyed in this research.

The extent of e-commerce adoption was computed by adding the number of e-commerce applications being adopted by respondents, which means the higher the score the higher the adoption. In order to test the hypotheses on the perceived importance of the social-cultural factors and the attitude factors of e-commerce adoption descriptive statistics were used. To analyze barrier factors that hinder the adoption of e-commerce, a number of statistical methods were used. Factor analysis with varimax rotation was employed to reduce the variables that are used to measure barrier factors of e-commerce to a fewer number of factors.

The factors were categorized based on suitable factor loadings depending on the sample size. Reliability analysis was also performed to examine whether the factors obtained above were reliable measures or not. Any factor with Cronbach's alpha less than 0.7 would be discarded, as it would not be considered reliable (Hair, Anderson, Tatham and Black, 1998). The correlations between the barrier factors were determined and results tabulated. Correlation analysis was used to examine whether there was any association between each of the factors and the extent of e-commerce adoption. To examine whether the barriers have any influence on the extent of e-commerce adoption, and to test the hypotheses formulated earlier, regression analysis was used. The moderating factors were also tested using regression analysis.

Table 3.3 shows the various methods used, their purpose and suitability.

Table 3.3 Data Analysis Methods

	Method	Purpose	Suitability
1.	Frequency distribution	• Describe number & type of e-commerce applications • Evaluate stage of e-commerce adoption	Allows grouping of data and drawing of charts
2.	Descriptive statistics	• Evaluate attitude factors, Social & cultural factors.	Allows computation of mean and standard deviation of scores on Likert scale.
3.	Factor analysis	• Reduce the number of variables to get significant ones	Allows grouping of variables using varimax rotation & obtain factor loading.
4	Correlation analysis	• Determine associations between each independent and the dependent variable.	Suitable for determining whether a variable is a reliable measure or not
5.	Regression analysis	• Determine whether barrier factors have influence on the extent of e-commerce adoption	Allows one to derive the regression model

3.3 Operationalization of Variables

3.3.1 Measurement of Stages of E-commerce Adoption

According to White et al. (1998) in their study of web adoption by the publishing industry, adoption is measured according to business activities undertaken on-line, rather than the technology features or platforms utilized. The proposed conceptual model shown in Figure 3.1 below will not be used to test any hypothesis, but instead to measure the state of e-commerce adoption by the SMEs in Kenya. Sulaiman (2000), classified e-commerce applications into five categories namely; electronic marketing, electronic advertising, customer support services, order

and delivery, and online payment. It is suggested that a firm will be placed in the highest stage where it has adopted a majority of the applications.

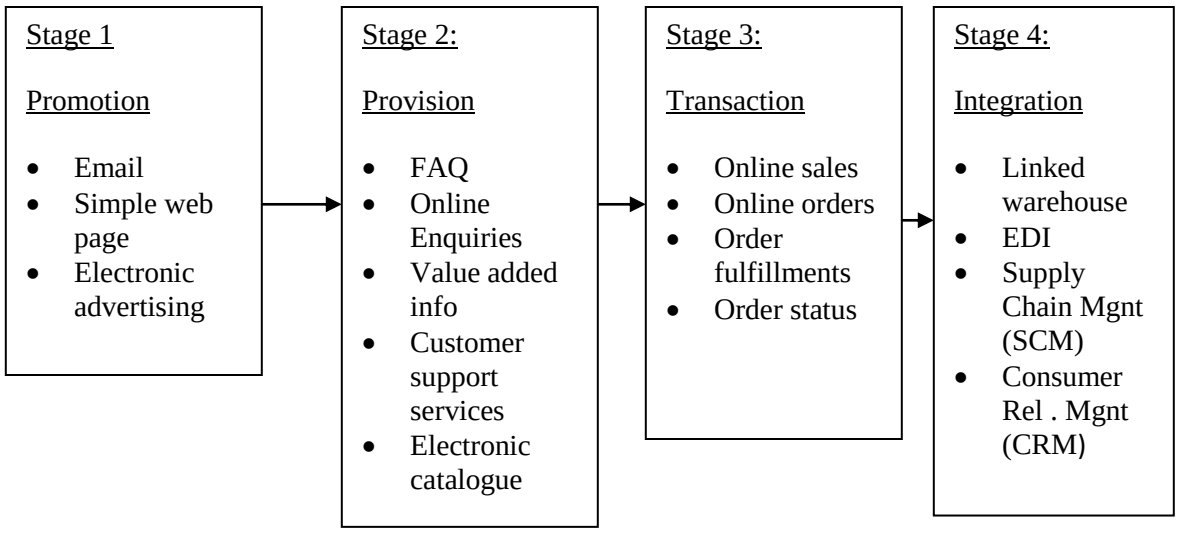


Figure 3.1 Conceptual Model of Stages of E-commerce adoption
(Source: compiled by the author)

The four stages can be described as follows:

Stage 1: Promotion

This stage involves the one-way communication namely by owning a website which provides company's profile and information on products and services offered. It uses email, simple web pages and electronic advertising.

Stage 2: Provision

This stage is the introduction towards a two way communication that includes the website and email usage to interact with suppliers or consumers. It handles Frequently Asked Questions (FAQs), online enquiries, value added services, customer support services and electronic catalogue.

Stage 3: Transaction

This stage allows for the presence of financial transactions, employing high level IT infrastructure capabilities. It enables online sales, online orders, order fulfillments and obtaining of order status.

Stage 4: Provision

This stage refers to a complete business process integration up to the level which involves high cooperation among users and suppliers. It supports Linked warehouse, Electronic Digital Interchange (EDI), Supply Chain Management (SCM) and Customer Relationship Management (CRM) .

Sulaiman (2000) classified e-commerce applications into five categories namely; electronic marketing, electronic advertising, customer support services, order and delivery, and online payment. It is suggested that a firm will be placed in the highest stage where it has adopted a majority of the applications. The measurement of e-commerce adoption will be adapted from the measures used by Sulaiman (2000), with an addition of mobile commerce. The detail items under each category are to be adapted from the measures used in the e-commerce research by the National Productivity Corporation (2000), Malaysia.

3.3.2 Definition of Operational Variables

The table 3.4 and table 3.5 below contain the description of variables used in this research.

Table 3.4 Adoption of E- commerce Variables

E-commerce Applications	**Variable**	**Type**
Electronic Marketing	**E_Marketing**	Numeric
Research on consumer preferences	Mk1	Numeric
Research and evaluation of new suppliers	Mk2	Numeric
Research on Competitors	Mk3	Numeric
Electronic Advertising	**E_Advertisement**	Numeric
Displaying company information and products/services offered	EAd1	Numeric
Web site hosted by another company	EAd2	Numeric
Web site hosted by owner server	EAd3	Numeric
Advertising on third party web site	EAd4	Numeric
Electronic catalogues	EAd5	Numeric
Customer Support Services	**CS_Services**	Numeric
Online help- Frequently Asked Questions (FAQ)	CSS1	Numeric
Online help- products updates	CSS2	Numeric
Handling customers feedback/queries online	CSS3	Numeric
Personalised email communication	CSS4	Numeric
Online application/registration	CSS5	Numeric
Order and Delivery	**Order_delivery**	Numeric
Processing sales order from customers online	ORD1	Numeric
Coordinating procurement with suppliers online	ORD2	Numeric
Tracking incoming and outgoing goods delivery (shipment, courier service online)	ORD3	Numeric
Electronic Data Interchange (EDI)	ORD4	Numeric
Payment System	**Pay_System**	Numeric
Electronic Fund Transfer (EFT)	PAS1	Numeric
Online credit card processing	PAS2	Numeric
Smart card	PAS3	Numeric
Prepaid card	PAS4	Numeric
Mobile Commerce	**M-commerce**	Numeric
Banking and financial services	MCO1	Numeric
Wireless Advertising	MCO2	Numeric
Games and entertainment	MCO3	Numeric
Working from home/out-of-office (teleworking)	MCO4	Numeric

Table 3.5: Definition of Study Variables

Objective	**Variable**	**Indicator(s)**	**Measurement scale**	**Data analysis method**
To establish the state of usage of EC adoption	• E-Marketing • E-dvertisement • CS-Services • Order_delivery • Pay_system • M-commerce	Percentage Number of EC adopted per stage	Ordinal	Frequency distribution & descriptive statistics
To determine the level of usage of individual EC applications	Name of application	Percentage Number of individual EC apps adopted	Ordinal	Frequency distribution & descriptive statistics
To establish the level of usage of EC per sector	SectorName_level	Percentage Number of EC apps adopted per sector	Ordinal	Frequency distribution & descriptive statistics
To establish the importance of social cultural factors in EC adoption	• Socio-culture1 • Socio-culture2 • Socio-culture3 • Socio-culture4 • Socio-culture5	Sample Mean and Standard deviation	Likert scale	Descriptive statistics
To establish the importance of attitude factors in EC adoption	• Attitude_fact1 • Attitude_fact2 • Attitude_fact3 • Attitude_fact4 • Attitude_fact5 • Attitude_fact6	Sample Mean and Standard deviation	Lickert scale	Descriptive statistics
To establish the barriers to EC adoption	P1, P2, … , P27	Total variance Factor loading, Rotated component matrix	Ordinal	Factor analysis, correlation analysis and regression analysis

KEY

EC – e-commerce; App – Application

3.4 The Pilot study

3.4.1 Introduction

The pilot study was conducted between March and June 2012. The goal of the study was to pre-test the research instrument and also learn the data analysis process. The aim of the research was to investigate the extent of e-commerce adoption, the benefits realized, and determine the factors that influence e-commerce adoption among SMEs in Kenya. The outcome was to be used to make recommendations to stakeholders including SMEs and the Government. During the pilot study, the scope of e-commerce applications was limited to the utilization of information technology to enhance communication, information processing and integration of business processing. The study purposely focused on SMEs that had started using e-commerce to carry out transactions and interactions that affect existing business relationships or pre-existing contractual relations between trading partners, i.e. business-to-business and business-to-customer e-commerce.

3.4.2 Research Design

The research purposes and questions of this thesis can be described as confirmatory, a survey design approach was adapted which provided a non-threatening environment whereby SMEs responded to issues openly. This design was suitable because the study intended to gather information from a large number of respondents who were located in Nairobi city and its environments.

3.4.3 Research Instrument

In order to investigate e-commerce adoption in SMEs in Kenya, a survey instrument was developed to collect data in order to evaluate the model. A questionnaire was the main instrument in this study. Two sources of information were used to identify survey items namely: a review of the pertinent literature and the research instrument constructed by Dr. Ainin Sulaiman in a research on e-commerce applications in Malaysia in 1999 for National

Productivity Corporation (NPC). Questionnaires were distributed only to SMEs actively engaged in e-business that make use of the Internet in conducting all or part of their business. Eligible respondents were owners, managers or individuals in each firm best qualified to speak about the firm's overall e-business activities. They were asked to answer the questionnaire items.The first part consisted of dichotomous questions that required the respondent to indicate types of e-commerce applications they were using as well as those that were not being used. The second part of the questionnaire consisted of mostly Likert scale type of questions. A 5-point Likert scale questions was used, that require respondents to rate the hindrances of e-commerce where 5 indicates very high hindrance while 1 indicates very low hindrance. The third part of the questionnaires consisted of Likert scale items that measure benefits of e-commerce for those who have adopted e-commerce, where 1 indicates very high benefit while 5 indicates virtually no benefit. The fourth part of the questionnaires consisted of Likert scale items that measure attitudes and perceptions towards e-commerce for the respondents, where 1 indicates very high value while 5 indicates virtually no value. The fifth part of the questionnaires consisted of Likert scale items that measure importance considered attached to the social and cultural issues by staff of the respondents organization, where 1 indicates very high importance while 5 indicates virtually no importance.

The last part of the questionnaire consisted of questions about the profile of the firm that includes questions like what sector the firm is in, type of industry or business involved, size (number of employees), amount of investment in e-commerce etc. Due to commercial confidentiality, the names of the respondent SME organizations were be kept undisclosed.

3.4.4 Population and sample

The population for this study is defined as all SMEs registered and operating in Nairobi which had started using e-commerce during the sampling time frame. SMEs are often defined based on certain quantitative measures such as the number of staff, the amount of capital, the amount of assets and sales turnover. In Kenya the measure that would be most reliable will be the number of staff since it has no tax implications that may lead to falsification of data. For this study we consider the following criteria to define the SMEs.

The sample consisted of 31 firms working in seven different sectors as shown in the table below:

Table 3.6: Frequency distribution of the sample.

Industry Sector	Frequency	Percentage(%)
1. Construction	3	9.7
2. ICT Services	4	12.9
3. Health services	6	19.4
4. Sales & Marketing	6	19.4
5. Transport	5	16.1
6. Education	2	6.4
7. Other services	5	16.1
Total	31	100.0

3.4.5 Organizations Profiles

The sample organization profiles were summarized and tabulated. About 70% of sample organization had been established after 1990. Analysis of organizations maintenance support shows that 50% of the sampled SMEs depend on their own IT staff, 31% depend on vendors while the balance never indicated their source of support which could mean they have no support at all. Only 28% of organizations offer on-job training, 22% depend on training from local colleges, 31 % depend on In-house training while 53% did not report any form of training source. The average number of IT staff per organization is 6, this figure could be misleading because 22% of this organizations don't have IT staff.

3.4.6 Results and Conclusion

The results of the study revealed that the state of e-commerce adoption stands at an average of 53% among SMEs. The three most popular categories of e-commerce applications use in Kenya given in order were Consumer support services, Marketing, and Advertising. There is a difference in e-commerce applications adoption among different SME industry sectors on

average, and there is also a difference in e-commerce application adoption among individual applications among SMEs on the average.

The three most important benefits of e-commerce adoption reported by SMEs in Kenya were increase in efficiency in dealing with suppliers, enhanced company brand and corporate image, and improved customer service. The overall picture suggests that SMEs that have adopted e-commerce benefited more in terms of improved relationship with trading partners as opposed to increasing market share and their profits.

The results from sampled SMEs showed that there were no barriers of attitude and culture but clearly highlighted technical, financial, governmental, organizational and behavioral barriers in organizations. At the beginning of this study a conceptual framework of barriers to e-commerce adoption was proposed. By investigating various factors and testing hypotheses related to the barriers of e-commerce adoption the study has developed a model of barriers of e-commerce adoption which include technical, financial, governmental, organizational and behavioral barriers. In addition, the respondents when asked about pertinent issues (moderating factors) that they considered would influence the adoption of e-commerce among SMEs in Kenya, cited perceived risk, uncertainty, change and knowledge. Overall, one would expect that these results will help SME managers' to understand the benefits and socio-technical factors that impact on e-commerce adoption as well as the barriers that need to be addressed to enable faster e-commerce adoption. Policy makers in government and development agencies are expected to find these results critical in formulating and implementing policies on e-commerce adoption among SMEs.

CHAPTER FOUR: RESULTS AND FINDINGS

4.1 The Organizations Profiles

The sample organization profiles have been summarized in Appendix II. About 34.5% of sample organizations were established after the year 2000. Analysis of organizations maintenance support shows that 46.6% of the sampled SMEs depend on their own IT staff, 16.3% depend on vendors while the balance never indicated their source of support which could mean they have no support at all. At least 58.6% of organizations offer on-job training, 11.2% depend on training from local colleges, 43.1 % depend on In-house training while 15.5% did not report any form of training source. The average number of IT staff per organization is 6; this figure could be misleading because 18% of these organizations don't have IT staff.

4.2 Distribution of Sample SMEs

The data collected in the research was analyzed using descriptive statistics and the results tabulated below. The distribution of sampled organizations per sector is shown in Table 4.1. The organizations were randomly drawn from Nairobi, Central, Eastern, Western, and Nyanza regions of Kenya.

Table 4.1: Frequency Distribution per Sector

	Industry Sector	**Frequency**	**Percentage (%)**
1.	Manufacturing and Construction	14	12
2.	Media & ICT	15	13
3.	Health Services	13	11
4.	Sales and Marketing	18	15
5.	Transport	9	8
6.	Education	14	12
7.	Hospitality	11	9
8.	Finance and Insurance	14	14
9.	Agriculture and Food processing	11	9
	Total	119	100

The distribution in Table 4.1 above show the actual SMEs frequency distribution per sector from the data collected. The observation made during the administration and verification of Questionnaires is that some sectors such as Sales and Marketing, and Media and ICT had a higher number of valid questionnaires compared to those with low frequencies such as Transport.

Table 4.2: Sample Frequency Distribution per Region.

	Region	**Frequency**	**Percentage**
1.	Nairobi	48	40.3
2.	Central	17	14.3
3.	Nyanza	22	18.5
4.	Eastern	24	20.2
5.	Western	8	6.7
	Total	119	100

Table 4.2 shows the distribution of the sample collected per region, with Nairobi having the highest occurrence while Western region has the lowest. This observation could be related to the total number of SMEs operating in the region.

4.3 Adoption of E-commerce Applications

This section treats the data by computing descriptive statistics related to the first objective which sought to investigate the extent of e-commerce adoption among SMEs in Kenya.

4.3.1 State of E-commerce Adoption

The results in Table 4.3 indicate the state of adoption among those organizations that have already started using e-commerce applications. Out of the 119 firms surveyed, 13% of them are at promotion level, 26% at the provision stage, 27% at the transaction stage while 34% have moved on to the integration stage. However, the figures might not be conclusive as the firms were classified in the highest stage where it has adopted a majority of the applications. Therefore, it is important to examine the percentage of adoption in each individual e-commerce application.

Table 4.3: State of E-commerce adoption

Adoption stage	Frequency	Percentage (%)
Promotion	16	13
Provision	31	26
Transaction	32	27
Integration	40	34
Total	119	100

The distribution of sampled organizations per region is shown in Table 4.2.

4.3.2 Adoption of Individual E-commerce Applications

The Table 4.4 below shows the list of percentage e-commerce application adoption among the SMEs, weighted according to the total number of SMEs. In order to understand better the e-commerce application adoption the various applications have been grouped into six categories. The percentage adoption of each application as well as for each category have been computed and tabulated accordingly. The categories listed include Marketing, Advertising, Customer service, Order and delivery, Payment system, and Mobile-commerce.

Table 4.4: Adoption of E-commerce Applications

E-commerce Applications	**Percentage (%)**	
	In Use	**Not in Use**
Electronic Marketing		
Research on Consumer preferences	85	15
Evaluation of new suppliers	74	26
Research on Competitors	78	22
Electronic Advertising		
Displaying Co. information on products & services	87	13
Web site hosted by another company	45	55
Web hosted by own sever	60	40
Advert on 3rd party website	31	69
Electronic Catalogues	57	43
Consumer Support Service		
Online help (FAQ)	69	31
Online help-product update	73	27
Handling customer feedback	72	28
Personal email communication	82	18
Online application/ registration	62	38
Order and Delivery		
Processing sales order online	53	47
Coordinating procurement online	51	49
Tracking incoming and outgoing goods delivery	34	67
Electronic Data Interchange (EDI)	44	57
Payment System		
Electronic Fund Transfer (EFT)	69	31
Online Credit Processing	38	62
Smart Cards	55	45
Prepaid Cards	49	51
Mobile Commerce		
Banking & Finance services	87	13
Wireless Advertising	53	47
Games & entertainment	31	69
Working from home/out-of office	42	58

4.3.3 Electronic Marketing

From the statistics obtained (Table 4.4), the extent of adoption in this application is considered high as 85% of the firms surveyed implemented research on consumers' preferences, 74% carry out evaluation of new suppliers and 78% are doing research on competitors. This may be attributed to the fact that SMEs adopt e-commerce in order to become more competitive through understudying their competitors, customer preferences and tracking new customers.

4.3.4 Electronic Advertising

The adoption rate in this area is average, although 87% display company information on products and services, only 45% have their Web site hosted by another company. Those whose Web site is hosted by own sever is 60%, 31% advertise on third party website and 57% have electronic catalogues. The most preferred mode of electronic advertising is displaying company information, followed by hosting own server. This could have been motivated by a desire to improve their corporate image.

4.3.5 Customer Support Service

This service is closely related to relationship management. It appears that most companies are providing some support services to their customers through the Internet as 69% of them have Online frequently asked questions (FAQ) service, 73% provide Online help-product update, 72% are handling customer feedback online, 82% use personal email communication and 62% Online application as well as registration. This is the second most popular application after Electronic Marketing. This may be an indication that the number of customers who require online support is growing considering that there has been significant increase in the use of Internet over the last five years (see Appendix IV). It can be noted that Kenya emerged third among the Africa top ten Internet user countries.

4.3.6 Order and Delivery

Although this application comprises some of the most important functions of companies, the uptake is surprisingly low. For instance only 53% engage processing sales order online, 51% coordinate procurement online, only 34% firms track incoming and outgoing goods delivery and 44% Electronic Data Interchange (EDI). The relatively lower adoption above could be explained by the concerns they have over security of online credit transactions (Table 4.16, Item P9: 50.5%).

4.3.7 Payment System

It is evident that the usage of online payment system is average in fact lower than electronic marketing, electronic advertising and customer support. From the results obtained, 69% of firms use electronic fund transfer (EFT), only 38% carry out online credit processing, 55% make use of smart cards and 49% use prepaid cards. The slow uptake of payment system could be explained firstly, in terms of concerns over insufficient security for online credit (50.5%). Secondly, the introduction of M-PESA (mobile money) which is a mobile-phone based money transfer (Vodacom, 2010) and micro-financing service, launched in 2007 by Vodafone for Safaricom and Vodacom, the largest mobile network operators in Kenya and Tanzania (Saylor, 2012) together with other mobile money services including Airtel Money and MobiCash, may have taken over a large part of the traditional payment system business. For instance, M-PESA service has spread quickly, and by 2010 had become the most successful mobile phone based financial service in the developing world. M-PESA is a branchless banking service; M-PESA customers can deposit and withdraw money from a network of agents that includes airtime resellers and retail outlets acting as banking agents (Jack et al., 2010). By 2012, a stock of about 17 million M-PESA accounts had been registered in Kenya (CCK Statistics, 2012). The service has been lauded for giving millions of people access to the formal financial system and for reducing crime in an otherwise largely cash-based society (Mutiga, 2014).

4.3.8 Mobile Commerce

The mobile commerce applications can be considered as having picked-up very fast over the last ten years. As the statistics in Table 4.4 reveal that 87% companies are using mobile banking & finance services, 53% use wireless advertising, 31% enjoy games & entertainment over their mobile sets and 42% engage in working from home and/or out-of office.

The results indicate that SMEs in Kenya are at just above average state of e-commerce adoption. This outcome is further demonstrated by splitting the sample into high, moderate and low level of adoption based on the number of applications that have been adopted where those firms which are using less than 9 applications are classified as low adoption, firms with between 9 and 17 application as moderate adoption and those with 18 to 25 applications as high adoption group. This is shown in Table 4.5.

Table 4.5: Extent of E-commerce Adoption

	Frequency	**Percentage**	**Valid Percentage**
Low adoption	19	16.0	16.0
Moderate adoption	60	50.0	50.0
High adoption	40	34.0	34.0
Total	119	100.0	100.0

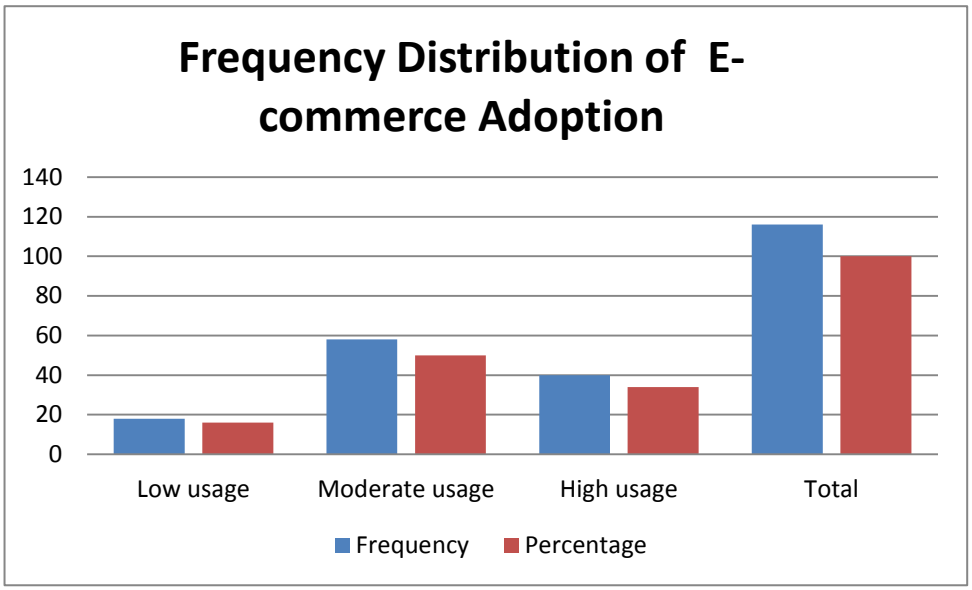


Figure 4.1: Frequency Distributions of E-commerce Adoption

The graph above shows the distribution of the extent of e-commerce application usage expressed as a percentage.

4.4 Adoption of E-commerce Application per Sector

Table 4.6 shows the adoption of e-commerce applications per sector for the nine sectors considered in the study expressed as percentages.

Table 4.6: Adoption of E-commerce per Sector

	Industry Sector	**Sample Size**	**Marketing (%)**	**Advertis-ing (%)**	**Customer Service (%)**	**Order & Delivery (%)**	**Payment System (%)**	**Mobile Commerce (%)**	**Mean (%)**
1	Manufacturing and Construction	14	81	56	76	48	43	53	60
2	Media and ICT	15	80	56	73	32	40	60	57
3	Health services	13	74	63	80	56	75	54	67
4	Sales and Marketing	18	93	51	66	74	76	54	69
5	Transport	9	70	41	63	41	37	37	48
6	Education	14	76	59	81	27	43	63	58
7	Hospitality	11	76	49	67	43	59	50	57
8	Finance and Insurance	14	81	71	81	57	71	66	71
9	Agriculture and Food processing	11	70	45	55	34	39	39	47
	Mean (%)		78	55	71	46	54	53	59

The results show that on the average the adoption of e-commerce in the nine sectors sampled during the study is 59%. The sector usage of e-commerce in descending order were; Finance and Insurance 71%, Sales and Marketing 69%, Health Services 67%, Manufacturing and Construction 59%, Education 58%, Media and ICT 57%, Hospitality 57%, Transport 48%, and, Agriculture & Food processing at 47%. Similarly, the results show that the adoption of individual application varies as follows (given in descending order); Marketing 78%, Customer service 71%, Advertising 55%, Payment System 54%, Mobile Commerce 53% and Order & Delivery at 46%.

4.5 Hypotheses

In order to test whether there is any significant difference in e-commerce adoption among different industry sectors we shall set a hypothesis. According to a study done by Payne (2006), e-commerce will not benefit all economic sectors in the same industry in the same way, suggesting that it is most likely to benefit sectors that activities and products that can be used or delivered electronically.

In the light of existing literature we state the Null hypotheses H_0 which represents a theory that we believe to be true about e-commerce adoption in Kenya and the alternative hypotheses as follows:

H_0: there is a difference in e-commerce applications adoption by SMEs among different industry sectors on average

H_a: there is no difference in e-commerce applications adoption by SMEs among different industry sectors on average

In the case of the adoption of individual e-commerce applications by all SMEs we set the following hypothesis:

H_0': there is a difference in e-commerce application adoption of individual applications by SMEs on average

$H_{a'}$: there is no difference in e-commerce application adoption of individual applications by SMEs on average

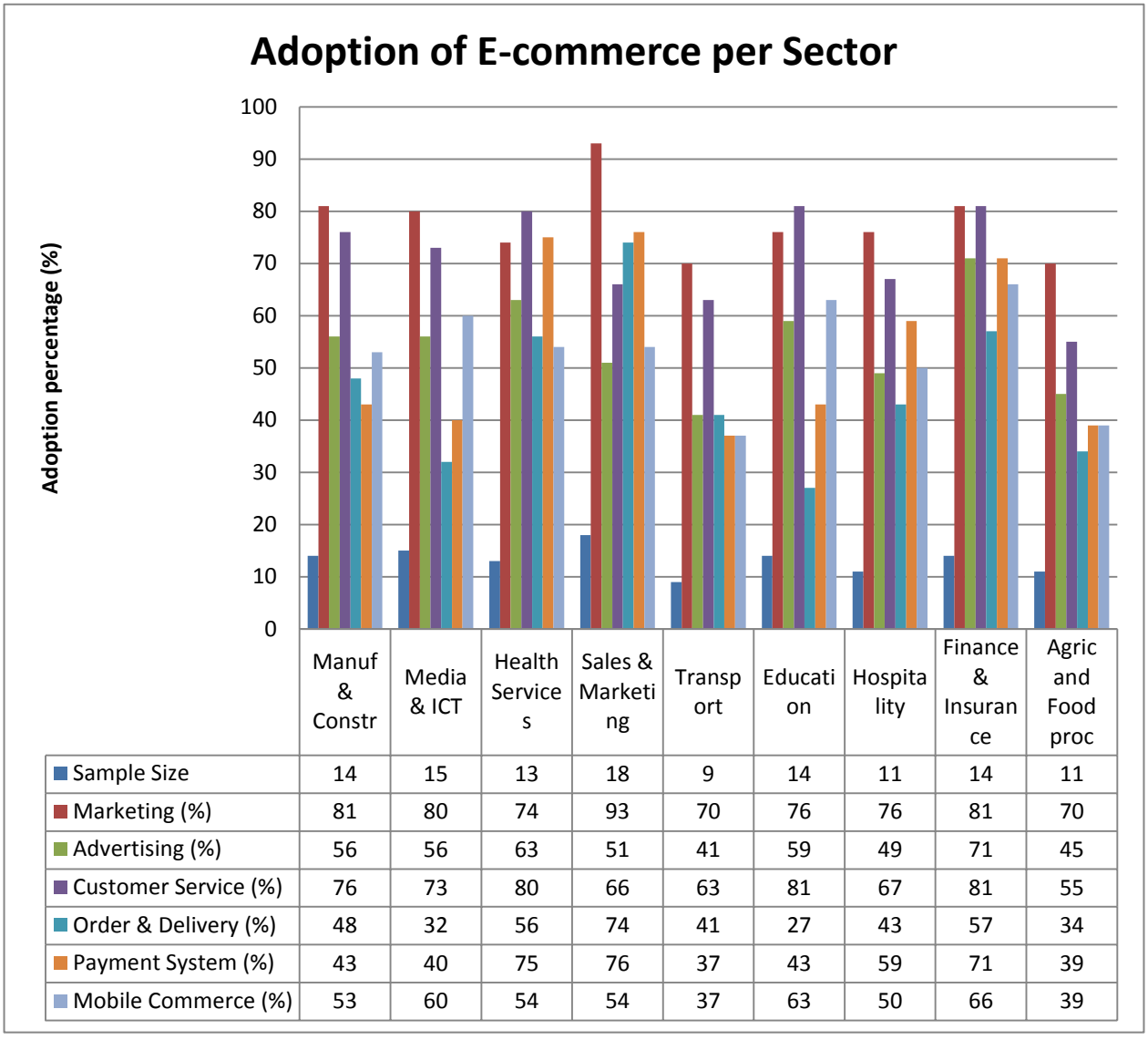
The last column of Table 4.6 shows the mean e-commerce adoption per industry sector. There are clear differences in the figures shown, thus H_0 is supported.

The last row of Table 4.6 shows the mean e-commerce adoption per individual application. There are clear differences in the figures shown, thus $H_{0'}$ is supported.

It can therefore be stated that there is a difference in e-commerce applications adoption by SMEs among different industry sectors on average, and there is a difference in e-commerce application adoption by SMEs of individual applications by SMEs on average.

Figure 4.2 shows a comparison of the adoption of e-commerce applications per sector for the six applications used in this research.

Figure 4.2: Adoption of E-commerce Application per Sector



	Manuf & Constr	Media & ICT	Health Services	Sales & Marketing	Transport	Education	Hospitality	Finance & Insurance	Agric and Food proc
Sample Size	14	15	13	18	9	14	11	14	11
Marketing (%)	81	80	74	93	70	76	76	81	70
Advertising (%)	56	56	63	51	41	59	49	71	45
Customer Service (%)	76	73	80	66	63	81	67	81	55
Order & Delivery (%)	48	32	56	74	41	27	43	57	34
Payment System (%)	43	40	75	76	37	43	59	71	39
Mobile Commerce (%)	53	60	54	54	37	63	50	66	39

4.6 Correlation Analysis

The population correlation coefficient ρ (rho) measures the strength of the association between the variables. The sample correlation coefficient r is an estimate of ρ and is used to measure the strength of the linear relationship in the sample observations. The Pearson's correlation coefficient (r), for continuous (interval level) data ranges from -1 to +1. The inter-item correlation in Table 4.7 below shows that there are significant correlations in adoption between pairs of e-commerce applications. Descriptive statistics on correlation variables is given in Table 4.8.

Table 4.7 Inter-Item Correlation Matrix

	Marketing	**Advertising**	**Customer_ Service**	**Order_ delivery**	**Payment_ System**	**Mobile_ commerce**
Marketing	1.000	.300	.229	.684	.539	.519
Advertising	.300	1.000	.881	.241	.523	.876
Customer_service	.229	.881	1.000	.089	.341	.847
Order_delivery	.684	.241	.089	1.000	.842	.128
Payment_system	.539	.523	.341	.842	1.000	.400
Mobile_commerce	.519	.876	.847	.128	.400	1.000

Table 4.8 Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	59.352	45.778	77.889	32.111	1.701	153.706	6

According to the results in Table 4.7, all the variable pairs have significant (i.e. greater than 0.3 in absolute terms (Campbell & Machin, 1999)) linear relationships. A positive correlation indicates that both variables increase or decrease together. Any negative correlation would have indicated that as one variable increases, the other decreases, and vice versa. All the variable pairs under

study have a positive correlation, which suggests that adoption of one application positively influences the adoption of the other.

4.7 Cronbach's Alpha

Alpha was developed by Lee Cronbach in 1951 to provide a measure of the internal consistency of a test or scale; it is expressed as a number between 0 and 1. Internal consistency describes the extent to which all the items in a test measure the same concept or construct and hence it is connected to the inter-relatedness of the items within the test. Internal consistency should be determined before a test can be employed for research or examination purposes to ensure validity. Descriptive Statistics:

Table 4.9 Case Processing Summary

		N	%
Cases	Valid	9	100.0
	Excluded[a]	0	.0
	Total	9	100.0

a. Listwise deletion based on all variables in the procedure.

Table 4.10 Reliability Statistics

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.829	.855	6

The alpha coefficient for the six items is 0.829, suggesting that the items have relatively high internal consistency. (Note that a reliability coefficient of 0.70 or higher is considered "acceptable" in most social science research situations.)

4.8 State of E-commerce Application Adoption

According to White et al. (1998) in their study of web adoption by the publishing industry, adoption is measured according to business activities undertaken on-line, rather than the technology features or platforms utilized. The extent of e-commerce adoption for an organization has been computed as the ratio of the number of e-commerce applications reported to have been adopted by the respondent to the total applications considered in the research. When obtained the higher the computed ratio for the state of adoption the larger the extent of e-commerce adoption. The state of adoption for the sample organizations has been summarized in a frequency table as shown in Table 4.11.

Table 4.11: State of E-commerce Application Distribution

	Adoption State (%)	Organization Frequency
1	0 – 20	5
2	21 – 40	19
3	41 – 60	28
4	61 – 80	58
5	81 – 100	9

The computed average state of e-commerce application adoption is 59%

Figure 4.3: State of E-commerce Application Adoption

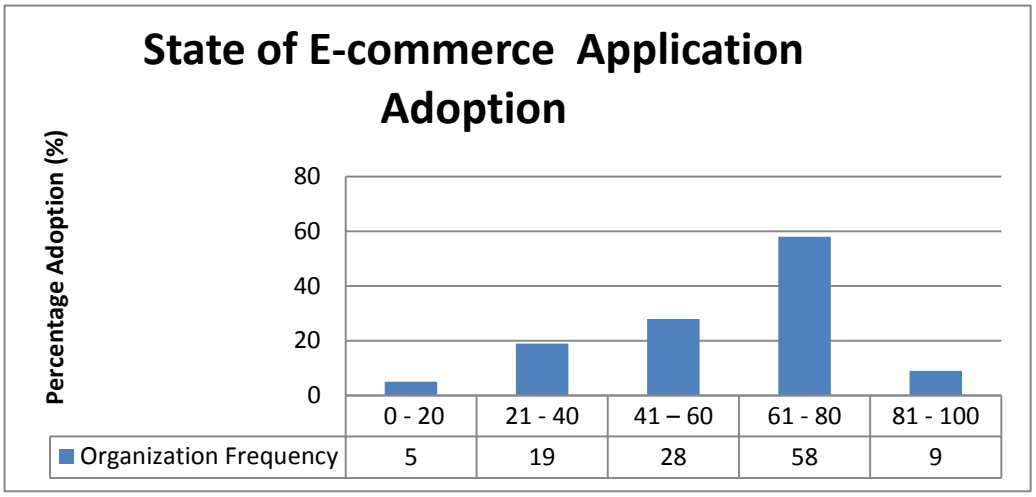


Figure 4.3 shows the frequency distribution of the state of e-commerce adoption among sample organizations. The distribution appears to be skewed towards the left, with the highest number of organizations occurring in the range of 61 – 80 percent. This illustration agrees with the statistical e-commerce application mean which we found to be 59%.

Figure 4.4: State of Adoption Application Frequency Graph

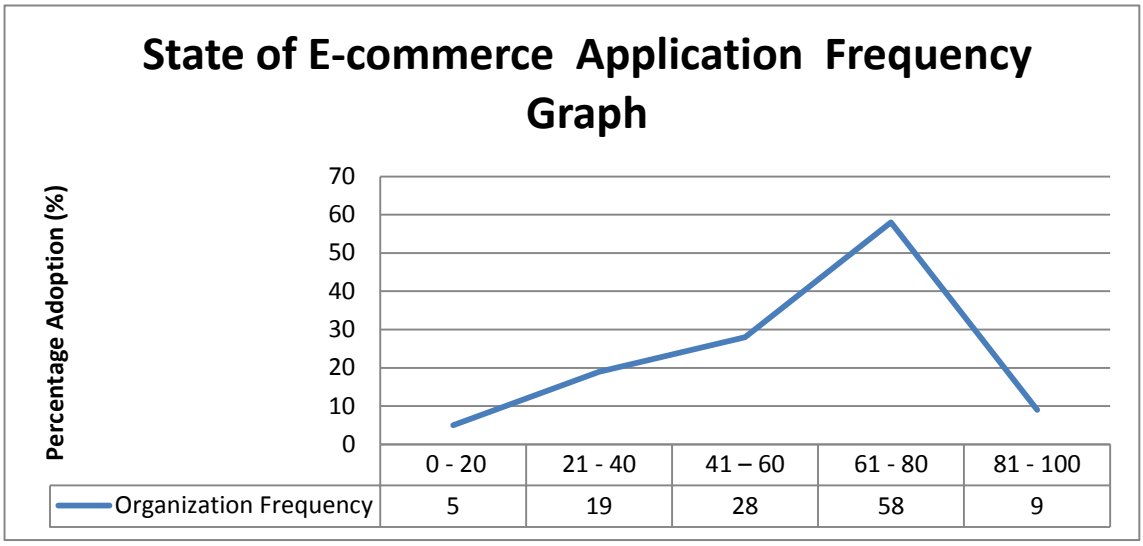


Figure 4.4 shows the frequency distribution of the state of e-commerce adoption among sample organizations expressed as a line graph.

4.9 Social and Cultural Issues

In order to determine the importance of the social and cultural factors towards e-commerce adoption, respondents were asked to rate the social and cultural factors of e-commerce on a five point Likert scale ranging from 1 (very high) to 5 (virtually no importance). The summary of respondents' score of the importance of each item on the given scale is recorded in the Table 4.12.

Table 4.12: Importance of Social and Cultural Factors

	Variable	Social and Cultural factor	Mean score of factor Importance	Standard Deviation
1.	SC1	Decision making process being executed in top down fashion	2.24	1.08
2.	SC2	Relation with trading partners	1.89	0.94
3.	SC3	Protection of company image	2.06	0.96
4.	SC4	Personal innovation and creativity	2.25	1.14
5.	SC5	Socializing in order to obtain business contacts (Personal network)	2.03	1.07
		Mean	2.09	

Note: The scoring is based on 1 denoting that respondents observed Very High, 2 High, 3 Moderate, 4 Low, 5 Virtually no importance

The three main social-cultural factors cited in order of importance by respondents in adoption e-commerce applications were firstly, relation with trading partners; the SMEs see their online presence as an opportunity to create and improve their relationships with customers, suppliers and other trading partners. Secondly, socializing in order to obtain business contacts; the SMEs have realized the value of engaging potential customers and prospective business partners through social media to obtain contacts that may lead to concrete business transactions. Thirdly, protection of company image; SMEs consider the use of e-commerce applications as a means of protecting and even enhancing their corporate image in a competitive market environment, where customers prefer to engage credible providers of products and services.

The remaining two factors rated as moderate to high in importance by the respondents are: decision making process being executed in top down fashion and personal innovation & creativity. The respondents rate this two nearly as important as the other three factors enablers in the adoption of e-commerce. The mean score for social and cultural factors of e-commerce

adoption was 2.09 which imply high in terms of importance of social & cultural views of e-commerce's adoption. It shows that the respondents have a favorable or positive attitude towards e-commerce adoption.

4.10 Attitude Factors of E-commerce Adoption

In order to determine the importance of attitude towards e-commerce adoption, respondents were asked to rate the importance of attitude factors towards e-commerce adoption on a five point Likert scale ranging from 1 (very high) to 5 (virtually no importance). The summaries of respondents' score of the importance of each item on the given scale are recorded in the Table 4.13.

Table 4.13: Importance of Attitude Factors in E-commerce Adoption

	Variable	Attitude Factor	Mean	Standard Deviation
1.	AT1	Using e-commerce is important to our business	1.72	0.88
2.	AT2	Having e-mail is important to our business	1.50	0.84
3.	AT3	Having a website is important to our business	1.58	0.94
4.	AT4	The Internet is a viable business tool	1.69	0.94
5.	AT5	Smart cards are useful for our business activities	2.25	1.26
6	AT6	Mobile banking /financial are important to our business	1.79	1.09
		Mean	1.76	

Note: The scoring is based on 1 denoting that respondents observed Very High, 2 High, 3 Medium, 4 Low, 5 Virtually no importance

The three outstanding attitude factors cited in order of importance by respondents in deploying e-commerce applications is firstly, having e-mail is important to our business; the SMEs see the

efficiency and effectiveness of using email for communication in their business as a very essential tool at minimal cost. Secondly, having a website is important to our business; this attitude explains why SMEs prefer hosting their own website (60%) as opposed to using a third party website (31%) as recorded in table 4.4. This suggests that owning a website is considered to be a valuable asset to SMEs. Thirdly, the Internet is a viable business tool; SMEs have come to appreciate the use of Internet as a platform that enables them integrate services and interact with customers and potential business partners.

The other three factors which were rated high but relatively of lesser importance for deploying e-commerce by respondents listed in order were: Using e-commerce is important to our business, Mobile banking /financial are important to our business, and Smart cards are useful for our business activities. The respondents consider having a web presence and engaging e-commerce type of business transactions as important for their business survival in a competitive environment.

The mean score for attitude factors of e-commerce adoption was 1.76 which imply high importance in user attitude towards e-commerce's adoption. It shows that the respondents have a favorable or positive attitude towards e-commerce adoption. This high positive attitude towards e-commerce among respondents can act as an accelerator to e-commerce adoption.

4.11 Hypotheses and Hypothesis Testing

The technology acceptance model (TAM) (developed by Davis, 1986 cited by Bolongkikit et al, 2006) postulates that the potential user of e-commerce must not only be convinced of the relevant usefulness/advantages of e-commerce but also have a positive attitude towards it. In addition Poon and Swatman (1997) espouse that the adoption of Internet by small businesses and its ongoing usage is driven by the perceived benefits and potential business opportunities that are offered to the business. Accordingly, we formulated and sought to test the following hypotheses:

H_8: SMEs have a positive / favourable attitude towards e-commerce.

H_9: SMEs have a positive social-cultural orientation towards e-commerce.

Details in Table 4.14 outline the hypothesis which the research sought to test.

Regarding $H_{8,}$ five out of six attitude factors had mean scores between 1.50 and 1.79 representing high to very high importance. The sixth had a mean of 2.25 being highly important. This shows that SMEs have a very positive attitude towards e-commerce. Concerning $H_{9,}$ all five social-cultural factors analyzed show a mean score between 1.89 and 2.25, which fall in the range high to very high importance category. This reveals that SMEs have a positive social and cultural orientation towards e-commerce.

Table 4.14 Hypothesis Testing

Hypothesis Number	Hypothesis	Mean Score (X)	Result
H_8	SMEs have a positive/favourable attitude towards e-commerce	1.76	Accepted
H_9	SMEs have a positive/favourable social-cultural orientation towards e-commerce	2.05	Accepted

Key: X< 3 Accept, X>=3 Reject

This findings agree with the results of a study by (Barua, Konana, Whinstone, and Yin, 2004; Oliveira and Matins, 2010) where it was found that pressure from customers and suppliers for electronic business was major determinant of e-commerce adoption and use within business operations.

4.12 Barriers of E-commerce Adoption

This research was confirmatory research due to its objective of describing the causal relationship through hypotheses testing (Mahotra, 2004). In order to determine the extent to which specific

factors influences the adoption of e-commerce the respondents were asked to circle only one appropriate value on a five point Likert scale (Singarimbun and Effendi, 1995). The respondents were asked to state the extent to which they agree or disagree with each listed factor by rating the importance of perceived barriers or hindrances in influencing their decision to adopt the e-commerce on a five point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Table 4.15 is a summary of respondents' perception about e-commerce and reason why they have not adopted it in their business operations.

Table 4.15: Respondents views on Barriers to Adoption of E-commerce

No	Variable	Reason	Mean score for Agree	Standard. Deviation
1	P1	High cost of setting up electronic commerce	3.41	1.28
2	P2	It is difficult to access credit facilities	2.90	1.22
3	P3	Cost of Internet connectivity in terms of rate per minute is too high	3.10	1.22
4	P4	Electronic commerce is not as effective as traditional marketing channel	2.22	1.25
5	P5	Electronic commerce applications are difficult to use	2.42	1.27
6	P6	Our management structure is well defined, with clear job description for everyone	3.09	1.42
7	P7	Lack of employee knowledge/skills to use E-Commerce	2.60	1.30
8	P8	Our organization lacks adequate resources for E-Commerce	2.59	1.26
9	P9	Insufficient security for online credit payment transaction	3.02	1.27
10	P10	Lack of adequate Bandwidth/Access speed for Internet	2.89	1.34
11	P11	Lack of IT skilled developers of electronic Commerce	2.54	1.35
12	P12	Problems between ISP and telecoms supplier taking responsibility for service failures/problems	2.75	1.19
13	P13	Lack of standards/regulations from government on electronic commerce issues	3.06	1.17
14	P14	Insufficient incentives from the government for Electronic commerce	3.09	1.26
15	P15	There is lot of pressure from suppliers/buyers	2.97	1.17

		demanding we use e-commerce applications		
16	P16	Telecommunication infrastructure is not adequate	2.89	1.12
17	P17	Market potential of electronic commerce user is too small	3.01	1.12
18	P18	Lack of government leadership	2.69	1.29
19	P19	There is no perceived relative advantage in using e-commerce	3.35	1.26
20	P20	Incompatibility with other existing technologies	2.71	1.24
21	P21	The integration of e-commerce is quite complex	2.71	1.1
22	P22	Weak support from top organizations management	2.85	1.31
23	P23	Lack of sufficient E-Commerce knowledge in management	2.96	1.26
24	P24	Keeping up with changing technology	3.22	1.29
25	P25	Mindset shift towards using electronic commerce	3.18	1.12
26	P26	Our sales/marketing requires high degree of human Interaction	3.32	1.32
27	P27	It will upset existing distribution channels	2.81	1.35

Note: The scoring is based on 5 denoting that respondents strongly agree, 4 Agee, 3 Neutral, 2 Disagree, 1 Strongly disagree

The respondents mean scores of variables P1 to P27 and the summary of their results are show in Table 4.16

Table 4.16 Summary of Views on Barriers to E-commerce Adoption

No	**Variable**	**Reason**	**Percentage Agree (%)**	**Percentage Disagree (%)**
1	P1	High cost of setting up electronic commerce	60.25	39.75
2	P2	It is difficult to access credit facilities	47.5	52.5
3	P3	Cost of Internet connectivity in terms of rate per minute is too high	52.5	47.7
4	P4	Electronic commerce is not as effective as traditional marketing channel	30.5	69.5

5	P5	Electronic commerce applications are difficult to use	35.5	64.5
6	P6	Our management structure is well defined, with clear job description for everyone	52.25	47.75
7	P7	Lack of employee knowledge/skills to use E-Commerce	40	60
8	P8	Our organization lacks adequate resources for E-Commerce	39.75	60.25
9	P9	Insufficient security for online credit payment transaction	50.5	49.5
10	P10	Lack of adequate Bandwidth/Access speed for Internet	47.25	52.75
11	P11	Lack of IT skilled developers of electronic Commerce	38.5	61.5
12	P12	Problems between ISP and telecoms supplier taking responsibility for service failures/problems	43.75	66.25
13	P13	Lack of standards/regulations from government on electronic commerce issues	51.5	48.5
14	P14	Insufficient incentives from the government for Electronic commerce	52.25	47.75
15	P15	There is lot of pressure from suppliers/buyers demanding we use e-commerce applications	49.25	51.75
16	P16	Telecommunication infrastructure is not adequate	47.25	52.75
17	P17	Market potential of electronic commerce user is too small	50.25	49.75
18	P18	Lack of government leadership	42.25	57.75
19	P19	There is no perceived relative advantage in using e-commerce	58.75	41.25
20	P20	Incompatibility with other existing technologies	42.75	57.25
21	P21	The integration of e-commerce is quite complex	42.75	57.25
22	P22	Weak support from top organizations management	46.25	53.75
23	P23	Lack of sufficient E-Commerce knowledge in management	49	51
24	P24	Keeping up with changing technology	55.5	44.5
25	P25	Mindset shift towards using electronic commerce	54.5	45.5
26	P26	Our sales/marketing requires high degree of human Interaction	58	42
27	P27	It will upset existing distribution channels	45.25	54.75

The four most important barrier factors are; high cost of setting up electronic commerce (P1) at 3.41 (60%), there is no perceived relative advantage in using e-commerce (P19) at 3.35 (59%), our sales/marketing requires high degree of human interaction (P26) at 3.32 (58%) and challenges of keeping up with changing technology P24 at 3.22 (56%).

Since most of the variable mean scores do not lead to conclusive results there is need to perform factor analysis in order to reduce them to fewer factors that would explain the barriers to e-commerce adoption better. It was noted that some of the items may be interrelated or interdependent.

Besides, they did not adequately show any relationship between those barriers and the level of e-commerce adoption. Therefore, two other advanced statistical analyses namely factor and regression analyses were used.

4.13 Factor Analysis

The main objective of factor analysis is to analyze the structure comprising of variables and group them into a set of factors, thus achieving the purposes of data reduction and summarization. Factor analysis is suitable for both confirmatory as well as exploratory studies (Hair et al. 1998). Since there are no established theories related to barriers of e-commerce adoption by SMEs, this study was exploratory in nature. The question of sample size was addressed in this research. We used a sample size of 119 against 27 variables, this do not meet the number of variables to sample size ratio of 1:5, however factor analysis could be used for sample size of more than 50 (Hair et al., 1998). Moreover the correlation matrix obtained using SPSS (Table 4.20) revealed existence of substantial number of significant correlations (with significance level at 0.05) among the variables. Besides, Bartlett test of sphericity (Table 4.21) indicated that some of the variables are significantly correlated, having a KMO measure of 0.802, therefore factor analysis was deemed appropriate for this study.

4.13.1 Reliability Tests

The results in Table 4.17 and Table 4.18 show the outcome of statistical analysis performed on the data cases to test its reliability.

Table 4.17 Case Processing Summary

		N	%
Cases	Valid	103	86.6
	Excluded[a]	16	13.4
	Total	119	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Table 4.18 Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.913	.914	27

The alpha coefficient for the four items is 0.913, suggesting that the items have relatively high internal consistency. (Note that a reliability coefficient of 0.70 or higher is considered ”acceptable" in most scientific research situations (Field, 2009; Warmbrod, 2001; Nunnaly, 1978).

Table 4.19 Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	2.907	2.243	3.398	1.155	1.515	.080	27

4.13.2 The Correlation Matrix

The next result from the analysis is the correlation coefficient. A correlation matrix is simply a rectangular array of numbers which gives the correlation coefficients between a single variable and every other variable in the investigation. The correlation coefficient between a variable and itself is always 1; hence the principal diagonal of the correlation matrix contains 1s. The correlation coefficients above and below the principal diagonal are the same.

Table 4.20 below shows a correlation matrix which was generated for all variables inhibiting e-commerce in order to explain correlation between them and identify pairs of variables not significantly correlated. If the correlation between variables (in absolute value) are small, it is unlikely that they share common factors (variables must be related to each other for the factor model to be appropriate). Correlation coefficients greater than 0.3 in absolute value are indicative of acceptable correlations (Campbell & Machin, 1999).

Table 4.20: Correlation Matrix.

<will be inserted>

The three factor pairs with the highest correlation are firstly, challenges of keeping up with changing technology (P24) is positively correlated to mindset shift towards using electronic commerce (P25) with p-value of 0.658 which means that slow mindset shift is the main cause of inability to keep up with changes in technology. Secondly, weak support from the top organizations management (P22) is positively correlated to lack of sufficient e-commerce knowledge in management (P23) with p-value of 0.586. This means that lack of sufficient knowledge in e-commerce is the main reason for the weak support of e-commerce adoption from top management. Thirdly, telecommunication infrastructure is not adequate (P16) is positively correlated to lack of government leadership (P18) with p-value of 0.582. This means that inadequate telecommunications infrastructure is caused by lack of government leadership in e-commerce adoption.

The three best cases of non-correlation given in order are: There is no perceived relative advantage in using e-commerce (P19) is negatively non-correlated to Weak support from top management with p-value of -.006, Insufficient security for online credit payment transaction (P9) is positively non-correlated to 'There is no perceived relative advantage in using e-commerce (P19)' with p-value of .009, and thirdly 'There is a lot of pressure from suppliers/buyers demanding we use e-commerce applications' is positively non-correlated to ''Telecommunication infrastructure is not adequate' with a p-value of .013. In each of this three cases we conclude that there is no correlation in each pair since the p-value is less than 0.3.

4.13.3 KMO and Bartlett Tests

The Kaiser-Meyer Olkin (KMO) test was carried out on sample data and the results tabulated in Table 4.21.

Table 4.21 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.802
Bartlett's Test of Sphericity	Approx. Chi-Square	1279.657
	Df	351
	Sig.	.000

The KMO measures the sampling adequacy which should be greater than 0.5 for a satisfactory factor analysis to proceed. If any pair of variables has a value less than this, we consider dropping one of them from the analysis. Looking at the table above, the KMO measure is 0.802. Kaiser (1974) recommend 0.5 as minimum (barely accepted), values between 0.7-0.8 acceptable, and values above 0.9 are excellent.

Bartlett's test is another indication of the strength of the relationship among variables. This tests the null hypothesis that the correlation matrix is an identity matrix. An identity matrix is a matrix in which all of the diagonal elements are 1 and all off diagonal elements are 0. We want to reject this null hypothesis.

From the same table, we can see that the Bartlett's test of sphericity is significant. That is, its associated probability is less than 0.05. In fact, it is actually 0.000, i.e. the significance level is small enough to reject the null hypothesis. This means that correlation matrix is not an identity matrix.

4.13.4 Communalities

Further, factor analysis was applied by comparing the pattern of correlations between observed measures. Measures that are highly correlated were likely to be influenced by the same factors while those that are uncorrelated are likely to be influenced by different factors. Factor analysis produced communalities of the variables which is the proportion of the variance that each item has in common with other items. Table 4.22 shows the communalities of the variables with extraction method being the principal component analysis. The research results revealed that over 79.6% of barriers to e-commerce adoption by SMEs in Kenya is accounted for by weak support from top organization management. This is followed by keeping up with changing technology at 78.8%. Another 76.1% of e-commerce adoption is explained by problems between ISP and telecommunication companies. The rest of the findings are as presented in Table 4.22.

Table 4.22 Communalities

	Initial	Extraction
Cost of Setting up E-Commerce	1.000	.584
Difficult to access credit	1.000	.541
Cost of Internet connectivity	1.000	.577
EC not as effective as traditional market	1.000	.527
EC apps are difficult to use	1.000	.748
Our mgnt structure is well defined	1.000	.541
Lack of employee knowledge	1.000	.621
Our org lacks resources	1.000	.676
Insufficient security for online credit	1.000	.546
Lack of adequate bandwidth	1.000	.729
Lack of IT skilled developers	1.000	.641
Problems between ISP and telecoms	1.000	.761
Lack of std regulations from Gov	1.000	.571
Insufficient incentives from govt	1.000	.713
Lot of pressure from suppliers	1.000	.728
Tel infrastructure inadequate	1.000	.655
Market potential EC too small	1.000	.600
Lack of govt leadership	1.000	.710
There is perceived relative advantage	1.000	.582
Incompatibility with other technologies	1.000	.582
Integration of EC is quite complex	1.000	.628
Weak support from top organization mgnt	1.000	.796
Lack of sufficient EC knowledge in mgnt	1.000	.748
Keeping up with changing technology	1.000	.788
Mindset shift towards EC	1.000	.709
Our Marketing requires high degree of H.I	1.000	.726
It will upset distribution channels	1.000	.559

Extraction Method: Principal Component Analysis.

4.13.5 Total Variance Explained

Table 4.23 Total Variance Explained

Component	Initial Eigen values			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.574	31.755	31.755	3.029	11.218	11.218
2	2.114	7.831	39.585	2.818	10.437	21.655
3	1.646	6.097	45.682	2.637	9.767	31.421
4	1.495	5.538	51.221	2.618	9.698	41.119
5	1.418	5.251	56.472	2.549	9.441	50.561
6	1.240	4.591	61.063	2.292	8.490	59.050
7	1.099	4.071	65.134	1.643	6.084	65.134
8	.931	3.450	68.584			
9	.853	3.160	71.743			
10	.803	2.974	74.717			
11	.758	2.806	77.524			
12	.717	2.656	80.179			
13	.688	2.547	82.726			
14	.578	2.142	84.868			
15	.544	2.016	86.883			
16	.521	1.931	88.815			
17	.454	1.681	90.495			
18	.408	1.510	92.006			
19	.381	1.412	93.418			
20	.332	1.231	94.649			
21	.308	1.141	95.790			
22	.270	1.000	96.790			
23	.224	.831	97.621			
24	.186	.688	98.309			
25	.178	.658	98.967			
26	.156	.578	99.546			
27	.123	.454	100.000			

Extraction Method: Principal Component Analysis.

The factors extracted from the analysis along with their Eigen values are shown in Table 4.23, along with the percentage of variance attributable to each factor, the cumulative variance of the factor and the previous factors. The study findings revealed that the first component explained 31.7% of e-commerce adoption, 7.8% by component two, component three explained 6.1%, component four explained 5.5%, component five explained 5.3%, component six explained 4.6% and component seven explained 4.1%. Cumulatively the seven components of factors account for 65.1% of the variance with regard to adoption of e-commerce by SMEs in Kenya. The other components were not statistically significant.

4.13.6 Component Matrix

Table 4.24 shows the loadings of the twenty seven variables on the seven main component factors extracted. The higher the absolute value of the loading, the more the variable contributes to the factor. The spaces in the table represent loadings that are less than 0.5, this makes reading the table easier.

Table 4.24: Component Matrix

Table 4.24 Component Matrix[a]							
	Component						
	1	2	3	4	5	6	7
Cost of Setting up E-Commerce	.525			.501			
Difficult to access credit	.650						
Cost of Internet connectivity							
E-comm not as effective as traditional mkt	.540						
EC apps are difficult to use	.619						
Our mgnt structure is well defined		.507					
Lack of employee knowledge	.615						
Our org lacks resources	.679						
Insufficient security for online credit	.593						
Lack of adequate bandwidth	.566						
Lack of IT skilled developers	.614						
Problems between ISP and telecoms	.556						-.505
Lack of std regulations from Gov	.656						
Insufficient incentives from govt	.634						
Lot of pressure from suppliers							
Tel infrastructure inadequate	.628						
Market potential EC too small	.616						
Lack of govt leadership	.583				-.500		
There is perceived rel. advantage							
Incompatibility with other technologies	.601						
Integration of EC is quite complex	.691						
Weak support from top org mgnt	.497		.611				
Lack of sufficient EC knowledge in mgnt	.537		.593				
Keeping up with changing tech	.621						
Mindset shift towards EC	.514						
Our marketing requires high degree of Human Interaction		.653					
It will upset existing distribution channels	.583						
Extraction Method: Principal Component Analysis.							
a. 7 components extracted.							

4.14.7 Rotated Component Matrix

Table 4.25 Rotated Component Matrix[a]

	Component						
	1	2	3	4	5	6	7
Cost of Setting up E-commerce.						.616	
Difficult to access credit							
Cost of Internet connectivity						.720	
EC not as effective as traditional marketing			.655				
EC apps are difficult to use			.805				
Our mgnt structure is well defined							.583
Lack of employee knowledge		.594					
Our org lacks resources		.486					
Insufficient security for online credit				.560			
Lack of adequate bandwidth						.715	
Lack of IT skilled developers		.682					
Problems between ISP and telecoms		.788					
Lack of std regulations from Gov	.550						
Insufficient incentives from govt	.784						
Lot of pressure from suppliers							.816
Tel infrastructure inadequate	.663						
Market potential EC too small	.484						
Lack of govt leadership	.740						
There is perceived rel advantage					.589		
Incompatibility with other technologies			.556				
Integration of EC is quite complex							
Weak support from top org mgnt				.840			
Lack of sufficient EC knowledge in mgnt				.798			
Keeping up with changing tech					.795		
Mindset shift towards EC					.786		
Our Mketing requires high degree of Human Interaction					.675		
It will upset distribution channels			.510				

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 8 iterations.

The idea behind rotation is to reduce the number factors on which the variables under study have high loadings. Rotation does not really modify anything but makes the interpretation of the analysis a lot easier. Looking at the Table 4.25, we can see how various variables have been loaded on the respective Component 1 to 7 (factors). These factors can be used as variables for further analysis.

Table 4.25 shows that there exists seven (7) component factors influencing SMEs adoption of e-commerce. These seven components are able to describe the barriers/inhibitors to adoption of e-commerce with the level of 65.1%.

The following observations can be made about these factors:

i) Innovation factor (component 3). This includes the view that e-commerce is not as effective as traditional market, e-commerce applications are difficult to use, the market potential for e-commerce is too small, e-commerce is incompatible with other technologies and e-commerce will upset distribution channels.

ii) The technological factor (component 2). This includes lack of employee knowledge, inadequate IT resources in the organization, lack of IT skilled developers, and problems between ISP and telecommunication companies.

iii) The financial factor (component 6). This includes: cost of setting up e-commerce, cost of internet connectivity and lack of adequate bandwidth.

iv) The governmental factor (component 1). This includes insufficient incentives from government, inadequate telecommunications infrastructure and lack of government leadership.

v) The environmental factor (component 7). This includes our management structure is well defined (formalized) and there is a lot of pressure from suppliers.

vi) The behavioral factor (component 5). This includes the challenges of keeping up with changing technology, mindset shift towards using e-commerce and the view that our marketing requires high degree of human interaction.

vii) The organizational factor (component 4). This includes insufficient security for online credit payment, weak support from top management and lack of sufficient e-commerce knowledge in management.

4.13.8 E-commerce Barrier Factor Loadings

The barriers factors and their significant component loading can be summarized as shown in Table 4.26.

Table 4.26: Barrier factor Loading

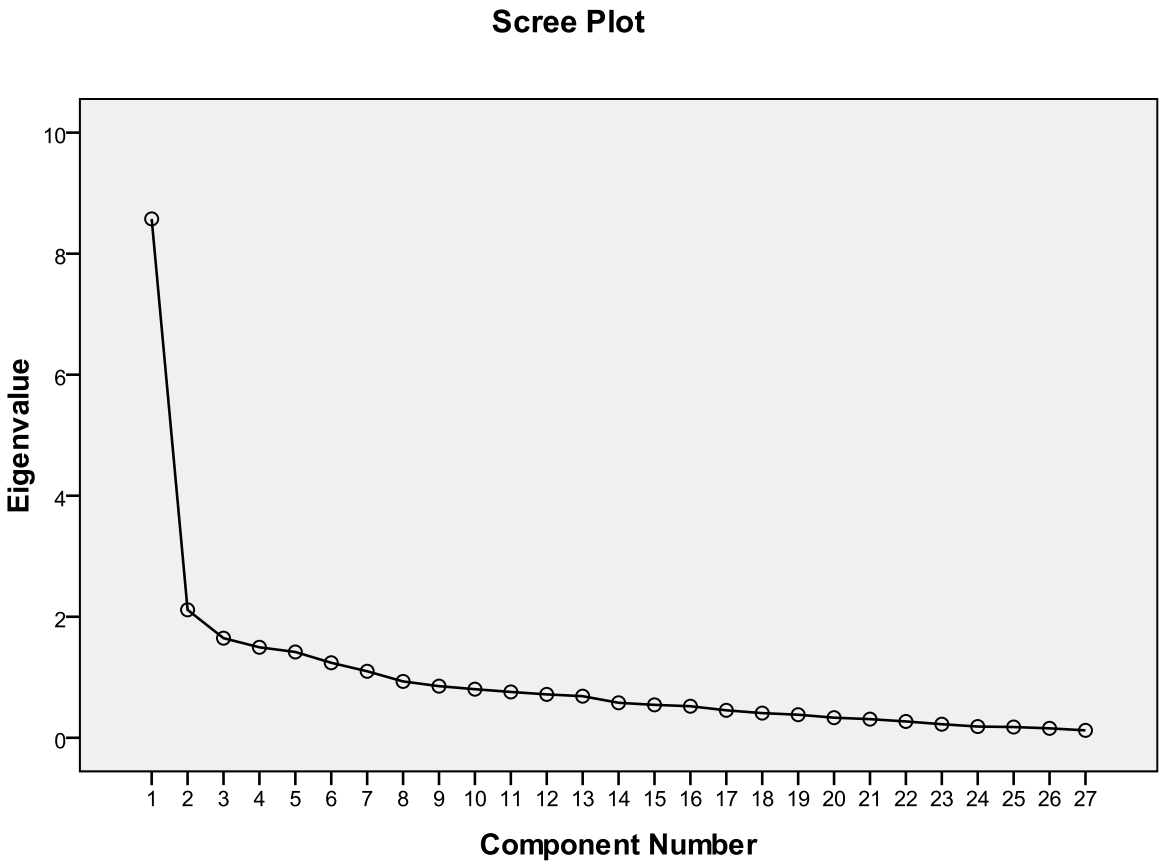
	FACTOR	SIGNIFICANT VARIABLE	LOADING
1.	Innovational (Component3)	• E-commerce not as effective as traditional market (P4) • E-commerce applications are difficult to use (P5) • Compatibility with other technologies (P20) • It will upset of distribution channels (P27)	0.655 0.805 0.566 0.510
2.	Technical (Component 2)	• Lack of employee knowledge & skills (P7) • Our orgn. lacks IT resources (P8) • Lack of IT skilled developers (P11) • Problems between ISP & Telecomm providers (12)	0.594 0.486 0.682 0.788
3.	Financial (Component 6)	• Cost of setting up E-commerce (P1) • Cost of Internet connectivity (P3) • Lack of adequate bandwidth (P10)	0.616 0.720 0.715
4.	Governmental (Component 1)	• Insufficient incentives from Government (P14) • Telecommunication is inadequate (P16) • Market potential for E-commerce is too small (P17) • Lack of government leadership (P18)	0.784 0.663 0.484 0.740
5.	Environmental (Component 7)	• Our management structure is well defined (Formalization) (P6) • There is a lot of pressure from suppliers/partners (P15)	0.583 0.816
6.	Behavioural (Component 5)	• Difficulties in keeping up with changing technology (P24) • There is perceived relative advantage P19) • Mindset shift towards e-commerce (P25) • Our market require a high degree of human interaction (P26)	0.795 0.589 0.786 0.675
7.	Organizational (Component 4)	• Insufficient security for online credit (P9) • Weak support from top organization management (P22) • Lack of sufficient e-commerce knowledge in top management (P23)	0.560 0.840 0.798

Variables that were loaded in each category closely resembled the measures that were proposed in relation to the conceptual framework of factors of e-commerce adoption (Figure 2.10). For instance, items P1, P3 and P10 were loaded to factor 6, which was categorized as financial barriers, were grouped under the same category in the proposed measures. Similarly, items P7, P8, P11 and P12 were loaded to factor 2, which was categorized as technical barriers, were grouped under the same category in the proposed measures, although one other variable P10 was excluded, as it had been grouped among financial barriers. This procedure was repeated for all the items and the results are shown in Table 4.26. Therefore, the results of the factor analysis have more or less confirmed that the conceptual framework (Figure 2.10) could indeed be used to explain the factors that were considered barriers to e-commerce by SMEs in Kenya.

4.14 The Scree Plot

The Scree plot is a graph of the Eigen values against all the barriers. The graph is useful for determining how many factors to retain. The point of interest is where the curve begins to flatten. It can be observed that the curve begins to flatten between factors 7 and 8. Note also that factor 8 has an Eigen value of less than 1, so only seven factors have been retained. An Eigen value is the standardized variance associated with a particular factor. The sum of the Eigen values cannot exceed the number of items in the analysis, since each item contributes one to the sum of variances.

Figure 4.5: Scree Plot for E-commerce Barriers



The following observations can be made on the Scree plot in Figure 4.7

a) The examination of the **Scree plot** provides a visual of the total variance associated with each factor.

b) The steep slope shows the seven large factors, having Eigen value of at least 1 which include component 1 through component 7. This components represent: Governmental, Technical, Innovational, Organizational, Behavioral, Financial and Environmental barriers respectively.

c) The gradual trailing off (Scree) shows the rest of the factors usually lower than an Eigen value of 1.

4.15 Regression Analysis

Although factor analysis had identified factors that were perceived by SMEs in Kenya as barriers to e-commerce adoption, it did not investigate the associations between these barriers and the extent of e-commerce adoption. Therefore, tests of associations using correlation and regression analyses were performed to analyze the relationship between these factors and the adoption of e-commerce by the SMEs. The scores of e-commerce adoption were obtained by computing the number of e-commerce applications adopted by respondents. The computed scales were also obtained for all the factors by adding all the variables that were significantly loaded to each of the factors. Each factor was also tested for reliability. The consistency values of Cronbach's alpha were displayed in Table 4.27.

Table 4.27: Reliability of factors

Factor	**Cronbach's Alpha**
Financial	0.700
Environmental	0.346
Technical	0.777
Governmental	0.775
Organizational	0.735
Behavioral	0.752
Innovational	0.743

The Environmental factor had Cronbach's alpha less than 0.7, which means that it cannot be used reliably to determine the extent of e-commerce adoption and hence was dropped for the subsequent analysis.

Correlation coefficients between each factor and the extent of e-commerce adoption were computed; the results are shown in Table 4.28.

Table 4.28: Correlations between the factors and the extent of e-commerce adoption

		Financial	**Technical**	**Governmental**	**Organizational**	**Behavioral**	**Innovational**
Extent of e-commerce adoption	Pearson Correlation	-0.123	-0.096	-0.072	-0.101	0.093	-0.022
	Sig.(2-tailed)	0.183	0.301	0.434	0.275	0.314	0.813
	N	119	119	119	119	119	119

* Correlation is significant at the 0.05 level (2-tailed).

From Table 4.28, financial, technical, governmental, organizational and innovational factors were negatively correlated to the extent of e-commerce adoption. This indicated that the higher the barriers related to the above factors, the lower the extent of e-commerce adoption and vice versa. The results favor the acceptance of Hypotheses H1, H2, H3, H4 and H7. As for the behavioral factor, it was positively correlated to the extent of e-commerce adoption, which means that many SMEs may not be aware of the behavioral barriers especially related to challenges in keeping up with changing technology, perceived relative advantage, mind-shift towards e-commerce and the need of the market requiring human interaction.

The above results indicated that only factors related to financial, technical, organizational, governmental and innovational barriers have a negative influence on the extent of e-commerce adoption.

The correlation analysis only indicated that there existed some form of association among the variables, without specifying which is the dependent variable and which are the independent variables that could be used to predict the dependent variable. Therefore, regression analysis was performed in order to find out whether the extent of e-commerce adoption is influenced by the factors that are related to various barriers.

The regression analysis was performed and shown in Table 4.29

Table 4.29: Linear Regression Analysis

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
1(Constant)	67.619	6.992		9.671	.000	53.766	81.472
Innovational	.479	.637	.096	.752	.454	-.783	1.741
Technical	-.289	.647	-.060	-.447	.656	-1.572	.993
Financial	-.602	.734	-.094	-.820	.414	-2.055	.852
Governmental	-.109	.523	-.025	-.208	.836	-1.145	.927
Organizational	-.336	.498	-.071	-.674	.502	-1.323	.651

a. Dependent Variable: Extent of E_Commerce

The dependent variable of the model is the extent of e-commerce adopted, which is the total number of e-commerce applications already adopted.
From the analysis, we could write the regression model as:

$$Y = 67.62 + 0.479X_1 – 0.289X_2 - 0.602X_3 - 0.109X_4 - 0.336X_5$$

Whereby, Y is the Extent of e-commerce adoption, X_1 is the factor related to innovational barriers, X_2 is the factor related to technical barriers, X_3 is the factor related to financial barriers, X_4 is the factor related to governmental barriers, and X_5 is the factor related to organizational barriers.

The model illustrates that when all variables are held at zero (constant), the value of the extent of e-commerce would be 67.62. However, holding other factors constant, a unit increase in financial barriers would lead to a 0.602 decrease in the extent of e-commerce adoption, a unit increase in organizational barriers would lead to a 0.336 decrease in the extent of e-commerce adoption, a unit increase in technical barriers would lead to a 0.289 decrease in the extent of e-

commerce adoption, a unit increase in governmental barriers would lead to a 0.109 decrease in the extent of e-commerce adoption, a unit decrease in innovational barriers would lead to a 0.479 increase in the extent of e-commerce adoption. Thus, the financial situation, organizational issues, governmental support and ability to innovate appear to hold the key to unlocking the barriers to e-commerce adoption in Kenya. The results confirm that the barriers under consideration contribute individually and jointly to the extent of e-commerce adoption in Kenya.

4.16 Moderating Variables of E-commerce Adoption

The moderating factors in the conceptual framework of e-commerce adoption were Change, Risk, Knowledge and Uncertainty. These four factors were tested and the results are shown in Table 4.30 below:

Table 4.30 Linear Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
1(Constant)	16.905	1.748		9.671	.000	13.442	20.368
Financial	-.150	.183	-.094	-.820	.414	-.514	.213
Innovational	.120	.159	.096	.752	.454	-.196	.435
Technical	-.072	.162	-.060	-.447	.656	-.393	.248
Governmental	-.027	.131	-.025	-.208	.836	-.286	.232
Organizational	-.084	.125	-.071	-.674	.502	-.331	.163

a. Dependent Variable: Extent of EC Adoption

The result in table shows the Beta values of each barrier regressed against the dependent variable which is the extent of e-commerce adoption.

Table 4.31: Moderating Effect of Risk

	Variable	Beta	Significance (%)	Remark
1	Financial	-0.064	95	Not significant
2	Innovational	0.133	95	Significant
3	Technical	0.036	95	Significant
4	Governmental	0.031	95	Significant

Table 4.31 shows the Beta values of each independent variable together with the moderating factor Risk regressed against the dependent variable which is the extent of e-commerce adoption. It shows that Risk significantly moderates Innovation, Technical and Governmental barriers to the extent of e-commerce adoption but does not moderate Financial barriers.

Table 4.32: Moderating Effect of Knowledge

	Variable	Beta	Significance (%)	Remark
1	Innovational	0.099	95	Significant
2	Technical	-0.051	95	Not Significant
3	Organizational	-0.070	95	Not Significant

Table 4.32 shows the Beta values of each independent variable together with the moderating factor Knowledge regressed against the dependent variable which is the extent of e-commerce adoption. The results show that Knowledge significantly moderates Innovation barriers, but not Technical barriers to extent of e-commerce adoption.

Table 4.33: Moderating Effect of Uncertainty

	Variable	Beta	Significance (%)	Remark
1	Financial	-0.157	95	Not Significant
2	Innovational	-0.017	95	Not Significant

Table 4.33 shows the Beta values of each independent variable together with the moderating factor Uncertainty regressed against the dependent variable which is the extent of e-commerce adoption. The results show that Uncertainty does not significantly moderate Innovational barriers or Governmental barriers to e-commerce adoption.

Table 4.34: Moderating Effect of Change

	Variable	Beta	Significance (%)	Remark
1	Innovational	-0.140	95	Not Significant
2	Organizational	-0.151	95	Not Significant

Table 4.34 shows the Beta values of each independent variable together with the moderating factor Uncertainty regressed against the dependent variable which is the extent of e-commerce adoption. The results show that Change does not significantly moderate Innovation barriers or Organizational barriers to the extent of e-commerce adoption.

Table 4.35: Summary of Hypotheses Testing

Research Question	Hypothesis	Variable	Scale	Response	Data Analysis Method
1	H_1	a difference in Application adoption per industry sector	Numeric	Accepted	Frequency distribution
	H_2	a difference in individual Application adoption	Numeric	Accepted	Frequency distribution
2	H_8	Attitude	Numeric	Accepted	Frequency distribution
	H_9	Social & Cultural orientation	Numeric	Accepted	Frequency distribution
3	H_1	Technical barrier factor	Numeric	Accepted	Regression analysis
	H_2	Financial barrier factor	Numeric	Accepted	Regression analysis
	H_3	Organizational barrier factor	Numeric	Accepted	Regression analysis
	H_4	Environmental barrier factor	Numeric	Invalid	Correlation analysis
	H_5	Governmental barrier factor	Numeric	Accepted	Regression analysis
	H_6	Behavioral barrier factor	Numeric	Rejected	Correlation analysis
	H_7	Innovational barrier factor	Numeric	Accepted	Regression analysis
2	H_{8a}	Change - Innovation	Numeric	Rejected	Regression analysis
	H_{8b}	Change – Organ	Numeric	Rejected	Regression analysis
	H_{8c}	Change - behavior	Numeric	Rejected	Regression analysis
	H_{9a}	Risk – financial	Numeric	Rejected	Regression analysis
	H_{9b}	Risk – innovational	Numeric	Accepted	Regression analysis
	H_{9c}	Risk – governmental	Numeric	Accepted	Regression analysis

	H_{9d}	Risk – technical	Numeric	Accepted	Regression analysis
	H_{10a}	Uncertainty – behavioral	Numeric	Rejected	Regression analysis
	H_{10b}	Uncertainty – financial	Numeric	Rejected	Regression analysis
	H_{10c}	Uncertainty – innovational	Numeric	Rejected	Regression analysis
	H_{11a}	Knowledge – innovational	Numeric	Accepted	Regression analysis
	H_{11b}	Knowledge – technical	Numeric	Rejected	Regression analysis
	H_{11c}	Knowledge – organizational	Numeric	Rejected	Regression analysis

Table 4.35 shows a descriptive summary of the hypotheses tested during this research, variables, scales, response and data analysis method used for each.

CHAPTER FIVE: DISCUSSION

5.1 State of E-commerce Adoption

The result of this research shows that the adoption of e-commerce applications by individual organizations in Kenya is at an average of 59%. There are variations in adoption among applications with the most popular service being electronic marketing (78%), followed by customer support service (71%), electronic advertising (55%), payment system (54%), mobile commerce (53%), and Order processing & delivery (46%),. This result agrees with the assertion made by Poon and Swatman (1997) that there are possibilities of differences in degree of adoption of Internet depending on particular industry and product factors. Teo and Tan (1998) studied the relationship between the various types of business (governmental, local or foreign organization; characteristics of products, number of product categories, etc.) and the adoption of the Internet. According to these authors, this variable, as well as the enterprise's types of activities, have an influence on the adoption of e-commerce. The position of SMEs in developing countries in terms of e-commerce adoption is lagging behind SMEs in developed countries (Kartiwi 2006). For example, Kartiwi and MacGregor (2007) have found that organizational barriers were the main inhibitors to e-commerce adoption by SMEs in Indonesia.

Previous studies on Information and ICT in SMEs found that in Botswana depending on the geographical location of the SME, obtaining business-related information has been a challenge due to lack of power or electricity to charge their cell phones (Duncombe & Heeks, 2002). The pattern of influence and use of E-commerce differs according to a country's level of social economic development (Van Slyke et al., 2005). According to Ndyali (2013), most of SMEs in Tanzania have only adopted basic applications, and the most common e-commerce technologies which is e-mail and internet as a second marketing tool to display company's products and services information, rather than as an e-commerce platform to permit transactions.

5.2 E-commerce Adoption among Industry Sectors

The sample organizations were classified into nine industry sectors namely; Manufacturing & Construction, Media & ICT, Health Services, Sales and marketing, Transport, Education, Hospitality, Finance and Insurance and Agriculture & Food processing. The analysis of data per sector reveal that there are some variations in e-commerce adoption across the sectors with the Manufacturing & Construction at 60%, Media & ICT 57%, Health Services 67%, Sales and marketing 69%, Transport 48%, Education 58%, Hospitality 57%, Finance and Insurance 71% and Agriculture & Food processing 47%. Hypothesis testing in section 4.6 led to the conclusion that there is a difference in e-commerce application adoption by SMEs in different industry sectors on average, and there is a difference in e-commerce adoption by SMEs of individual applications on average. This result is consistent with observations made by Payne (2006) that e-commerce will not benefit all economic sectors in the same industry in the same way, suggesting that it is most likely to benefit sectors that have information intensive activities and products that can be used or delivered electronically.

5.3 Barrier Factors of E-commerce and Hypotheses Testing

The study of the factors that influence e-commerce adoption is based on a conceptual framework in Figure 2.10 having seven variables, namely, technical barriers, financial barriers, organizational barriers, governmental barriers, environmental barriers, behavioral barriers and innovation barriers. To test this barriers a set of seven hypotheses were formulated. The outcome of the research was analyzed using linear regression and results shown in Table 4.29. The same were subsequently used to test the hypotheses. The resultant framework of factors influencing e-commerce adoption is shown in Figure 5.1.

Independent Variables

(Barrier Factors)

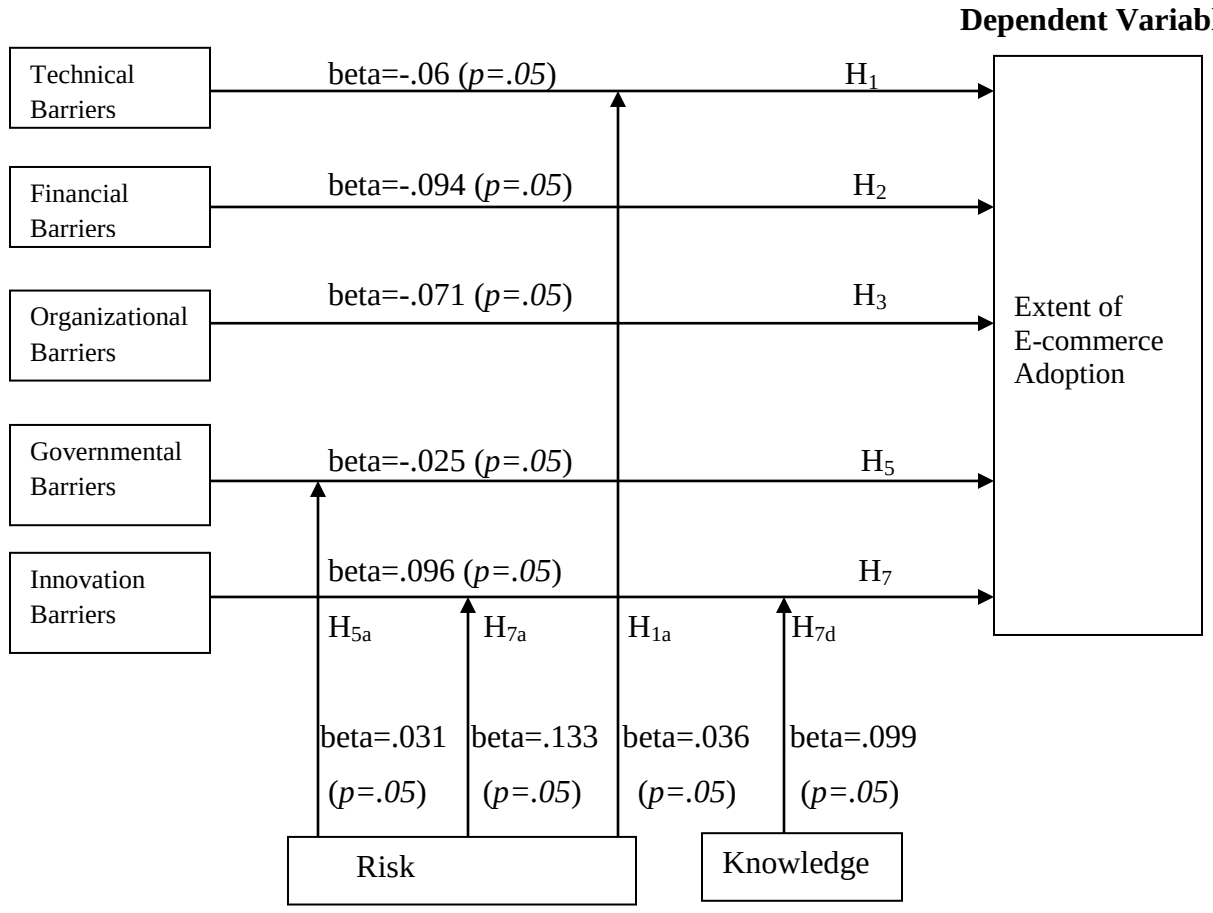


Figure 5.1: Framework of Factors Influencing E-commerce Adoption

(Source: compiled by the author)

H1: Technical barriers have a negative influence on e-commerce adoption among SMEs in Kenya

This hypothesis is supported in this research as shown in Table 4.28. The significant technical barrier factors identified are; 'lack of employee/skills to use e-commerce', 'our organization lacks adequate IT resources for e-commerce', 'lack of IT skilled developers of e-commerce', and

‘problems between ISP and telecommunications supplier taking responsibility for service failures’. This outcome agrees with results from previous studies that, in most developing countries, the lack of Internet and slow speed of telecommunication networks has greatly contributed to delays in adopting e-commerce (Oreku, Li, Kimeli & Mtenzi, 2009; Mutula & Van Brakel, 2007; Uzoka et al., 2007; Molla and Licker, 2005a; Magembe and Shemi, 2002).

In a similar research conducted by Love et al. (2001) they stated that problems related to acquiring suitable technologies to meet business requirements, lack of education and expertise about the system requirements and risks related to security and authentication, prevent small business firms from adopting e-commerce applications. Looi (2005) has pointed out that lack of IT knowledge and lack of trust have been explored as inhibitors to e-commerce adoption. Wilson et al. (2008) also stressed that the challenge of lack of skilled ICT personnel is more important than the lack of finance. A study in Thailand revealed that shortage of IT infrastructure, lack of confidence in electronic legal framework and payments systems act as inhibiting factors to engage aggressively in e-commerce (Laosethakul & Boultan, 2007). The outcome from this study has established that inadequate skills among users and application developers, lack of sufficient infrastructure and difficulties of Internet connectivity form major technical barriers to e-commerce adoption among SMEs in Kenya,

H2: Financial barriers have a negative influence on e-commerce adoption among SMEs in Kenya

This hypothesis is supported in this research with the result of factor analysis identifying ‘the cost of setting up e-commerce infrastructure’, ‘the cost of Internet connectivity in terms of rate per minute is too high’ and ‘lack of adequate bandwidth, as the main financial barriers. This result agrees with the position from previous studies captured in the literature surveyed. In most

developing countries, SMEs have little or no financial resources to acquire ICT infrastructure or to venture into e-commerce initiatives (Magembe and Shemi, 2002; Cloete et al., 2002; Mutula & Van Brakel, 2007). Cooray (2003) found that there are several important barriers to e-commerce adoption, mainly: restricted diffusion of computers, high value of web access, and an

absence of on-line payment processes were found to directly inhibit e-commerce. Schmid et al. (2001) suggests that the main e-commerce issues facing SMEs in Argentina are Awareness, Access to hardware, Infrastructure, Organizational culture, and Financial issues. Unavailability of credit cards has also been cited as a major hurdle (Mercer, C., 2006; Miller R., 2001). Literature suggests that bandwidth availability is low in developing countries, (Frontline.net, 2001). A lower bandwidth means that longer time is needed to transfer data and hence a lower relative advantage of Internet.

H3: Organizational barriers have a negative influence on e-commerce adoption among SMEs in Kenya

This hypothesis is supported and factor analysis reveals the main factors as 'insufficient security for online credit payment', 'weak support from top organizations management' and 'lack of sufficient e-commerce knowledge in management'. This outcome is consistent with what literature says. For instance, Mutula & Van Brakel, 2007 have cited as inhibiting the amount of financial resources that an SME can utilize for e-commerce adoption as relates to setting up, buying necessary ICT equipment, paying consultancy fees, training personnel, maintenance of website and other infrastructure. A study conducted by Iacovou *et al*., (2005) found that the owner's lack of awareness of the technology and perceived benefits is a major factor to a take up of electronic business. Other factors, according to Olatokun and Kebonye (2010), such as the size of the enterprise and the type of business enterprise also influence its adoption.

Cloete, Courtney, and Fintz (2002) in their study of SME adoption of e-commerce in South Africa found that adoption is heavily influenced by factors within the organization. Research done elsewhere has shown that there is a relation between e-commerce technologies adoption and a number of factors such as organization culture and task variety (Seyal et al. 2004), organization and strategic orientation (Huy and Filiatrault, 2006; Jean et al. 2006). One would expect top managerial support to address matters related to organization and strategic orientation of the SME so that it is better placed to adopt e- commerce. Insufficient security to prevent hacking cited by respondents also points to lack of laws to provide legal validity of digital and electronic signatures, as predicted in literature (Stephens, 2001; Pucihar, 2006). Musau et al.

(2011) stated that things (e-services) have not been as planned in Kenya because majority of people do not trust e-government services.

H4: Governmental barriers have a negative influence on e-commerce adoption among SMEs in Kenya

This hypothesis is supported since factor analysis confirms the following barriers; 'insufficient incentives from the government for e-commerce', 'telecommunications infrastructure are not adequate' and 'lack of government leadership' as the main barriers. The outcome of regression analysis (Table 4.29) also confirms existence of a relationship between this factor and the extent of e-commerce adoption. The impact of government policies and initiatives has been shown to have direct and indirect stimulation to the supply of information that produces faster technology. Gikandi and Bloor (2010) in their study on the factors that influence the adoption and effectiveness of e-banking in Kenya identified lack of resources, constant change of technology and time to develop systems as main barriers. They concluded by emphasizing the role of Kenya Government in achieving a secure environment for e-banking by putting in place clear laws, rules and regulations, and to provide relevant technical training to the regulatory authority to enforce the same.

For many organizations, government has been the source of funding for infrastructure (Kettinger and Lee, 1994). The developed countries have been able to adopt and utilize e-commerce due to their governments' proactive role in providing good infrastructure for e-commerce to thrive (Martinsons, 2008). Studies also illustrate the need for the governmental support with infrastructure projects, adoption schemes and initiatives towards a positive impact on technology uptake especially in SMEs (Wagner, Fillis & Johanson, 2003). Government entities can be among the most powerful institutional forces affecting innovation (Lefebvre and Lefebvre, 1996; Ling, 2001; Rashid and Qirim, 2001). The policies of governments that increase, or seem to increase, a company's capabilities to compete in the marketplace should have a strong positive influence on strategies of development of technologies in enterprises.

H5: Environmental barriers have a negative influence on e-commerce adoption

This hypothesis was not tested in this research since the variable for environmental barrier had no sufficient correlation to the extent of e-commerce adoption.

H6: Behavioral barriers have a negative influence on e-commerce adoption among SMEs in Kenya

This hypothesis is not supported in this research since it was positively correlated to the extent of e-commerce adoption, which means that many SMEs may not be aware of the behavioral barriers especially related to keeping up with changing technology, mind-shift towards e-commerce and the need of the market requiring human interaction. Probably as SMEs adopt and use more advanced applications they will become more aware of the behavioral issues. Therefore, the level of awareness of behavioral change could be a moderating factor, which could have contributed to the above discrepancy. This moderating factor needs to be studied in future research. As there was positive correlation between the extent of e-commerce adoption and the behavioral factor, the hypothesis that the extent of e-commerce adoption is affected by factor related to behavioral barriers was rejected.

H7: Innovational barriers have a negative influence on e-commerce adoption among SMEs in Kenya

This hypothesis is supported in this research and the main innovational factors identified that hinder e-commerce adoption are ‘e-commerce is not as effective as traditional marketing channel’, ‘e-commerce applications are difficult to use’, ‘the market potential for e-commerce is too small’, ‘incompatibility with other existing technologies’ and ‘it will upset existing distribution channels’. This outcome is in agreement with the results from previous research referenced in literature review. Innovation factors are attached to owner’s perceptions of the degree to which the technology or the innovation will enhance the organizations performance, decrease transactional delays, and result in improved efficiencies and communication with business partners (Teo et al. 2004, Grandon and Pearson 2004).

Tornatzky and Klein (1990) identified compatibility as one of influencing innovation characteristics. Compatibility is defined as the degree to which an innovation is perceived as consistent with the existing values, needs, and past experiences of the potential adopter. Premkumar and Roberts (1999) identified the use of various communication technologies and the factors that influence their adoption in small businesses located in rural US communities. This present study establishes the fact that innovational barriers have a negative influence on e-commerce adoption among SMEs.

5.4 The Moderating Variables of E-commerce Adoption Factors

The following factors: risk, knowledge, change and uncertainty had been suggested in literature as possible moderating factors to the relationship between the extent of e-commerce which is the dependent variable and some of the independent variables. Subsequently, the four moderating factors were studied by using regression analysis. The results of hypotheses testing are shown in Table 4.35. The result shows that risk and knowledge factors were found significant and therefore to moderate relationships as shown in Figure 5.1.

This result on risk factor is supported by other previous studies (Boateng et al., 2008, Zhu & Thatcher, 2010) which state that lack of confidence in the rule of law slows e-commerce adoption in the countries with unstable political and weak regulatory systems that are unable to adequately regulate rights and obligations in the electronic space. Additionally, corruption is one of the factors that inhibit the effective utilization/adoption of sophisticated ICT solutions among SMEs in developing countries (Apulu et al., 2011). The lack of knowledge on how to use the technology and the low computer literacy are other contributing factors for not adopting electronic business (Knol and Stroeken, 2001). Iacovou et al. (2005) posits that the owner's lack of awareness of technology and perceived benefits is a major factor to a take up of electronic business.

5.5 The Attitude Factors of E-commerce Adoption

The computed respondents rating of factors that reveal that the value attached to e-commerce adoption factors on average is 1.76 on a scale of 1 to 5 where 1 is very high and 5 virtually no value. This suggests that SME managers have a favorable or positive attitude towards e-commerce adoption. The owner/managers play a significant role in decision making in SMEs. SME owners are concerned about a return on their investments, reluctant to make substantial investments particularly when short-term returns are not guaranteed (Akkaren and Cavaye, 1999). Thus, the owner/manager characteristics contribute a number of factors that affect e-commerce adoption. It has been noted that the characteristics of senior management play an important part in the level of e-commerce adoption (Al-Qirim, 2003). The lack of knowledge on how to use the technology and the low computer literacy are among contributory factors for not adopting e-commerce (Knol and Stroeken, 2001). Additionally, Iacovou et al., (1995) found that the owner's lack of awareness of technology and perceived benefits is a major barrier to a up-take of e-commerce.

Seyal and Rahman (2003), Rashid and Al-Qirim (2001), Chieochan et al. (2000), Mehrtens et al. (2001) have also studied the CEO characteristics and attitudes towards adoption of IT and found a direct link with the success of adoption process. It is also believed that user skill and knowledge can assist and increase the speed of technology adoption (Morteza et al., 2011). In addition, the owners' IT ability and experience are also identified as determinant factors of e-commerce adoption by SMEs in developing countries. If the SME owner has greater ability and greater experience with IT, they will be confident in adopting IT and it will reduce the uncertainty and risk in that technology adoption. The more innovative the SMEs owner, the more likely they have an intention to adopt an e-commerce application (Ghobakhloo & Tang, 2013).

5.6 The Social & cultural Factors of E-commerce Adoption

The computed respondents rating of factors that reveal that the importance attached to e-commerce adoption on average is 2.19, on a scale of 1 to 5 where 1 is very high and 5 virtually no

importance. This suggests that SME managers hold favorable social and cultural orientation or disposition towards e-commerce adoption. The literature on the digital divide problem generally concludes that the divisions that prevent productive use of ICTs are more than technology and also include cultural factors (Gurstein, 2003; Jussawalla, 2003; Kling 2000, Tibben, 2003). According to Kling (2000), overcoming the digital divide problem, implies that both "technological infrastructure" and "social infrastructure" must be considered. The result from this study shows that 'protection of company image' is considered the most important social-cultural factor with mean score 2.09 of factor importance among sampled organizations. The importance attached to other social-cultural factors is as follows: relation with trading partners' rated at 1.89, socializing in order to obtain business contacts, 2.03, protection of company image 2.06, decision making process being executed in top down fashion, 2.24, and personal innovation and creativity 2.25.

Considering the two social-cultural factors ranked highest namely; relation with trading partners and socializing in order to obtain business contacts, one may argue that, if they are perceived as being very important among the public and trading partners, then this would promote the adoption of e-commerce through social media platforms. On the other hand if personal innovation and creativity is not rated as highly as the other factors then little effort will be made to recognize or reward innovators who work quietly behind the scene.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The aim of this research was to analyze the state e-commerce adoption and influencing factors among the SMEs in Kenya. A conceptual framework was developed to investigate the barriers, which represent negative factors and facilitators which represent positive factors (enablers) of e-commerce adoption among SMEs. The framework was designed based on the study by Love et al. (2001) and other relevant literature. The research method was quantitative survey in which the questionnaires were sent to targeted respondents in the designated sampling frame. The data gathered was then analyzed using various statistical tools in order to provide answers to the research questions that were raised earlier. The research questions were (a) What is the state of e-commerce adoption among SMEs in Kenya, (b) How does the state of e-commerce adoption compare among different SMEs sectors in Kenya, (c) What factors affect the adoption of e-commerce among SMEs in Kenya and (d) What adoption model explains the state of e-commerce adoption among SMEs in Kenya.

Pertaining to the extent of e-commerce adoption, the results showed that considering only those SMEs in Kenya that have adopted some form of e-commerce application the rate of adoption is 59% (just above average). It was also observed that a majority of those SMEs had only adopted mainly the basic applications. Indeed, the adoption of advanced applications like online payment system, order processing as well as EDI is at a relatively low level. The results have indeed adequately answered the first research question. The findings imply that more efforts are needed to help and encourage SMEs in Kenya to speed up e-commerce adoption, particularly the more advanced applications.

Regarding the second research question, descriptive statistical analysis was performed, using the collected sample data. Based on the mean scores of the adoption of applications per sector (Table 4.6), it could be concluded that adoption of e-commerce varies among industry sector, having Finance and Insurance leading, followed by Sales and Marketing, while Agriculture and Food processing is at the bottom of the nine. Looking at e-commerce adoption of individual

applications across all sectors, it was observed that there are variations in individual application adoption. The most popular application being Marketing, followed by Customer service and the least among the six considered was Order processing. The above findings have basically answered the second research question.

With respect to the third research question, a factor analysis was performed to reduce the twenty seven variables (barriers) to only seven components that were statistically significant each having an Eigen value of at least one. Further analysis using varimax rotation was performed to group the variables under each component based on their factor loading. Thus factor analysis successfully grouped the barriers into seven factors, which were labeled as environmental, governmental, financial, organizational, technical and behavioral and innovational barriers. The grouping was found to match the proposed conceptual model in this research. These results effectively answered the third research question.

With respect to the fourth research question, regression analysis was required to establish the relationship between the dependent variable and the independent variables. The correlation analysis showed that only factors related to organizational, financial, technical, governmental and innovational barriers had some negative influence on the extent of e-commerce adoption.
Regression analysis confirmed that four factors, namely financial, technical, governmental and organizational barriers had significant negative influence on the extent of e-commerce adoption while innovational barriers had a positive influence on dependent variable. The above findings thus sufficiently answered the fourth research question.

6.2 Research Contributions

In any research, it is important for the study not only to broaden theoretical foundation by investigating individual theories, but also to deepen the foundation by extending or integrating them where applicable. The contribution to the existing body of knowledge from this research is as follows:

6.2.1 Empirical Evidence

This research contributes to knowledge by providing academics and practitioners with an empirical evidence and original explanation of the factors influencing e-commerce adoption among SMEs in Kenya. The research has empirically established that there is a variation in e-commerce individual application adoption in Kenya and confirmed the fact that different industry sectors have adopted e-commerce to varying degrees. The research also clearly established the rating of the importance of user attitude factors and social & cultural factors influencing e-commerce adoption among SMEs in Kenya. Although SMEs in Kenya have an average extent of e-commerce adoption, there is empirical evidence to show that the high cost of setting up e-commerce, Internet connection cost, and inadequate bandwidth negatively influence e-commerce adoption under the grouping of financial barriers. The technical barriers highlighted include inadequate ICT infrastructure, insufficient employee knowledge and Internet connectivity challenges, particularly between ISPs and telecommunication companies.

The Organizational barriers include; weak top management support, insufficient security for online credit and lack of sufficient e-commerce knowledge in top management. The two other factors identified in this research are governmental and innovational barriers. Governmental barriers are described in this research by inadequate telecommunications infrastructure, insufficient incentives from government, market potential for e-commerce is too small and lack of government leadership. Innovational barriers are described by; e-commerce is not as effective as traditional market, e-commerce applications are difficult to use, lack of compatibility with other technologies and it will upset existing distribution channels.

6.2.2 Theoretical Contributions

This research has made a theoretical contribution by developing a conceptual framework for analyzing the state of e-commerce adoption and influencing factors among SMEs. This is in line with the fourth objective of this research. In addition, in order to determine the state of e-commerce adoption a conceptual model of stages of e-commerce adoption was developed (Figure 3.1) and subsequently used successfully to categorize SMEs state of e-commerce

adoption. Through predictive modeling, this study contributed to enhancement of widely used information system models by developing a model of the extent of e-commerce adoption among SMEs. Methodologically, the research provides a positivist's evaluation of the extent of e-commerce adoption research in a developing country context, namely Kenya.

6.2.3 Contribution to National Discourse

This research provides a basis for national discourse on the extent of e-commerce adoption and influencing factors. This can enable ICT professionals, the business managers and public policy makers to engage in a dialogue on the state and factors that influence e-commerce adoption among SMEs in Kenya. This is particularly important because of the prevailing low rate of e-commerce adoption.

6.3 Further Research Areas

The results of this research have implications for business as well as for researchers. Researchers may replicate this research in the context of different countries, especially the SMEs in developing countries. Their results could be compared with findings in this research and hence, draw more commonalities and differences with Kenya context.

This research points to a need for further research on policy issues relating to the provision of affordable Internet connections and legislation to regulate e-commerce transactions in such a way that would guarantee security and trust to the users. This study also opens up a number of research opportunities for an extensive countrywide quantitative research on e-commerce adoption and e-business in general using both Questionnaire and Structured interviews. Furthermore, studies are required on the impacts of e-commerce adoption and implementation in relation to the various industry sectors.

6.4 Recommendations

This research analyzed the state and factors influencing e-commerce adoption among SMEs in Kenya. Based on the literature and the results of this research, the following recommendations can be made:

Firstly, the adoption of e-commerce applications among SMEs in Kenya stands at an average 59%, with the lowest at 46% and the highest at 78% as per the sample used. Marketing is the most popular application in use among SMEs and Payment system is the least. The detailed level of e-commerce adoption varies per industry sector, having the lowest at 47% for Agriculture and Food processing sector, and the highest at 71% for the Finance and Insurance sector. There is need to investigate further the cause of the observed variations by in e-commerce adoption by examining the adoption of individual industry sectors.

Secondly, the SME owner/manager's response shows that they considered the social-cultural factors to be very important in the following order: relations with trading partners, socializing in order to obtain business contacts and protection of company image. The managers can be described as having a very positive disposition towards e-commerce adoption. This disposition of SME managers/owners should be harnessed to promote e-commerce adoption, through relevant policy and regulatory framework.

Thirdly, the survey on SME owner/manager attitude revealed that they have a very positive attitude towards e-commerce, with the following three attitude factors considered the most important (given in order); having e-mail is important to our business, having a website is important to our business, and using e-commerce is important to our business. This kind of response suggests that the key SME decision makers are likely to choose e-commerce adoption should there be no other hindrances.

Fourthly, the implication of these results is that urgent and serious measures should be taken by policy makers in order to curb the barrier factors that negatively impact on e-commerce adoption. The research recommends that the technical barriers which were attributed to

inadequate employee knowledge and skills, lack of expert developers and problems associated with telecommunications service providers should be addressed through training and provision of sufficient regulatory framework. The financial barriers included; cost of setting up e-commerce, cost of Internet connectivity and inadequate bandwidth. We recommend improvement in the telecommunication infrastructure so that quality services become available to users, which would lower the connectivity cost. Availability of credit facilities from financial institutions can address the initial set-up costs. Governmental barriers have been captured through lack of leadership, insufficient incentives, market potential being too small and inadequate telecommunication infrastructure. Although it is true that the Kenya government was planned to address the issues of leadership and infrastructure through the ICT Master Plan it suffices that a follow up particularly on the implementation of the ICT Master plan is required to ensure that the envisaged benefits trickle down to the ICT users and providers. Finally, on the organizational barriers, the parameters highlighted include weak support from top management, lack of sufficient e-commerce knowledge in top management and insufficient security for online credit transactions. We do recommend provision of training to top management to equip them with necessary knowledge and skills to make informed decisions and allay fears that lead to insecurity.

These findings suggest the need for a socio-technical approach in providing an environment where SMEs can adopt e-commerce and reap the benefits from it. The outcome further suggests a need for a clear policy on SMEs that will enable them adopt e-commerce technologies. In addition to having a supportive policy framework, there is need for other enablers such as access to credit, tax exemptions on ICT products, provision of ICT skills and Internet access at SME-manageable cost.

6.5 Limitations of the Study

This research focused on the context of SMEs randomly picked from five regions in Kenya and therefore may not be generalized to other countries since certain factors may vary between countries, such as social-cultural orientations and prevailing legislation. Moreover, this research relied on information provided by different people. Much of the information that was collected is

retrospective data, recollections of past events, and is therefore subject to the problems inherent to memory. Also, the statements made by the subjects may be affected by natural human tendencies, such as beliefs, selective memory and bias.

This research was essentially both exploratory and confirmatory, and the findings were inducted from empirical evidence. Quantitative methods were used to test the validity of the findings on the sampled population of SMEs in Kenya. Deductive research could be carried out to provide more insight on the factors that influence e-commerce adoption.

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APPENDIX I : Research Questionnaire

Information and Communication Technology (ICT)

(E-Commerce Adoption - 2015)

SECTION 1 ELECTRONIC COMMERCE APPLICATIONS

Please tick (√) against the following electronic commerce applications that are relevant to your organization.

			In Use	Not In use
1.	Electronic Marketing			
	i)	Research on consumers' preferences	☐	☐
	ii)	Research and evaluation on new suppliers	☐	☐
	iii)	Research on competitors	☐	☐
2.	Electronic Advertising			
	i)	Displaying company information and the Product/services offered	☐	☐
	ii)	Web site hosted by another company	☐	☐
	iii)	Web site hosted by own server	☐	☐
	iv)	Advertising on third party website	☐	☐
	v)	Electronic catalogues	☐	☐
3.	Consumer Support Service			
	i)	Online help - Frequently Asked Question (FAQ)	☐	☐
	ii)	Online help - products updates	☐	☐
	iii)	Handling customers feedback/queries on-line	☐	☐
	iv)	Personalized email communication (Email)	☐	☐
	v)	Online application/registration	☐	☐

Please tick (√) against the following electronic commerce applications that are relevant to your organization.

			In Use	**Not In use**
4.	Order and Delivery			
	i)	Processing sales order from customers' online	☐	☐
	ii)	Coordinating procurement with customers' online	☐	☐
	iii)	Tracking incoming and outgoing goods delivery (shipment, courier service online)	☐	☐
	iv)	Electronic Data Interchange (EDI)	☐	☐
5.	Payment System			
	i)	Electronic Fund Transfer (EFT)	☐	☐
	ii)	Online credit processing	☐	☐
	iii)	Smart cards	☐	☐
	iv)	Prepaid cards	☐	☐
6.	Mobile commerce			
	i)	Banking and financial services	☐	☐
	ii)	Wireless Advertising	☐	☐
	iii)	Games and entertainment	☐	☐
	iv)	Working from home/out-of office (teleworking)	☐	☐

SECTION 2: HINDRANCES OF ELECTRONIC COMMERCE

To what extent do the followings hinder your organization from using or using more electronic commerce applications?
(Please circle only ONE appropriate score on the scale 1 to 5)

	Strongly Disagree	Disa -gree	Less Agree	Agree	Strongly Agree
1. High cost of setting up electronic commerce	1	2	3	4	5
2. It is difficult to access credit facilities	1	2	3	4	5
3. Cost of Internet connectivity in terms of rate per minute is too high	1	2	3	4	5
4. Electronic commerce is not as effective as traditional marketing channel	1	2	3	4	5
5. Electronic commerce applications are difficult to use	1	2	3	4	5
6. Our management structure is well defined, with clear Job description for everyone	1	2	3	4	5
7. Lack of employee knowledge/skills to use E-Commerce	1	2	3	4	5
8. Our organization lacks adequate physical resources for E-Commerce	1	2	3	4	5
9. Insufficient security for online credit payment transaction	1	2	3	4	5
10. Lack of adequate Bandwidth/Access speed for Internet	1	2	3	4	5
11. Lack of IT skilled developers of electronic Commerce	1	2	3	4	5
12. Problems between ISP and telecoms supplier taking responsibility for service failures/problems	1	2	3	4	5
13. Lack of standards/regulations from government on E-Commerce issues	1	2	3	4	5
14. Insufficient incentives from the government for E-Commerce	1	2	3	4	5

SECTION 2: HINDRANCES OF ELECTRONIC COMMERCE

To what extent do the followings hinder your organization from using or using more electronic s e-commerce applications?
(Please circle only ONE appropriate score on the scale 1 to 5)

	Strongly Disagree	Disagree	Less Agree	Agree	Strongly Agree
15. There is lot of pressure from suppliers/buyers demanding we use e-commerce applications	1	2	3	4	5
16. Telecommunication infrastructure is not adequate	1	2	3	4	5
17. Market potential of electronic commerce user is too small	1	2	3	4	5
18. Lack of government leadership	1	2	3	4	5
19. There is perceived relative advantage in using e-commerce	1	2	3	4	5
20. Incompatibility with other existing technologies	1	2	3	4	5
21. The integration of e-commerce is quite complex	1	2	3	4	5
22. Weak support from top organizations management	1	2	3	4	5
23. Lack of sufficient E-Commerce knowledge in management	1	2	3	4	5
24. Keeping up with changing technology	1	2	3	4	5
25. Mindset shift towards using electronic commerce	1	2	3	4	5
26. Our sales/marketing requires high degree of human interaction	1	2	3	4	5
27. It will upset existing distribution channels	1	2	3	4	5

SECTION 3: ATTITUDES TOWARDS E-COMMERCE

How would you rate the value of electronic commerce?
(Please circle only ONE appropriate score on the scale 1 to 5)

	Very High value	High value	Medium Value	Low Value	Virtually No Value
1. Using e-commerce is important to our business	1	2	3	4	5
2. Having e-mail is important to our business	1	2	3	4	5
3. Having a website is important to our business	1	2	3	4	5
4. The internet is a viable business tool	1	2	3	4	5
5. Smart cards are useful for our business activities	1	2	3	4	5
6. Mobile banking /financial are important to our business	1	2	3	4	5

SECTION 4: SOCIAL AND CULTURAL ISSUES

How would you rate the importance attached to the following practices among staff in your organization.

	Very High Import-Ance	High Import-ance	Medium Import-Ance	Low Import-ance	Virtually No Importance
1. Decision making process being executed in top-down fashion	1	2	3	4	5
2. Relationship with trading partners	1	2	3	4	5
3. Protection of company image	1	2	3	4	5
4. Personal innovation and creativity	1	2	3	4	5
5. Socializing in order to obtain business contacts (Personal network)	1	2	3	4	5

SECTION 5: PROFILE OF THE ORGANIZATION

We need some information about your organization to enable meaningful interpretations of the study. Please be assured that this information will be treated with strict confidence.

Please tick(√) ☐ or fill in blanks where appropriate

1. In which sector / sub-sector is your organization classified:

☐ Agriculture	☐ Tourism
☐ Media & Communication	☐ Transport
☐ Construction	☐ Wholesale
☐ Education	☐ Healthcare
☐ Finance	☐ Distributor
☐ Florist industry	☐ Hospitality
☐ Information Technology	☐ Food processing
☐ Insurance	☐ Manufacturing
☐ Publishing	☐ Retail

Other, Please Specify: _____

2. Year established: _____

3. Major products/service

_____

_____

_____

4. Ownership of the organization: (Please tick(√) or fill in blanks where appropriate)

☐ Sole Proprietor ☐ Partnership

☐ Private Limited

☐ Others, Please Specify: _____

5. Total number of employees in your organization: _____

6. Who provides the system support for maintenance of the electronic commerce infrastructure?

☐ Own IT department ☐ Vendors

☐ Others, please specify: _____

7. Total number of IT personnel: _____

8. Do you send your staff for electronic commerce or ICT training?

☐ Yes ☐ No

9. Types of electronic commerce training: (You may select more than one)

☐ On-the-job training ☐ Local vendors

☐ In-house training ☐ Overseas training

☐ Local institutes (Colleges) ☐ Other _____
Specify

10. Company Name and Address

_____

_____

_____

APPENDIX II: Sampled Organizations Profile

Table 4.36

CODE	ORGANIZATION SECTOR	YEAR OF INCORP	TYPE OF ORGANIZATION	NUMBER OF EMLOYEES	**SUPPORT PROVIDER**	**NUMBER OF IT STAFF**	IT STAFF TRAINING	TRAINING PROVIDER
1	Transport/Manuf	1999	Partnership	12	Vendors	1	Yes	Local vendor
2	Education	2012	Partnership	37	Own IT	4	Yes	In-house
3	Education	2011	Private Ltd	26	Own IT	2	No	On-job
4	Education	2006	Sole Proprietor	10	Own IT	2	No	On-job
5	Finance	1979	Sacco Society Ltd	40	Vendors	1	Yes	In-house
6	Retail	1999	Private Ltd	12	Vendors	2	Yes	On-job
7	Retail	2009	Sole Proprietor	35	Vendors	3	No	On-job
8	Retail	1975	Family business	80	Vendors	4	Yes	On-job, Local coll
9	Agriculture	1958	Private Limited	220				
10	Florist	2003	Private Ltd	130	Own IT	15	Yes	various
11	Education	1961	Private Ltd	50	Vendors	3	Yes	Local institutions
12	Education	1991	Private Ltd	50	Own IT	10	Yes	On-job, In-hse
13	Transport		Sole Proprieor	200	Own IT	12	Yes	On-job,In-hse, Local col
14	Transport	1991	Private Ltd	250	Own IT	15	Yes	On-job,In-hse
15	Manufacturing	2012	Partnership	261	Own IT	4	Yes	On-job,In-hse
16	Manufacturing	1960	Partnership	250	Own IT	4	Yes	On-job,In-hse
17	Construction	1961	Private Ltd	250	Own IT	13	Yes	On-job,In-hse, Local col
18	Wholesale/Retail	1953	Private Ltd	175	Own IT	16	Yes	On-job,In-hse
19	Wholesale/Retail	1987	Partnership		Vendors	10	Yes	
20	Wholesale/Retail	2001	Partnership	200	Own IT	50	Yes	On-job,In-hse
21	Wholesale/Retail	1997	Private Ltd	240	Own IT	43	Yes	On-job,In-se,Local col
22	Wholesale/Retail	2006	Partnership	240	Own IT	10	Yes	On-job
23	Wholesale/Retail	1976	Partnership	190	Own IT	8	Yes	On-job,Local col
24	Manufacturing	1984	Partnership		Own IT	6	Yes	On-job,In-hse
25	Health	1979	Private Ltd	220	Own IT	17	Yes	On-job,In-hse, Local col
26	Health	1962	Private Ltd	249	Vendors	16	Yes	On-job,In-hse, Local col
27	Health	1954	Private Ltd	215	Own IT	13	Yes	On-job,In-hse, Local col
28	Hospitality	1958	Private Ltd	200	Own IT	20	Yes	On-job,In-hse
29	Finance	1993	Sacco	10	hired	2	No	
30	Construction		Partnership	10	Vendors	1	No	
31	TransportDistributor	2013	NGO	11	Own IT	0	No	
32	Real estate	2011	Partnership	12	Vendors	2	No	

33	Finance	2004	Private Ltd	250	Own IT	0	Yes	On-job,In-hse
34	Insurance	2000	Sole proprietor	15	Vendors	0	Yes	On-job, Local col
35	Insurance		Private Ltd	12	Own IT	0	Yes	On-job,In-hse
36	Finance	2004	Private Ltd		Own IT	0	Yes	On-job
37	Agriculture	2006	Private Ltd	13	None	0	No	
38	Health	1996	Private Ltd	16	Own IT	4	No	
39	Health	2003	Private Ltd	100	Vendors	1	No	
40	Health		Partnership		Own IT		Yes	On-job, Local col
41	Health	2013	Private Ltd	15	Vendors	0	No	
42	Health		Private Ltd	230	Own IT	7	No	
43	Transport	2011	Private Ltd	11		3	Yes	On-job,In-hse
44	Retail		Private Ltd	200	Own IT	5	Yes	On-job,In-hse
45	Transport	2004	Private Ltd	30	Vendors	0	No	
46	Retail	2002	Private Ltd	270	Own IT	5	Yes	On-job
47	Retail/wholesale	2013	Private Ltd	19	Vendors	2	Yes	On-job,Inhse, Loc vendors
48	Education	1985	Private Ltd	250	Vendors	15	Yes	On-job,In-hse,local inst
49	Media & comm	1995	Private Ltd	150	Own IT	10	Yes	On-job,In-hse, Local col
50	Media & comm	1990	Private Ltd	100	Own IT	10	No	On-job,In-hse
51	ICT		Private Ltd	130	Vendor	3	Yes	On-job,In-hse, Local col
52	Transport	1999	Private Ltd	10		0	No	Orokise Sacco Ltd
53	Transport	2008	Sole proprietor	100	Own IT		Yes	On-job,In-hse
54	ICT	2011	Private Ltd	12	Vendors	0	No	
55	ICT	1998	Private Ltd	20	Own IT	16	Yes	On-job,In-hse, Overseas
56	Sales Marketing	2011	Partnership	200	Own IT	2	No	
57	Construction	2012	Partnership	13	Own IT	2	Yes	On-job, Local col
58	Construction	2006	Private Ltd	250	Vendors	10		On-job,local ist, Overseas
59	Manufacturing	1983	Partnership	30	Own IT	1	Yes	On-job, Local vend
60	ICT	2012	Partnership	12	Own IT	3	Yes	On-job
61	ICT	2009	Sole proprietor	14	Own IT	1	Yes	On-job
62	ICT	2006	Partnership	16	Own IT	1	No	
63	Finance	1965	Private Ltd		Own IT	12	Yes	On-job,In-hse, Overs's, Locl
64	Insurance	2000	Private Ltd		Own IT	15	Yes	On-job,In-hse
65	Insurance		Private Ltd	250	Own IT	20	Yes	On-job,In-hse, Local col
66	Food processing		Private Ltd	249	Own IT		Yes	On-job
67	Food processing	1990	Sole proprietor	119	Vendors	8	Yes	Local Inst
68	Food processing	1978		215	Own IT	5	Yes	Overseas
69	Food processing	1965	Private Ltd	273	Own IT	3	Yes	Local Inst
70	Education	1989	Partnership	200	Own IT, vendors	20	Yes	On-job,In-hse, local

								vend
71	Education		Private Ltd	53	Own IT	2	Yes	On-job, Local inst
72	Education	1989	Partnership	16	Vendors	3	Yes	In-hse, local inst, local vend
73	Hospitality	1956	Private Ltd	200	Own IT	6	Yes	
74	Tourism		Private Ltd	200	Own IT	3	Yes	In-hse
75	Hospitality		Partnership		Vendors		No	
76	Tourism	1965		220	Own IT	1	No	
77	Tourism	2009	Sole proprietor	11	Vendors	2	Yes	Local vendors
78	Retail	2002	Private Ltd		Own IT	4	Yes	In-hse
79	Retail	2002	Private Ltd		Own IT	4	Yes	Retail
80	Hospitality		Private Ltd	46	Own IT	5		On the job
	Insurance	1908	Private Ltd	15	Own IT		Yes	In-hse, L-vendor
81	Insurance	1968	Public	26	Own IT		Yes	On job, In-hse
82	Media & Comm		Partnership	8	Own IT		Yes	Local Inst
83	Finance	1975		9	Own IT		Yes	On job training
84	Manufacturing		Sole propritor	50	Own IT	3	No	In-hse
85	Wholesae & Retail	1963	Private Ltd	157	Own IT	21	Yes	On-job
86	Retail	1990	Private Ltd	98	Own IT	6	Yes	On job, In hse
87	Hospitality	1993	Sole proprietor	67	Own IT	2	Yes	On-job training
88	Healthcare	1980	Private Ltd	18	Own IT	2	No	On job training
89	Healthcare		Private Ltd	142	Own IT	1	Yes	On job, In hse training
90	Media & Comm		Partnership	14	Vendors	1	No	Local Institution
91	Media & Comm		Private Ltd	20	Own IT	10	Yes	On job, In hse
92	Education		Non Profit	40	Own IT		Yes	On job, In hse
93	Agriculture		Private Ltd	128	Vendors	2	No	In-hse
94	Education		Private Ltd	33	Own IT	7	No	On job
95	Hospitality	1944	Private Ltd	50	Own IT	1	No	In hse
96	Media Comm	2012	Private Ltd	4		1	Yes	Local institutes
97	Finance	1991	Partnership	40		2	Yes	On job, In hse
98	Media & Comm	2007	Private Ltd	200	Own IT		Yes	Local Institutes
99	Insurance	1990	Private Ltd	4	Own IT	2	No	Local Institutes
100	Manufacturing	2013	Private Ltd	247	Vendors	7	No	On job, In hse
101	Manufacturing	1993	Partnership	30	Own IT	3	Yes	In house
102	Food processing	2004	Partnership	110	Vendors	5	Yes	On job, In hse
103	Manufacturing	1932	Partnership	213	Vendors	3	No	In house
104	Food processing	1999	Private Ltd	150	Vendors	3	Yes	In-hse, Local Institutes
105	Healthcare	2013	Private Ltd	67	Vendors	2	No	Local

								Institutes
106	Education			98	Own IT	4	Yes	On job, Local Institues
107	Healthcare	1994	Private Ltd	37	Vendors	4	No	Local Institutes
108	Distributorr	1974	Partnership	201	Vendors	6	Yes	On job, In hse
109	Wholesale	2006	Private Ltd	26	Vendors	1	No	Local vendors
110	IT	2011	Private Ltd	27	Own IT	3	No	On job, In hse
111	IT	1994		58	Own IT	3	No	On job
112	Construction	1997	Private Ltd	18	Vendors	2	Yes	On job, local vendors
113	Construction	1998	Private Ltd	46	Vendors	2	No	On job
114	Agriculture	2012	Private Ltd	70	Own IT	4	Yes	On job
115	Education	2007	Private Ltd	50	Own IT	4	Yes	On job, Local Institutions
116	Education	1972	Partnership	42		4	Yes	On job, Local Institutions
117	Hospitality	1998	Private Ltd	12	Own IT	2	Yes	On job
118	Healthcare	1968	CBO	50	Own IT	6	Yes	On job, In hse
119	Hospitality	2013	Private Ltd	12	Own IT	1	Yes	On job

APPENDIX III: Summary of Factors of IT in SMEs

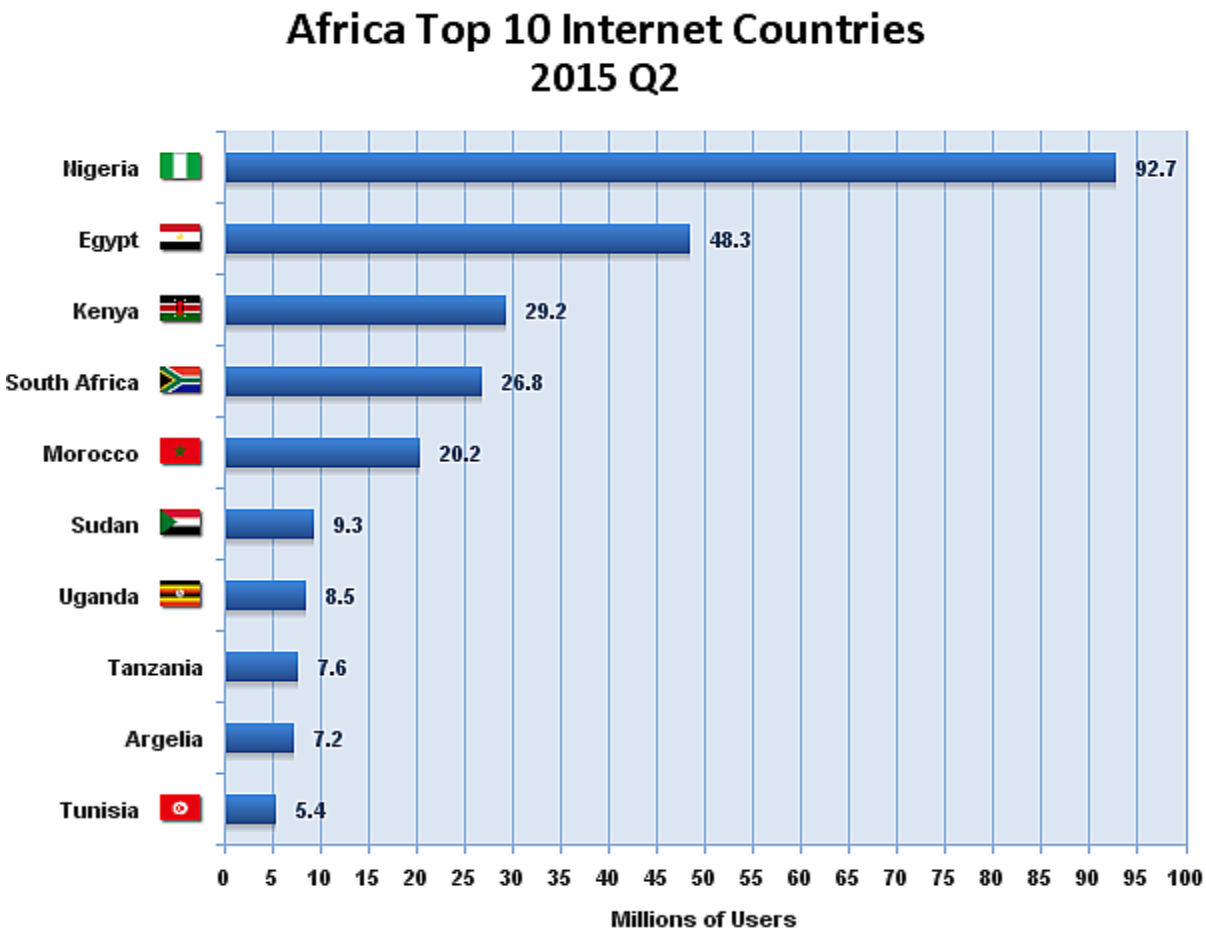
Table 4.37

Source	Influencing factors	IT studied	No. SMEs	Industries
Iacovou et al.(1995)	External pressure, perceived benefits, organizational readiness	EDI adoption practices	7 SMEs (n<200)	7 different industries
Chwelos et al.(2001)	Readiness, external pressure, perceived benefits	EDI adoption	268 SMEs (n/a)	Manufacturing, services, government, etc.
Kuan and Chau (2001)	Technology organization environment	EDI adoption	575 SMEs (n<100)	Not specified
Igbaria et al. (1997)	Intra-organizational factors, extra-organizational factors, perceived ease of use, perceived usefulness	Personal computer	203 SMEs (n<100)	Manufacturing and engineering
Thong (1999)	CEO characteristics, IS characteristics, organizational characteristics, environmental characteristics	IS adoption	166 SMEs (n<100)	Not specified
Premkumar and Roberts (1999)	Relative advantage, top management support, organizational size, external competitive pressure	Online data access, e-mail, and the Internet	78 SMEs (n<90)	Manufacturing, retail sales and wholesale trade, service, finance, insurance, others
Mehrtens et al. (2001)	Perceived benefits, organizational readiness, external pressure	Internet adoption	7 SMEs (n<200)	IT industry, clothing manufacturer, entertainment, transport
Mirchandani and Motwani (2001)	Enthusiasm of top management, compatibility, relative advantage, knowledge of companies employees about computers	E-commerce adoption	62 SMEs (n<200)	Not specified
Riemenschneider and McKinney (2001-2002)	Attitude, subjective norm, perceived behavioral control	E-commerce adoption	7184SMEs (n<500)	Defense, agriculture, oil and gas, manufacturing
Riemenschneider	Attitude, subjective norm, perceived behavioral	Web site adoption (web	156 SMEs (n<500)	Service/sales, government, retail,

et al. (2003)	control, perceived usefulness, perceived ease of use	presence)		banking, medical, manufacturing
Granton and Pearson (2004)	Organizational readiness, external pressure, perceived ease of use, perceived usefulness	E-commerce adoption	100 SMEs (n<500)	Education, finance, wholesale, retail, healthcare, construction, insurance
Hunaiti, Masadeh, Mansour & Al-Nawafleh (2009)	Postal system suitability, banking system services, Internet services and customer's culture	E-commerce adoption	30 SMEs	Different industry sectors
Olatokun and Bankole (2011)	Promoting factors: awareness, benefits, size, pressure from suppliers. Inhibiting factors: Owner/mgr characteristics, organizations char, cost & RoI, tech infrastructure, culture	E-Business	60 SMEs	Different sectors
Lyatta Ndiali (2013)	Adoption barriers: technical, legal, regulatory & lack of internet security	E-commerce adoption barriers	95 SMEs	6 Different Industries
Kinuthia & Akinnusi (2013)	E-commerce barriers: economic, social, telecomm infrastructure, legal/political, individual & organizational	E-commerce Barriers	74 Businesses	Several different sectors
Abdul & Jamali (2013)	Buyer/supplier pressure, support from technology vendors, perceived compatibility, CEO innovativeness, perceived rel. advantage, competitive & information intensity	E-commerce adoption	250 SMEs	Manufacturing

n represents the maximum number of employees considered in the criteria to define a SME.

APPENDIX IV: Africa Top 10 Internet Countries



Source: Internet World Stats - www.internetworldstats.com/stats1.htm
313,257,074 Internet Users in Africa estimated for June 30, 2015
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APPENDIX V: State of E-commerce Application Adoption

Table 4.38

Organization Serial Number	Number of Applications Adopted	Percentage (%)
1	6	24%
2	11	44%
3	9	36%
4	11	44%
5	24	96%
6	6	24%
7	8	32%
8	8	32%
9	17	68%
10	12	48%
11	18	72%
12	18	72%
13	17	68%
14	14	56%
15	14	56%
16	10	40%
17	17	68%
18	16	64%
19	20	80%
20	17	68%
21	20	80%
22	15	60%
23	18	72%
24	6	24%
25	18	72%
26	16	64%
27	16	64%
28	5	20%
29	14	56%
30	14	56%
31	10	40%
32	14	56%
33	16	64%
34	23	92%
35	16	64%
36	19	76%
37	2	8%

38	17	68%
39	10	40%
40	20	80%
41	21	84%
42	18	72%
43	24	96%
44	17	68%
45	20	80%
46	18	72%
47	13	52%
48	17	68%
49	18	72%
50	18	72%
51	13	52%
52	4	16%
53	4	16%
54	6	24%
55	14	56%
56	14	56%
57	6	24%
58	18	72%
59	20	80%
60	11	44%
61	18	72%
62	7	28%
63	18	72%
64	23	92%
65	19	76%
66	14	56%
67	14	56%
68	11	44%
69	5	20%
70	21	84%
71	21	84%
72	18	72%
73	16	64%
74	12	48%
75	17	68%
76	8	32%
77	16	64%
78	19	76%

79	13	52%
80	20	80%
81	18	72%
82	6	24%
83	16	64%
84	16	64%
85	20	80%
86	19	76%
87	19	76%
88	16	64%
89	17	68%
90	14	56%
91	14	56%
92	11	44%
93	6	24%
94	6	24%
95	17	68%
96	13	52%
97	8	32%
98	23	92%
99	16	64%
100	18	72%
101	15	60%
102	17	68%
103	23	92%
104	15	60%
105	18	72%
106	13	52%
107	16	64%
108	18	72%
109	9	36%
110	18	72%
111	19	76%
112	13	52%
113	16	64%
114	14	56%
115	16	64%
116	14	56%
117	20	80%
118	10	40%
119	15	60%