

**UTILIZATION OF MOBILE FINANCIAL SERVICES AMONG SMALL
SCALE BUSINESSES IN KIAMBU COUNTY, KENYA.**

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DECLARATION


This project is my original work and has not been presented for a degree in any other university or any other award.

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DEDICATION

To my lovely daughter Valeria Waithira Kamau.

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ABBREVIATIONS AND ACRONYMS

CAK	Communication Authority of Kenya
FSD	Financial Sector Deepening
ID	Identity Card
KCB	Kenya Commercial Bank
MFS	Mobile Financial Services
MMTS	Mobile Money Transfer Services
MNO	Mobile Network Operators
NACOSTI	National Commission for Science ,Technology and Innovation
RUM	Random Utility Theory
SIM	Subscriber Identification Module
SPSS	Statistical Package for Social Sciences
UMFS	Use of Mobile Financial Services
VIF	Variance Inflation Factor

OPERATIONAL DEFINITION OF TERMS

Business growth – The expansion of an enterprise and addition of more income generating opportunities.

Financial inclusion – Provision of affordable monetary services to previously excluded businesses owners

Mobile financial services – Monetary services offered through a mobile phone to carry out business transactions.

Small scale business –A business initiated to operate at a small scale with limited turnover and number of employees.

Utilization of mobile financial services – use of mobile money services by business owners to facilitate easy and timely transactions.

ABSTRACT

The Kenyan government has been implementing policies to expand financial access including promoting mobile enabled financial services to those excluded by formal banking sector. Despite the efforts, 65 percent of Kenyans have no access to a bank account due to limited bank branches in rural areas and information asymmetry about the sector. To facilitate financial inclusion and reach out to rural areas historically marginalized by conventional banking, mobile network operators have made huge investment to create network and ease access to money. While invention of Mobile money offers financial alternative, small scale businesses in rural areas have not seized the opportunity due to lack of collateral, lack of regular income and inability to maintain a formal account. In light of this, the study focused on utilization of mobile financial services among small scale businesses in rural areas. Specifically, the study sought to, examining the level of utilization of Mobile financial services and investigate determinants of mobile financial services utilization among small scale businesses in Kiambu County. Primary data was obtained through interview administered questionnaire from 123 small scale businesses in Kiambu County. Descriptive statistics and the logit model were utilized in the analysis. The study found out that businesses that utilized mobile financial services were 48.8 percent while those that did not use Mobile financial services were 51.2 percent. Some of the utilized mobile financial services included; mobile money in phone, Pay bill, till number and mobile money bank account. Majority of the businesses preferred mobile money in phone transactions at 65 percent compared to other modes of mobile financial service transactions. The logit regression analysis indicated that; size of business, age of business, distance to bank, transport cost, business type and sex of business owner were significant determinants of mobile financial service utilization by small scale businesses. However, number of employees, level of education, pressure to use mobile enabled financial services and non-business income were not significant factors in determining use of mobile financial services. The study concluded that mobile financial services are compliments of other financial sectors and a means of extending financial services to the unbanked. This study recommends, infrastructure development by the government to facilitate movement in rural areas and to encourage financial service providers to penetrate with ease, provision of an encouraging environment for business to thrive and improvement of mobile financial services by the mobile network operators.

CHAPTER ONE

INTRODUCTION

1.1 Background

1.1.1 Financial Inclusion

Financial inclusion has been a central objective of every country in pursuit of addressing financial access challenges to achieve economic development and business prosperity. According to Demirguc, Klapper, Singer, Ansar & Hess (2018) 31 percent of the global population have no access to basic financial services. Lack of access to financial services has been attributed to lack of regular income and information asymmetry in the banking sector especially in developing countries in Africa. As a result a large proportion of businesses and households have no access to formal financial institutions.

Globally, 1.7 billion adults have no access to formal financial services which has been attributed to distrust in the financial sector, distance to banks, religious concerns, and lack of required documentation and cost of operating a formal financial account. This barriers to formal financial institutions have created opportunities for financial technology lending through mobile money to thrive and bring on board individuals and businesses who would otherwise be left out from accessing formal financial services (World Bank, 2018).

The use of Mobile Financial Services (MFS) is on the rise, the number of people and businesses transacting through MFS increased by 11 percent between 2014 and 2017.

Sub-Saharan Africa remains the global leader in use of MFS. Specifically, the region is home to ten economies globally where businesses and individuals have more mobile financial accounts than formal bank accounts. Initially utilization of mobile money concentrated in East Africa but with time it has spread to West Africa and beyond creating opportunities for financial inclusion and affordability of financial services through eliminating the need to travel long distance to access bank accounts and reducing transaction cost (World Bank, 2018).

According to Swaiss (2017) global players such as World Bank acknowledge financial inclusion as an important ingredient to combat poverty and stimulate business growth. In light of this, the World Bank is working towards eliminating the challenges through multiple initiatives such as universal ability to access financial services by the year 2020 and promoting technological advancement in the finance sector. Access to finances will empower poor households and provide a solution to small scale businesses to save, borrow and make transactions at their convenience.

Financial exclusion in Africa has opened doors for development of sophisticated informal financial instruments where the poor and businesses in rural setup are exploited through exorbitant charges by shylocks and brokers. To prevent the exploitation the African governments are promoting mobile network operation to reach out to the population in the periphery where there is little or no access to formal financial institutions (Kanobe, Alexander & Bwalya, 2017).

The developing countries represents substantial population without access to finances in Africa and Asia .Specifically, East Africa is home to one fifth of the global population

who are mostly financially excluded in the formal spectrum (van, Klapper, Demirguc-Kunt & Singer, 2015). To solve finance access paradox mobile network operators have developed easy access to money through initiatives such as Mobile Financial Services (MFS). Sub-Saharan Africa leads the way with 45.6 percent of the total deployment while South Asia region follows them with a distance highest deployment of 33.2 percent (Pasti, 2018).

According to Felsenthal and Hahn (2018) access to finance is experiencing an upward trajectory from 62 percent to 69 percent between 2014 and 2017. However 1.7 billion adults have no access to financial services. The people of Kenya especially those located at the rural setup have very limited scope of financial services. This is due to barriers to formal financial inclusion which depend on both supply and demand factors. The supply factors include; unstable income, distance to bank branches, distance to agent's location and information asymmetry. The demand barriers on the other hand include; lack of permanent income, low financial literacy and information asymmetry among others.

In Kenya, a sizeable proportion of the population lives in rural areas and participate in subsistence farming with a few in the cash crop industry. Due to unpredictable seasons and climate change the mass can no longer rely on farming as the main economic activity and have resulted to small scale businesses especially in the rural areas of the country. The emergence of this businesses have created unmet financial demand to facilitate the sector and provide a platform for people to transact (Crick, Eskander, Fankhauser & Diop, 2018).

Advocates of Mobile Financial Services (MFS) believe that utilization of mobile enabled financial services enhance business growth and promote financial inclusion through provision of a platform for people to ; save and borrow, receive or make payments, send or receive money ,access bank accounts and transact at their own convenience. Utilization of mobile enabled financial services have brought a wide range of economic opportunities and financial alternatives among businesses in Kenya. In light of this, the government of Kenya has developed the National payment Act, 2011 and the National Payment System Regulation Act, 2014 to facilitate and protect transactions in the telecommunication industry.

According to communication Authority of Kenya (2020) access to financial services has experienced tremendous growth in Kenya since inception of MFS in the country in 2007. Since then mobile phone subscription has gone up from 16 million subscription to 57 million active participants in the telecommunication industry (Republic of Kenya, 2020). This swift progression in the telecommunication sector is attributed to expansion of the digital economy and multiple Subscriber identification Module (SIM) ownership by consumers. In addition, mobile financial services have brought on board small scale businesses and poor households who are considered risky in the formal financial sector. These explains the increase in number of businesses and poor people accessing financial services in Kenya (Kenya, Financial Sector Deepening, 2016). Table 1.1 illustrate the trend on indicators of financial inclusion in Kenya from 2008 to 2017.

Table 1.1: Trends on indicators of financial inclusion in Kenya (2008 – 2017)

Indicators of financial Inclusion	2008	2011	2014	2017
Domestic credit Provided by Financial Sector (% of GDP)	33.9	41.7	44.7	40.6
Account ownership at a financial institution or MFS (% of Population)	-	42.3	74.7	81.6
Financial services Accessed by the poor (% of Population)	-	19.4	63.2	70.5

Source: World Bank Development Indicators (2019)

As shown in table 1.1, growth of domestic credit has experienced upward trajectory from 33.9 percent in 2008 to 40.6 percent in 2017 since mobile enabled financial services was incorporated in the financial sector. Ownership of an account at a formal financial institution or mobile enabled financial service has also experienced steady increase from 42.3 percent in 2011 to 81.6 percent in 2017. In addition, the number of poor people accessing financial services recorded a swift improvement from 19.4 percent in 2011 to 70.5 percent in 2017. The people of Kenya especially those located at the rural setup are the biggest beneficiaries of mobile financial services since it offers alternative sources to finance their business and ensure a smooth transaction with their clients.

According to Central Bank of Kenya, Kenya National Bureau of Statistics and Financial Sector Deepening (2019) digital financial services have transformed uptake of financial services in Kenya. The most utilized digital financial services includes, MFS at 79.4 percent, mobile banking at 40.8 percent followed by digital loans app at 8.3 percent. Table 1.2 illustrate the changing trends of digital financial uptake in Kenya from 2006 to 2019.

Table 1.2: Trends on Digital Financial Uptake in Kenya (2006 – 2019)

Digital Financial Services (% of Adults)	2006	2009	2013	2016	2019
Mobile Financial Service (MFS)	-	27.9	61.6	71.4	79.4
Mobile Banking	14.0	20.5	29.2	34.4	40.8
Digital Loan Apps	-	-	-	0.6	8.3

Source: Central Bank of Kenya, Kenya National Bureau of Statistics and Financial Sector Deepening (2019)

Table 1.2 shows an increasing trend on utilization of all digital financial services in Kenya. The high uptake of mobile financial services has largely been attributed to acquisition of mobile phones by individuals and businesses for transaction purposes and the changing landscape in the financial service providers. In addition, the increasing trend on use of digital loan apps from 0.6 percent since inception to 8.3 percent indicates the role of unregulated financial service providers in the country. The growing trend of digital financial services indicates that businesses and individuals have financial alternatives to choose from apart from the formal financial services (Central Bank of Kenya, Kenya National Bureau of Statistics and Financial Sector Deepening, 2019).

1.1.2 Mobile Financial Services and Financial Inclusion

Mobile financial services enables online transactions, bill payments, receiving salaries and making general transactions through mobile device. The rapid adoption of mobile aided financial transactions is attributed to improved network coverage, presence of agents all over the country and initiatives such as M-banking services which enables the

mobile phone holder to withdraw and deposit cash from the bank or any other financial institution.

The presence of mobile network operators countrywide has greatly eased ways of doing business and contributing to economic growth at large. Individuals and businesses can make transactions at their convenience regardless of their geographical location as far as they own a mobile device and registered to use any of the available mobile enabled financial service. This platform has been embraced for the inclusivity and minimum prerequisite to open and operate an account. The unbanked can now participate in the financial sector at their convenience and make transactions of their choice with the little they have.

According to Nyaga (2013) the trust associated with mobile enabled financial services has been a key ingredient to its prosperity and increased economic activities. Low transaction costs have brought on board many people and businesses from the rural areas who initially could not access financial services therefore increasing productivity and business development.

1.1.3 Trends of Utilization of Mobile Financial Services in Kenya

According to Central Bank of Kenya, Kenya National Bureau of Statistics and Financial Sector Deepening (2019) 79.4 percent of Kenyans are utilizing MFS for various business and individual transactions. The uptake of mobile money has greatly been influenced by the high dependency ratio among the citizens, financial exclusion by the formal financial sector and the global trend of increased use of cell phones. The

increased trend on use of MFS in Kenya has been attributed to the desire to deposit and withdraw at ease, safe keeping and convenient purchase of airtime (Central Bank of Kenya, Kenya National Bureau of Statistics and Financial Sector Deepening, 2019).

The mobile money transfer networks supporting mobile financial services in Kenya includes; Safaricom *M-Pesa* introduced in 2007, Airtel Kenya limited which at inception in 2000 was referred to as *kencell* and rebranded to *Zain* in 2008 and finally *Airtel* in 2010, Orange Money launched in 2010 by Telkom Kenya which rebranded to *T-Kash* in 2018, Mobile pay limited *Tangaza* launched in 2011 and more recently *Equitel* from Equity bank group launched in July 2015 (FinAccess, 2016). The competition from various mobile network operators in Kenya has facilitated the rapid growth of mobile financial service utilization in the country. Table 1.2 shows the trends on indicators of mobile financial services utilization in Kenya between 2016 and 2018.

Table 1.3: Trends on Indicators of MFS Utilization in Kenya (2016-2018)

Indicators of MFS Utilization	2016	2017	2018
Number of MFS transactions	400.6 Million	611.3 Million	730.2 Million
Number of Mobile Commerce transactions	447.3 Million	483.2 Million	526.9 Million
Active MFS Users	20.6 Million	24.9 Million	29.7 Million
Active MFS agents	169,698	206,940	218,495

Source: Communication Authority of Kenya (2019)

Table 1.2 shows an increasing trend of all indicators of utilization of mobile enabled financial services. The growth witnessed in mobile aided financial services has largely been driven by widespread growth of mobile agent network, as well as increased use of mobile solutions and adoption of the service among traditionally underserved groups

(rural population). Utilization of MFS have brought a wide range of economic opportunities and financial alternatives among businesses in Kenya.

1.1.4 Mobile Enabled Financial Products Exploited by Businesses

The inception of mobile enabled financial transactions in Kenya has revolutionized business services in the country. Businesses have been able to thrive where alternatives could have taken a big chunk of their profits through utilization of mobile financial services. The current mobile transaction platforms have enabled customers to operate their devices without hitches, enabling fast, secure and convenience transactions. Mobile financial services are categorized in two major sets; mobile enabled banking services and business payment services.

The mobile payment platform have two components, pay bill and buy goods and services. The pay bill service enables cash collection from clients through mobile enabled financial service platform such as *M-Pesa*, *Airtel money*, *T-Kash*, *Equitel* among others. On the other hand, buy goods and services facilitates easy and timely payment for goods and services to the suppliers and from the customers. A good example is *lipa na M-pesa* platform where *lipa na M-pesa* tills are connected to a nominated Safaricom number preferably the merchants business number. This connection allows the merchant to move money from the business till balance to an *M-Pesa* account for withdrawal via *M-pesa* agent, send money to supplier or do an M-Pesa deposit.

Alternatively, mobile banking creates a link between a merchant's mobile device and financial institutions such as commercial banks, microfinance institutions and credit associations. Through the use of mobile banking, businesses can easily borrow, save, deposit, withdraw, track business transactions and check account balances in their account at their convenience.

1.1.5 Businesses in Kiambu County

Available data shows high rates of financial exclusion to businesses in various regions among them Kiambu County (Republic of Kenya, 2017). According to County Government of Kiambu (2018) the County comprise of 72,000 registered businesses across the county which cut across industries, transport operators, small enterprises, financial service providers among others. Among the registered businesses, 70 percent comprise of micro enterprises which are based in rural setup with little or no access to financial institution (County Government of Kiambu, 2018). This small scale businesses plays an important role of the economy through provision of goods and services, job creation and generating revenue for the County. The county is home to major industries for all sectors of the economy with a specialization in the agro-processing and manufacturing industries. The presence of industries provides a major source of employment and market outlet for agricultural products which forms the backbone of the livelihoods of area residents.

Kiambu County has 118 designated markets spread across the county. The main markets include; Gatundu market in Gatundu south sub-county, Kiamwangi market in Gatundu North, Juja market in Juja and Madaraka market in Thika Sub County.

Gatundu South Sub-County enjoys the geographical advantage of proximity to other counties and as a result residence are able to enjoy products and services from investors who visit Gatundu ultra-modern market regularly. In light of this, the study was be based at Gatundu South Sub County since it offers a true reflection of the county activities.

1.2 Statement of the Problem

Despite efforts by Government of Kenya and the private sector to promote access of financial services, 22.3 percent of businesses in the rural areas have no access to formal financial services (Central Bank of Kenya, Kenya National Bureau of Statistics and Financial Sector Deepening, 2019). Businesses in rural areas are often not considered viable customers to the formal financial sectors due to their small transactions in nature and their location at remote areas beyond the reach of bank network. As a result, majority of potential businesses are left out of the formal financial sector with their only hope remaining in other financial sectors such as mobile financial services within their reach. While innovation of mobile financial services offers financial alternative to businesses with limited or no financial access, available data shows that businesses in the rural setup have not seized the opportunity as compared to their counter parts in the urban and peri-urban setup, thus making the gains of MFS as a tool to financial exclusion be in question (World Bank, 2017). In light of this, evidence is needed on utilization of mobile financial services by businesses.

The several mobile financial services that can be used to overcome financial limitations faced by businesses include; mobile money platform by mobile network operators

which provides opportunities for business to receive payments, buy goods and services, save money in bank account, transact or borrow. In this context and given the effect of access to financial service on business development, financial inclusion and economic growth, this study analyzed utilization of mobile financial services by businesses.

Previous studies (Lee (2012), Marumbwa (2014), Keli, 2018) have focused on use of mobile financial services by individuals and found various factors that influence use of Mobile Financial Services such as user characteristics and increased network penetration. The studies provided a good empirical understanding about mobile financial services, but failed to provide evidence on utilization of MFS by businesses and which products could be promoted more to encourage financial inclusion to small scale businesses in rural areas. In addition, none of these studies were based in a rural context. In light of this, the current study analyzed utilization of mobile financial services by businesses based in a rural setup.

1.3 Research Questions

The study sought to find answers to the following questions:

- i. What is the level of utilization of mobile financial services among small scale businesses in Kiambu County?
- ii. What are the determinants of utilization of mobile financial services in small scale businesses in Kiambu County?

1.4 Research Objectives

The main objective of this study was to evaluate utilization of mobile financial services among small scale businesses in Kiambu County, Kenya. The specific objectives were;

- i. To examine the level of utilization of mobile financial services among small scale businesses in Kiambu County.
- ii. To investigate the determinants of utilization of mobile financial services in small scale businesses in Kiambu County.

1.5 Significance of the study

The study benefits scholars by adding to the existing literature on utilization of Mobile financial services among business in Kenya. Subsequently, Mobile financial services providers can use the study findings to develop and promote products to enhance access to finances by businesses. At the same time the study provides a guide to mobile network operators on support programmes to prioritize towards financial inclusion through use of MFS by business. In addition, the government benefits from this study through the recommended policies to facilitate better service delivery to the mobile money clients and the telecommunication stakeholders.

1.6 Scope of the Study

The study was restricted to utilization of mobile financial services among small scale businesses in Kiambu County on a sample of businesses drawn from Gatundu South Sub County. The sampled businesses constituted of small enterprises based in a rural set

up in the four wards in Gatundu South Sub-County. The results of the study were limited to role of MFS in financial inclusion to small scale enterprises in a rural setup.

1.7 Organization of the Study

This project is organized in five chapters. Chapter one outlines the study background, Chapter two presents a review of relevant theoretical and empirical literature, Chapter three describes the methodology adopted by the study. Chapter four presents the empirical findings while chapter five outlines the summary, conclusion and policy recommendations of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter presents economic theories and selected literature related to the study.

2.2 Theoretical literature

This section outlines the economic theories that relate to the study. The theories discussed include, utility maximization theory and random utility theory.

2.2.1 The Utility Maximization Theory

The utility theory assumes that consumer's belief upon individual preferences is based on logic. Each individual has a certain preference which is intrinsic in nature. Utility theory is a positive theory that seeks to explain the individual observed behavior and choices. The theory assumes that each individual faces a set of consumption bundle and a budget constraint. The consumers have a clear preference that enables them to rank or order all bundles based on the level of satisfaction each bundle provides to the consumer. The consumers may choose one bundle in expense of the rest or an optional bundle comprising of some combination of the commodities. According to the theory, more consumption is perceived better to less consumption and rank ordering of bundle of goods is assumed fixed regardless of the context and time (Fishburn, 1970).

The utility maximization theory assumes that consumers are rational beings who utilize their resources to achieve the highest level of satisfaction. The utility maximization

function is derived from bundles of goods and subject to a budget constraint. The bundle of goods is divided into two; basic commodities and others. The consumers are expected to spend the budget they have as a result there is an opportunity cost between basic commodities and other goods. The choice problem is generally presented as;

$$\text{Max } U = (X_1, X_2) \dots \dots \dots (2.1)$$

Subject to

$$P_1X_1 + P_2X_2 = I \dots \dots \dots (2.2)$$

Where: X_1 represents basic commodities, X_2 represents other goods and services, U is a measure of utility to be maximized. P_1 and P_2 represent the price of both basic commodity and other goods or services, respectively and I represent the available income so that $P_1X_1 + P_2X_2 = I$ is the budget constraint the individual faces.

The solution to the choice problem are demand functions for basic commodities and other commodities, which take the form,

$$X_i = f (P_1, P_2, I) \dots \dots \dots (2.3)$$

Where subscript i denotes the commodity.

In the context of utility theory, the firm could be thought of as making a decision between utilization of mobile financial services alongside other important services to be utilized in the business. The firm faces constraints in relation to the set of services that are affordable, but selects the set that leaves it at the higher level of utility. The choice to embrace mobile financial services just as in the case of a theoretical commodity could be thought to depend on price paid to obtain the service, price of other alternative services and level of business income.

$$\text{MFS Use} = f(X_1, X_2, X_3) \dots \dots \dots (2.4)$$

Where X_1 represents cost of mobile transactions, X_2 represents cost of other alternatives and X_3 represents Business income. This theory therefore offers a very good start for constructing a model to analyze utilization of mobile financial services in businesses.

2.2.2 The Random Utility Theory

According to ordinalist's utility is a subjective concept that cannot be directly measured. The user of a commodity can only be able to rank bundles in order of preference. In this context this study will contrast use of mobile aided transactions to other financial alternatives that are utilized by businesses in rural areas. If a business uses mobile supported transactions, and no other financial alternatives, it indicates that they rank mobile financial services higher than other financial services.

As postulated by Block and Marshak (1960) Random Utility Theory (RUM) explores the theoretical implications of choice, probabilities of maximizations of utilities based on the concept of ordinal utility. RUM outlines choice of an individual based on the satisfaction obtained from each alternative provided. The utility obtained from an alternative depends on aspects of individual choice and individual user characteristics. According to the model an individual achieves higher level of satisfaction by choosing an option that yields higher level of utility so that if an individual is choosing between two alternatives i and j ; the likelihood of choosing alternative i is given by:

$$P_i = \text{Prob} (U_i > U_j) \quad ; i \neq j \dots \dots \dots (2.5)$$

Equation 2.5 implies that the probability of choosing an alternative i is higher since it yields the highest level of utility.

The RUM enables extension of the demand models. The assumption that utility depends on the characteristic of an alternative as well as individuals user characteristics enables extension of empirical models to include such relevant factors, especially factors that distinguish one type of service from another as well as those that distinguish one business from another.

2.3 Empirical Literature

Morawczynski (2009) carried out a study on use of mobile money by the poor in Kenya. The study set out to assess whether the poor use mobile money; and evaluate the impact of M-Pesa on welfare. The study collected data from 350 persons and 21 focus groups through structured surveys and interviews. The study found out that utilization of mobile financial services such as M-pesa has been accredited to security and mobility in comparison to alternatives. Safe storage mechanism attributed to MFS has resulted to increase in net household savings and increased rural livelihoods. In addition, MFS has improved investment and funding among households. Since the unit of analysis concentrated on individuals the current study analyzed financial services utilized by businesses and investigated determinants on use of such services.

Lee (2012) carried out a study on factors that influence use of mobile money in Korea. Specifically, the study examined the key drivers of mobile money use. Data was sampled from 240 respondents who utilized Mobile Financial Services. Using

descriptive technique the study found out that user perception and user characteristics influence MFS usage. Using this study the current study utilized descriptive techniques to determine the level of MFS utilization and the most utilized MFS applications among small scale businesses in Kiambu County.

Nyaga (2013) conducted a study on the role of mobile financial services on business growth in Naivasha, Kenya. Specific objectives included, to establish categories of mobile aided transactions utilized by SMEs in Naivasha town. The study collected data using structured questionnaires from 113 respondents using five point Likert scale survey questionnaires. Using descriptive methods and inferential statistics, the study found out that mobile enabled financial services influenced sales and a good number used the mobile banking for saving purposes. Using this study the present study focused on how businesses utilized mobile financial services in general with a focus on small scale businesses at the periphery.

Maradung (2013) investigated the factors affecting adoption of mobile financial services in the banking industries in Botswana. The study collected data from 190 respondents using structured questionnaires on 5 point Likert scale containing close ended questionnaires. Using quantitative analysis the study established that sex, employment status and age of individuals were the main significant determinants of individual choice of adopting mobile money services in Botswana. Whereas the study focused on individuals as the unit of analysis, the current study will focus on businesses as the unit of analysis.

Marumbwa (2014) conducted a study on effects of social characteristics on user acceptance of mobile finance services in Zimbabwe. The study sought to investigate application preferences on mobile financial services by households. Based on 350 respondents obtained using a structured survey the study identified that use of Mobile Money Transfer Services (MMTS) does not always depend on social demographic factors but also other factors. The study focused on urban setup and thus future studies can be based in a rural setup.

Musembi (2015) examined determinants on mobile phone technology adoption in Kenya. The study collected cross sectional data using structured questionnaires from 177 respondents. Using descriptive statistics and the logit model the study established that among the human characteristics, its only sex which influenced mobile phone use in Kenya. This study was faulted for not accounting for brand loyalty when factoring in factors that lead clients to choose a particular mobile phone device. Whereas the study focused on mobile phone adoption in Kenya by individuals the present study focused on utilization of mobile aided financial services in businesses and the type of mobile transactions that spur businesses growth in rural areas.

Mutisya (2016) carried out a study on the role of mobile banking on the growth of Small and Medium Enterprises (SMEs) in Kitui County. The study collected data from 105 SMEs licensed in Kitui town. Using descriptive statistics and multiple linear regression, the study found out that, use of mobile banking contributed to the growth of SMEs through increase in sales which subsequently increased business profits. Whereas

the study focused on business growth the current study will focus on use of mobile financial services by small scale businesses.

Chebet (2017) conducted a study on impact of mobile payment on business performance in Machakos town, Kenya. Using a case study of Safaricom *lipa na M-pesa* the study sought to investigate the impact of *lipa na M-pesa* on business performance in Machakos town. The study collected data using structured questionnaires and interviews from 300 merchants registered with Safaricom *lipa na M-pesa* payment platform. Using descriptive statistics and inferential statistics such as correlation analysis and multiple regression analysis the study identified that, convenience, efficiency, accessibility and reliability of *lipa na M-pesa* influenced business performance in Machakos town. Whereas the study focused on impact of Safaricom *lipa na M-pesa* on business performance in an urban setup the current study focused on use of all mobile financial services by businesses in a rural setup.

Keli (2018) investigated the influence of access to mobile phone services on financial inclusion in Kitui County. The study collected data using structured questionnaires and interviews from 351 mobile users. Using correlation analysis and multivariate regression analysis, the study identified that mobile phone use facilitated access to finance. In addition, the study also found out that, financial inclusion was enhanced by the high rate of mobile subscription penetration rate as well as the strong growth on subscribers registering for mobile money services and increased agent network that facilitates the end to end mobile transfer transactions. The current study used businesses

as the unit of analysis to identify benefit and cost factors that determine use of mobile enabled transactions.

Mararo (2018) investigated the impact of mobile enabled transactions on development of SME in Nakuru County. Data was sampled from 109 entrepreneur's using structured questionnaires on 5 point Likert scale containing close ended questionnaires. The study analyzed data using descriptive methods and established that mobile banking enable the traders to track transactions in their bank, access their account balances and address customers' needs through their phones. Based on this study the current study adopted Likert scale in establishing the level of use of different mobile enabled products in business.

Njuguna (2018) carried out a study on household choice of mobile money transfer services in Nairobi County, Kenya. The study collected data using interview administered questionnaire from 209 respondents. Using descriptive statistics and multinomial logistic regression analysis the study established that convenience, ease of access and cost of transaction were the main determinants of household choice of mobile money transfer services. In addition, none of the human characteristics among them age and gender were significant determinants on household choice of MMTS. Whereas the study focused on households as the unit of analysis, the current study will focus on businesses with more emphasis on human characteristics that determine use of mobile financial services.

2.4 Overview of Literature

The reviewed theoretical work reveals utilization of mobile financial services by businesses can be explained by the ordinal Utility and utility Maximization model. The rationality of utility maximization shows that the decision to choose among alternatives depends on consumer's preference which is based on level of satisfaction derived from use or not using mobile financial services based on the available resources. In addition, the ordinalist postulates that the choice of a business to utilize mobile financial services or not will be based on satisfaction derived by a business when it decides to use MFS and the utility derived from not using the service.

While previous empirical studies have tried to focus on the use of mobile enabled financial services by individuals the present study focused on the level of use of MFS by businesses. In addition, the few studies that focused on sub sectors such as SMEs narrowed down to impact of MFS on business growth and none of them has found the level of utilization of MFS and the determinants of utilization of MFS to those excluded in the formal financial spectrum. Furthermore, none of the studies reviewed were conducted in rural setup for example; Mararo (2018) carried out a study at Nakuru town, Marumbwa (2017) focused on Urban and peri-urban while Nyaga (2013) carried out the study in Naivasha town in Kenya.

Mutisya (2016) noted that to ensure a comprehensive and representative finding on the use and aspects that have led to growth of businesses more studies need to be conducted on utilization of mobile financial services. Using this recommendation and given the impact of MFS on business development, financial inclusion and economic growth, it

will be necessary to analyze MFS utilization among business in Kenya. The present study specifically analyzed utilization of mobile enabled financial service among small scale businesses in Kiambu County.

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CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter outlines the research methodology utilized by the study. The chapter describes the research design, measurement of variables, data type and source, area of study, target population as well as data analysis and diagnostic tests.

3.2 Research Design

The study utilized non-experimental cross section research design. The technique was considered appropriate because the study did not involve any alteration on variables by the researcher but the behavior was observed as it naturally occurred. In addition, cross section survey allowed comparison of users and non-users of mobile financial services at the same point in time.

3.3 Theoretical Framework

Analysis of utilization of MFS was based on Ordinal utility theory. The Ordinal utility theory posits that a user of a commodity may not directly measure level of utility from a good or service but is able to rank bundles of consumption in order of preference. A commodity that is ranked higher than the other simply means that it's more preferred and thus is thought to provide higher satisfaction. Therefore a consumer who utilizes mobile financial services is assumed to compare it with other financial services and is thought to derive higher level of utility from its use than in the case of other financial services. Therefore:

$$U_i > U_j \dots\dots\dots (3.1)$$

Where U_i is utility from mobile financial services and U_j is utility from other financial services.

Underlying each individual choice is the utility which represents the difference between benefit and cost associated with a specific choice made by a consumer. Thus

$$U_i = \beta_i - C_i \dots\dots\dots (3.2)$$

Where β_i is benefits associated with use of MFS and C_i is the cost associated with utilization of MFS. Where benefits to a user of MFS is modelled as a function given as;

$$\beta_i = f(b_1, \dots b_n) \dots\dots\dots (3.3)$$

Where b_1 are elements that affect level of benefits from utilization of MFS and can include; size of the business, type of business, credibility, MFS devices ownership, convenience, income level among others (Abdinoor & Mbamba, 2017).

The cost of utilization of the service can be expressed as;

$$C_i = f(c_1, \dots c_n) \dots\dots\dots (3.4)$$

Where c_1 are factors influencing cost of users of MFS. The cost aspects associated with utilization of MFS can include; transaction cost, distance to bank, transport cost to MFS agents and cost of buying MFS devices such as mobile phones and money transmission gadgets (Abdinoor & Mbamba, 2017).

Equation (3.2) can therefore be modified to express utilization of mobile financial services as depend on both benefit and cost factors as follows;

$$UMFS = f(bi, \dots bn, c_1, \dots cn) \dots \dots \dots (3.5)$$

Based on the random utility model utilization of MFS depends on benefits and cost factors of a particular choice. Equation (3.5) was extended so that utility from use of mobile enabled financial services is influenced by benefits and cost factors as well as demographic characteristics of the business owner which include; sex of owner of business, main occupation of the owner, education attainment of the owner, as well as business characteristics. The business characteristics include; age of business, number of employees in a business, size of business as well as business type.

3.4 The Empirical Model

Based on the theoretical framework, the study utilized the following model to analyze utilization of mobile financial services.

$$MFSU = f(MFSB, MFSC, BSC, BSOC) \dots \dots \dots (3.6)$$

Where MFSU is mobile financial service use, MFSB is mobile financial services benefits factors, MFSC is mobile financial services cost factors, BSC is business characteristics and BSOC is business owner characteristics.

3.5 Definition and Measurement of Variables

The dependent variable was mobile financial services use. The independent variables consisted of service benefit factors, service cost factors, business characteristics and business owner characteristics. The definition and measurement of the variables in each category are expressed in tables 3.1 to 3.5.

Table 3.1: Description and Measurement of the Dependent Variables

Variable	Definition	Measurement
Utilization of MFS	The use of mobile financial services by a business in the form of; <ul style="list-style-type: none"> • Pay bill • Buy goods & Services • Mobile money bank account • Mobile money in phone 	Measured by a dummy variable 1 if Business use any form of MFS and 0 if otherwise.

Table 3.2: Description and Measurement of MFS Benefits factors

Variable	Definition	Measurement
Credibility	The trust and confidence accorded to mobile financial services	Measured by the extent of agreement in a scale of 1-5; 1 if strongly Agree, 2 if Agree, 3 if Neutral, 4 if Disagree and 5 if Strongly Disagree
Convenience	Refers to how fast a user can make a transaction using mobile financial services without challenges	Measured by the extent of agreement in a scale of 1-5; 1 if strongly Agree, 2 if Agree, 3 if Neutral, 4 if Disagree and 5 if Strongly Disagree
Ease of use	Interaction with mobile financial services without hitches	Measured by the extent of agreement in a scale of 1-5; 1 if strongly Agree, 2 if Agree, 3 if Neutral, 4 if Disagree and 5 if Strongly Disagree

Table 3.3: Definition and Measurement of MFS Cost factors

Variable	Definition	Measurement
Transaction Cost	This refers to the charges in shillings that a business incur for using mobile financial services per month	Intervals for various categories; Below 1,000 [1] 2,000 - 5,000 [2] 6,000 - 10,000 [3] Above 10,000 [4]
Distance to the nearest bank	Refers to the distance in kilometers to the nearest commercial bank from the business location.	Intervals for various categories; 5 and Below [1] 6 – 10 [2] 11 – 15 [3] 16 – 20 [4] 20 and Above [5]
Distance to the nearest Agent	Refers to the distance in kilometers to the nearest MFS agent from the business location	Intervals for various categories; 5 and Below [1] 6 – 10 [2] 11 – 15 [3] 16 – 20 [4] 20 and Above [5]

Table 3.4: Definition and Measurement of MFS Business Characteristics

Variable	Definition	Measurement
Age of Business	The number of years a business has been in existence	Intervals for various categories; 1 Year and Below [1] 2 – 5 Years [2] 6 – 9 Years [3] 9 Years and above [4]
Size of Business	The relative magnitude of a business classified according to profit per month in Kenyan Shillings	Intervals for various categories; 0 – 10,000 [1] 10,100 – 20,000 [2] 20,100 – 30,000 [3] Above 30,000 [4]
Type of Business	Categories of businesses based on the services and products they offer.	Measured by categorized variable 0 if it deals with both goods and services, 1 if it deals with goods and 2 if it deals with services only
Number of Employees in a Business	The number of people working in a particular business.	Intervals for various categories; 1 [0] , 2- 4 [1] , 5-7 [2], Above 7 persons [3]

Table 3.5: Definition and Measurement of MFS Business Owner Characteristics

Variable	Definition	Measurement
Education Attained	The highest academics level achieved by the owner of a business	Measured by categorized variable 1 if Primary ,2 if Secondary,3 if tertiary and 4 if University level
Age	Refers to the age of the business owner in years	Intervals for various categories; 15 – 35 [1] 36 – 56 [2] 57 – 77 [3] 77 and Above [4]
Sex	Refers to whether the owner of the business is male or female	Measured by a dummy variable where 1 if Male ,0 if Female
Marital status	Refers to whether the business owner is single or married	Measured by categorized variable 1 if Single, 2 if married, 3 if widowed and 4 if any Other

3.6 Data Type and Source

The study utilized primary data collected from sampled businesses. Structured questionnaires were administered by the interviewer to the sampled businesses to collect data on benefit and cost factors as well as business and business owner characteristics. The questionnaire used is presented in the appendix I.

3.7 Area of study

The study was conducted in Kiambu County of Kenya. Kiambu County comprise of twelve Sub-Counties among them Gatundu South. Gatundu South Sub-County in which the study was conducted had a population of 114,183 in 2015 and occupies a total area of 192.4Km². The sub- County comprise of four wards namely; Kiamwangi, Kiganjo,

Ndarugu and Ngenda. Ngenda ward which is the most populated ward comprise of eight sub locations with a total population of 46,430 occupying a total area of 35.40 Km² (Republic of Kenya, 2015).

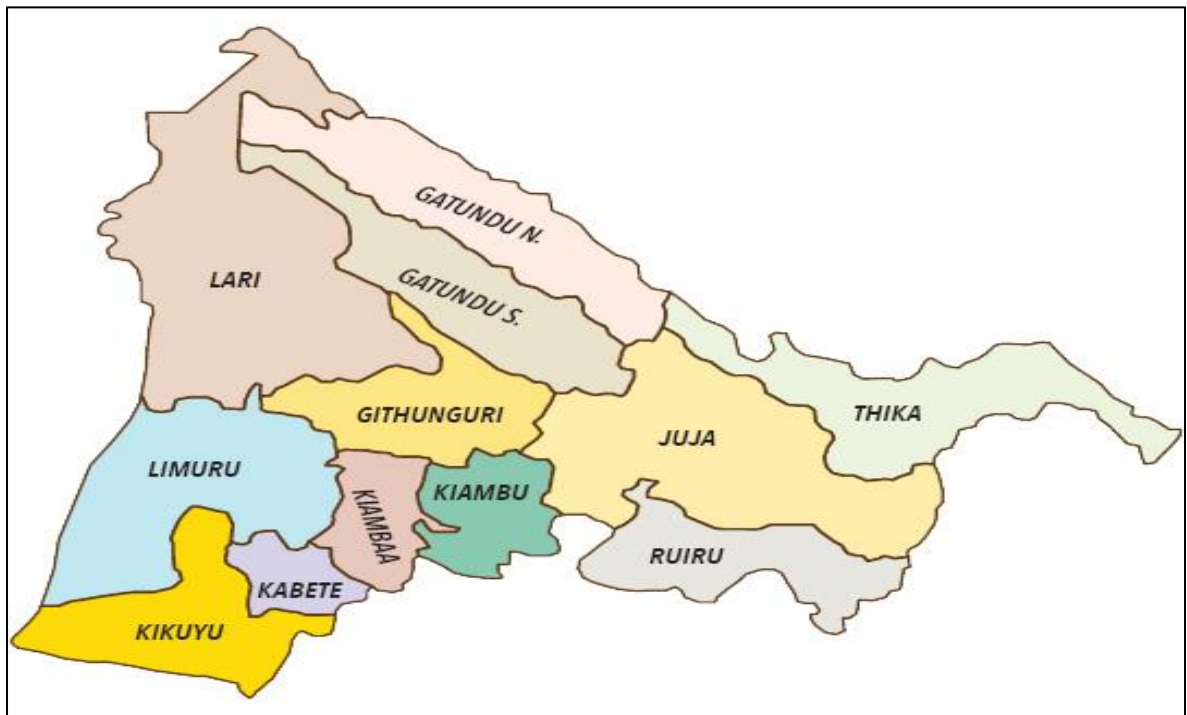


Figure 1: Kiambu County Administrative Units by Sub-County

Source: Republic of Kenya (2015)

The main income generating activity in Gatundu Sub-County is farming and commercial activities. The commercial activities include; wholesale and retail trade conducted by various business vendors, transportation, local production such as *jua kali* products, sales and distribution of products, restaurants, cyber services and sale of second hand clothes (*mitumba*). There is only one supermarket in the Sub-County and several general stores. As a result, majority of the businesses are small scale businesses located in highly populated areas within the villages. Therefore, the businesses are retail

in nature, owned by area residents who maintains the businesses for subsistence purposes, source of income and source of employment to the unemployed.

3.8 Target Population and Sampling Procedures

The target population for the study was all registered small scale business within Gatundu South Sub-County which as at August, 2019 were 323 in number. The choice of the Sub-County was guided by convenience and presence of businesses within the rural areas where there is no formal financial institutions. Stratified sampling was used to sub divided the target population into 4 strata among Kiamwangi, Kiganjo, Ndarugu and Ngenda wards.

The sample size was estimated using Yamane’s formula (Yamane, 1967) with 5% precision and a 95% confidence interval. The formula is specified as;

$$n = \frac{N}{1+N(e)^2} \dots\dots\dots (3.7)$$

Where;

n = Estimated Sample size

N = Total Number of people in the population, this case 323 businesses

e = Sampling error expressed in percentage (± 5 Percent)

The computed sample size was 179 which was considered appropriate, but was adjusted as recommended for a population of less than 10,000 according to Yamane (1967) to 116, using the sample adjustment equation 3.8.

$$n = \frac{no}{1 + \frac{(no-1)}{N}} \dots\dots\dots (3.8)$$

The number of respondents per stratum was based on proportional allocation of the licensed businesses per ward as presented in table 3.6.

Table 3.6: Sample distribution

Ward	Number of Licensed Businesses	% of licensed Businesses	Sample
Kiamwangi	23	7	8
Kiganjo	71	22	26
Ngenda	197	61	70
Ndarugu	32	10	12
TOTAL	323	100	116

Source of data: County Government of Kiambu (2019)

3.9 Pilot Study

Before commencing actual data collection exercise, a pilot study was conducted using the survey questionnaire to test for its validity and reliability using a sample of 12 businesses from Kiamwangi, Kiganjo, Ngenda and Ndarugu wards. The choice of the particular area for conducting the pilot study was guided by the number of wards in the area of study. The businesses were randomly selected from licensed businesses per ward and represented 10 percent of the sample size as recommended by Mugenda and Mugenda (2003). Businesses that participated in the pilot study were excluded from the main study. The questionnaire was modified by removing any inconsistency, correcting errors and addressing deficiencies in the research tool.

3.10 Data Collection and Refinement Procedures

The study collected data by administering questionnaires to business owners in Gatundu South Sub-County through face to face interviews. Business owners who could read and write were issued with a questionnaire and given time to fill in the questionnaire while the researcher responded to any queries and clarifications. Business owners who could not read and write were guided in every step of the questionnaire and the researcher filled in the questionnaire according to their response without any alterations. The exercise took two weeks between January 2020 and February 2020. After data collection the questionnaires were analyzed to identify any missing information and edited accordingly. Codes were allocated to different variable categories and recorded into an excel spreadsheet to be ready for analysis.

3.11 Data Analysis and Diagnostic Test

This study used descriptive and inferential statistical techniques to analyze data. Descriptive analysis included; frequencies and percentages across all variables. Inferential statistics in form of logit regression model and correlation analysis were employed to determine the relationship between the outcome and explanatory variables. Correlation analysis was also done to check the collinearity between the explanatory variables.

To examine the level of utilization of MFS by businesses descriptive analysis was conducted using Statistical Package for Social Sciences (SPSS). Subsequently, to investigate determinants of utilization of MFS, logit regression was used to identify the

relationship between use of MFS and different explanatory variables using Stata software. To validate that the model was free from specification errors the study conducted model specification test using link test while the overall evaluation of the model was carried out using likelihood ratio test. The model was subjected to multicollinearity test using variance inflation factor (VIF) and variables with high VIF were dropped to solve the problem. The parameters were interpreted accordingly. In addition, the residuals were tested for normality using Kernel density estimate and quantiles of a normal distribution and were found to be normally distributed.

CHAPTER FOUR

EMPIRICAL FINDINGS

4.1 Introduction

This chapter presents and discusses the study findings on utilization of mobile financial services among small scale business in Gatundu South Sub-County, Kiambu County. The findings are presented in line with the study objectives.

4.2 Response Rate

A total of 128 businesses were selected for interviews against a target of 116 so as to achieve more accurate estimates and minimize the margin of error. Out of the 128 interview administered questionnaires in regard to utilization of MFS by businesses in the periphery only 123 business owners accepted to participate in the interviews translating to a response rate of 96.1 percent.

4.3 Utilization of MFS among Small Scale Businesses in Kiambu County

The first objective of the study was to examine the level of utilization of mobile financial services among small scale businesses in Gatundu South Sub-County, Kiambu County. The study collected information on use of MFS, mode of MFS transaction and the challenges encountered by businesses while utilizing mobile financial services. The study findings are presented in the following subsections.

4.3.1 Use of Mobile Financial Services in business transactions

The study analyzed use of mobile financial services in business transactions by examining whether the businesses utilized any form of mobile enabled financial service in their business transactions. Table 4.1 presents the summary of responses on use of mobile financial services by businesses in rural areas of Gatundu South Sub-County, Kiambu County.

Table 4.1: Utilization of Mobile Financial Services

Use of MFS	Frequency	Percentage
Yes	60	48.8
No	63	51.2
Total	123	100

As shown in table 4.1, 48.8 percent of the businesses in the sample used mobile phone enabled financial services in their business transactions while 51.2 percent did not utilize mobile money transactions in their businesses at all. Businesses that did not utilize MFS alluded to customer's preference of paying in cash, lack of MFS incentives such as loyalty points, information asymmetry and lack of MFS devices by businesses. The study findings concur with those of Muriuki (2014) who attributed the low utilization of MFS to lack of awareness by the clients and lack of infrastructure to support use of MFS.

4.3.2 Utilization of different Types of MFS in business transactions

The study determined the specific types of mobile financial services utilized by small scale businesses to carry out their transactions while in line of business. Some of the different types included; mobile money in phone, Pay bill, till number and mobile money bank account. Table 4.2 presents a summary on the level of use of the different types of MFS by various businesses in their day to day operations.

Table 4.2: Methods of MFS Transactions

Type of MFS	Frequency	Percentage
Pay Bill	2	3.3
Mobile Money Bank a/c	6	10.0
Till Number	13	21.7
Mobile money in phone	39	65.0
Total	60	100.0

Table 4.2 shows that the most utilized MFS is Mobile money in phone at 65.0 percent of the total respondents. The use of mobile money in phone was highest among small scale businesses because it facilitate timely transactions between person to person and person to business. In addition, majority of the rural residence preferred to send money direct to the business owners who did not possess a mobile payment option. Only 10 percent of the businesses integrated mobile money bank account transactions due to the nature of their small transactions. The low utilization of pay bill number was as a result of higher transaction charges to the clients in comparison with other means such as use of till number. The findings are similar to that of Chebet (2017) who found that till

number was more utilized than pay bill number due to transaction cost .Similar findings were made by Mararo (2018) who established that person to person transfer was the highest mode of payment, followed by till number while pay bill was the least utilized method of MFS transaction among SME’s in Nakuru town, Kenya.

Business owners who utilized mobile financial services were requested to indicate the major challenges they encounter while using MFS in their business transaction .A summary of the challenges reported are presented in table 4.3.

Table 4.3: Challenges Experienced in Utilizing MFS

Challenge	Frequency	Percentage
Transaction errors	1	1.7
Cost of acquiring MFS device	1	1.7
Data Privacy concerns	2	3.3
Difficult Accessing Customer Services	2	3.3
Asymmetric information on use of MFS	2	3.3
Poor interoperability between networks	2	3.3
Lack of MFS Incentives such as loyalty points	2	3.3
Provision of ID in all transactions	3	5.0
Fluctuating Transaction Charges	3	5.0
Service System Breakdown	10	16.7
Losing Money through Fraudsters	11	18.3
Insufficient cash/float from agents	21	35.0
Total	60	100.0

Table 4.3 indicate that, 35.0 percent of the businesses experienced insufficient cash or float from MFS agents. This meant that businesses could not transact on time since at one point in time MFS agents had all the money as cash or float. 18.3 percent of the

businesses lost money through fraudsters who either hacked the system to defraud, received fraudulent calls or messages or coned at the point of sale. 16.7 percent of the businesses experienced service system breakdown during transactions and 5.0 percent of the businesses complained of high and fluctuating MFS transaction charges.

From the findings, 5.0 percent of the businesses owners complained of the mandatory requirement for providing Identity Card (ID) when making business transactions using MFS. 3.3 percent of businesses complained that MFS lacked Incentives such as loyalty points to encourage their use and reward businesses that promoted MFS transactions. Instead of being rewarded for using MFS, businesses incurred transaction chargers when withdrawing money from their till and pay bill numbers.

According to the results, Poor interoperability between networks made it difficult for businesses utilizing different networks to transact. 3.3 percent of the Businesses sited low acquaintance with MFS transactions due to asymmetric information on use of MFS while another 3.3 percent of the businesses complained on difficulties when accessing MFS customer care Services. According to the findings, 3.3 percent of the businesses sited data Privacy concerns on their identity and amount transacted when making business transactions. Other challenges included; Cost of acquiring MFS device and Transaction errors.

The study findings are consistent with Ndunge and Mutinda (2012) who noted that fraud and network connectivity hindered use of mobile financial services. Similarly, Nyaga (2013) established that, expensive transaction cost, loss of money, insufficient

float to carry out transactions and lack of interest from MFS deposits affected use of mobile financial services.

4.4 Determinants of utilization of MFS among small scale businesses in Kiambu County.

The second objective of the study was to investigate the determinants of utilization of mobile financial services in small scale businesses. Data was collected on variables reflecting business owner characteristics, business characteristics, benefit factors as well as cost factors that determined use of mobile financial services. The summary on data is presented by use of descriptive statistics and analyzed using correlation analysis and the logit regression model.

4.4.1 Descriptive statistics

Data was collected on demographic characteristics of the business owner, business characteristics as well as cost and benefit factors on use of MFS. The descriptive summary on the data are presented in the following subsections.

A. Business Owner Characteristics

Business owners who were interviewed were requested to indicate their demographic characteristics in order for the study to develop an understanding how different the research participants were. Table 4.4 shows a summary of the characteristics.

Table 4.4: Summary on Business Owner Characteristics

Variable	Category	Frequency	Percentage
Sex	Male	59	48.0
	Female	64	52.0
Age	15-35	44	35.8
	36-56	66	53.7
	57-77	12	9.8
	Above 77	1	0.8
Education	Primary	21	17.1
	Secondary	52	42.3
	Tertiary	30	24.4
	University	20	16.3
Marital Status	Single	20	16.3
	Married	100	81.3
	Windowed	3	2.4
Non-Business Income	None	76	61.8
	Less than 15,000	13	10.6
	16,000-30,000	10	8.1
	31,000-45,000	7	5.7
	Above 46,000	17	13.8

As shown in table 4.4, 48.0 percent of the business owners were male and 52.0 were female, indicating that woman are more involved with small scale businesses in the rural area than their male counterparts. The findings are similar to the conclusion by Nyaga (2013) who found that there were more female respondents who operated businesses than male respondents who operated businesses. However, the findings differed with earlier study by Mutisya (2016) who concluded that there were more male respondents who operated businesses than female respondents who operated businesses.

The majority of the business owners were middle aged between 36 and 56 at 53.7 percent followed by the youth at 35.8 percent while 9.8 percent were aged between 57-77 years. According to the study majority of the middle age business owners consisted

of residence who did not have formal jobs and had to venture into business to provide for their families.

From the findings, majority of the business owners had attained secondary school education at 42.3 percent, 24.4 had tertiary education while those with primary and university education were 17.1 and 16.3 percent, respectively. The findings on level of education were similar to Mutisya (2016) who observed that over half of the respondents who operated businesses had attained secondary school level of education in a study on adoption and use of mobile phone technology by entrepreneurs in Machakos County. In addition, more than half of the respondents were married at 81.3 percent while the single and widowed recorded 16.3 and 2.4 percent respectively. This findings vary from Karoki (2013) who found that majority of business owners were single while married business owners were second in sequence in a study on use of MFS by business operators in Kakamega town. More than half of the business owners did not have any other source of income apart from their business at 61.8 percent while 38.2 percent of the business owners generated incomes from other sources. This implied that majority of the business owners had no other source of livelihood apart from their businesses and only a few had the privilege to access finances outside their businesses.

B. Business Characteristics

To understand the nature of businesses interviewed for the study, business owners were requested to indicate characteristics of their businesses. The summary is presented in Table 4.5

Table 4.5: Summary on Business Characteristics

Variable	Category	Frequency	Percentage
Size of Business (Profit per Month)	Below 10,000	40	32.5
	10,100-20,000	30	24.4
	20,100-30,000	20	16.3
	Above 30,000	33	26.8
No. of employees	1	62	50.4
	2-4	58	47.2
	5-7	1	0.8
	Above 7	2	1.6
Business Type	Goods	47	38.2
	Goods & Services	64	52.0
	Services	12	9.8
Age of Business (Years)	1 Year and Below	32	26.0
	2-5 Years	55	44.7
	6-9 Years	9	7.3
	9 Years and above	27	22.0

Table 4.5 shows that Majority of the businesses earned less than Kshs 10,000 profit per month at 32.5 percent indicating that the businesses were small in nature and generated low profit per month. From the findings, 24.4 percent of the businesses earned between Kshs 10,100-20,000 while 16.3 percent of the businesses earned between Kshs 20,100 and Kshs 30,000 profit per month. Those businesses that earned above Kshs 30,000 per month were 26.8 percent. Munga (2010) made a similar observation that majority of the businesses earned below Kshs 10,000 per month and only a few managed to earn above Kshs 30,000 per month due to their small scale of operation. More than half of the businesses were operated by one staff at 50.4 percent, 47.2 percent consisted of 2-4 employees while only a few businesses were operated by more than 5 employees. The few employees per business is due to the small nature of businesses and the fact that

majority were individual owned whose objective was to provide goods and services at a local level.

More than half of the respondents businesses dealt with both goods and services at 52.0 percent while the rest specialized in either goods or services at 38.2 and 9.8 respectively. Chebet (2017) also found out that majority of the businesses engaged in both goods and services followed by those that specialized in goods and services only in that order.

According to the results, majority of the businesses had operated for 2-5 years at 44.7 percent, 26.0 percent of the businesses had not lasted more than one year while 7.3 percent of the businesses had operated for 6-9 years. Only 22.0 percent of the businesses had existed for more than 9 years. This shows that most of the businesses were young. Mararo (2018) also found that majority of the businesses were below 5 years of operations and only a few who had operated above 9 years.

C. MFS Benefit Factors

The study sought to know the benefits associated with use of MFS in businesses using a 5 point Likert scale. The benefits factors considered included credibility, convenience and ease of use of mobile financial services. Table 4.6 presents a summary of the ratings of the respondents on the benefits of using mobile financial services.

Table 4.6: Summary on MFS Benefit Factors

Factor	Response	Frequency	Percentage
Credibility	1-Strongly Agree	13	21.7
	2-Agree	37	61.7
	3-Neutral	4	6.6
	4-Disagree	0	0.0
	5-Strongly Disagree	6	10.0
Convenience	1-Strongly Agree	13	21.7
	2-Agree	46	76.7
	3-Neutral	0	0.0
	4-Disagree	0	0.0
	5-Strongly Disagree	1	1.6
Ease of use	1-Strongly Agree	8	13.3
	2-Agree	47	78.3
	3-Neutral	3	5.0
	4-Disagree	2	3.4
	5-Strongly Disagree	0	0.0

From table 4.6, Majority of the businesses Agreed that MFS are Credible at 61.7 percent, 21.7 percent strongly agreed that MFS are credible while 10 percent strongly disagreed that MFS were credible. 6.6 percent were neutral on whether MFS were credible or not. Business owners who identified MFS as credible indicated that MFS were secure for conducting business transactions. From the findings, more than half of the respondents agreed that MFS were convenient at 76.7 percent .Consequently, 21.7 percent strongly agreed that MFS were convenient indicating that MFS saves time by facilitating faster and convenient transactions. Only 1.6 percent of the respondents strongly disagreed that MFS are convenient. Lastly, 78.3 percent of the business owners agreed that MFS were easy to use, 5 percent were neutral on whether MFS were easy or difficult to use while 3.4 percent disagreed that MFS are easy to use. Similar findings

were made by Mutisya (2016) who found that micro and small enterprises business owners agreed that mobile money services were convenience, credible and easy to use.

D. MFS Cost Factors

Business owners who utilized mobile financial services were requested to indicate the costs associated with use of MFS to conduct business transactions. Table 4.7 presents a summary of the ratings on the cost factors associated with use of mobile financial services.

Table 4.7: summary MFS Cost Factors

Factor	Response	Frequency	Percentage
Transaction Cost (Kshs)	Below 1,000	32	53.4
	2,000-5,000	24	40.0
	6,000-10,000	2	3.3
	Above 10,000	2	3.3
Distance to Bank (Km)	5 and Below	20	33.3
	6-10	19	31.7
	11-15	2	3.3
	16-20	9	15.0
	Above 20	10	16.7
Distance to Nearest MFS Agent (Km)	5 and Below	47	78.3
	6-10	11	18.3
	11-15	1	1.7
	16-20	1	1.7
Transport Cost to the nearest Agent (Kshs)	No Cost Incurred	30	50.0
	Below 1,000	26	43.3
	2,000-5,000	4	6.7
Cost of Buying MFS Device (Kshs)	Below 5,000	21	35.0
	5,000-10,000	16	26.7
	11,000-15,000	17	28.3
	Above 15,000	6	10.0

As shown in table 4.7, 53.4 percent of the businesses spend less than Kshs 1,000 as transaction cost, 40.0 percent spend between Kshs 2,000- Kshs 5,000, while 3.3 percent spend between Kshs 6,000 – Kshs 10,000 as transaction cost for using MFS. The transaction cost comprised of, sending charges, withdrawing charges and float transfer charges. This indicates that majority of the business spend Kshs 5,000 and below to carry out MFS transactions in their business operations. With regard to distance to the bank, 31.7 percent of the business owners travelled between 6-10 kilometers, 33.3 percent travelled below 5 km, 15.0 percent travelled between 16-20 Km while 16.7 percent of the business owners travelled above 20 Km to the nearest commercial bank.

More than half of the businesses were located less than 5 kilometers to the nearest MFS agent at 78.3 percent while no business was located above 20 Km away from the MFS agents. 50.0 percent of the businesses incurred no cost as transport cost to the nearest MFS agent per month, 6.7 percent spend between Kshs 2,000-Kshs 5,000 while those that spend below Kshs 1,000 were 43.3 percent.

For those businesses that used MFS, 35.0 percent of the businesses spend less than Kshs 5,000 to buy MFS devices in their businesses, 28.3 percent spend Kshs 11,000-Kshs 15,000 while 26.7 percent spend Kshs 5,000-Kshs 10,000. Only 10.0 percent of the businesses spend above Kshs 15,000 on MFS devices. Some of the MFS devices included mobile phones which were used for; person to person transactions and person to business transactions.

E. Intensity of pressure to use Mobile Financial Services

The study analyzed the level of pressure from clients for use of the different types of mobile financial services in business transactions by asking business owners to indicate how often clients wished to transact through MFS. Clients demand for MFS can encourage the business owners to install MFS devices and support MFS transactions to contain their clients. The responses were provided in a scale of 0 to 100 percent. Table 4.8 provides a summary of the responses.

Table 4.8: Customers Demand for MFS Transactions

Response	Frequency	Percentage
0 %	21	17.1
10 %	24	19.5
20 %	25	20.3
30 %	25	20.3
40 %	12	9.8
50 %	11	8.9
60 %	5	4.1
Total	123	100.0

As shown in table 4.8, at least 17.1 percent of the business clients did not demand to transact via any form of MFS while 82.9 percent of the clients preferred to use MFS at various levels. This implied that there is desire for people to use MFS in business transactions but businesses are yet to fully embrace use of MFS in their businesses.

4.4.2 Correlation Analysis Results

The study carried out a Pearson correlation analysis with the aim of determining the magnitude/strength and direction of the association between the dependent and independent variables. Subsequently, correlation between independent variables was also conducted to identify and address multicollinearity problem. The summary of the correlation analysis is presented in the following subsections.

A. MFS benefit factors and Use of MFS

Table 4.9 presents the summary of the correlation between Use of MFS and the benefit factors.

Table 4.9: Correlation between MFS benefit factors and Use of MFS

		Use of MFS	Credibility	Convenience	Ease of Use
Use of MFS	Pearson Correlation	1			
	Sig. (2-tailed)				
Credibility	Pearson Correlation	.819**	1		
	Sig. (2-tailed)	0			
Convenience	Pearson Correlation	.914**	.807**	1	
	Sig. (2-tailed)	0	0		
Ease of Use	Pearson Correlation	.930**	.803**	.871**	1
	Sig. (2-tailed)	0	0	0	

** Correlation is significant at the 0.01 level (2-tailed).

Table 4.9 shows a strong positive correlation between credibility and use of MFS of 0.819 indicating that a change in magnitude of credibility is associated with a positive change in magnitude of use of MFS. Consequently, there is a strong positive correlation between convenience and use of MFS implying that improving convenience results to improvement on use of MFS. The study also indicates that there is a strong positive

correlation between ease of use and Use of MFS indicating that increase in ease of use leads to increased use of MFS. Therefore, there is a linear association between use of MFS and benefit factors. From the findings, the benefit factors were highly correlated and above the accepted threshold of 0.8 as recommended by Hilmer & Hilmer (2014) and therefore could significantly affect the results of the regression model.

B. MFS Cost factors and Use of MFS

Table 4.10 presents the summary of the correlation between use of MFS and cost factors.

Table 4.10: Correlation between MFS Cost factors and Use of MFS

		UseMFS	TransaC	DistBank	DistAgent	Trancost	DeviceCost
UseMFS	Pearson Cor	1					
	Sig. (2-tailed)						
TransaCos	Pearson Cor	.843**	1				
	Sig. (2-tailed)	0					
DistBank	Pearson Cor	-0.112	-0.07	1			
	Sig. (2-tailed)	0.219	0.441				
DistAgent	Pearson Cor	0.013	0.061	.381**	1		
	Sig. (2-tailed)	0.891	0.502	0			
Trancost	Pearson Cor	0.077	0.105	.316**	.581**	1	
	Sig. (2-tailed)	0.399	0.246	0	0		
DeviceCo	Pearson Cor	.835**	.789**	-0.128	-0.054	0.037	1
	Sig. (2-tailed)	0	0	0.158	0.554	0.687	

** Correlation is significant at the 0.01 level (2-tailed).

As shown in table 4.10, transaction cost and use of MFS were positively correlated at 1 percent level of significance implying that a change in magnitude of transaction cost is associated with a positive change in magnitude of use of MFS. Consequently, there is a strong positive correlation of 0.835 between MFS device cost and use of MFS. This

indicates that a change in cost of buying MFS devices results to a positive change in use of MFS. However, transport cost, distance to MFS agent and distance to bank were not significantly correlated with Use of MFS implying that a change in transport cost, distance to MFS agent and distance to bank had no significant effect on use of MFS. From the results, the correlation between the cost factors was significantly below the accepted threshold of 0.8 and therefore could not significantly affect the results of the regression model.

C. Business Characteristics and Use of MFS

Table 4.11 presents the summary of the correlation between use of MFS and business characteristics.

Table 4.11: Correlation between Business Characteristics and Use of MFS

		MFSuse	AgeBs	No.Emp	BsType	SizeBs	BsLocation
MFSUse	Pearson Cor	1					
	Sig. (2-tailed)						
AgeBs	Pearson Cor	-0.032	1				
	Sig. (2-tailed)	0.724					
No.Empl	Pearson Cor	0.13	.194*	1			
	Sig. (2-tailed)	0.152	0.032				
BsType	Pearson Cor	-.514**	-0.014	-0.142	1		
	Sig. (2-tailed)	0	0.879	0.117			
SizeBs	Pearson Cor	.403**	0.168	0.151	-.273**	1	
	Sig. (2-tailed)	0	0.063	0.096	0.002		
BsLocat	Pearson Corr	0.038	-0.066	-0.095	-0.125	0.017	1
	Sig. (2tailed)	0.676	0.468	0.297	0.169	0.855	

** Correlation is significant at the 0.01 level (2-tailed).

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

From table 4.11, there is a positive correlation between size of business in terms of sales per month and use of MFS at 1 percent level of significance implying that increase in

size of business increase use of MFS. The results also indicate a negative correlation between business type and use of MFS indicating that there is difference in use of MFS between businesses dealing with both goods and services to those dealing with either goods or services alone. However, the coefficients of Age of business and number of employees were not significantly correlated with Use of MFS implying that a change in age of business and number of employees had no significant effect on use of MFS. Based on the findings, the correlation between the business characteristics was low and therefore could not significantly affect the results of the regression model.

D. Business Owner Characteristics and Use of MFS

Table 4.12 presents the summary of the correlation between use of MFS and business owner characteristics.

Table 4.12: Correlation between Business Owner Characteristics and Use of MFS

		MFSUse	SexBO	AgeBO	EduBO	MarBO	NonBsIn
MFSUse	Pearson Cor	1					
	Sig. (2-tailed)						
SexBO	Pearson Cor	-0.04	1				
	Sig. (2-tailed)	0.663					
AgeBO	Pearson Cor	-0.059	.189*	1			
	Sig. (2-tailed)	0.518	0.036				
EduBO	Pearson Cor	.190*	0.043	-.288**	1		
	Sig. (2-tailed)	0.036	0.638	0.001			
MarBO	Pearson Cor	-0.028	0.153	.299**	-.213*	1	
	Sig. (2-tailed)	0.758	0.092	0.001	0.018		
NonBsIn	Pearson Cor	0.138	.249**	0.082	.310**	0.065	1
	Sig. (2-tailed)	0.128	0.006	0.366	0	0.472	

** Correlation is significant at the 0.01 level (2-tailed).

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

As shown in table 4.12, there is a positive correlation between education of the business owner and use of MFS of 0.190 at 5 percent level of significance implying that level of education influences use of MFS. From the findings, sex, age, marital status and non-business income of the business owner were not significantly correlated with Use of MFS implying that a change in sex, age, marital status and non-business income of the business owner had no significant effect on use of MFS. Therefore, among the human characteristics level of education was shown to have the greatest association to the use of mobile financial services.

4.4.3 Regression Results

The study conducted a logistic regression to investigate determinants of utilization of MFS among different explanatory variables using Stata software. To remove highly correlated variables in the logit model the study carried out multicollinearity test using variance inflation factor (VIF). The study did not use the benefit factors and some of the cost factors in the regression analysis because the dependent variable was a binary variable represented by 1 for those that used MFS and 0 if otherwise. The businesses that did not use MFS did not respond on both the benefit and cost factors associated with use of MFS hence could therefore not explain difference in use of MFS. The summary of the results are presented in the following subsections.

A. Multicollinearity Test

In order to exclude all the correlated explanatory variables in the model. The study conducted a multicollinearity test using Variance Inflation Factor on the study logistic regression. The summary of the VIF are presented in table 4.13.

Table 4.13: Variance Inflation Factor (VIF) for the study variables

Variable	VIF	Tolerance (1/VIF)
Marital Status of Business Owner	18.05	0.055389
Distance to MFS Agent	11.25	0.088865
Age of Business Owner	10.81	0.092510
Number of Employees in a Business	7.65	0.130768
Size Of Business	6.96	0.143774
Age Business	6.85	0.145935
Distance to Commercial Bank	5.56	0.179733
Education of Business Owner	4.79	0.208813
Intensity of pressure to use MFS	3.52	0.284229
Transport Cost	3.1	0.322179
Business Type	3.07	0.326021
Sex of Business Owner	2.5	0.399677
Non Business Income	1.88	0.531880
Mean VIF	7.2	

As shown in table 4.13, marital status, distance to MFS agent and Age of business owner had a VIF above 10. VIF above 10 indicates presence of multicollinearity and had to be dropped from the model (Kennedy, 2003).

B. The Logit Model

To establish the determinants of utilization of MFS among small scale businesses the study conducted a logistic regression of use of MFS on all explanatory variables whose VIF was below 10. The Logit regression was executed in two steps. The first steps was determination of log of odds ratios while the second step was estimation of marginal effects. Table 4.14 presents a summary of the log of odds of the independent variables.

Table 4.14: The Logit regression results

Use of MFS	Odds Ratio	Std. Err.	z	P>z	[95% Conf. Interval]	
Number Employees in Business	0.2265388	0.384906	0.59	0.556	-0.5278634	0.980941
Size of Business	0.7712207	0.239576	3.22	0.001	0.3016611	1.24078
Age of Business	-0.3472036	0.23386	-1.48	0.138	-0.8055607	0.1111535
Distance to Bank	-0.2948057	0.175285	-1.68	0.093	-0.6383571	0.0487458
Education of Business Owner	-0.1170194	0.289013	-0.4	0.686	-0.6834748	0.449436
Pressure to use MFS	0.0691532	0.152344	0.45	0.650	-0.2294349	0.3677412
Transport Cost	0.8433933	0.472174	1.79	0.074	-0.0820502	1.768837
Business Type	1.262139	0.284548	4.44	0.000	0.7044355	1.819842
Sex of Business Owner	-1.008516	0.536446	-1.88	0.060	-2.059931	0.0428992
Non Business Income	0.1391299	0.177191	0.79	0.432	-0.2081589	0.4864188
Constant	-2.174377	0.988007	-2.2	0.028	-4.110834	-0.2379191

Dependent Variable: Use of MFS

Number of observations = 123, LR Chi2 (10) = 56.91, Prob > chi2 = 0.000; Pseudo R² = 0.3339; Log likelihood = -56.765685

As shown in table 4.14, Pseudo R² = 0.3339, implying that 33.4 percent of variations in utilization of MFS were correctly predicted. Other determinants on use of MFS not included in the model were explained by the remaining 66.6 percent of changes. However, log of odds lack instinctive economic meaning (Hilmer & Hilmer, 2014).

Based on that, the slope coefficients were used to estimate marginal effects before interpretation of the results.

C. Diagnostic Test of the Logit Model

The study conducted the following diagnostic tests; likelihood ratio test to assess the overall evaluation of the model; model specification test using link test to authenticate whether the model was free from specification errors and normality of residual tests using kernel density estimate and quantiles distribution plots.

I. Likelihood Ratio Test

The study conducted the overall evaluation of the model using likelihood ratio test of the logistic analysis. The test was achieved by carrying out a hypothesis test between two nested models .The first model M1 was generated by imposing restrictions on the parameters of the second model M2. Bruin (2006) suggested that regression parameters are restricted by removing some of the explanatory variables from the regression analysis or equating them to zero. Table 4.16 presents a summary of the log likelihoods of the two models.

Table 4.15: Summary of the Likelihood- ratio Test

Model	Number of Observations	Log Likelihood
M1	123	-85.220514
M2	123	-56.765685

Assumption: M1 nested in M2, LR chi2 (10) = 56.91, Prob > chi2 = 0.0000

From table 4.15, M1 is the more restrictive model with less variables (constant only) with a log likelihood of -85.220514 while M2 is the less restrictive model with all variables (all the ten explanatory variables) with a log likelihood of -56.765685. From the findings, the test statistics is 56.91, with p-value of 0.0000 and 10 degrees of freedom. The degrees of freedom equals the number of restricted variables from the M1 model. The results indicate that adding all the ten explanatory variables to the constant only model (M1) will result to a statistical significant improvement in model fit. Since the difference between M1 and M2 is statistically significant at 1 percent level, then the model with all the variables (M2) fits the data significantly better than M1.

II. Model Specification Test

The study conducted model specification test using link test to authenticate whether the model was free from specification errors. The test generates two new variables; prediction variable (**_hat**) and squared prediction variable (**_hatsq**) out of which only the prediction variable should be significant if the model was specified correctly.

Table 4.16: Test for model specification (link test)

UseMFS	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
_hat	1.009783	0.1789984	5.64	0.000	0.6589523	1.360613
_hatsq	0.0402188	0.1012427	0.40	0.691	-0.1582132	0.2386509
_cons	-0.0707042	0.2931538	-0.24	0.809	-0.6452751	0.5038668

Number of observations = 123, LR Chi2 (2) = 57.07, Prob > chi2 = 0.0000; Pseudo R² = 0.3348; Log likelihood = -56.686456

As shown in table 4.15, only the **_hat** was significant while **_hatsq** was insignificant implying that the model had no specification error.

III. Test for normality of residuals

To verify that the residuals were normally distributed the study used the Kernel density plot and quantiles of a normal distribution plot. The two test indicated that the residuals had a normal distribution. The kernel density plot and the quantiles distribution plots are provided for in appendix ix and appendix x respectively.

D. The Marginal Effects

To interpret the logit regression model the study estimated the marginal effects from the slope coefficients of log of odds logit regression model. This is because log of odds lack instinctive economic meaning (Hilmer & Hilmer, 2014). Table 4.15 presents the marginal effects.

Table 4.17: Marginal Effects from the Logit regression

Variable	dy/dx	Std. Err.	z	P>z	[95% C.I.]
Number Employees in Business	0.0565444	0.09603	0.59	0.556	-0.13168 0.244766
Size of Business	0.1924978***	0.06005	3.21	0.001	0.07481 0.310186
Age of Business	-0.0866625	0.05841	-1.48	0.138	-0.20114 0.027816
Distance to Bank	-0.0735839*	0.04375	-1.68	0.093	-0.15933 0.012159
Education of Business Owner	-0.0292082	0.07215	-0.40	0.686	-0.17062 0.112205
Pressure to use MFS	0.0172607	0.03801	0.45	0.650	-0.05723 0.091755
Transport Cost to MFS Agent	0.2105121*	0.11778	1.79	0.074	-0.02033 0.441356
Business Type	0.3150316***	0.07078	4.45	0.000	0.17629 0.453765
Sex of Business Owner	-0.2467144**	0.12599	-1.96	0.050	-0.49365 0.000217
Non Business Income	0.0347270	0.04424	0.78	0.433	-0.05199 0.121441

Dependent Variable: Use of MFS

*** Significant at 1 percent level, ** Significant at 5 percent level, * Significant at 10 percent level

As shown in table 4.17, the coefficients of size of business, distance to bank, transport cost, business type and sex of business owner were statistically significant. However, coefficients of number of employees, age of business, education of business owner, pressure to use MFS and non-business income were not statistically significant at any level.

Holding all other predictor variables constant, a unit increase in size of business increased the likelihood of a business utilizing MFS by 19.2 percent. The positive relationship was attributed to the fact that as business expands in sales and eventually handles more cash there is need to diversify the nature of transactions especially by embracing electronic transactions for easy tracking and accommodating all sorts of customers. Nyaga (2013) made similar observation that increase in size of business in terms of sales turnover increased the likelihood of a business to use mobile money services due to security reasons and embracing customers' needs.

The Coefficient of distance to bank was negative and significant. The marginal effects coefficient of -0.0735839 indicate that, increase in distance to bank would lead to a decrease in the likelihood that businesses utilize MFS by 7.4 percent. Indicating that increase in distance in kilometers from a business location to the nearest commercial bank decreased the likelihood of a businesses to utilize MFS. The findings vary with conclusions by Musyoka (2019) who found out that increase in distance from a business to formal financial institutions such as banks increased the likelihood of a business to utilize informal source of finances such as MFS.

The coefficient of transport cost to MFS agents was positive and significant. The marginal effects coefficient of 0.2105121, indicate that, increase in transport cost increase the likelihood that small scale businesses utilize MFS by 21.1 percent. Indicating that increase in travelling cost will be expensive and hence businesses will opt to invest in MFS rather than incurring transport cost seeking the services. The positive probability to utilize MFS implies that travelling cost to MFS agents raises the likelihood of utilizing MFS in business transactions. The results suggest that, businesses located far away from MFS agents are more likely to adopt use of MFS than business located near MFS agents. This is because those near MFS agents lack the incentive to invest with MFS since they can easily access the services without incurring transport cost. However, business located far from MFS agents prefer to invest in MFS and save the travelling cost associated with seeking the services. These outcomes differ with conclusions by Njuguna (2018) who found that increase in travelling cost to mobile money outlets reduced the likelihood of their utilization.

Business type which was categorical variable was transformed to a dummy variable such that, businesses that dealt with both goods and services were coded as 0 while businesses that deal with either goods or services were coded as 1. The coefficient of business type was positive and significant. The marginal effects coefficient of 0.3150316, indicates that, businesses that dealt with either goods or services alone were more likely to use MFS by 31.5 percent than businesses that dealt with both goods and services. Indicating that dealing in either goods or services in small scale business encouraged use of MFS more than dealing in both goods and services. These outcomes vary with conclusions by Chebet (2017) who found that businesses that dealt with both

goods and services used mobile payment platforms more than businesses that dealt with either goods or services.

The coefficient of Sex of the business owner was negative and significant. The marginal effects coefficient of -0.2467144 indicate that, there was a significant difference in utilization of MFS between female operated businesses and male operated businesses. The negative coefficient on sex of business owner implies that male operated small scale businesses in the rural areas were less likely to use MFS by 24.7 percent than female operated small scale businesses. This meant that MFS was more appealing to female operated businesses than male operated businesses in the rural areas which was attributed to knowledge on use of MFS and technology adoption behavior between the two genders. This findings concurs with Musembi (2015) who found that sex influenced use of mobile technology in Kenya.

The coefficient of number of employees in a business was positive and non-significant. The marginal effect of 0.0565444, indicate that, increase in the number of employees per business increased the likelihood that a business utilize MFS by 5.7 percent. However, the effect in this case is insignificance implying that number of employees per business was not an important determinant of use of MFS by small scale businesses. This can be attributed to the fact that use of MFS is not limited by the number of people working in a business but their ability to embrace technology and utilize it in their business operations.

The coefficients of age of business was negative and non-significant. The marginal effects of -0.0866625, indicate that, increase in age of business has a potential of

decreasing the likelihood that a business's utilize MFS by 8.7 percent. The negative sign implies that, businesses that had operated for longer periods were less likely to use MFS than businesses that had operated for shorter periods. This findings, imply that as businesses operate for longer periods they become less conversant with technology based financial services such as MFS. However the younger business are easier to embrace and adopt to new and sophisticated technologies to enhance service delivery in their businesses and attract clients willing to make electronic payments.

The coefficient of level of education of the business owner has no significant impact on use of MFS. The marginal effect coefficient of -0.0292082, indicate that, increase in level of education has a potential of reducing the likelihood of utilizing MFS by 2.9 percent. However, the effect in this case is insignificance implying that there is no significant difference in use of MFS among small scale business owners who have attained various levels of education. In addition, the findings implies that, attainment of higher education does not increase or reduce the likelihood of a business owner to utilize MFS in their respective business transactions. This findings differ with earlier study by Kikulwe, Fischer & Qaim (2013) who found that there was a positive relationship between level of education and use of mobile money. According to Kikulwe et al., (2013) increase in level of education increased the likelihood of using mobile money.

The coefficient of the intensity of pressure to use MFS was positive and insignificant. The marginal effect coefficient of 0.0172607, indicate that, increase in intensity of pressure to use MFS has the potential of increasing the likelihood of using MFS by 1.7

percent. This implies that, clients demand for MFS encouraged business owners to support MFS transactions to contain clients which in return results to higher utilization of MFS by small scale businesses. The insignificant coefficient suggests that utilization of MFS does not only depend on pressure from clients to transact via MFS but also on other factors such as business owner willingness to adopt MFS in business transactions.

The coefficient of non-business income from the business owner was positive and insignificant. The marginal effect coefficient of 0.0347270, indicate that, increase in non-business income has a potential of increasing the likelihood for a business to utilize MFS, because availability of funds from other sources provides the business owner with financial muscle to buy MFS devices and support MFS transactions in their business. The insignificant coefficient implies that among small scale businesses in Kiambu County there was no difference in utilization of MFS among the business owner with various levels of income from other occupations apart from business. This findings differ with earlier study by Musyoka (2019) who found that there was a negative and significant relationship between non business income and use of informal financial services such as MFS. According to Musyoka (2019) increase in non-business income reduced the likelihood of using informal financial services such as mobile money, attributed to the fact that, availability of collateral from non-business income provided security for acquiring finances from formal financial institutions such as banks.

CHAPTER FIVE

SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

5.1 Introduction

This chapter presents the summary of the study findings, conclusions of the study, contribution to knowledge, and recommended policies to various stakeholders. In addition, the section outlines the study limitations and suggests further areas for study.

5.2 Summary

The purpose for carrying out the study was to examine the level of utilization of MFS and investigate the determinants of utilization of mobile financial services among small scale businesses in Kiambu County. Using a sample of 123 small scale businesses, the study adopted the random utility model adopted by Block and Marshak (1960) which was extended such that utility derived from use of MFS was influenced by business characteristics, business owner characteristics, benefit factors as well as cost factors. To address the study objectives, both the descriptive statistics and logistic regression were utilized.

The study revealed that businesses that utilized MFS were 48.8 percent while those that did not use MFS were 51.2 percent. Some of the utilized mobile financial services included; mobile money in phone, Pay bill, till number and mobile money bank account. Businesses that did not utilize MFS cited consumer's preference of paying in cash, lack of MFS incentives such as loyalty points, information asymmetry and lack of MFS devices by businesses.

Majority of the businesses preferred mobile money in phone transactions at 65 percent compared to other modes of MFS transactions because it was the most affordable. Business owners did not fully embrace the use of mobile enabled financial services in their business, due to challenges including; poor interoperability between networks, MFS transaction charges, low acquaintance to MFS transactions, fear of losing money through fraudsters, low commission, insufficient cash or float from agents, service system breakdown and difficulties while accessing customer care services.

The descriptive statistics indicated that utilization of mobile financial services was influenced by the business characteristics, business owner characteristics, as well as MFS benefit and cost factors. From the logit analysis the significant determinants of MFS utilization by small scale businesses were; size of business, age of business, distance to bank, transport cost, business type and sex of business owner. The findings also indicated that number of employees, level of education, pressure to use MFS and non-business income were not significant factors in determining use of MFS.

The study established that increase in size of business increased the likelihood for using MFS by 19.2 percent. Businesses that dealt with both goods and services had higher rate of using MFS compared to their counter parts who specialized with either goods or services alone at 31.5 percent. Subsequently, increase in transport cost to MFS agents by one unit increased the likelihood of small scale businesses not utilizing MFS in their transactions at 21.1 percent. In addition, the study revealed that age of business and distance to bank were negatively related to use of MFS. Such that, increase in age of business and distance to bank reduced the likelihood of a business's opting not to adopt

MFS transactions and were more likely to utilize MFS at 8.7 percent and 7.4 percent respectively. Further, the logistic regression results indicated that female were more likely to utilize MFS in their businesses by 24.7 percent than their male counterparts who were 24.7 percent less likely to utilize MFS in their businesses.

5.3 Conclusion

The study established that businesses that utilized MFS were 48.8 percent while those that did not use MFS were 51.2 percent. Based on the study findings, Mobile money in phone, pay bill, till number and mobile money bank account are the most utilized mode of MFS by small scale businesses in Kiambu County. The study established that size of business, distance to bank, transport cost to MFS agents, business type and sex of the business owner are the main determinants of use of mobile financial services in Gatundu South Sub-County. This is because their coefficient in the logit model were statistically significant. The findings also indicated that number of employees, level of education, pressure to use MFS, age of business and non-business income were not significant factors in determining use of MFS.

5.4 Policy Implications of the Findings

The following policy implications emerge from the study findings.

5.4.1 Policy Implications to MFS Providers

From the findings, there was low utilization of MFS attributed to various challenges faced by small scale business. To address the challenges the mobile network operators

(MNOs) should develop loyalty points per every transaction which are redeemable to reward their clients; to encourage use of MFS, mobile network operators should hire more customer care attendants to facilitate timely feedback from clients encountering challenges on MFS transactions and also regularly conduct countrywide awareness programs to educate clients on MFS services, importance of ID in business transactions and solutions to daily challenges. This is because, the study findings indicated that, lack of loyalty points, difficulties while accessing customer care services, asymmetric information on use of MFS and mandatory requirement for providing ID when making business transactions influenced use of MFS by businesses.

In addition, mobile network operators should providing easier mechanisms for tracking and recovering transactions to minimize fear of losing money to fraudsters and uphold confidence on the security of MFS. To address float challenges to the MFS agents, MNOs should develop a framework of lending money to MFS agents to facilitate timely business transactions and provide swiftly repayment options through their commission earnings. Further, MNOs should provide MFS devices for free or at subsidized prices to encourage business to embrace MFS in their transactions.

The study also recommends MNOs to develop their systems to make reversals easier and time convenience, improve service delivery by installing boosters in rural areas to enhance connectivity, reduce network interoperability handles to facilitate easy transaction between different networks, revise transactions costs and develop products that suit small scale businesses. This is because the findings showed that businesses

experienced service system breakdown, poor network interoperability and fluctuating transaction costs that affected their level of utilizing MFS.

The study recommends MNO to reconsider the cost associated with use of pay bill number. This is because the study established that pay bill was the least utilized among the different types of MFS due to high charges of operating a pay bill number in comparison with other alternatives. MNO should therefore revise the pay bill charges to avoid losing business clients.

To create awareness and promote demand of MFS products by clients, the study recommends MNOs to carry out awareness programmes not only to business owners but also to their customers. This will create a platform for service providers to encourage clients to use MFS in their daily transactions and as a result indirectly exert pressure to businesses to adopt utilization of MFS in their transactions. This is because the results indicate that, intensity of pressure to use MFS by clients had the potential of encouraging business owners to support MFS transactions to contain their clients.

The study also recommends, MNOs to conduct countrywide awareness programmes to educate business owners on use of MFS. This will provide knowledge on use of MFS and help change the altitude on MFS especially to older businesses. At the same time, it will create a platform for MNOs to provide clarity on merits and demerits on use of MFS in their businesses. This is because the findings indicate that businesses that had existed for many years were less conversant and less likely to use MFS.

5.4.2 Policy Implications to Government

The government through the communication authority of Kenya to enact legislation on data protection and cyber-crimes, develop infrastructure such as forensic laboratories to facilitate timely tracking and arrest of MFS fraudsters. This will enable investigating officers to get transaction statements directly without express authority from the MNO provider to minimize time wasted when investigating MFS crimes. This is because the results indicated that losing money through fraudsters and disclosure of private business information during transactions discouraged use of MFS.

To promote business growth and ensure businesses operate for long periods the study recommends the government to provide an encouraging environment for business to thrive through; lowering interest rates to encourage business to borrow and expand; relax trade restrictions on small scale businesses to enable them realize significant cost saving and provide contract works to small scale businesses especially at county levels. This is because, the findings indicated that increase in size of business and age of businesses determined use of MFS by small scale businesses.

The study recommends the government to encourage local financial institutions such as banks to work with small scale businesses and start-ups through provision of loans. This will enable different types of small scale businesses to emerge and those already in existence to diversify in their products provision. In addition the government should promote infrastructure development to facilitate movement in rural areas and to encourage financial service providers to penetrate with ease. This will motivate financial institutions and MFS providers to access small scale businesses in rural areas

with ease. This is because, the findings indicated that distance to bank, transport cost to MFS agents and business type determined use of MFS by small scale businesses.

The study recommends the government to encourage male entrepreneurs operating small scale businesses by providing state loans such as men enterprise funds. This incentive will encourage male entrepreneurs to participate in small scale businesses and use MFS and probably match their female counterparts. This is because, the findings indicated that sex of the business owner determined use of MFS such that being female increased the likelihood of using MFS in the business.

The government through the ministry of industry, trade and co-operatives in liaison with the ministry of labour and social protection to provide income generating activities to business owners and people in rural areas. This will enable small scale business owners to have other sources of income which will enable them improve their businesses, diversify their livelihoods and access financial services outside their businesses. This is because, the findings indicated that, increase in non-business income had the potential of increasing the likelihood of utilizing MFS.

5.4.3 Policy Implications to Businesses

On the other hand, businesses should acquaint themselves on MFS and acquire MFS devices. This will facilitate use of MFS in their businesses and address customers' needs especially those who wish to transact through MFS. In addition, business owners should familiarized themselves with changes on transaction charges and laws governing business transactions via MFS. This is because, the findings indicated that asymmetric

information on use of MFS, unclear transaction charges and lack of MFS devices influenced use of MFS by small scale businesses.

In addition, the study recommends businesses to specialize on specific products in their operations. Specialization in one product will increase efficiency and provide a comparative advantage of a business thus increasing the likelihood of utilizing MFS for business transactions. This is because the findings indicate that, dealing with either goods or services in small scale businesses encouraged use of MFS more than dealing in both goods and services.

5.5 Contribution to Knowledge

The study contributes to existing literature on utilization of mobile financial services among businesses. Previous studies focused on MFS and individual use for example Lee (2012), Marubwa (2014) and Keli (2018). To address the gap on MFS use by businesses this study provides evidence on level of use and determinants of MFS utilization by businesses in the periphery and provides evidence on products that could be promoted to spur business growth.

In addition, this study used more variables than previous studies such as business characteristics, business owner characteristics, benefit factors as well as cost factors to determine factors influencing use of MFS by businesses. This enabled the study to establish policy implications rooted from different perspectives that determine use of mobile financial services.

5.6 Suggestion for Further Research

Technology based financial services are dynamic and as time goes by there is development of new and sophisticated technologies that enhance service delivery. Based on the study findings, the study recommends further research on digital lending apps and financial technology (Fintech) lending. In addition, similar studies on MFS should be carried out using larger sample size and in different parts of the country to find the consistency of the results.

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APPENDIX I: Questionnaire

SERIAL NO:

SECTION A: INTRODUCTION

I am Kenneth Karanja, a student at Kenyatta University pursuing Masters of Economics (Cooperation & Human Development) .I am carrying out a research project in relation to the requirements of the Master Programme .I am collecting data related to the use of Mobile financial services by businesses in Gatundu south. Your experience in use of mobile enabled financial service in your business will be valuable to this study. This will later result to valuable recommendations on how mobile enabled financial services can be improved to serve businesses in a better approach.

I am kindly requesting you to provide answers to a few questions that will help me capture information related to your business and the experience on using mobile financial services. This study is for academic purpose only and all information will be treated with utmost confidentiality. Your name or name of your business will not be recorded anywhere only the relevant characteristics for the research will be captured.

B: Business Owner Characteristics

1. What is the Sex of the Business Owner?			
Male []		Female []	
2. What is the Age Bracket of the Business Owner in Years?			
15 – 35 []	36-56 []	57-77 []	77 Years and Above
3. What is the highest attained academic Level of the Business Owner?			
Primary []	Secondary []	Tertiary []	University []
4. What is the Marital Status of the Business Owner?			
Single []	Married []	Windowed []	Others (Specify)
5. Does the business owner have any other income earning Occupation apart from Business?			
Yes []		NO []	
6. What is the Level of Income of the business owner from the other Occupation approximately per month?			
Less than 15,000 []	16,000-30,000 []	31,000-45,000 []	Above 46,000 []

C: Business Characteristics

7. How old is the Business in Years?			
1 Year and Below []	2 - 5 [] Years	6 – 9 [] Years	9 Years and Above
8. How many people work in the Business?			
1 []	2- 4 []	5 – 7 []	Above 7 Persons
9. What does the Business deal with?			
Goods []	Service []	Goods & Services []	
10. How big is the business in terms of Profit per month?			
0 – 10,000 []	10,100 – 20,000 []	20,100 – 30,000 []	Above 30,000 []

D: Level of Utilization of Mobile Financial Services by Businesses in Kiambu County

11. Do you use any Mobile Financial Service (e.g M-Pesa, Airtel Money, T-Kash, Equitel, Mobile money bank account) in your business transactions?

Yes []	No []
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12. If **YES** in question 12 above indicate what type of business transactions that you carry out using **SPECIFIC** Mobile Financial Services?

MFS	Type of Transaction					
	Receive payments from clients	Making payments to suppliers	Transfer money to bank accounts	Borrowing from Credit sources	Saving	Paying Bills such as Electricity,Rent, Water,etc
Mobile Money in phone <i>(M-Pesa, Airtel Money, T-Kash, Other (Specify))</i>						
Pay Bill <input type="checkbox"/> Yes[] <input type="checkbox"/> No[]						
Buy goods & Services <i>(Till number)</i> <input type="checkbox"/> Yes[] <input type="checkbox"/> No[]						
Mobile money bank account <i>(M-Akiba, KCB M-Pesa, Pesa Pap, Equitel, MCo-op Cash Unaitas)</i> <input type="checkbox"/> Yes[] <input type="checkbox"/> No[]						

13. If **NO** in question 11 above indicate reasons why you don't utilize mobile financial services in your business?

14. In a scale of 1 – 10 Indicate how often your clients/customers wish to transact through mobile financial services?

Mode of Payment	Tick										
	0	1	2	3	4	5	6	7	8	9	10
Cash											
Mobile money in phone (e.g M-pesa)											
Pay bill number											
Buy goods and services (Till number)											

15. What is your biggest challenge when using mobile financial services?

Challenges	Tick (√)
Insufficient cash/float from agents	
Losing money through Fraudsters	
Service system breakdown	
Fluctuating transaction charges	
Lack of incentives such as loyalty points	
Difficult accessing customer services	
Poor interoperability between networks	
Asymmetric information on use of MFS	
Provision of Identity Card (ID) in all transactions	
Other (Specify)	

E: Mobile Financial Services Benefits Factors

16. In a scale of 1-5 indicate the benefit factors associated with use of mobile financial services in your business in the following sections where;

(1 = strongly Agree, 2 = Agree, 3 = Neutral, 4 = Disagree, 5 = strongly Disagree)

Credibility of mobile financial services

	1	2	3	4	5
Sending or receiving money via mobile device is secure					

Convenience of mobile financial services

	1	2	3	4	5
Making transactions using mobile money Saves time					

Ease of use

	1	2	3	4	5
I use mobile money services in my business without difficulties					

F: Cost Factors for Mobile Financial Services

17. How much do you incur as transaction cost for using mobile financial services in your business per month in Kenya shillings?

Below 1,000 []	2,000 – 5,000 []	6,000 – 10,000 []	Above 10,000 []
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18. What distance do you travel from your business location to the nearest Commercial Bank in Kilometers?

5 and Below []	6 – 10 []	11 – 15 []	16 – 20 []	20 and Above []
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19. How far from your business is the nearest Mobile money Agent in Kilometers?

5 and Below []	6 – 10 []	11 – 15 []	16 – 20 []	20 and Above []
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20. How much do you pay as transport cost from your business to the nearest mobile money agent with the fastest available means per month?

Zero []	Below 1,000 []	2,000 – 5,000 []	6,000 – 10,000 []	Above 10,000 []
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21. How much did you incur to buy mobile financial service devices in your business? (eg Mobile phone, money transmission gadgets, etc.)

Below 5,000 []	5,000 – 10,000 []	11,000 – 15,000 []	Above 15,000 []
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Thank you for taking your valuable time to respond to my questionnaire. All information provided will be treated with utmost confidentiality.

APPENDIX II: Research Approval Letter



KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke

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P.O. Box 43844, 00100
NAIROBI, KENYA
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Internal Memo

FROM: Dean, Graduate School

DATE: 19th November, 2019

TO: **Kenneth Kamau Karanja**
C/o Applied Economics Dept.

REF: K101/CTY/PT/32749/2015

SUBJECT: APPROVAL OF RESEARCH PROJECT PROPOSAL

This is to inform you that Graduate School Board at its meeting of 6th November, 2019 approved your Research Project Proposal for the M. Econ., Degree Entitled, "**Utilization of Mobile Financial Services among Small Scale Businesses in Kiambu County, Kenya**".

You may now proceed with your Data Collection, Subject to Clearance with Director General, National Commission for Science, Technology and Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking Forms per semester. The form has been developed to replace the Progress Report Forms. The Supervision Tracking Forms are available at the University's Website under Graduate School webpage downloads.

Thank you,

ELIJAH MUTUA
FOR: DEAN, GRADUATE SCHOOL

c.c. Chairman, Applied Economics Department.

Supervisors:

1. Dr. Perez Onono
C/o Department of Applied Economics
Kenyatta University

EM/lnn

APPENDIX III: Research Authorization Letter



KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke

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P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

Our Ref: K101/CTY/PT/32749/2015

DATE: 19th November, 2019

Director General,
National Commission for Science, Technology
and Innovation
P.O. Box 30623-00100
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR KENNETH KAMAU KARANJA – REG. NO. K101/CTY/PT/32749/2015.

I write to introduce **Kenneth Kamau Karanja** who is a Postgraduate Student of this University. The student is registered for M. Econ. degree programme in the **Department of Applied Economics**.

Kenneth intends to conduct research for a M. Econ. Project Proposal entitled, “**Utilization of Mobile Financial Services among Small Scale Businesses in Kiambu County, Kenya**”.

Any assistance given will be highly appreciated.


Yours faithfully,


A handwritten signature in black ink, appearing to read 'E. Kimani'.

PROF. ELISHIBA KIMANI
AG. DEAN, GRADUATE SCHOOL

EM/inn


APPENDIX IV: Research Permit


REPUBLIC OF KENYA


NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY & INNOVATION

Ref No: 179228 Date of Issue: 24/January/2020


RESEARCH LICENSE




This is to Certify that Mr. KENNETH KARANJA of Kenyatta University, has been licensed to conduct research in Kiambu on the topic: UTILIZATION OF MOBILE FINANCIAL SERVICES AMONG SMALL SCALE BUSINESSES IN KIAMBU COUNTY, KENYA. for the period ending : 24/January/2021.

License No: NACOSTI/P/20/3530

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APPENDIX V: Logit Regression With All The Variables

Logit regression with all the variables determining utilization of MFS

Logistic UseMFS MSBO BssLocation DistoMfsAgent AGEBO NoPInBus SizeOfBs
AgeBss DistoBank EDBO LevelOfUse TransportCost BStype SEXBO NonBInc

Logistic regression	Number of obs = 123
	LR chi2(14) = 59.2
	Prob > chi2 = 0
Log likelihood = -55.618026	Pseudo R2 = 0.3474

Use MFS	Odds Ratio	Std. Err.	z	P>z	[95% Conf. Interval]	
Marital Status BO	1.836633	1.1167940	1.00	0.317	0.557745	6.04796
Dist MFS Agent	0.6379029	0.3755171	-0.76	0.445	0.201221	2.02225
Age Bss Owner	0.9490856	0.4164585	-0.12	0.905	0.401604	2.24291
No. Empl in Bss	1.197282	0.4684593	0.46	0.645	0.556094	2.57778
Size Of Business	2.200093	0.5415349	3.20	0.001	1.358078	3.56416
Age of Business	0.7068812	0.1739632	-1.41	0.159	0.436381	1.14506
Distnce to Bank	0.7107998	0.1379183	-1.76	0.079	0.485944	1.03970
Edu Bs/Owner	0.984675	0.3114832	-0.05	0.961	0.529702	1.83044
Pressure to use	1.104652	0.1726441	0.64	0.524	0.813191	1.50058
Transport Cost	3.275401	1.9334280	2.01	0.044	1.029937	10.4164
Business Type	3.758315	1.0980130	4.53	0.00	2.119873	6.66310
Sex Bss/ Owner	0.288119	0.1649185	-2.17	0.03	0.093831	0.88470
Non Bss Inc	1.159028	0.2166269	0.79	0.43	0.803528	1.67181
Constant	0.1202043	0.2359142	-1.08	0.28	0.002567	5.62984

APPENDIX VI: Multicollinearity Test Using VIF

Multicollinearity test using Variance Inflation Factor (VIF)

Variable	VIF	Tolerance (1/VIF)
Marital Status of Business Owner	18.05	0.055389
Distance to MFS Agent	11.25	0.088865
Age of Business Owner	10.81	0.092510
Number of Employees in a Business	7.65	0.130768
Size Of Business	6.96	0.143774
Age Business	6.85	0.145935
Distance to Commercial Bank	5.56	0.179733
Education of Business Owner	4.79	0.208813
Intensity of Pressure to use MFS	3.52	0.284229
Transport Cost	3.10	0.322179
Business Type	3.07	0.326021
Sex of Business Owner	2.50	0.399677
Non Business Income	1.88	0.531880
Mean VIF	7.2	

APPENDIX VII: Logit Regression After Dropping Variables

Logit regression after dropping variables with high VIF to solve Multicollinearity

Logit UseMFS NoPinBus SizeOfBs AgeBss DistoBank EDBO LevelOfUse
 TransportCost BStype SEXBO NonBInc

Logistic regression	Number of obs	=	123
	LR chi2(10)	=	56.91
	Prob > chi2	=	0.0000
Log likelihood = -56.765685	Pseudo R2	=	0.3339

UseMFS	Odds Ratio	Std. Err.	z	P>z	[95% Conf. Interval]	
No. Empl in Bss	0.2265388	0.384906	0.59	0.556	-0.5278634	0.980941
Size Of Business	0.7712207	0.239576	3.22	0.001	0.3016611	1.24078
Age of Business	-0.3472036	0.23386	-1.48	0.138	-0.8055607	0.1111535
Distnce to Bank	-0.2948057	0.175285	-1.68	0.093	-0.6383571	0.0487458
Edu Bss/Owner	-0.1170194	0.289013	-0.4	0.686	-0.6834748	0.449436
Pressure to use	0.0691532	0.152344	0.45	0.65	-0.2294349	0.3677412
Transport Cost	0.8433933	0.472174	1.79	0.074	-0.0820502	1.768837
Business Type	1.262139	0.284548	4.44	0.000	0.7044355	1.819842
Sex Bss Owner	-1.008516	0.536446	-1.88	0.060	-2.059931	0.0428992
Non Bss Income	0.1391299	0.177191	0.79	0.432	-0.2081589	0.4864188
Constant	-2.174377	0.988007	-2.2	0.028	-4.110834	-0.2379191

APPENDIX VIII: Marginal Effects After Logit

Marginal effects after logistic

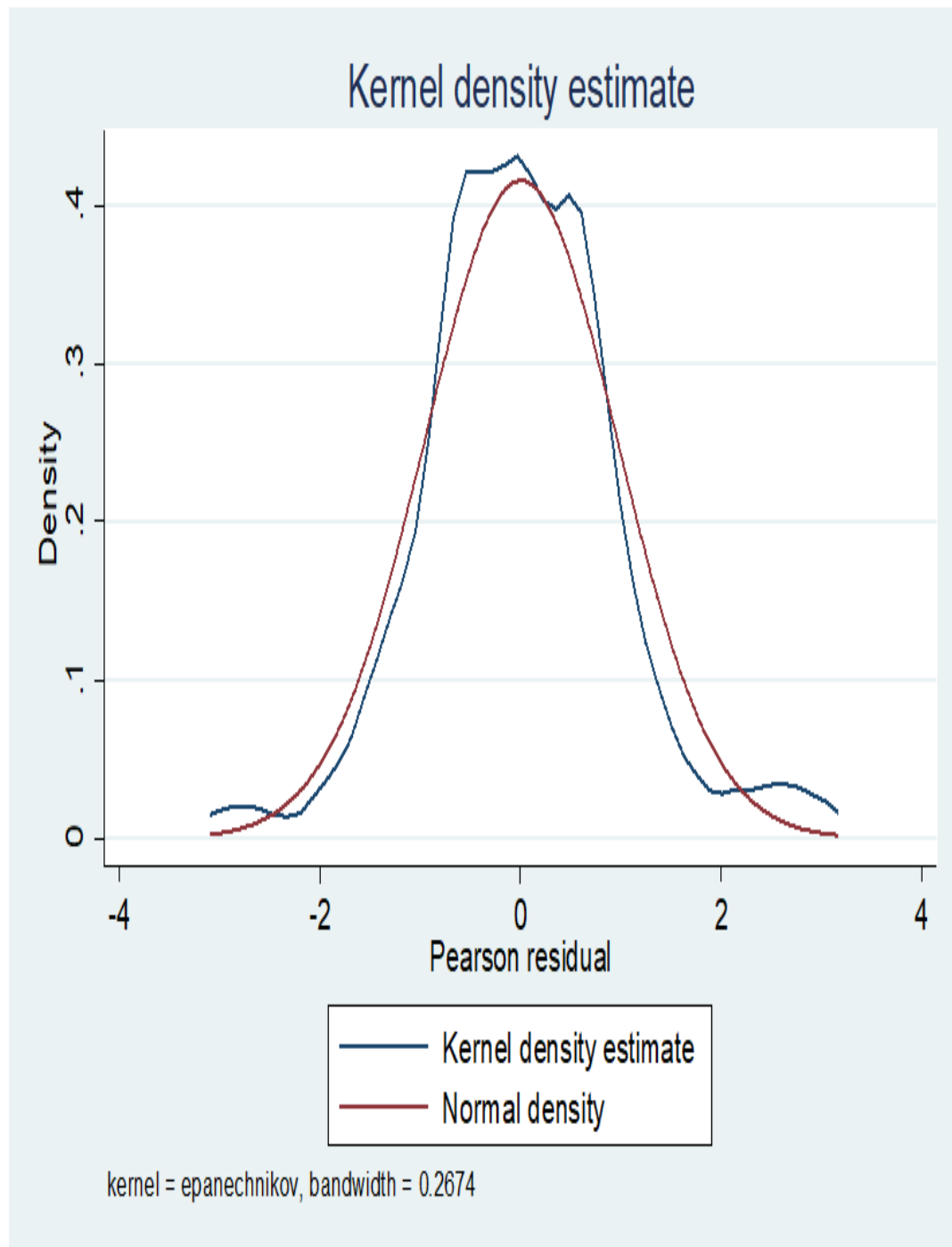
$$y = \text{Pr}(\text{UseMFS}) \text{ (predict)}$$

$$= .48003421$$

Variable	dy/dx	Std. Err.	z	P>z	[95% C.I.]	X
No. Empl in Bss	0.0565444	0.09603	0.59	0.556	-0.13168 0.244766	1.53659
Size Of Business	0.1924978	0.06005	3.21	0.001	0.07481 0.310186	2.37398
Age of Business	-0.0866625	0.05841	-1.48	0.138	-0.20114 0.027816	2.25203
Distnce to Bank	-0.0735839	0.04375	-1.68	0.093	-0.15933 0.012159	2.66667
Edu Bss/Owner	-0.0292082	0.07215	-0.40	0.686	-0.17062 0.112205	1.39837
Pressure to use	0.0172607	0.03801	0.45	0.650	-0.05723 0.091755	2.29268
Transport Cost	0.2105121	0.11778	1.79	0.074	-0.02033 0.441356	0.52033
Business Type	0.3150316	0.07078	4.45	0.000	0.17629 0.453765	1.13821
Sex Bss Owner*	-0.2467144	0.12599	-1.96	0.050	-0.49365 0.000217	0.52033
Non Bss Income	0.0347270	0.04424	0.78	0.433	-0.05199 0.121441	0.99187

(*) dy /dx is for discrete change of dummy variable from 0 to 1

APPENDIX IX: Residuals Kernel Density Estimate



APPENDIX X: Residuals Quantiles of a normal distribution

