

Determinants of Utilization of Mobile Financial Services in Small Scale Businesses in Kiambu County, Kenya

Kenneth K. Karanja¹, Perez O. Onono, PhD²

¹Department of Applied Economics, School of Economics, Kenyatta University, Nairobi, Kenya

²Department of Applied Economics, School of Economics, Kenyatta University, Nairobi, Kenya

Correspondence: Kenneth K. Karanja

Abstract: The Kenyan government has been implementing policies to expand financial access including promoting mobile enabled financial services to those excluded by the formal banking sector. Majority of small scale businesses in Kenya have no access to a bank account due to limited bank branches 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 alternatives businesses have not seized the opportunity. This study investigated the determinants of mobile financial services utilization among small scale businesses in Kiambu County using primary data obtained through interviews with licensed small scale businesses. The logit regression analysis was used and the results 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. The 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.

Key Words: mobile financial services, small scale businesses, logit, financial inclusion, rural areas

Date of Submission: 02-08-2020

Date of Acceptance: 17-08-2020

I. Introduction

1.1 Background of the Study

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 World Bank (2012) 48 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 the households have no access to formal financial institutions.

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 has been 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 (World Bank, 2012). Access to finances would 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 developing nations 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. To solve finance access paradox mobile network operators have developed easy access to money through initiatives such as Mobile Financial Services (MFS) which are now available in most emerging and developing markets.

According to Global Findex Database (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 (Felsenthal & Hahn, 2018). 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 live 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.

Advocates of MFS believe that utilization of mobile enabled financial services enhance business growth and promote financial inclusion through provision of a platform for people to ; safe 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 (Kenya Economic Survey, 2015).

1.1.1 Trends of Utilization of Mobile Financial Services in Kenya

Rapid utilization 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. There are now four billion mobile phone subscriptions worldwide compared to one billion in 2002, two thirds of which are in developing countries (Etzo & Collender, 2010).

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 2008and 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 1.1 shows the trends on indicators of mobile financial services utilization in Kenya between 2016 and 2018.

Table 1.1: 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 1.1 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.

1.1.2 Mobile Enabled Financial Products Exploited by Businesses in Kenya

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 merchants who owns a 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.

1.1.3 Businesses in Kiambu County, Kenya

Available data shows high rates of financial exclusion to businesses in various regions among them Kiambu County. According to County Government of Kiambu (2019) the County had 72,000 registered businesses which cut across industries, transport operators, small enterprises, and 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 institutions. The small scale businesses plays an important role of the economy through provision of goods and services, job creation and generating revenue for the County.

1.2 Statement of the Problem

Despite efforts by Government of Kenya and the private sector to promote access of financial services, majority of businesses in the rural areas have limited or no access to financial services. Businesses in the periphery 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 inclusion be in question (World Bank Report, 2017). 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 MFS by businesses.

Previous studies (Lee (2012), Marumbwa (2014), Keli, 2018) 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, however none of these studies were based in a rural context. Therefore, their findings do not give clear understanding on determinants of using MFS in rural areas. To address the gap, this study investigated the determinants of utilization of mobile financial services in small scale businesses in Kiambu County.

1.3 Significance of the study

The study benefits scholars by adding to the existing literature on determinants of utilization of Mobile financial services among business in Kenya. Subsequently, Mobile financial services providers can use the study findings to identify products to develop and promote to rural businesses. At the same time the study provides a guide to mobile network operators on support programmes to prioritize towards business growth and financial inclusion. 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.

II. Literature Review

2.1 Theoretical literature

This section outlines the economic theories that relate to utilization of mobile financial services.

2.1.1 The Utility Maximization Theory

The utility theory assumes that consumer's belief upon individual preferences are 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;

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

Subject to

$$P_1X_1 + P_2X_2 = I \tag{2.2}$$

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,

$$X_i = f(P_1, P_2, I) \tag{2.3}$$

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.

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

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 Empirical Literature

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.

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.

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.

2.3 Overview of Literature

The reviewed theoretical work reveals determinants of utilization of mobile financial services by businesses can be explained by the 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.

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 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 determinants of MFS utilization among business in Kenya. The present study specifically analyzed determinants of utilization of mobile enabled financial service among small scale businesses in Kiambu County, Kenya.

III. Methodology

3.1 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.

3.2 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.

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:

$$U_i > U_j \tag{3.1}$$

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

$$U_i = \beta_i - C_i \tag{3.2}$$

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;

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

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.

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

$$C_i = f(c_1 \dots c_n) \tag{3.4}$$

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.

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

$$UMFS = f(b_1, \dots, b_n, c_1, \dots, c_n) \tag{3.5}$$

Based on the random utility model, utility and hence 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

The study utilized the following model to establish the determinants of utilization of MFS

$$MFSU = f(MFSB, MFSC, BSC, BSOC) \tag{3.6}$$

Where MFSU is mobile financial service use, MFSB is mobile financial services benefits factors which include; credibility, convenience and ease of use, MFSC is mobile financial services cost factors which include; transaction cost, distance to bank, distance to nearest MFS agent, transport cost to the nearest MFS agent and cost of buying MFS device, BSC is business characteristics which include; size of business, business type, age of business and number of employees in a business and BSOC is business owner characteristics which include; sex, age, education, marital status and non-business income.

3.5 Definition and measurement of Variables

Variable	Definition and Measurement
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]
Size of Business	The relative magnitude of a business classified according to profit per month in Kenyan Shillings. Intervals for various categories; 0 –10,00 [1] 10,100 – 20,000 [2] 20,100 – 30,000 [3] Above 30,000 [4]
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]
Business Type	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
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
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]
Education of business owner	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
Transport cost to MFS agents	Refers to the cost incurred in Kenya shillings by the business owner to and from the MFS agent. Measured in Kenya shillings.
Distance to the nearest MFS 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]
Distance to the nearest bank	Refers to the distance in kilometers to the nearest commercial bank from the business location. Measured in Intervals for various categories; 5 and Below [1] , 6 – 10 [2] , 11 – 15 [3] , 16 – 20 [4], 20 and Above [5]
Pressure to use MFS	Refers to intensity of pressure/demand to use MFS. Measured in percentage

Cost of buying MFS device	Refers to the cost incurred when acquiring a mobile financial service device in a business (eg mobile phone or money transmission gadget). Measured in Kenya Shillings.
Age of Business owner	Refers to the age of the business owner in years. Measured in number of years
Sex of business owner	Refers to whether the owner of the business is male or female. 0 if female and 1 if male
Non business Income	Refers to income generate from outside the business. Measured in Kenyan Shillings.
Marital status of the business owner	Refers to whether the business owner is single or married. Measured by categorized variable 1 if Single, 2 if married, 3 if windowed and 4 if any Other

3.6 Data Analysis and Diagnostic Test

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.

IV. Results And Discussions

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.

4.1.1 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 4.1 shows a summary of the characteristics.

Table 4.1: 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 4.1, 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.

4.1.2 Business Characteristics

To understand the nature of businesses covered in the study, business owners were requested to indicate characteristics of their businesses. The summary is presented in Table 4.2

Table 4.2: 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 4.2 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.

4.1.3 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 4.3 presents a summary of the ratings on the cost factors associated with use of mobile financial services.

Table 4.3: 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 4.3, 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.

4.1.4 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 4.4 presents a summary of the ratings of the respondents on the benefits of using mobile financial services.

Table 4.4: 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 4.4, 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.

4.2 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

4.2.1 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 4.5

Table 4.5: 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 4.5, 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).

4.2.2 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 4.6 presents a summary of the log of odds of the independent variables.

Table 4.6: The Logit regression results

Use of MFS	Odds Ratio	Std. Err.	z	P>z	[95% Conf. Interval]	
Number Employees in Business	1.254251	0.4827690	0.59	0.556	0.589864	2.666965
Size of Business	2.162404	0.5180594	3.22	0.001	1.352103	3.458311
Age of Business	0.706661	0.1652598	-1.48	0.138	0.446837	1.117566
Distance to Bank	0.744676	0.1305303	-1.68	0.093	0.528159	1.049953
Education of Business Owner	0.889568	0.2570968	-0.40	0.686	0.504860	1.567428
Pressure to use MFS	1.071600	0.1632515	0.45	0.650	0.794983	1.444468

Transport Cost	2.324240	1.0974450	1.79	0.074	0.921226	5.864028
Business Type	3.532970	1.0052980	4.44	0.000	2.022704	6.170884
Sex of Business Owner	0.364760	0.1956740	-1.88	0.060	0.127463	1.043833
Non Business Income	1.149273	0.2036414	0.79	0.432	0.812078	1.626481
Constant	0.113679	0.1123156	-2.20	0.028	0.016394	0.788267

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 4.6, 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.

4.2.3 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.

4.2.3.1 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 4.7 presents a summary of the log likelihoods of the two models.

Table 4.7: 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 4.7, 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.

4.2.3.2 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 4.8: 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 4.8, only the **_hat** was significant while **_hatsq** was insignificant implying that the model had no specification error.

4.2.3.3 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 I and appendix II respectively.

4.2.4 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 4.9 presents the marginal effects.

Table 4.9: 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 4.9, 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 opts not to utilize MFS by 7.4 percent. Indicating that increase in distance in kilometers from a business location to the nearest commercial bank increased the likelihood of a businesses to utilize 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 decrease 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 reduces 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 increases 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 increases the likelihood for a business to utilize MFS. This may be attributed to the fact that, 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 there was no difference in utilization of MFS among the business owner with various levels of income from other occupations apart from business.

V. Summary, Conclusion And Policy Recommendation

5.1 Summary

The purpose for carrying out the study was to 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 objective, both the descriptive statistics and logistic regression were utilized.

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.

5.2 Conclusion

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 Kiambu County. This is because their coefficient in the logit model were statistically significant.

5.3 Policy Implication

The following policy implications emerge from the study findings.

5.3.1 Policy implications to MFS Providers

The study recommends Mobile network operators (MNO's) to improve service delivery to rural businesses by installing boosters in rural areas to enhance connectivity and develop products that suit small scale businesses.

5.3.2 Policy implications to Government

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.

5.3.3 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

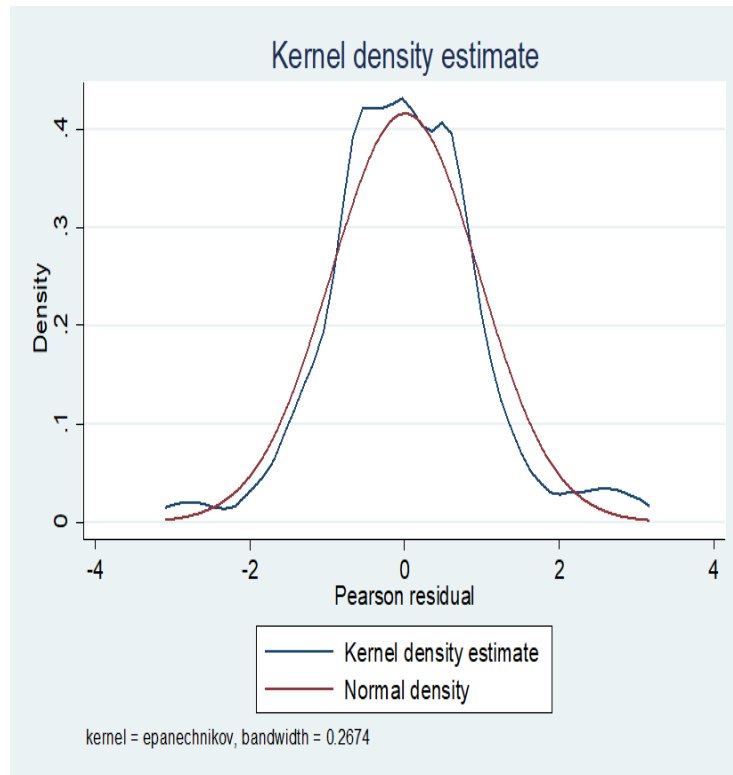
5.4 Suggestion for Further Research

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.

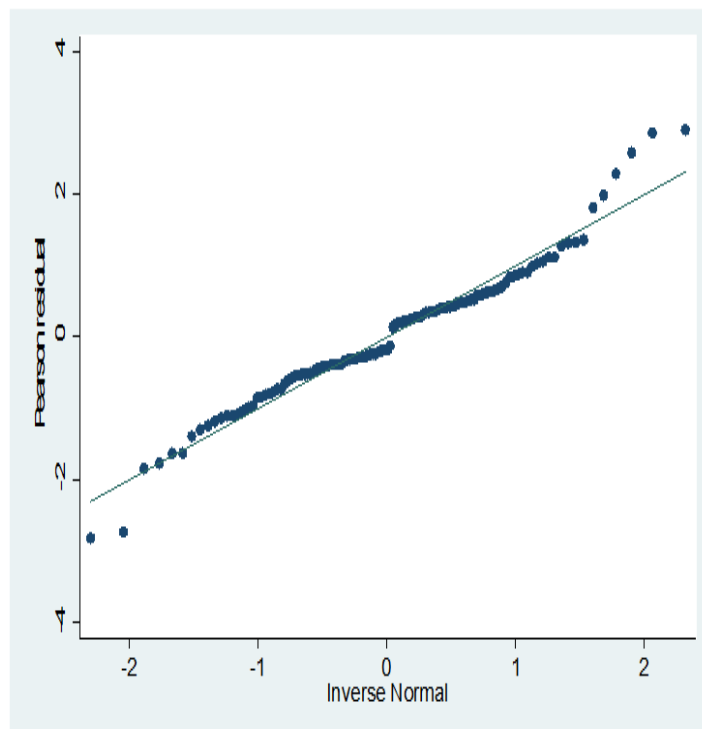
References

- [1]. Block, H. D., & Marschak, J. (1960). *Contributions to probability and statistics: Random Orderings and Stochastic Theories of Responses*. California, United States of America. Stanford University Press.
- [2]. Central Bank of Kenya, Kenya National Bureau of Statistics & Financial Sector Deepening Kenya. (2016). *The 2016 FinAccess Household Survey on financial inclusion*. Nairobi, Kenya: FSD Kenya.
- [3]. Chebet, E. R. (2017). *The Impact of Mobile Payments On The Performance Of Micro-Businesses: A Case Of Safaricom Lipa Na M-Pesa Services In Machakos Town, Kenya*. Unpublished project. University of Nairobi.
- [4]. Communication Authority of Kenya (2019). *Third Quarter Sector Statistics Report for the Financial Year 2018/2019 (January – March 2019)*. Nairobi, Kenya. Government printer. Retrieved from www.ca.go.ke
- [5]. Demirguc-Kunt, A., & Klapper, L. (2012). *Measuring financial inclusion: The global finindex database*. The World Bank.
- [6]. Etzo, S., & Collender, G. (2010). *The mobile phone 'revolution' in Africa: rhetoric or reality? African affairs*, 659-668. Retrieved from <https://journals.sagepub.com>
- [7]. Felsenthal, M., & Hahn, R. (2018). *Financial Inclusion on the Rise, But Gaps Remain, Global Findex Database Shows*. Washington, DC: World Bank. Retrieved from: <http://www.worldbank.org>.
- [8]. Fishburn, P.C. 1970. *Utility Theory for Decision Making*. New York: Wiley.
- [9]. Hilmer, C. E., & Hilmer, M. J. (2014). *Practical Econometrics*. New York: McGraw-Hill Education.
- [10]. Kanobe, F., Alexander, P. M., & Bwalya, K. J. (2017). Policies, regulations and procedures and their effects on mobile money systems in Uganda. *The Electronic Journal of Information Systems in Developing Countries*, 83(1), 1-15.
- [11]. Karoki, S. W. (2014) *Factors contributing to the use of mobile financial services in Kakamega town, Kenya*. Unpublished project. University of Nairobi.
- [12]. Keli, J. (2018). *Effect of mobile technology on financial inclusion in Kitui County, Kenya*. Unpublished project. Moi University.
- [13]. Kennedy, P. (2003). *A guide to econometrics*. London, United Kingdom. The MIT press.
- [14]. Kikulwe, E. M., Fischer, E., & Qaim, M. (2013). Mobile money, market transactions, and household income in rural Kenya. *Global Food Discussion Papers*, 9(10): e109804.1-20. Doi: 10.1371
- [15]. Lee, Y. K., Park, J. H., Chung, N., & Blakeney, A. (2012). A unified perspective on the factors influencing usage intention toward mobile financial services. *Journal of Business Research*, 65(11), 1590-1599.
- [16]. Mararo, M. W. (2018). *Influence of mobile money services on the growth of SME in Nakuru town Kenya*. Unpublished project. JKUAT
- [17]. Marumbwa, J. (2014). *Exploring the moderating effects of socio-demographic variables on consumer acceptance and use of mobile money transfer services (MMTs) in Southern Zimbabwe*. American Journal of Industrial and Business Management, 4(2), 71-79.
- [18]. Munga, G. N. (2010). *The Impact of Mobile banking: A case study of M-Pesa in Kenyan Society*. Unpublished project. University of Nairobi.
- [19]. Musembi, L. M. (2015). *The determinants of mobile phone technology adoption in Kenya*. Unpublished project. Kenyatta University.
- [20]. Mutisya (2016). *New media and business: Adoption and use of mobile phone technology services in empowering women entrepreneurs in Machakos County*. Unpublished project. University of Nairobi.
- [21]. Mutisya, R. (2016) *The Role of mobile banking on the growth of micro and small enterprises in Kitui County, Kenya*. Unpublished project. University of Nairobi.
- [22]. Njuguna, M. J. (2018). *Household Choice of Mobile Money Transfer Service Providers: Case of Nairobi County, Kenya*. Unpublished project. Kenyatta University.
- [23]. Nyaga, K. M. (2013). *The impact of mobile money services on the performance of small and medium enterprises in an urban town in Kenya*. Unpublished Project. KCA University.
- [24]. Republic of Kenya (2015) *Kenya Economic Survey*. Nairobi. Government Printer
- [25]. Republic of Kenya (2015). *County Statistical Abstract Kiambu County*. Nairobi. Government Printer. Retrieved from www.knbs.or.ke
- [26]. Republic of Kenya (2019). *County Statistical Abstract Kiambu County*. Nairobi. Government Printer. Retrieved from www.knbs.or.ke
- [27]. Swaiss, A. (2017). *The World Bank's Goal of Universal Financial Access and Financial Inclusion is Achievable by 2020*. Munich, Germany, GRIN Publishing.
- [28]. World Bank (2017). *The World Bank Annual Report 2017*. Washington, DC: The World Bank. Retrieved from <https://databank.world.org>
- [29]. World Bank. (2007). *The World Bank Annual Report 2007*. Washington, DC: The World Bank. Retrieved from <http://documents.worldbank.org>
- [30]. World Bank. (2012). *The World Bank Annual Report 2012*. Washington, DC: The World Bank. Retrieved from <http://documents.worldbank.org>

APPENDIX I: Residuals Kernel Density Estimate



APPENDIX II: Residuals Quantiles of a normal distribution



Kenneth K. Karanja, et. al. "Determinants of Utilization of Mobile Financial Services in Small Scale Businesses in Kiambu County, Kenya." *IOSR Journal of Economics and Finance (IOSR-JEF)*, 11(4), 2020, pp. 39-54.