UNIVERSITY OF NAIROBI, SCHOOL OF COMPUTING AND INFORMATICS

MASTER OF SCIENCE IN INFORMATION SYSTEMS

RESEARCH PROJECT REPORT

MODELLING UPTAKE OF MOBILE PAYMENTS BY MSMEs IN KENYA

BY

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DECLARATION

This research project report is my original work and has not been presented to any university for any award or anywhere else for academic purposes.

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This project proposal report has been submitted for examination purposes with my approval as University Supervisor.

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DEDICATION

I dedicate my project work to my family and many friends. A special feeling of gratitude to my loving parents Mr. & Mrs. John Ndege whose words of encouragement and push for tenacity ring in my ears.

Linda Deborah Akoth, my loving wife who has never left my side and is very special. Special thanks to my kids Alexandra, Derry and Kelly for being there for me throughout and understanding the many hours I spent away from them.

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ABSTRACT

This study sets to model the uptake of mobile payments by MSMEs in Kenya. The objectives of the study were: to establish the relevant determining and moderating factors for technology adoption of mobile payments by MSMEs in Kenya; to establish the external factors affecting acceptance of mobile payments by MSME's in Kenya; to use the factors to formulate a model for technology adoption of mobile payments by MSMEs in Kenya and; to validate the model. The study utilized a descriptive survey design. The target population comprised persons drawn from various SMEs categories of businesses (boutiques, clothes materials shops, retail shops, retail shop and MPESA shops) sampled from Kariobangi and Uhuru Markets, Nairobi. The target population comprised 95 persons. These two markets were targeted for purposes of delimiting the study in scope. Furthermore, there is a huge concentration of business that use lipa na MPESA in these markets. The researcher used proportionate stratified sampling. The researcher used the simplified formula to calculate sample size that was put forward by Yamane (1967). The formula employed is: $n=N/(1+N(e)^2$ (where n = sample size, N = population size and e =the level of precision (0.05)). As such, the researcher sampled 90 person from the 5 strata. Individuals within each strata were randomly sampled. The study relied on primary data that will be collected using a structured questionnaire as the research instrument. The questionnaire was divided into through sections that correspond to the research questions of the study. An extra section on the level of adoption of Lipa na MPESA by SMEs was included in the study. Before analysis, the completed questionnaires were checked for completeness and consistency. The data collected was analysed using descriptive and inferential statistics and presented in Tables and Figures. F and t-tests were used to test the hypotheses. From the findings, it can be concluded that various relevant and external factor determine the adoption of mobile payments by MSMEs in Kenya and understanding them could help enhance adoption of such payments. As such, the most important factors are pegged to cost reduction, risk reduction and perceived importance and convenience over other payment methods. Understanding these factors may augment the level of adoption of mobile payments in Kenya. The study therefore recommends as follows: Managers of Safaricom Ltd should understand the factors that influence the adoption of mobile payments as highlighted in this study and institute ways of ensuring that they are well understood and taken into consideration. This should include regular information dissemination on mobile money payments. There should be regular review of prices and upgrading of the payment system to match up the ever increasing needs of MSMEs. In addition, there should always be in place robust customer care services to ensure that the image of Lipa na MPESA is maintained since such an image would safeguard the extent to which its clients would continue subscribing to it. Lastly, Safaricom Ltd. should continuously invent services that could add value to Lipa na MPESA as that would increase its value in Kenya. This study was based on only one mobile money payment service (Lipa na MPESA) of Safaricom Ltd. The Researcher therefore recommends comparative studies focusing on other similar payment services offered by other mobile telephony service providers in Kenya.

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CHAPTER ONE: INTRODUCTION

1.1.Background Information

In Kenya, we have seen an exponential growth in both customer and business transactions being carried out daily on the mobile phones. The two fundamental attributes of the mobile phone which has led to its flourished usage are mobility and immediate access (Leung and Wei, 2000).It was also anticipated that within reasonable time, face to face transactions involving paper money will be displaced by electronic mobile money. However, this is yet to materialize especially in Kenya where most of the transactions being done are mostly cash based. With the current drive by MNO's to push the usage of mobile payment as a means of payment, a fundamental question arises; Will mobile money be able to replace the need for cash? To properly understand this question, we need to understand the extent to which the MSME's are willing to accept electronic money as a means of goods exchange. The two key functions of money are: as a store of value and a means of exchange. Most of the emerging markets operate a cash economy with over 70% unbanked (Jenkins, 2008).Therefore MSME's acceptance of mobile payment as a means of exchange will depend on the MSME's adoption of the technology.

The business value of mobile payments is especially strong for mobile network operators (MNO's). MNO's have invested heavily in the technical infrastructure that supports their network and it's always paramount that they get return on investments. This investment in infrastructure has also been supported by intensive marketing campaign and roll-out towards supporting the services being offered on this infrastructure. The value proposition for mobile payments for the MNO's is derived from both the ubiquitous nature of the mobile phone and the potential for micropayments. In Kenya for instance, Safaricom Limited, one of the leading MNO's on mobile money does not levy any charge to customers using her mobile money system to make payments. MNO's are eager to increase average revenue per user through the mobile payments especially since global payment transactions are estimated to grow rapidly.

This attraction in mobile payments can be attributed to various factors related to value addition and efficiency gains. For users, mobile payments enhance the ease and security of the payment process while financial institutions can be able to create differential advantages in the current fierce and turbulent marketplace. Mobile Network Operators (MNOs) can also add a new revenue stream on their revenue base. By the end of 2012, there were 501 million

mobile subscribers in Africa (ITU, 2013). Kenya is the most developed mobile market in East and Central Africa, with its four mobile operators (Safaricom, Airtel-formally Zain, Yu and Orange) already having launched mobile money services, largely aimed at reducing churning, thus increasing loyalty and increasing revenue. The Communications Commission of Kenya (CCK), which regulates mobile telephony in Kenya, revealed that as of June 2013, there was 75% mobile telephony penetration of the national population (CCK, 2013). During the same period under review, the number of mobile money subscriptions increased by 10.1 per cent to reach 23.2 million up from 21.1 million the previous quarter.

However, in spite of the growing number of studies on the adoption of information and communication technology (ICT) in MSMEs, the literature still suggests the need for advancing understanding of the key factors experienced in different contexts around the world. In addition, this area of study is still under-researched in African settings (Mpofu, 2009).

1.2.Definition of Micro and Small Medium Enterprises in Kenya

In Kenya, the MSME bill 2009 has used 2 criteria to define SMEs in general: Number of people/employees and the company's annual turnover. For this study, focus shall be on that organization with less than 10 employees and annual turnover of not more than Ksh 1,000,000.

1.3.Research Problem

The proliferation of new technologies and the need for convenience has fuelled enormous interest in the use of mobile payments innovations. Indications are that mobile phones and handheld devices should have made more inroads in businesses and societies as in most advanced societies are at today. Instead there has been a slow acceptance of mobile as alternative payment systems despite the effort of key players such as mobile network operators and banks.

According to Safaricom Half Year financial results September 2013 (www.safaricom.co.ke), the reported total number of acquired merchants currently stands at 36,749 and 142 distributors for cashless payments. This is the number reported since the launch of Lipa na M-PESA as a mobile payment service in June 2013. It is pertinent to note that several electronic payments have failed to achieve the much desired critical mass required.

Business at large in Kenya has a strong cash-based heritage and cash is the default means of carrying out small-scale transaction despite the relative growth and success of mobile money systems in Kenya. The strong cash-based culture and people's ability to conceptually relate to transferring money by mobile phones have however shown to be some of the greatest hurdles to overcome for mobile transactions service providers (FSD, 2006 and 2009).

Further, there has been no published model of technology adoption and diffusion focused on mobile payments usage by MSMEs in Kenya. Developing a technology adoption model based upon Kenyan culture is important and necessary in order to promote usage of the mobile payments technology in Kenya.

1.4.Objectives of the Study

The purpose of this study is to assess MSME's acceptance of mobile payments as a sole mean for retail point of sale payments. To achieve this objective, the study will be guided by the following specific objectives:

(i) To Investigate and Establish relevant determining and moderating factors for technology adoption of mobile payments by MSMEs in Kenya
(ii) External Factors affecting acceptance of mobile payments by MSME's in Kenya.
(iii) Use the factors to formulate a model for technology adoption of mobile payments by MSMEs in Kenya
(iv) Validate the model.

1.5.Hypothesis

$H0_1$: There is no significant relationship between determining and moderating factors for technology adoption and the adoption of mobile payments by MSMEs in Kenya

HO_2: There is no significant relationship between external factors for technology adoption and the adoption of mobile payments by MSMEs in Kenya

1.6. Significance of the Research

Several classes of people should benefit from this study. Firstly, academic leaders and researchers exploring thematic areas such as technology adoption, MSMEs and mobile payments will find this study useful since substantial theoretical foundation will be laid and literature reviewed forming a strong basis for the conclusions to be made. The article will

give them a reference on the subject matter and similar studies may thus be replicated in other countries or at some other point in time, as confirmatory studies. Essentially, this study endeavours to make theoretical, practical and methodological contributions to the body of knowledge.

Secondly, Bank and Non-Bank Financial Institutions (NBFIs), money transfer companies and mobile network operators are, perhaps, to be the main beneficiaries of this study given that they are the key players in the mobile payments sub-sector. The study will elaborate with empirical evidence the convergence of financial services on one hand, and mobile telephony on the other hand. Business entities can therefore use this paper as reference material in pursuit of strategically proficient practices in their organizations. Financial institutions are keen to develop relevant mobile financial services in order to not only increase financial inclusion, but also to increase customer base and revenue streams. This study's recommendations should be of crucial strategic value to these organisations.

Thirdly, the management and the cross-functional strategy teams within Safaricom Ltd will benefit from this study as it will examine the mobile payments in Kenya. This impact on the company's success of mobile money transfer (MMT) services in the local sector and ultimately affects its competitiveness. The study results will assist the senior management in determining strategies for effective MMT. In anticipation, the study results will generate discussions among board members and result in implementation of relevant strategic infrastructure for MMT services in the company, especially for mobile payments.

Finally, regulatory authorities, specifically the Central Bank of Kenya (CK) and the Communications Commission of Kenya (CCK) have an intricate role of enforcing government policies. Typically, the regulators will push for the growth and development of appropriate financial products as they seek efficiency gains within the financial system and this study sheds light on what constitutes some of the characteristics of potentially effective mobile payment systems which the regulators can support. The industry regulators, the Communications Commission of Kenya and the Central Bank of Kenya, will use the study findings to implement relevant policy framework and institutional competencies to foster growth in the sector. The study's findings can also inform resource mobilisation and allocation decisions by government bureaucrats.

1.7 Scope of the Study

This study of merchant adoption on mobile payments is characterized by:

1) The research is limited to Safaricom's mobile payment services namely Lipa Na M-PESA, Cashless Retail Distribution and Buy Goods.
2) The research is primarily focused on mobile payments where merchants are charged on the e-value exchanged between them and the customer.
3) The study will also be limited to merchants currently trading within Nairobi.
4) Other forms of mobile payments do exist, either using other devices (e.g. proximity contact cards, RFID tag, Laptop computer on wireless network) or for other purposes (e.g. person-to-person mobile banking, bill payment by mobile phone), but these are not considered in the current study.

1.7.Limitations of the Study

Business usage of mobile money transfer is currently mainly taking place over services designed for private use. It is equally true that business usage of mobile financial services will expand out from mobile money transfer to a range of more sophisticated services.

The payment environment in itself does not exist in isolation and has several players who play a significant role in shaping it. Banks are showing an increased interest in the expanding payments space. Banks also seek to defend its existing payment infrastructure and also expand by increasingly turning to new services.

We also do have the traditional regulatory challenge which endeavours to allow for new services to evolve whilst maintaining stable financial mechanism and market confidence in the financial system.

The convergence of mobile and payments is extremely complex and which has many players including but not limited to application providers, mobile operators, banks, regulators, merchant, consumers and attempting to explain this co-operations may not be feasible with this study.

The financial services sector in Kenya is wide and complex, yet this work is in essence expository. Though relevant references may be made to other areas, the basic area of focus remains the Modelling of uptake of mobile payments in Kenya's local financial system with an emphasis on the Lipa na M-PESA service. Additionally, it is obvious that a research work

is never an easy task to overcome given the many occasions when the research would encounter problems, some very basic and unavoidable. This research work is not an exception.

Finally, lack of previous concrete studies done in the organization on the subject may cause a major hindrance in understanding the subject matter of the study, since the researcher may not get enough literature to review, which could have formed the basis of the research. However, the researcher will endeavour to make a detailed analysis of literature from the libraries and other online sources, including articles, journals and theses.

1.8.Organization of the Study

This research project has a total of three chapters. Chapter one introduces the research project in which the study foundation is set, indicating what the context of the study is, the research problem, objectives significance, limitations scope is delineated. Chapter two reviews literature, analysing various theoretical and empirical underpinnings of the study as well as laying out the conceptual framework. Chapter three discusses the methodology to be adopted in conducting the study. Chapter four presents data analysis and presentation while chapter five deals with summary of the findings, discussions, conclusions and recommendations.

CHAPTER TWO: LITERATURE REVIEW

2.1.Introduction

This chapter reviews relevant literature related to the field of mobile money transfer, and specifically mobile payments, and its uptake by MSMEs, with a focus on the Kenyan case.
Since mobile payments are an interdisciplinary and convergent topic, similar to e-commerce and mobile marketing, we have quite a number of relevant published journals and articles. Mobile payment research is still an emerging area in research and most materials found have been mostly from conference proceedings. However, since our aim is to review Lipa na M-PESA, Cashless & Buy Goods service which is a sub segment of mobile payments, there is even less material. Hence, following the convergence approach the research will not only be specific to Lipa na M-PESA, cashless and Buy Goods service but also look at articles that could provide good and specific insights into Mobile and the payment domain in such a way so as to integrate the findings from these disciples.

Due to the proliferation of mobile phone in the market, the number of mobile phones is far higher than other technological devices such as television, computers that could be used to market, sell, produce, or deliver products and services to consumers. This has therefore opened new lucrative and exciting opportunities for service providers, mobile operators and even merchants. Mobile technology has also taken relevance and root within different industries including the medical industry, banking industry, financial industry, agricultural industry etc. Mobile payments are the ability to purchase goods and or services and to pay for such with the use of a mobile phone or other personal device using a wireless technology.

The fallen prices of mobile handsets have led to a rapid spread of mobile phones in the emerging economies (Orozco et al. 2007), leading to cell phone ownership saturation levels in most economies. This has opened up diverse opportunities for it to be used over and above voice communication, whose revenues are no longer growing. Thus, telecom operators have continuously worked to introduce value-added services (VASs) in addition to the traditional voice calls, often based on new technologies, in order to be able to cross-sell additional mobile services and increase revenue from the consumption of these services. With the convergence of these advanced mobile communication technologies and the ability to use it for data services, is mobile money transfer (MMT). According to Alleman (2010), several benefits accrue with the combination of cellular and financial services: it enhances commerce; it allows for microfinance, it allows ease of remittances, it offers security that

cash does not and, possibly, and it could serve as a replacement for debit and credit cards, essentially providing banking services for the unbanked.

The bundling of new products and services together with an existing service, as is often the case with mobile services can be a beneficial strategy for service providers (Stremersch and Tellis, 2007). On top of MMT, other VASs are being developed for specialised services. These include mobile solutions for agriculture, health, insurance, transport, micro-credit and payment solutions, amongst others. Indeed, driven by the growing demands from the consumer side for mobile payment and the rapid rise and growth of e-commerce and mobile internet, mobile payment is attracting more and more attention throughout the world (Wang and Chou, 2012). A mobile payment can simply be regarded as a form of payment in which a user with a mobile device uses the device to realise information exchange and complete funds transfer from the payer to the payee. This either utilises communication networks or short-range communication technologies.

Several studies have identified mobile payment key adoption drivers by users and have indicated there is a substantial willingness to use their handset for making purchases. However, mobile payment industry, purchasing methods, transaction flows and technological standards are still fragmented. Mobile payments can utilize proximity technologies such as Bluetooth, UWB, NFC (Balaban, 2005; Mallat et al., 2004) or ‘’remote ‘’ technologies such as SMS, USSD and mobile data traffic connections like WAP (Dhalberg et al., 2007).According to Gartner (2011) NFC is being overhyped and will not be mainstream for at least four years. SMS and USSD will continue to dominate payments in developing markets and WAP payments will dominate in developed world.

Whereas literature on the adoption of mobile banking (Cheng et al., 2006: Chen, 2008) and mobile payment (Wang and Lie, 2006) and the broader scope of m-commerce (Dai and Palvia, 2008) although not quite exhaustive have enjoyed significant attention of many scholars in recent times, research on mobile money is still at its formative stages. Most of the existing literature represents other contexts in countries and regions of the world such as Europe, USA, Asia and Australia while far less research in this area has been carried out in African contexts (Omwansa, 2012). Investigating adoption patterns, models and theories is one of the key areas of interest in information systems (IS) research, with the primary objectives being to establish ways of improving adoption as well as to examine the hindering

factors for usage. Initially, researchers focused on IS in general but have now focused on specific related areas like mobile payments, bringing forth new research domains that are few years old and not substantially investigated.

Thus the researcher will attempt to include both academic journal papers from various disciplines and also conference proceedings that are informative and focus on this rapidly progressing area of research.

Both locally and globally, the MMT services have generated mixed results in terms of uptake (Omwansa, 2012). The Global Mobile Money Tracker that monitors deployments across the world, reported 129 live deployments and 91 planned as of September 2012 (GSMA, 2012). However, save for Kenya's M-PESA and a few other success stories like MTN in Uganda, M-PESA in Tanzania and Easypaisa in Pakistan, there have been no major successes globally. Still on the global scene, Gartner (2012), the world's leading information technology research and advisory company, makes the below analysis on mobile payments:

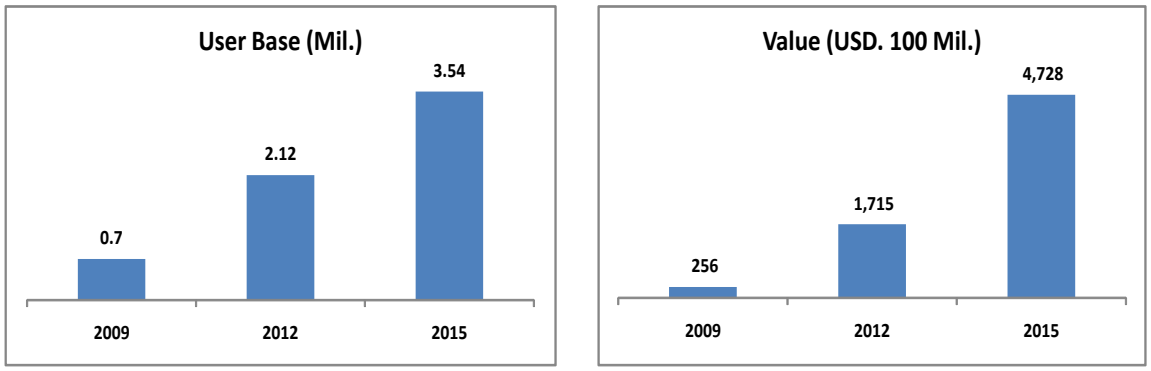

Figure 1: Global Mobile Payments (Source: Gartner, Forecast, 2012)

According to Maurer (2008), the academic inquiry into the convergence of telecommunication and financial services to the consumers is generally scarce. This is more so for mobile payments. There is, therefore, a need to understand the framework for users' acceptance of mobile money and to identify the relevant determining and moderating factors for technology adoption of mobile payments by MSMEs in Kenya. As previously mentioned, this is beneficial to consumers, Telco's and financial institutions. For this reason, the main goal of this study is to develop a simple model that tries to delineate the factors that affect MSMEs behaviour towards the adoption of mobile payments in Kenya.

2.2.Definition and Conceptualization of Mobile Payments

Mobile payments are a special form of electronic handling of payments. Below are some of the common definitions;

- Zmijewska (2004): *Payments in which at least one part of the transaction is conducted using a mobile device (such as a mobile phone, smartphone, or Personal Digital Assistant) through a mobile telecommunications network, or via various wireless technologies»;*
- Karnouskos and Fokus (2004): *A mobile payment or m-payment is any payment where a mobile device is used to initiate, authorize and confirm an exchange of financial value in return for goods and services»;*
- Pousttchi (2008): *m-payments are defined as a type of payment transaction processing in which the payer uses mobile communication techniques in conjunction with mobile devices for initiation, authorization, or completion of payment»;*
- Dhalberg et al. (2008): *Mobile payments are payments for goods, services, and bills with a mobile device (such as a mobile phone, smart-phone, or personal digital assistant (PDA)) by taking advantage of wireless and other communication technologies».*

Different authors have attempted to conceptualize the key characteristics that distinguish mobile payments from other forms of payments Some authors focus on the cell phones (e.g. Henkel, 2002) while others include the all the mobile devices involved (“e.g. Zmijewska et al.,2004). However, while all these conceptualize differently, the function of mobile payments still by definition refer to transfer of monetary value.

Different studies have also attempted to conceptualize that mobile payment can fall into two broad categories, namely ‘’Mobile Remote Payments’’ and ‘’Mobile Proximity Payments’’ (Fig 2).However, it’s prudent to note that not all scholars refer to these two names for making this distinction. For example, Dewan and Chen (2005) refer to such distinction by dividing Mobile Payments into ‘’Cellular;’ and ‘’Contactless’’.

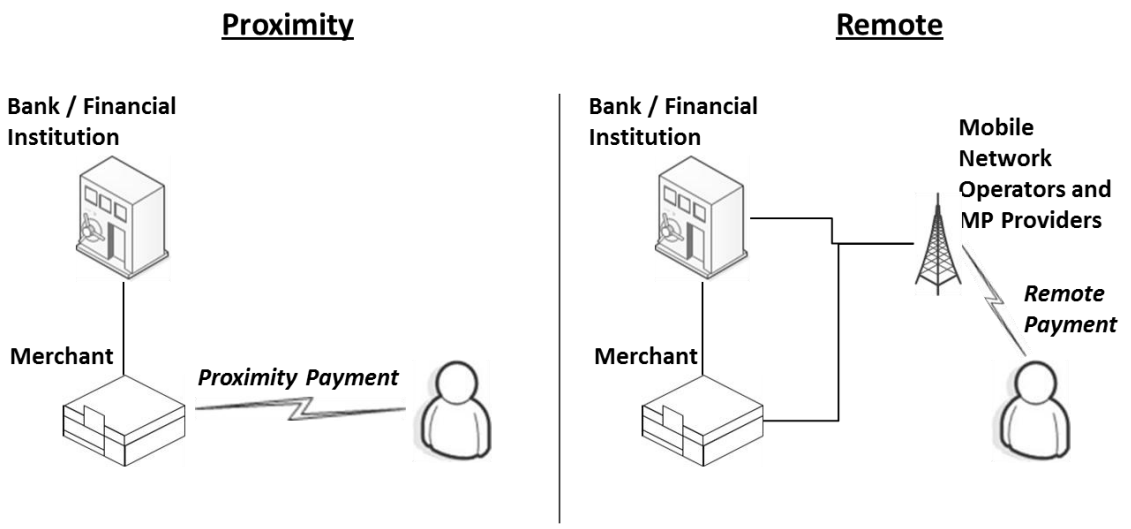

Figure 2: Mobile Payment-Remote vs. Proximity

In world economy today, the wireless industry is one of the most dynamic and growing industries. The rapid technological advancement that the world has witnessed in the recent years especially in the electronic industry has also changed the means of production around the world (Bwisa, 2010). The growth in mobile telecommunication service availability is expanding the reach of financial services across wireless networks in many ways, creating the potential for significant growth in mobile commerce and financial inclusion (Reichheld and Sasser, 1990). Devlin and Ennew (1997) showed that the particular factors emphasized in the value adding mix in attempts to add value and achieve competitive advantage may be dependent on the intricacy of the service offering in question as well as the perceived knowledge and sophistication of the target market. Added value is a multidimensional construct, interpreted differently by different people, and there are diverse roles that added values play.

Today's mobile payments are quite non-standardized with major players approaching the market with their own proprietary infrastructures and solutions. There is no widely accepted and applicable payments model that is dominating and or standardized. Different players have attempted to build solutions while still heavily relying on the banking solutions currently applicable from market to market.

There is about four existing mobile payments models i.e. acquirer-centric, user centric, bank-centric and mobile network operator centric models. Karnouskos states that the most likely dominant players in the area would be banks and mobile network operators. He foresees a

movement towards composite models where the main players cooperate on a revenue sharing basis.

Most payment transactions normally do consist of three basic phase's i.e. Fist the customer chooses the desired product by shopping. After shopping phase is completed, the customer is billed by the merchant and finally the customer does the payments for the good purchased. According to Ondrus and Pigneur, there are many possibilities of extending the number of phases during a payment transaction. The most pertinent issue is that the transaction must be easy to use to the customer regardless of how complex the transaction may be. The transaction scenario here could be a remote payment, at the point of sale payment, Pre-Pay and Post Pay.

It's been noted that the key phases of a generic mobile payments procedures is normally applicable to almost all transactions. However, this can be categorized into several procedure bases/groups. Karnouskos categorizes mobile payments procedures them as location-based (remote and proximity transactions), value-based (micro-payments, mini-payments and macro-payments), charge-based (Post-Paid, Pre-Paid and Pay-Now), validation-based (online mobile payment, offline mobile payment) and technology-based (single chip, dualchip, dual slot), token-based (e-coin) and account based (wireless wallets).
As evidenced in several previous studies, location of purchase has been a key determinant in driving the various forms of electronic payments. With the emergence of mobile payments as well as new features, we expect an increase in electronic payments. Mobile phones have also been used as wallets in different payment scenarios. MasterCard and Nokia have conducted several joint tests since the year 2003.Proximity payments usually involve two parties using an ad-hoc network based technologies such as Bluetooth, infrared and radio frequency identification (RFID) which enable short-range wireless device to device payments.
Adoption of mobile payments offers a great opportunity to MSMEs to gain greater global access and reduced transaction costs, provide substantial benefits via improved efficiencies and raised revenues; facilitate access to potential customers and suppliers, productivity improvements, customization of products and services and information exchange and management.

The rise of new technology standards and the implications at different levels such as stakeholders/key players and consumer must thus be considered by conceptualizing mobile

payments. The possibility to charge the merchant directly to their pre-paid e-value through the use of the operators system will here be referred to as "Lipa na M-PESA''.

For purpose of this study, "Lipa na M-PESA" will be defined as;

> *The act of purchasing goods, services and paying the same with a mobile device by taking advantage of the Operators mobile network and services and hereby referenced as M-PESA and charging the amount directly to the merchants pre-paid e-value.*

2.3. Mobile Money Ecosystem in Kenya

Micro, Small and Medium Enterprises (MSMEs)

Micro, Small and Medium Enterprises (MSMEs) have been known to play a central role in the growth of economies and enhancement of the entrepreneurial skilfulness of the local people. This then contributes enormously towards creation of sustainable development in the developing countries. However, these MSMEs suffer the challenge of limited technology and poor infrastructure, consequently leading to loss in competitive advantage. MSMEs enterprises mainly employ less than 100 workers and have been known to be the backbone of many countries' economic progress (Liedholm and Mead, 1999). Indeed, African economies have been seeking ways of growing the MSMEs businesses through improving the skills and technology in this critical sector. In addition to employment creation, MSMEs are also avenues of innovation and entrepreneurial growth.

In Europe for example, a study by Eurostat (2008) indicated that two thirds of employment came from the small enterprises in the countries where majority of the people are low income earners, Luckas (2005) indicated that MSMEs account for about 60 percent of the GDP and more than 70 percent of the employment opportunities. However, according to Luckas, most of these MSMEs faced the challenge of poor production methods leading to low quality of products, low levels of production, local and narrow markets for their products among other challenges. He highlighted the lack of technological advancement as the major barrier towards the advancement of the MSMEs into macro enterprises.

In Kenya, the majority of the MSMEs businesses operate in the informal sector with most of them being sole proprietorships or family businesses usually employing less than ten people. These MSMEs are involved in small, semi-organized and sometimes unregulated activities that are mainly concentrated in urban as well as in some parts of the rural areas. According to

Schmitz (1995), the desire to remain efficient is what has been the major drive for many MSMEs in Kenya. Information systems (IS) brought in by MSMEs has been a critical enabler to the dissemination of information in the market for the enterprises in Kenya, since they are more efficient and meticulous compared to other methods. According to Hagman and McCahon (1993), the adoption of IS by the Kenyan MSMEs has brought competitive advantage.

Advancement in technology has created an enormous challenge to MSMEs on adoption basis since it is costly and sometimes the MSMEs lack the knowhow of the technologies. According to Powell (2000), even with the improvements in technology, little may be achieved as very few MSMEs have been able to use the new technologies, pointing out that some of the MSMEs are unaware of the new technologies and for those that are aware, the technology is either unavailable or unaffordable to them or away from their local settings. This means that foreigner's investors still remain on the fore front in accessing and tapping new technology and enjoying the efficiency gains associated with it, creating a gap in production between local and foreign MSMEs.

In March 2007, Safaricom mobile operator launched the mobile money transfer system, the M-PESA and since then, the mobile payment system has become popular with both the banked and the unbanked population. MSMEs in Kenya have adopted the use of the mobile payments as a way of transacting their business because of the relative affordability of mobile phones and the mobile banking services they offer. Arunga and Kahora (2007) concluded that sole proprietors and MSMEs in Kenya benefited hugely from the mobile phone revolution as they are able to make savings and gain access to more customers and new services. The m-payment providers' agents are well distributed and easily accessible to the MSMEs-business owners for support of their services in Kenya. It is also easy for the MSMEs operators to control their mobile phone accounts as they can access their accounts any time.

Mobile Payments in Kenya

E-Commerce has transformed some sectors of MSMEs as they can now overcome some of their major disadvantages such as size, limited financial, technological and human resources, and limited exposure to the global marketplace, by adopting Internet technologies (Riquelme, 2002). Mobile payment services have made the MSMEs to make direct transactions with their

customers without going to the banks and even going to their services premises (Anuradi, Tyagi and Raddi, 2009). M-Payments are beneficial since it only requires one to possess a mobile device and have the basics of literacy in operating the device. Likewise, the system does not require any physical infrastructure and the services can be done in a speedy manner. These features have made the operations of the MSMEs to be so fast to operate with ease.

However, the degree of influence of the mobile payment to the operation performances of the MSMEs largely depends on how conducive the environment is (Porteous, 2006). According to Porteous, an environment is conducive if it has a set of conditions which enhance a course of developments at the marketplace. In Kenya the small enterprise are mostly clustered around the markets and the shopping centres providing the micro enterprises the ability to register and transact with the other traders or their clients more effectively and efficiently as they are widely distributed in Kenyan markets and places. Kenya constitutes one of the countries that have adopted mobile money transfer, which is being offered by telecommunications industry in Kenya. Safaricom Limited was the first company to launch money transfer services in Kenya, known as, M-PESA, which is an innovative payment service for the unbanked.

A major development on the M-PESA service has been the adoption of mobile money transfer in cashless retail distribution and mobile payments. While various cash and cashless payment instruments are available to consumers to pay for goods and services, continued reliance on mobile devices to execute monetary transactions is steadily gaining momentum. According to Wamuyu and Maharaj (2011), most Kenyan MSMEs' entrepreneurs initially had to travel or use public transport systems to send and exchange documents, access banking facilities or even transact their payments. This is not the case today, as they can e-mail the documents, pay for goods and services through MMT, use mobile banking and if one has a technologically advanced telephone, it is now possible to carry out the required tasks at any time and at any place.

Maore and Mutembei (2011) posit that the dynamic nature of Payment systems in Kenya has seen an increase in non-bank participants in payment systems to the extent that the risks associated with their operations requires a sound legal basis to provide for formal oversight and regulations in order to boost confidence among end users of payment systems. The payment needs of the un-banked community is a goal that the national payment system (NPS)

seeks to fulfil through sound programmes to increase the accessibility of the payment system by providing for new types of participants and products, while maintaining the safety and efficiency of the payment systems by adhering to sound internationally accepted payment system risk principles (Kenya Ministry of Finance, Medium Term Plan, 2008).

In Kenya, MSMEs have embarked on the use of m-payments in their transactions because they are cheap and affordable to them. Many transactions are carried out by the use of mobile devices such as payment of bills, sending cash, withdrawals, payment of goods and services.

Evolution of Operator Enabling Infrastructure (Lipa na M-PESA)

Technological environment consist of several related technologies and wireless which are normally used to develop and produce mobile payment services. Continuous development of technologies facilitates more reliable, efficient, versatile, user-friendly and functionality rich mobile payments services (Dhalberg et. al.2007).

Seven technologies have been identified as enabling mobile payment business models (Pousttchi et al.2007): IVR, calling line identification presentation, SMS, Unstructured Supplementary Service data (USSD),Wireless application Protocol (WAP),Near Field Communication (NFC),Java 2 Platform Macro Edition (J2ME) and finally Subscriber Identity Module Application Toolkit (SIM Toolkit).However, after full literature review, this classification can be updated to include new recent technologies such as the reliance of smartphones on iOS, Android OS (www.apple.com).

When focussing on Lipa na M-PESA, the key enables are:

1) Enabling billing, authorization and authentication services. In order for the mobile payment to take place, the transaction must be initiated, authorized and completed in the operator's mobile network. The technologies here will primarily be SMS, USSSD and SIM toolkit.
    - SIM Toolkit/SMS: Since the access channel is via SIM toolkit, the transport aspect for the specific payment transactions is through an SMS channel to the mobile payments system.
    - USSD:-It is usually associated with real-time or instant messaging services. USSD will be used to check merchants balance as well as refill merchant's money balance on phone (SIM card to be exact).

2) Enabling data exchange and network technologies. These include GSM, GPRS (Global packet radio services), EDGE (enhanced data rates for GSM evolution) and HSxPA (High Speed download or Upload Packet Access).

A schematic diagram of the Lipa na M-PESA ecosystem is as shown in Figure 3 below;

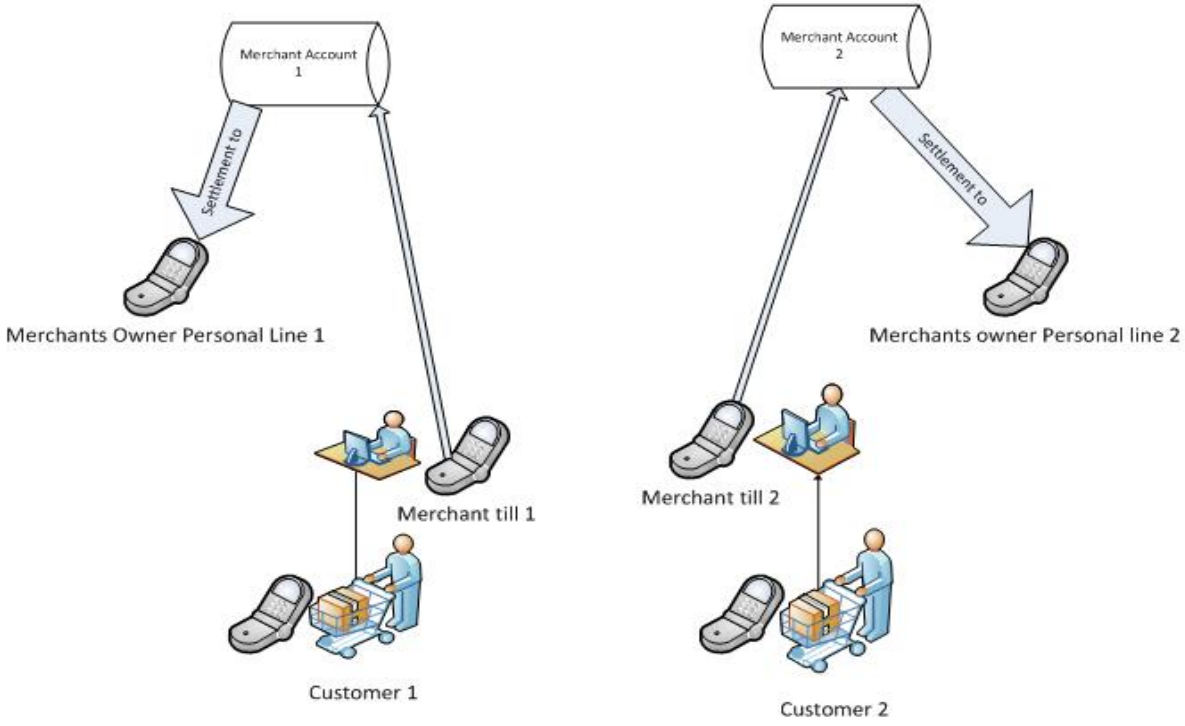

*Figure 3**: Lipa na M-PESA Service Overview***

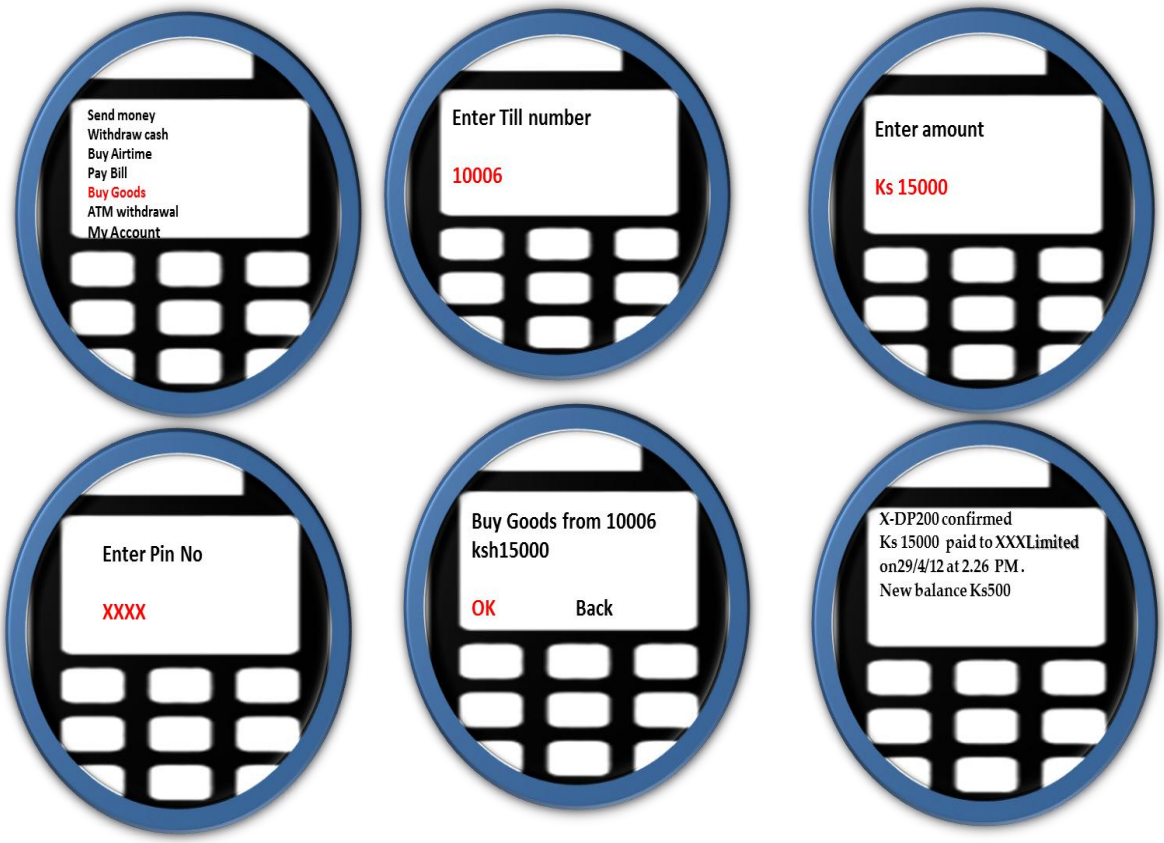

Figure 4: Merchant Till Experience

The merchant receives the following message following a payment

Figure 5: Message received by Merchant upon a Payment

2.4.Consumer Acceptance of Mobile Payments

Consumer Acceptance is defined as the relatively enduring cognitive and affective perceptual orientation of an individual. Most works use the construct on intention to use as a proxy for consumer acceptance (Mathieson,1991;Venkatexh & Davis,2000).This is a particular suitable concept, as empirical findings underscore the idea that intention to use is an appropriate predictor of later usage (Sheppard et al.,1988).In Information systems, a variety of models have been advanced to explain innovation usage (Venkatesh et al..,2003).We have the Technology Adoption Model (TAM),proposed by Davis (1989),which has evolved to be the most popular (Chau & Hu,2001). Bargozzi (2007) posits that TAM can be considered the most influential extension of the theory of reasoned action (TRA) and the theory of planned behaviour (TPB) replacing variable related to attitude and behavioural control with technology acceptance measures.

Several studies have elaborated and focused on the adoption factors of m-payments. Most of these studies have been based on the TAM with additional constructs adapted for the study of m-payments such as cost, security, mobility, trust, speed, convenience, social groups, privacy, attractiveness, system, the attractiveness of alternatives, technology anxiety, use situations (Chen & Adams, 2005; Cheong et al., 2004; Dahlberg et al., 2002; Dahlberg et al., 2003;Dahlberg et al., 2003b; Dewan & Chen, 2005; Mallat, 2004; Mallat & Dahlberg, 2005; Zmijewska, Lawrence, & Steele, 2004).

A more recent study of Kim, Mirusmonov and Lee, see ‘’perceived ease of use’’ and ‘’perceived usefulness’’ to be significant antecedents of the intention to use m-payments. Individual difference, convenience, and reachability are critical determinants of the perceived ease of use of m-payments. M-Payment knowledge has a greater effect on perceived ease of use than does personal innovativeness (Kim et al., 2010).These studies however provide significant insights for the development and refinement of mobile payments services in general.

2.5.Mobile Payments Merchant Adoption

There is currently little literature in terms of academic knowledge of merchant adoption of mobile payments. Mallat and Tuunainen in 2008 published a study dedicated to exploring merchant adoption and this study will remain a reference point in understanding the supply side/merchant perspective of mobile payments.

Mallat and Tuunainen Model

An empirical research based on the Finnish merchants was conducted by Mallat and Tuunainen with the main aim of understanding merchant's intention to adopt mobile payments. The model proposed by the scholars identifies 18 factors that are either enablers(Pre-requisites), contributing (Drivers) or inhibitors (barriers) for the adoption of mobile payments as described in the Figure 6 below;

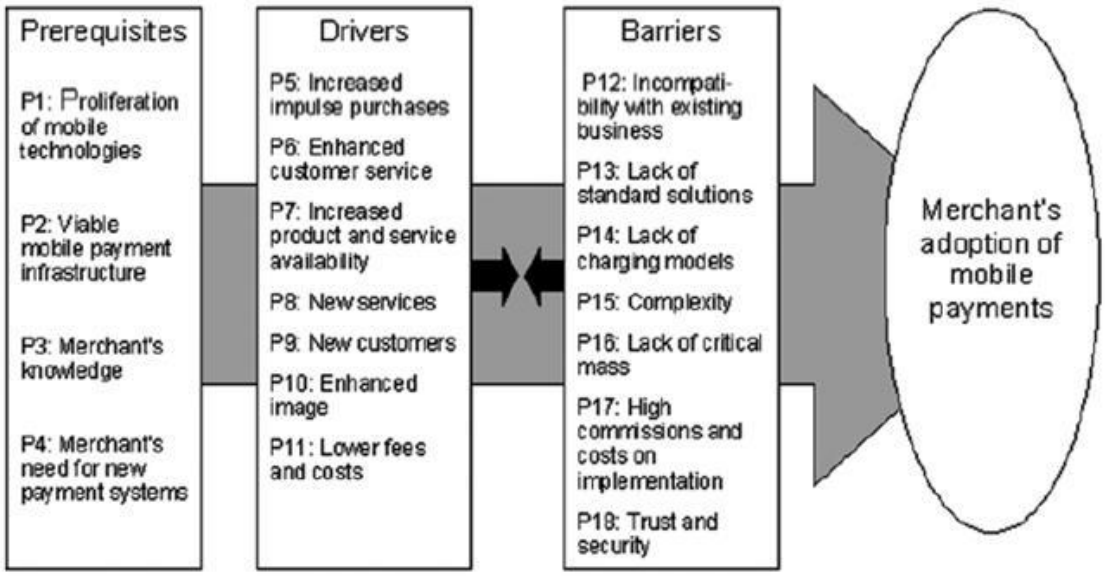

Figure 6: Merchant Adoption of Mobile Payments (by Mallat and Tuunainen 2008)

According to this study, the key drivers for merchant adoption of mobile payments is not only to increase sales and reduce payment processing costs but to also exploit specific benefits by the mobile technology-e.g. to increase impulse purchases. However, the results of their study also suggest that such benefits are recognized only by a few merchants (such as mobile content providers) that have found a viable way or business model to leverage mobility of the payments systems.

The scholars point out that merchants seen to perceive payment systems as some form of customer service, one that (if the consumers are not satisfied with the payment systems) impacts customer satisfaction and merchant sales directly. They also point out that by offering a new payment system that fits customer needs; merchants can improve their relationship with their customers and attract new ones.

Accordingly, cost reduction as defined by the transaction costs would be a driver but merchants did not think it would be possible in the future, business providing. Drivers were stronger for mobile content, ticketing, vending, or other small-value services through electronic channels or at unmanned POS. Restaurants with personal service and POS merchants with busy, large-value cash desk transactions were more uncertain about the benefits and the applicability of mobile payments in their business. This may in part explain the current low adoption rates of mobile payments.

Their study suggests that adoption barriers are still strong and affect the majority of merchants. It also suggests that barriers and the risks related to adoption are evident for the merchants, whereas the benefits are more uncertain and are likely to affect certain businesses only. Merchants perceive the current mobile payment systems as complex and slow, as compared to card and cash payments, and suspect that mobile payments are not suitable for busy checkout counters. Their survey results suggest that even the adopting merchants expect customers to need advice on the use of mobile payments

While there are other barriers such as high cost charged on the merchants, other barriers such as lack of standardization and critical mass are more difficult to overcome because they may require changes to not only in individuals providers business models but also in legislation and in consumer habits as well as in cooperation between major competing players such as financial institutions and Telco operators.

Mallat and Tuunainen indicate also a limitation of their study on the geographical reach (Finland) expressing the need for new research to confirm their findings in different countries with different mobile service infrastructures. They also indicate that the low response rate of their survey, probably driven by the novelty of the subject, suggests that further empirical study is still needed.

2.6.Identifying Research Gap

Mobile payments enabling technology and consumer acceptance have had a wide coverage of research. There is also an abundance of technology related studies such as NFC and proximity technologies. There are fewer studies when it comes to mobile payment adoption by MSME's .Also; what's currently missing as well is a holistic organization and description of mobile payment solutions and how this interfaces to adoption by merchants. There is

however good availability of knowledge concerning the business model that can be developed through the use of Mobile Payments, thanks to works such as the one of Poustcchi et al (2009) which have paved way to understanding the mobile payment business possibilities. However, no work has been done on associating the business models to specific technologies highlighting the business cases or empirical research describing sustainability of such business models.

TAM and UTAUT has been used to provide the predictive nature of consumer acceptance models. However, this research has mostly been predictive. The predictive analysis should in some way be confirmed by identifying and measuring factors that are really conditioning the use of mobile payments. Mallat and Tuunainen have provided some significant insights into merchant adoption of mobile payments systems. However in their findings they realize that there are clear differences between the types of merchants (for example mobile content providers or restaurants versus ticketing). Hence the main gap in current mobile payment literature is related to the specific focus on particular segments of merchants' adoption and the operative models used by such merchants. There is no theoretical framework or managerial reference as to what are the best practices and what factors need to be considered when MSME's deploy and manage a mobile payment system and in specific Lipa na M-PESA.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

The chapter elaborates on how the data was collected and prepared for analysis. The chapter describes the various research tools that were used in gathering information, procedures that were adopted in conducting the research, and the techniques which were used in analysis of the data collected. The chapter therefore presents the model, sampling procedure, research instruments, and data collection and analysis tools.

3.2 Research Design

According to Saunders, Lewis and Thornhill (2009), research design is defined as an overall plan for research undertaking. This case study utilized a descriptive survey design. Descriptive survey design, as put forward by Churchill (1991), is appropriate where the study seeks to describe the characteristics of certain groups, estimate the proportion of people who have certain characteristics and make predictions. Furthermore, according to As Hopkins (2000), descriptive studies are part of a quantitative research design. In quantitative research designs, the researcher seeks to establish the relationship between independent variable(s) and dependent (outcome) variable in a population as well as establishing the associations between variables and the causality. This study sets to model the uptake of mobile payments by MSMEs.

3.3 Population of the Study

According to Ngechu (2004), a population is a well-defined or set of people, services, elements, and events, group of things or households that are being investigated. Target population in statistics is the specific population about which information is desired. The target population comprises persons drawn from various SMEs categories of businesses (32 boutiques, 15 clothes materials shops, 19 retail shops, 14 restaurants and 15 MPESA shops) sampled from Kariobangi and Uhuru Markets, Nairobi. As such, the target population comprises 95 persons.

3.4 Sampling Technique & Procedure

Sampling is an important activity in any research project and it is commonly used because it is cheaper to collect information from a small sample rather than the entire population, especially when the population is large. According to Jankowicz (2005), sampling is said to be the deliberate choice of a number of units (sample) who provide data that can be used to

make conclusions about some other larger group. There are very may businesses in Nairobi. The City is divided into nine administration divisions namely: Central, Dagoretti, Embakasi, Kasarani, Kibera, Makadara, Pumwani and Westlands. This study was conducted among the micro and small scale business owners in two major markets, Kariobangi Market (Embakasi Division) and Uhuru Markets (Makadara division) in the city. These two markets were selected for purposes of delimiting the study in scope due to logistical (time and cost) constraints. Furthermore, these two locations have an array of businesses that utilize the Lipa na Mpesa service. According to Ngome & Kimiywe (2005) diverse micro and small scale businesses ranging from retail shops, beauty salons, and restaurants are located in urban markets in Kenya.

As such, this study was limited to Kariobangi and Uhuru Markets. Furthermore, all study targeted employees from various categories of business within these markets. The researcher used proportionate stratified sampling. In stratified sampling, the population is sub-divided into homogenous groups. These could be categories, sizes and various groups. The advantage of this sampling method is that it ensures units from each main group are included. In this case, there is the possibility of it being more reliably representative (Mugenda & Mugenda, 1999).

In the case of this study, stratum was the various categories of MSEs in Kariobangi and Uhuru Market. The researcher used the simplified formula to calculate sample size that was put forward by Yamane (1967). The formula employed is: $n=N/(1+N(e)^2$ **(**where n = sample size, N = population size and e = the level of precision (0.05))**.** As such, the researcher sampled 30 owners of boutiques owners, 14 clothes materials shops, 14 restaurants, 18 retail shop and 14 M-PESA shop. This made a sample of 90 respondents. Within each strata respondents were randomly sampled. The sampling frame is shown in Table 3.1.

Table 1: Sampling Frame

MSMEs registered with *Lipa na MPESA*	**No.**	**Sample ((n=N/ (1+N (e)^2)**
Boutiques (Clothes and cosmetics shops)	32	30
Clothes materials shops	15	14
Restaurants	14	14
Retail shops	19	18
M-pesa shops	15	14
Total	**95**	**90**

Source: Researcher (2014)

3.5 Data Collection

The study relied on primary data that will be collected using a structured questionnaire as the research instrument. The questionnaire was divided into through sections that correspond to the research questions of the study. An extra section on the level of adoption of Lipa na MPESA by SMEs was included in the study.

3.6 Data Analysis

Before analysis, the completed questionnaires were checked for completeness and consistency. The data collected was analysed using descriptive statistics and presented in form of percentages, means, standard deviations and frequencies. Regression analysis, ANOVA and t-test were used to test the hypotheses as well as the relationship between the independent variables (IVs) and the dependent variable (DV). To this end, the significance of the relationship between the independent variables and the dependent variables was tested. The information was displayed by use of tables and figures.

CHAPTER FOUR: DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter covered the analysis, presentation and interpretation of the same. The purpose of the study was to model the uptake of mobile payments by MSMEs in Kenya.

4.2 Response Rate

The study had targeted 90 respondents. All of them responded as shown in Table 4.1. This makes a response rate of 100%.

Table 2: Response Frame

Population	Targeted	Responded	Percentage
SMEs Owner's that use Lipa na MPESA services	90	90	100%

Source: Researcher (2014)

4.3 Demographic Information

The researcher aimed at determining general information about the respondents. This was in regard to the sex, age, academic qualification and duration of work in their businesses. The study established that the majority of the respondents were male (52%). In terms of age, the majority of the respondents (42%) were aged 25-35 years. These were followed by those who were aged 36-45 years (27%). To this end, it can be assumed that they had been in business long enough to respond adequately to the subject under investigation.

As far as academic qualification was concerned, the majority of the respondents were Diploma (36%) and Bachelor's Degree holders (30%). This shows that most of the employees were adequately educated to the subject under investigation.

In terms of duration working for a business registered by Safaricom, the majority of the respondents (48%) had been working for a period of 1 to 3 years. This was followed by respondents who had been working for a period of 4 to 6 years (41%). This shows that most of the respondents could easily understand the subject under investigation since they had been working in an environment where MPESA was being used. The findings are presented in Figures 7 to 10.

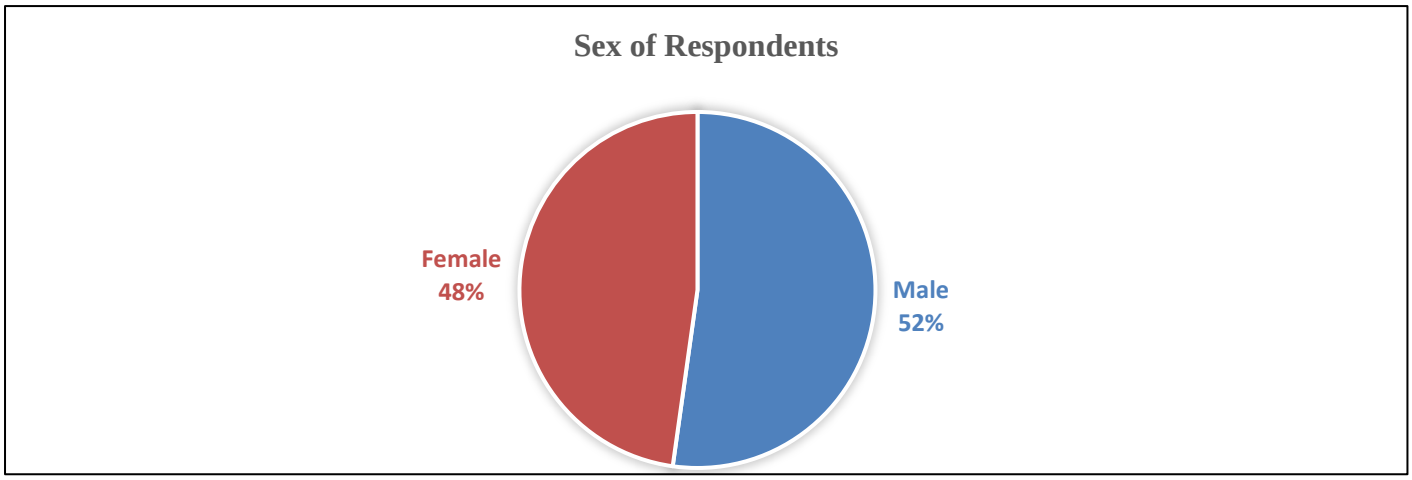

Figure 7: Sex Respondents (Researcher,2015)

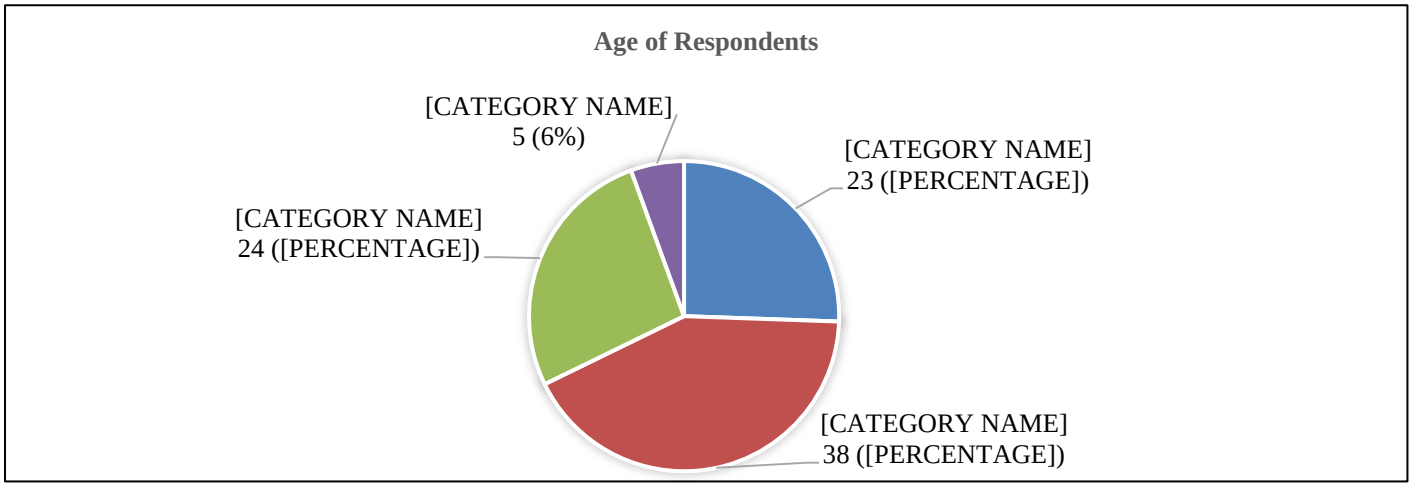

Figure 8:Age of Respondents 9Researcher,2015)

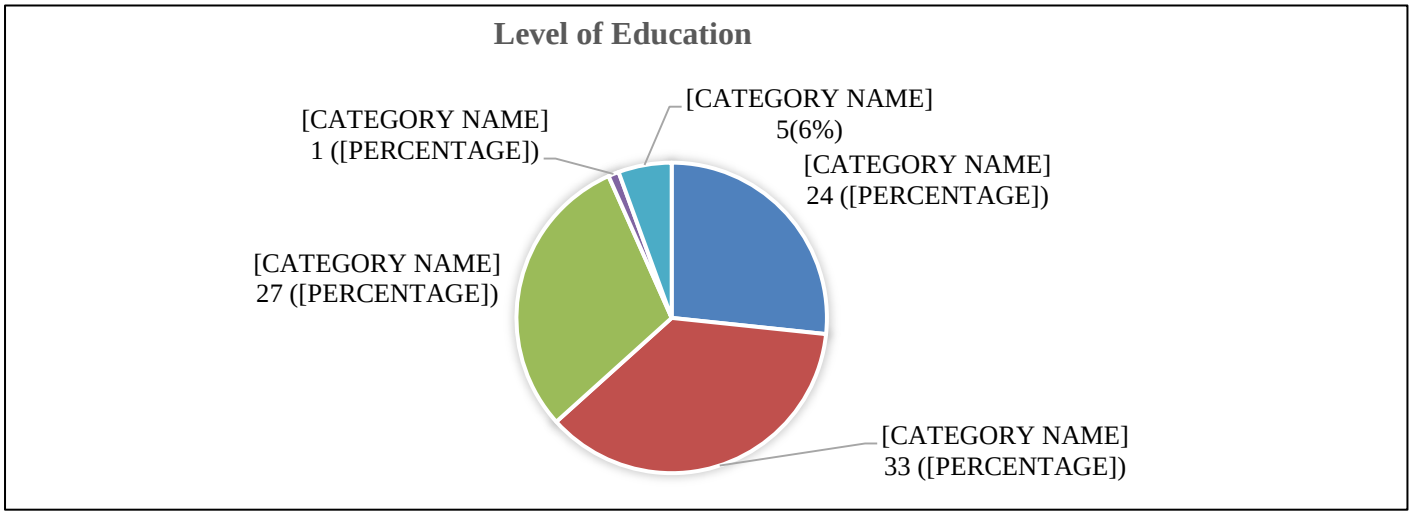

Figure 9: Education Level of Respondents (Researcher, 2015)

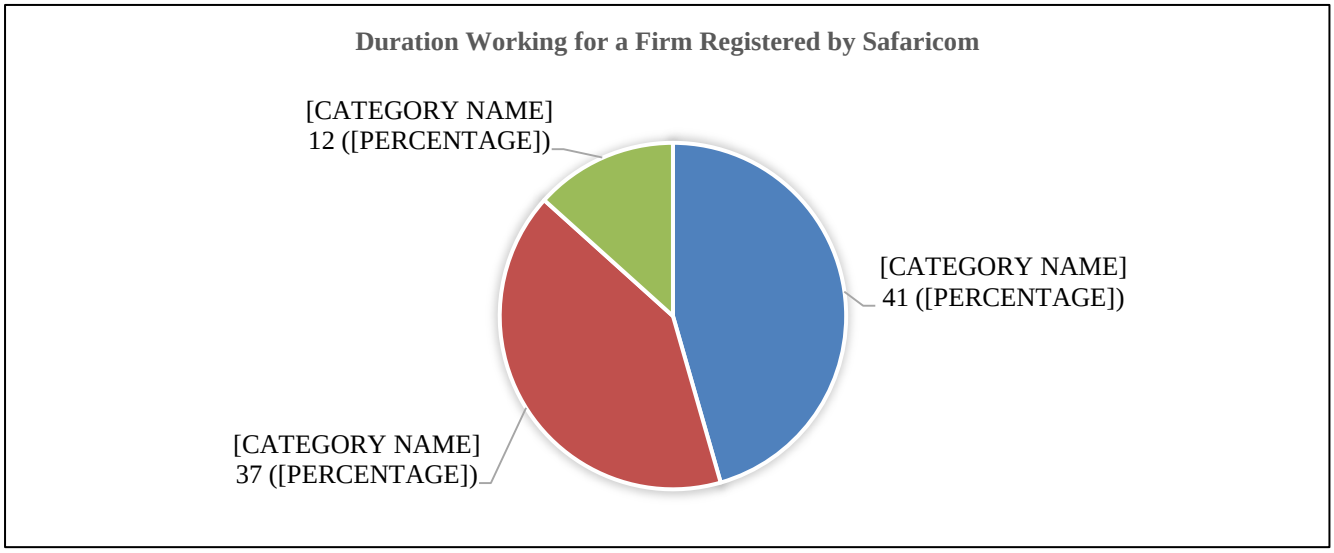

Figure 10: Duration Working for a Firm Registered by Safaricom (Researcher,2015)

4.4 Descriptive Analysis

External factors affecting acceptance of mobile payments by MSME's in Kenya

The respondents were asked to indicate their level of agreement with statements regarding external factors affecting acceptance of mobile payments by MSME's in Kenya. The data was categorized into strongly disagree (1), Disagree (2), Slightly Disagree (3), No Opinion (4), Slightly Agree (5); Agree (6) and Strongly Agree (7).

The findings of this study shows that the respondents strongly agreed that most of the factors identified contributed to the adoption of mobile money by MSMEs in Kenya. This is shown by the weighted mean of 6. All in all, the most important factors (strongly agree) were: presence of mobile payment infrastructure (7); level of knowledge on the available mobile payment options (7); presence of enhanced image (reputation of the mobile payment provider) (7). These was followed by factors to which the respondent agreed (6) such as: presence of robust customer care service (6) and; presence of new services that address various payment needs of customers (6). Lastly the respondents slightly agreed that capacity to reduce costs of transactions (lower fees) (5); perceived/actual complexity (5) and; the incompatibility (difficult to address existing payment needs or supplement existing payment methods) affected the adoption of mobile payment by MSMEs in Kenya. These findings

agrees with Powell (2000) that technology, with its inherent ability to improve service delivery, may enhance adoption of mobile money. Table 4.2 presents the analysed data.

Table 3: External Factors Affecting Acceptance of Mobile Payments by MSME's in Kenya

EXTERNAL FACTORS AFFECTING ACCEPTANCE OF MOBILE PAYMENTS BY MSME'S IN KENYA									
	1	2	3	4	5	6	7		
Factor	**Strongly Disagree**	**Disagree**	**Slightly Disagree**	**No Opinion**	**Slightly Agree**	**Agree**	**Strongly Agree**	**Total Responses**	**Weighted Mean**
(i) Presence of mobile technologies	0	0	0	0	0	18	72	90	7
(ii) Presence of mobile payment infrastructure	0	0	0	0	0	18	72	90	7
(iii) Level of knowledge on the available mobile payment options	0	0	0	0	0	26	64	90	7
(iv) Presence of robust customer care service	0	0	0	0	17	50	23	90	6
(v) Presence of new services that address various payment needs of customers	0	0	0	0	11	55	24	90	6
(vi) Presence of enhanced image (reputation of the mobile payment provider)	0	0	0	0	0	33	57	90	7
(vii) Capacity to reduce costs of transactions (lower fees)	0	0	0	4	57	22	7	90	5
(viii) Incompatibility (difficult to address existing payment needs or supplement existing payment methods)	0	0	11	46	12	12	9	90	5
(ix) Perceived/actual complexity	0	0	14	26	27	12	11	90	5
Average response for all variables/Total average weighted mean	0	0	3	8	14	27	38	90	6

Source: Researcher (2015)

Relevant Determining and Moderating Factors for Technology Adoption of Mobile Payments by MSMEs in Kenya

The researcher sought to determine the relevant and moderating factors for technology adoption of mobile payments by MSMEs in Kenya. As shown in Table 4.3, all the relevant determining and moderating factors identified in this study influences the adoption of mobile money by SMEs as shown by the weighted mean of 6 (agree). As such, the respondents agreed (strongly agree to slightly agree) that mobile money payment was adopted because: it reduces cost, it increases security (reduced risk), leverage mobility (track movement) of the payments , it is highly trusted, it is fast (speedy), it is convenient, it is highly used by many social group (wide-base of clientele willing to use it), it enhances privacy, it has attractiveness over other alternatives, it can be used in many ways, perceived associated

customer service and it has wide geographical reach. These findings agree with to McCahon (1993) on the speedy nature of technology on its adoption.

Table 4: Relevant Determining and Moderating Factors for Technology Adoption of Mobile Payments by MSME's in Kenya

RELEVANT DETERMINING AND MODERATING FACTORS FOR TECHNOLOGY ADOPTION OF MOBILE PAYMENTS BY MSMES IN KENYA									
	1	2	3	4	5	6	7		
Factor	**Strongly Disagree**	**Disagree**	**Slightly Disagree**	**No Opinion**	**Slightly Agree**	**Agree**	**Strongly Agree**	**Total Responses**	**Weighted Mean**
(i) It reduces cost	0	0	12	0	12	39	27	90	6
(ii) It increases security (reduced risk)	0	0	0	0	0	15	75	90	7
(iii) Leverage mobility (track movement) of the payments	0	0	0	0	17	22	51	90	6
(iv) It is highly trusted	0	0	0	0	7	32	51	90	6
(v) It is fast (speedy)	0	0	0	0	0	23	67	90	7
(vi) It is convenient	0	0	0	0	0	11	79	90	7
(vii) It is highly used by many social group (wide-base of clientele willing to use it)	0	0	0	0	0	76	14	90	6
(viii)It enhances privacy	0	0	11	12	21	23	23	90	5
(ix) It has attractiveness over other alternatives	0	0	0	15	15	39	21	90	6
(x) It can be used in many ways	0	0	0	0	18	56	16	90	6
(xi) Perceived associated customer service	0	0	0	21	21	31	17	90	5
(xii) Wide geographical reach	0	0	0	0	59	31	0	90	5
Average response for all variables/Total average weighted mean	0	0	2	4	14	33	37	90	6

Source: Researcher (2015)

Level of Adoption of Technology Adoption of Mobile Payments by MSMEs in Kenya

Furthermore, and as shown in Table 4.4, the researcher went on to establish the level of adoption of technology by MSMEs in Kenya. Most of the respondents indicated that they used it on a daily basis or a few times per week (highly agree, 7). These were followed by those who indicated that they used it a few times per month (agree at 6). Few indicated that they used it rarely (slightly disagree, 2) and not at all (very slightly disagree, 1). This shows that that MPESA is adopted highly by MSMEs in Kenya as shown by these findings.

Table 5: Level of Adoption of Technology Adoption of Mobile Payments by MSME's in Kenya

LEVEL OF ADOPTION OF MOBILE PAYMENTS BY MSMES IN KENYA									
	1	2	3	4	5	6	7		
Factor	**Strongly Disagree**	**Disagree**	**Slightly Disagree**	**No Opinion**	**Slightly Agree**	**Agree**	**Strongly Agree**	**Total Responses**	**Weighted Mean**
(i) We use it on daily basis	0	0	0	0	0	22	68	90	7
(ii) We use in a few times per week	0	0	0	0	0	23	67	90	7
(iii) We use it a few times per month	0	0	2	0	21	45	22	90	6
(iv) We use it rarely	44	32	14	0	0	0	0	90	2
(v) We do not use it all	86	4	0	0	0	0	0	90	1
Average response for all variables/Total average weighted mean	26	7	3	0	4	18	31	90	4

Source: Researcher (2015)

4.5 Model for technology adoption of mobile payments by MSMEs in Kenya

According to this study, the adoption of mobile payments (uptake of mobile payments by MSEs) is guided by determining and moderating factors as well as internal factors. These factors interact to various extents to determine the level of adoption of mobile money payments by SMEs in Nairobi. This study stipulates that the different variables influencing the adoption of Lipa na MPESA do not explicitly correspond to Merchant Adoption of Mobile Payment model put forward by Mallat and Tuunainen (2008), see Figure 5 (Merchant Adoption of Mobile Payment), chapter two.

However, this model developed in this study agrees that there is need to have knowledge of the system, cheaper payment options (viable payment infrastructure) do contribute to the level of adoption. It also agrees that customer service and low costs influence adoption of mobile payments by MSMEs in Kenya. The study does not find increase in impulse buying or presence of new customers as major determinants of adoption of mobile payment services. It also does not see trust as a major barrier since *Lipa na Mpesa* is pegged on the already

popular MPESA services that are well trusted by the majority in the Kenya market. However, the mobile money payment service should endeavour to maintain customer relations since loss of reputation can result in reduced trust and affect adoption negatively. The current model agrees with the former model that fees have to be flexible since if they are high, they can pose a barrier to adoption. It is also worth noting that the model developed in this study simplifies the model of Mallat and Tuunainen (hereinafter referred to as the former model) in various ways. Whereas the former model stipulates that the adoption of mobile payments is driven by three groups of factors (prerequisites, drivers as well as drivers in the economy) this current model groups these determinants into two (relevant and moderating as well as external factors). These rationale for this is there does not seem to exist a clear line between the three factors identified in the former model. In simple terms, some of the barriers identified in the former model are closely intertwined with the drivers. As such, the current mode simplifies the former model as shown in the following discourse.

In this current model, the adoption of *Lipa na MPESA* is influenced by various relevant factors. First of all, it should reduce cost as opposed to traditional/other ways of payment. At the same time, it has to be less risk than other methods (payment should be able to be easily tracked). It should be very fast (happen at the click of a mouse) and there should also be a huge client base of people who use it and the possibility of consulting colleagues in case of problems. Furthermore, it is has to be more attractive than other method of money transfer. The existing customer care should be in a position to effectively handle all the customer needs. Lastly, it should also have a wide geographical reach so that one can reach clients everywhere.

Secondly, the adoption of mobile payment options such as Lipa na MPESA is influenced by several external factors. First all, there has to be the requisite mobile technologies and infrastructure (software/systems) that support the payment option. If better technologies come around, then the adoption may be influenced (i.e. if competing services come to the market). Furthermore, the image of the money transfer service provider should be sustained. If the image is in question, or any reason to question it emerges, then the level of adoption would dwindle. The level of knowledge of the service should also be continuously enhanced. If people get to know of other better services, then the adoption level would be reduced. Furthermore, the fees offered by the service should be regularly reviewed. If the fees are not

flexible, then other services may start gaining competitive edge and vice versa. Figure 7 presents the model adopted by this study.

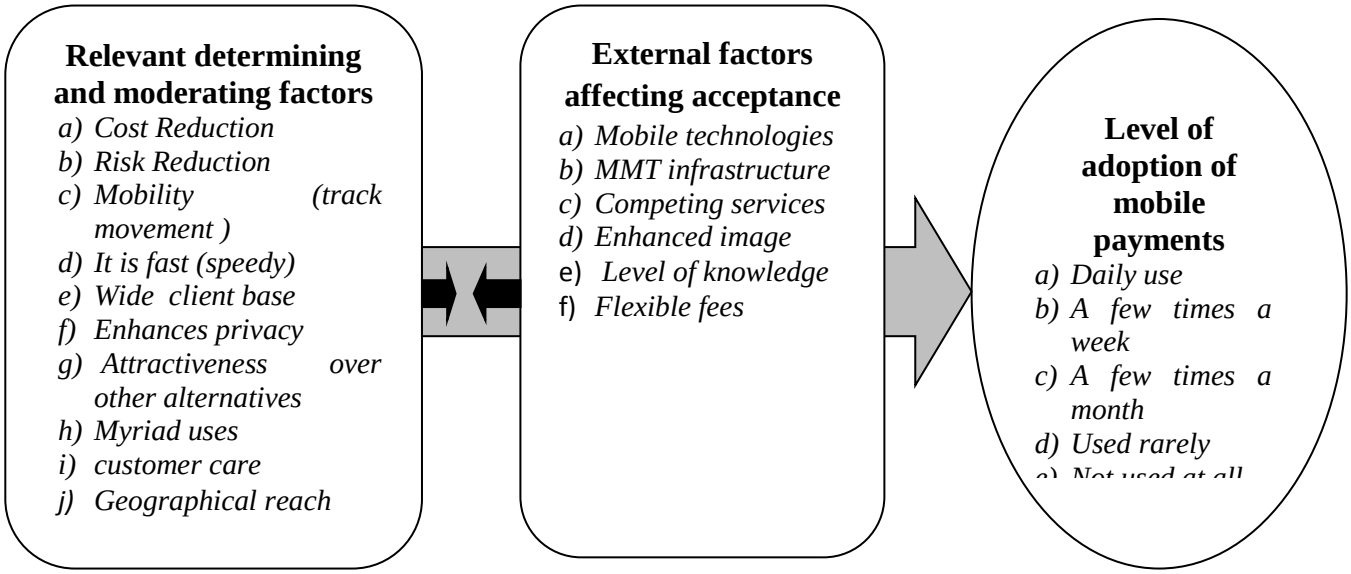

Figure 11: Model for Mobile Money Adoption by MSME's in Kenya (Researcher,2015)

4.6 Validating the model of adoption of mobile money payments by MSMEs in Kenya

The researcher went on to determine the relationship between the factors that were conceptualized in this study as being determinants of adoption of mobile money payments by SMEs in Kenya. In this regard, the study was guided by two hypotheses: (a) $H0_1$: There is no significant relationship between determining and moderating factors for technology adoption and the adoption of mobile payments by MSMEs in Kenya and; (b) HO_2: There is no significant relationship between external factors for technology adoption and the adoption of mobile payments by MSMEs in Kenya.

4.7 Hypotheses testing

Null Hypothesis 1

The first null hypothesis was: There is no significant relationship between determining and moderating factors for technology adoption and the adoption of mobile payments by MSMEs in Kenya. Regression Analysis and t-test were done to determine the relation between the (DV, Level of Adoption of Technology Adoption of Mobile Payments by MSMEs in Kenya and the first IV (determining and moderating factors for the adoption of mobile payments by MSME's in Kenya). From the findings obtained, it can be deduced that there exists a relatively weak association between the DV and IV. Indeed, the relation between determining and moderating factors and the adoption of mobile payments by MSMEs in Kenya can be

explained by 35% of this model as shown by R squared of 0.345 under the summary output of Table 4.5. Under the section labelled ANOVA, an F-test value of 46.53 which is significant (sig of 1.09435E-09) and which is greater than the critical F-value of 6.61) leads us to reject the null hypothesis. Furthermore, owing to the t-test of 6.15 which is significant (P (T<=t) two-tail = 2.1266E-08) and which is greater than the two tail critical t (1.99), we reject the null hypothesis. As such, the alternative hypothesis is accepted. To this end, we deduce that there is significant relationship between determining and moderating factors for technology adoption and the adoption of mobile payments by MSMEs in Kenya. This partially validates the model developed in this study (Figure 7). These findings are shown in Tables 4.5.

Table 6: Regression Analysis and T-Test 1

REGRESSION ANALYSIS								
SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.5881178							
R Square	0.3458825							
Adjusted R Square	0.3384493							
Standard Error	3.1991732							
Observations	90							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	476.2456	476.2456	46.5324	1.09435E-09			
Residual	88	900.6544	10.23471					
Total	89	1376.9						
COEFFICIENTS								
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-1.6705168	0.811788	-2.05782	0.042566	-3.283774618	-0.05726	-3.28377	-0.05726
X Variable 1	0.927089	0.135908	6.821466	1.09E-09	0.65700122	1.197177	0.657001	1.197177

t-TEST		
t-Test: Paired Two Sample For Means		
	Variable 1	*Variable 2*
Mean	3.36666667	5.43333333
Variance	15.4707865	6.2258427
Observations	90	90
Pearson Correlation	0.58811775	
Hypothesized Mean Difference	0	
df	89	
t Stat	-6.15316529	
P(T<=t) one-tail	1.0633E-08	
t Critical one-tail	1.66215533	
P(T<=t) two-tail	2.1266E-08	
t Critical two-tail	1.9869787	

Source: Researcher (2015)

Null Hypothesis 2

The second null hypothesis was: there is no significant relationship between external factors for technology adoption and the adoption of mobile payments by MSMEs in Kenya. Similarly, regression analysis and t-test were done to determine the relation between the (DV, Level of Adoption of Technology Adoption of Mobile Payments by MSMEs in Kenya and the second IV (External factors affecting acceptance of mobile payments by MSME's in Kenya).

From the findings obtained, it can be deduced that there exists a relatively weak association between the DV and IV. Indeed, the relation between external factors and the adoption of mobile payments by MSMEs in Kenya can be explained by 27% of this model as shown by R squared of 0.269 under the summary output of Table 4.6. Additionally, under the section labelled ANOVA, an F-test value of 33.73 which is significant (sig of 9.8991E-08) and which is greater than the critical F-value of 6.61 leads us to reject the null hypothesis.

In the same light, owing to the t-test of -6.87 which is significant (P (T<=t) two-tail = 8.44196E-10) and which is greater than the two tail critical t (1.99), we reject the null hypothesis. As such, the alternative hypothesis is accepted. To this end, we deduce that there is significant relationship between external factors for technology adoption and the adoption of mobile payments by MSMEs in Kenya. This also partially validates the model developed in this study (Figure 7). These findings are shown in Tables 4.6.

The findings obtained in these findings show that there is significant relationship between the two variables show that the IVs presented in the model brought forth in this study are significantly related to the DV. As such, it can be deduced that the model can be used to explain the adoption of mobile payments by MSMEs in Kenya. However, the model is not very strong as shown by the R squared variables. As such, other factors that are without the scope of this study could also be responsible for the adoption of mobile payments by businesses in Kenya.

Table 7: Regression Analysis and T-test 2

REGRESSION ANALYSIS								
SUMMARY OUTPUT								
Regression Statistics								
Multiple R					0.526375			
R Square					0.27707			
Adjusted R Square					0.268855			
Standard Error					3.363241			
Observations					90			
ANOVA								
	df		*SS*	*MS*	*F*	*Significance F*		
Regression	1		381.4979	381.4979	33.72689	9.8991E-08		
Residual	88		995.4021	11.31139				
Total	89		1376.9					
COEFFICIENTS								
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-2.65145	1.095233	-2.4209	0.017536	-4.827998834	-0.4749065	-4.827998834	-0.47490651
X Variable 1	1.039598	0.17901	5.807486	9.9E-08	0.683853493	1.39534321	0.683853493	1.395343208
t-TEST								
t-Test: Paired Two Sample for Means								
	Variable 1					*Variable 2*		
Mean	3.366666667					5.788889		
Variance	15.47078652					3.966167		
Observations	90					90		
Pearson Correlation	0.52637457							
Hypothesized Mean Difference	0							
df	89							
t Stat	-6.869264877							
P(T<=t) one-tail	4.22098E-10							
t Critical one-tail	1.662155326							
P(T<=t) two-tail	8.44196E-10							
t Critical two-tail	1.9869787							

Source: Researcher (2015)

CHAPTER FIVE: SUMMARY OF FINDINGS AND RECOMMENDATIONS

5.1 Introduction

The purpose of the study was to model the uptake of mobile payments by MSMEs in Kenya. This chapter provides a summary of the research findings in line with this objective. It also discusses these findings, makes recommendations and suggests areas of interest for further research.

5.2 Summary of Findings

This section presented summary of the findings according to objective of the study.

External factors affecting acceptance of mobile payments by MSME's in Kenya

The findings of this study shows that the respondents strongly agreed that most of the factors identified contributed to the adoption of mobile money by MSMEs in Kenya. All in all, the most important factors were: presence of mobile payment infrastructure; level of knowledge on the available mobile payment options; presence of robust customer care service; presence of enhanced image (reputation of the mobile payment provider); presence of new services that address various payment needs of customers; capacity to reduce costs of transactions (lower fees). The respondents agreed that adoption of mobile money payment by MSMEs was perceived/actual complexity. The respondents indicated that they did not have opinion on the incompatibility (difficult to address existing payment needs or supplement existing payment methods). This agrees with Powell (2000) that technology, with its inherent ability to improve service delivery, may enhance adoption of mobile money.

Relevant Determining and Moderating Factors for Technology Adoption of Mobile Payments by MSMEs in Kenya

All the relevant determining and moderating factors identified in this study influences the adoption of mobile money by SMEs as shown by the weighted mean of 6 (agree). As such, the respondents agreed that mobile money payment was adopted because: it reduces cost, it increases security (reduced risk), leverage mobility (track movement) of the payments , it is highly trusted, it is fast (speedy), it is convenient, it is highly used by many social group (wide-base of clientele willing to use it), it enhances privacy, it has attractiveness over other alternatives, it can be used in many ways, perceived associated customer service and it has

wide geographical reach. These findings agree with to McCahon (1993) on the speedy nature of technology on its adoption.

Model for uptake of mobile money by MSMES in Kenya

According to this study, the adoption of mobile payments (uptake of mobile payments by MSEs) is guided by determining and moderating factors as well as internal factors. These factors interact to various extents to determine the level of adoption of mobile money payments by SMEs in Nairobi. This study stipulates that the different variables influencing the adoption of Lipa na MPESA do not explicitly correspond to Merchant Adoption of Mobile Payment model put forward by Mallat and Tuunainen (2008), see Figure 5 (Merchant Adoption of Mobile Payment), chapter two.

However, this model developed in this study agrees that there is need to have knowledge knowledge of the system, cheaper payment options (viable payment infrastructure) do contribute to the level of adoption. It also agrees that customer service and low costs influence adoption of mobile payments by MSMEs in Kenya. The study does not find increase in impulse buying or presence of new customers as major determinants of adoption of mobile payment services. It also does not see trust as a major barrier since *Lipa na Mpesa* is pegged on the already popular MPESA services that are well trusted by the majority in the Kenya market. However, the mobile money payment service should endeavour to maintain customer relations since loss of reputation can result in reduced trust and affect adoption negatively. The current model agrees with the former model that fees have to be flexible since if they are high, they can pose a barrier to adoption. It is also worth noting that the model developed in this study simplifies the model of Mallat and Tuunainen (hereinafter referred to as the former model) in various ways. Whereas the former model stipulates that the adoption of mobile payments is driven by three groups of factors (prerequisites, drivers as well as drivers in the economy) this current model groups these determinants into two (relevant and moderating as well as external factors). These rationale for this is there does not seem to exist a clear line between the three factors identified in the former model. In simple terms, some of the barriers identified in the former model are closely intertwined with the drivers.

In this current model, the adoption of *Lipa na MPESA* is influenced by various relevant factors. First of all, it should reduce cost as opposed to traditional/other ways of payment. At the same time, it has to be less risk than other methods (payment should be able to be easily tracked). It should be very fast (happen at the click of a mouse) and there should also be a huge client base of people who use it and the possibility of consulting colleagues in case of problems. Furthermore, it is has to be more attractive than other method of money transfer. The existing customer care should be in a position to effectively handle all the customer needs. Lastly, it should also have a wide geographical reach so that one can reach clients everywhere.

Secondly, the adoption of mobile payment options such as Lipa na MPESA is influenced by several external factors. First all, there has to be the requisite mobile technologies and infrastructure (software/systems) that support the payment option. If better technologies come around, then the adoption may be influenced (i.e. if competing services come to the market). Furthermore, the image of the money transfer service provider should be sustained. If the image is in question, or any reason to question it emerges, then the level of adoption would dwindle. The level of knowledge of the service should also be continuously enhanced. If people get to know of other better services, then the adoption level would be reduced. Furthermore, the fees offered by the service should be regularly reviewed. If the fees are not flexible, then other services may start gaining competitive edge and vice versa.

Validating the model of adoption of mobile money payments by MSMEs in Kenya

The researcher sought to validate the model developed in this study by determining the relationship between the factors that were conceptualized in this study as being determinants of adoption of mobile money payments by SMEs in Kenya. To this end, the hypotheses that guided this study were tested. The first null hypothesis was: There is no significant relationship between determining and moderating factors for technology adoption and the adoption of mobile payments by MSMEs in Kenya. Regression Analysis and t-test were done to determine the relation between the (DV, Level of Adoption of Technology Adoption of Mobile Payments by MSMEs in Kenya and the first IV (determining and moderating factors for the adoption of mobile payments by MSME's in Kenya). From the findings obtained, it can be deduced that there exists a relatively weak association between the DV and IV. Indeed, the relation between determining and moderating factors and the adoption of mobile

payments by MSMEs in Kenya can be explained by 35% of this model as shown by R squared of 0.345. Furthermore, an F-test value of 46.53 which is significant (sig of 1.09435E-09) and which is greater than the critical F-value of 6.61) led to the rejection of the null hypothesis. Furthermore, owing to the t-test of 6.15 which is significant (P (T<=t) two-tail = 2.1266E-08) and which is greater than the two tail critical t (1.99), the null hypothesis was also rejected. As such, the alternative hypothesis is accepted. To this end, it can be deduced that there is significant relationship between determining and moderating factors for technology adoption and the adoption of mobile payments by MSMEs in Kenya. This partially validates the model developed in this study.

The second null hypothesis was: there is no significant relationship between external factors for technology adoption and the adoption of mobile payments by MSMEs in Kenya. Similarly, regression analysis and t-test were done to determine the relation between the (DV, Level of Adoption of Technology Adoption of Mobile Payments by MSMEs in Kenya and the second IV (External factors affecting acceptance of mobile payments by MSME's in Kenya).

From the findings obtained, it was deduced that there exists a relatively weak association between the DV and IV. Indeed, the relation between external factors and the adoption of mobile payments by MSMEs in Kenya can be explained by 27% of this model as shown by an R squared value of 0.269. Additionally, an F-test value of 33.73 which is significant (sig of 9.8991E-08) and which is greater than the critical F-value of 6.61 leads us to reject the null hypothesis.

In the same light, owing to the t-test of -6.87 which is significant (P (T<=t) two-tail = 8.44196E-10) and which is greater than the two tail critical t (1.99), the null hypothesis was tested. This led to the acceptance of the alternative hypothesis. As such, it can be deduced that there is significant relationship between external factors for technology adoption and the adoption of mobile payments by MSMEs in Kenya. This also validates the model developed in this study.

In summary, the findings obtained in these findings show that there is significant relationship between the two variables show that the IVs (relevant and moderating as well as relevant

variables) presented in the model brought forth in this study are significantly related to the DV (adoption of mobile payments by MSMEs in Kenya. As such, it can be deduced that the model can be used to explain the adoption of mobile payments by MSMEs in Kenya. However, the model is not very strong as shown by the R squared variables. As such, other factors that are without the scope of this study could also be responsible for the adoption of mobile payments by businesses in Kenya.

5.3 Discussion

The adoption of *Lipa na MPESA* is influenced by factors, most of these are related to the reliability of the service itself. These could include speediness, privacy and security. As such traders are likely to adopt mobile money services based on its capacity to meet the needs of their businesses. Safaricom Ltd itself should be in a build trust with those who consume its mobile payment services and to continue improving the service. This would enhance trust building. Should new services come out, Safaricom should be in a position to flexibly handle the prices of its mobile services. On another note, it is evident that the adoption of mobile money payment is pegged to the level of knowledge about it among traders. The more the knowledge, the more likely traders can adopt it.

Another pertinent contributor to the adoption of mobile payment is availability. As such geographical reach would determine the level to which MSMEs adopt it since they would be willing to reach more people. Furthermore, the extant customer care should be in a position to effectively handle all the customer needs. This is important because it enables people to effectively retain trust of it.

The adoption of mobile payment options such as Lipa na MPESA is also influenced by other external factors. First all, there has to be the requisite mobile technologies and infrastructure (software/systems) that support the payment option. If better technologies come around, then the adoption may be influence (i.e. if competing services come to the market).

Furthermore, the image of the money transfer service provider should be sustained. If the image is in question, or any reason to question it emerges, then the level of adoption would dwindle. The level of knowledge of knowledge of the service should also be continuously enhanced. If people get to know of other services more, then the adoption level would be

reduced. Furthermore, the fees offered by the service should be regularly reviewed. If the fees are not flexible, then other services may start gaining competitive edge.

5.4 Recommendations

The study therefore recommends as follows:

Managers of Safaricom Ltd should understand the factors that influence the adoption of mobile payments as highlighted in this study and institute ways of ensuring that they are well understood and taken into consideration.

i. This should include regular information dissemination on mobile money payments.
ii. There should be regular review of prices and upgrading of the payment system to match up the ever increasing needs of MSMEs.
iii. In addition, there should always be in place robust costumer care services to ensure that the image of Lipa na MPESA is maintained since such an image would safeguard the extent to which its clients would continue subscribing to it.
iv. Lastly, Safaricom Ltd. should continuously innovate services that could add value to Lipa na MPESA as that would increase its value in Kenya.

5.5 Areas of Further Research

This study was based on only one mobile money payment service (Lipan na MPESA) of Safaricom Ltd. The Researcher therefore recommends comparative studies focusing on other similar payment services offered by other mobile telephony service providers in Kenya.

5.6 Conclusion

From the findings, it can be concluded that various relevant and external factor determine the adoption of mobile payments by MSMEs in Kenya. As such, the most important factors are pegged to cost reduction, risk reduction and perceived importance and convenience over other payment methods. Understanding these factors may augment the level of adoption of mobile payments in Kenya. Based on this, the study recommends as shown in the subsequent section.

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APPENDIX I: QUESTIONNAIRE

Dear Respondent,

This questionnaire is aimed at answering the research questions for my study titled: "*Modeling uptake of mobile payments by MSMES in Kenya".* Kindly answer the following questions as accurately as possible. Your own response is STRICTLY CONFIDENTIAL and anonymous. Your answers shall be used for academic purposes only. Please tick in the box **[√]** corresponding to whatever your choice is.

A: DEMOGRAPHIC INFORMATION

1. What is your Sex? Male [ ] Female [ ]

2. What is your age? <25 years [ ] 25-35 [ ] 36- 45 years [ ] 46-55 years [ ] 55+ years [ ]

3. What is your highest academic qualification?

   High school [ ] College cert [ ] Diploma [ ] Degree [ ] PG Diploma [ ]

   Masters [ ] PhD [ ] Other [ ] Specify……..

4. How long have you worked for a firm registered by Safaricom Ltd?

   < 1 yr [ ] 1-3 years [ ] 4-6 years

   [ ] 7-9 years [ ] 10 -11 [ ]

PART B: EXTERNAL FACTORS AFFECTING ACCEPTANCE OF MOBILE PAYMENTS BY MSME'S IN KENYA

Please indicate your level of agreement with the statements shown below on your perception on the acceptance of mobile payments by your business.	**Strongly Disagree**	**Disagree**	**Slightly Disagree**	**No Opinion**	**Slightly Agree**	**Agree**	**Strongly Agree**
i. Presence of mobile technologies	☐	☐	☐	☐	☐	☐	☐
ii. Presence of mobile payment infrastructure	☐	☐	☐	☐	☐	☐	☐
iii. Level of knowledge on the available mobile payment options	☐	☐	☐	☐	☐	☐	☐
iv. Presence of robust customer care service	☐	☐	☐	☐	☐	☐	☐
v. Presence of new services that address various payment needs of customers	☐	☐	☐	☐	☐	☐	☐
vi. Presence of enhanced image (reputation of the mobile payment provider)	☐	☐	☐	☐	☐	☐	☐
vii. Capacity to reduce costs of transactions (lower fees)	☐	☐	☐	☐	☐	☐	☐
viii. Incompatibility (difficult to address existing payment needs or supplement existing payment methods)	☐	☐	☐	☐	☐	☐	☐
ix. Perceived/actual complexity	☐	☐	☐	☐	☐	☐	☐

PART C: RELEVANT DETERMINING AND MODERATING FACTORS FOR TECHNOLOGY ADOPTION OF MOBILE PAYMENTS BY MSMES IN KENYA

Please indicate your level of agreement with the statements shown below on your perception on the relevant determining and moderating factors for technology adoption of mobile payments by your business		**Strongly Disagree**	**Disagree**	**Slightly Disagree**	**No Opinion**	**Slightly Agree**	**Agree**	**Strongly Agree**
i.	It reduces cost	☐	☐	☐	☐	☐	☐	☐
ii.	It increases security (reduced risk)	☐	☐	☐	☐	☐	☐	☐
iii.	Leverage mobility (track movement)of the payments	☐	☐	☐	☐	☐	☐	☐
iv.	It is highly trusted	☐	☐	☐	☐	☐	☐	☐
v.	It is fast (speedy)	☐	☐	☐	☐	☐	☐	☐
vi.	It is convenient	☐	☐	☐	☐	☐	☐	☐
vii.	It is highly used by many social group (wide-base of clientele willing to use it)	☐	☐	☐	☐	☐	☐	☐
viii.	It enhances privacy	☐	☐	☐	☐	☐	☐	☐
ix.	It has attractiveness over other alternatives	☐	☐	☐	☐	☐	☐	☐
x.	It can be used in many ways							
xi.	Perceived associated customer service	☐	☐	☐	☐	☐	☐	☐
xii.	Wide geographical reach	☐	☐	☐	☐	☐	☐	☐

PART D: LEVEL OF ADOPTION OF TECHNOLOGY ADOPTION OF MOBILE PAYMENTS BY MSMES IN KENYA

Please indicate your level of agreement with the statements shown below on what your perception on the level of adoption technology adoption of mobile payments by your business	**Strongly Disagree**	**Disagree**	**Slightly Disagree**	**No Opinion**	**Slightly Agree**	**Agree**	**Strongly Agree**
i. We use it on daily basis	☐	☐	☐	☐	☐	☐	☐
ii. We use in a few times per week	☐	☐	☐	☐	☐	☐	☐
iii. We use it a few times per month	☐	☐	☐	☐	☐	☐	☐
iv. We use it rarely	☐	☐	☐	☐	☐	☐	☐
v. We do not use it all	☐	☐	☐	☐	☐	☐	☐

*****Thank You*****