

THE IMPACT OF MOBILE MONEY ON FIRM PERFORMANCE IN KENYA

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Declaration

I declare that the Research Project on the Impact of mobile money on firm performance in Kenya is my original work and had not been published or submitted to any university for the award of a degree. Similarly, the research project had no material posted by other scholars except in areas where reference is made and proper reference done.

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SIGNATURE.....



DATE.....

19/4/2022

SUPERVISOR'S APPROVAL

This Research Project is submitted for the award of the degree of Master of Arts in Economics with my approval as the University Supervisor.

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20/04/2022

DATE.....

Dedication

I dedicate this Research Project to my teachers, lecturers and my professors who instilled in me the spirit of intellectual curiosity.

Acknowledgement

First and foremost, I thank God for giving me life, breath and everything else (Acts 17:25). It is through God that all of us live and move and have our being (Acts 17:28). Therefore, by the grace of God, I was able to complete the research project. I would like to extend my sincere thanks to my supervisor, Dr. Laura Nelima Barasa for making me understand the research project process. Dr. Barasa is indeed a professional supervisor who made me appreciate research as the ultimate discourse in university studies. The guidance and advice from my supervisor was invaluable to me over the entire period of the study. The supervisor's continued assistance and support throughout the writing of the research project was phenomenal. Further, I appreciate and thank the lecturers and professors in economics department for the interaction and engagement I had with them that encouraged me to be more focused during my studies at the University of Nairobi. Special thanks to my family members for their support both morally and financially. Lastly but not least, let me acknowledge my friends Mark, Kevin and Kepha for sharing fruitful ideas and discussions during the entire period of writing the research project.

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List of Acronyms and Abbreviations

AN	Agent network
CBK	Central Bank of Kenya
FE	Fixed effect
IT	Information technology
MNO	Mobile network operators
OLS	Ordinary least squares
RE	Random effect
ROA	Return on assets
ROSCAS	Rotating Savings and Credit Association
SACCOs	Savings and Credit Cooperative Societies
SME	Small, Medium Enterprises
TOE	Technological, Organizational, Environmental
VIF	Variance-inflating factor
WBES	World Bank Enterprise Survey

Abstract

The research project focused on the impact of mobile money on firm performance in Kenya. It also dealt with the factors that influenced firms to adopt mobile money in their business transactions. The research project used secondary data of the World Bank Enterprises Survey for the years 2013 and 2018. Panel Data Analysis was applied using Stata Software. The research progressed by reorganization of both the dependent and independent variables to facilitate data analysis. Diagnostic tests such as normality, multicollineality and heteroscedasticity were conducted to ensure reliability and validity of analyzed data. The data was analyzed using logit model following the results of normality test. In addition, fixed effect model was adopted following the Hausman test. Both correlation and regression analysis were administered on the variables that were presented. Consequently, the association between firm performance in sales as dependent variable and independent variables had contrasting relationships. While sales performance and small firms had significant negative correlation of -0.55, the association of sales performance and medium firms as well as large firms were positive at 0.23 and 0.46 respectively. Further, the association between mobile money and credit access was positive at 0.13. Moreover, the association of mobile money and manager with over 10 years' experience was positive at 0.02 while that of female manager was also positive at 0.06. The regression results suggested that the coefficient of mobile money on sales revenue was positive at 0.131. The effect was, however, not statistically significant. Furthermore, the main factors that influenced firms to adopt mobile money were innovation such that firms that innovated and those that accessed credit had a higher probability of adopting mobile money than those that did not at 0.752 and 0.814, respectively. Similarly, the main reason why some firms did not adopt mobile money were large amount involved that mobile money threshold could not accommodate. Therefore, a major policy recommendation for the mobile money regulator would be to enhance the amount transacted through mobile money so that firms could transact their business that involve large amounts. The study identified mobile money adoption by the government ministries and parastatals as an area for further studies.

1 Introduction

1.1 Background

Communication technology originated with the invention of the telephone by Alexander Graham Bell in 1876 (Bellis, 2019). This innovation spread globally into many countries, including those in Africa. The first telephones were landline communication devices.

Since the invention of telephone communication by Bell in 1876, telephone communication technology has advanced exponentially. The use of landlines was every day until the 1990s, after which mobile telephony was introduced (Mbiti & David Weil, 2014). Mobile telephones were later innovated to be used for mobile money transactions, among many other functions.

Countries with significant financial markets, such as the United States of America (USA), have mobile money transactions linked with accounts from various banks. This contrasts to less advanced economies where Mobile Network Operators (MNO) control mobile money transactions. This system benefits the poor, who enjoy the privilege of minimum balance as a requirement and other regular charges for bank accounts(Aron, 2018).

In the past, people who could not afford formal financial services relied on cash. However, money is more accessible and safe transacted via financial institutions through individuals due to the risk expected (Pelletier et al., 2019).

According to Gupta's (2012) study, the 7 billion people globally have 6 billion mobile phones. However, there are only 2 billion bank accounts in the world, sending a significant difference. The difference in balance between mobile phones and bank accounts translates to individual countries like Bangladesh, where 50% of its population of 150 million people have mobile phones while the percentage of bank accounts is only 13. On the other hand, with 1.2 billion people, India has a record of 900 million mobile phones holders. Therefore, governments in some economies, such as in developing countries as recorded, look at mobile technology as a tool helping its residents to have financial inclusion, especially from the rural community.

There are records of increased mobile telephony in Africa over the decades, making them ten times more commonly used than landlines (Beuermann et al., 2012). This translates to over 60% population coverage, creating a mobile phone an essential gadget to own. While studying

mobile penetration in Africa, Akinyemi & Mushunje (2020) established the Sub –Saharan Africa region had the most prominent mobile money accounts worldwide. In Ghana, the number of portable phone holders in 2016 was 20 million compared to 10 million bank account holders. This means that mobile phone holders are twice the number of bank account holders (Apiors & Suzuki, 2018). This is attributed to the technical advancement of mobile telephones, which provide mobile money services fast, with flexibility, affordability, convenience, and right at one's accessible area. A person with a mobile phone approaches a mobile network provider to subscribe to a mobile money service to own an account called a wallet. In the study by Mawejje & Lakuma (2019), it was found that in Uganda, mobile money was introduced in 2009 with subscribers increasing and by 2016 hit about 21.6 million or significantly higher than 60% of Uganda's 35 million people. In contrast, commercial bank account holders were 5.2 million or about 15% of the population. This means that money from mobile phones provides a higher level of financial inclusion than banking services among the people of Uganda.

In Kenya, mobile phones have been transformed into a device used as communication gadgets and for the storage and transfer of money. Therefore, in 2007, Safaricom launched M-Pesa, a facility to provide mobile money transactions (Mbiti & David Weil, 2014).

M-Pesa is a technological innovation that has improved the lives of the people who have subscribed for its use. It requires users to register with Safaricom, allocating a unique number to the subscriber's mobile phone. M-Pesa is a banking service utilizing mobile money technology that has revolutionized the money transfer industry. Its acceptance is from its attributes such as safety, speed, extensive networks reliability, as well as its low price relative to other alternatives (Mbiti & David Weil, 2014). According to its annual report for the period ended 2020, Safaricom reported that M-Pesa not only allows for people-to-people (P2P) transfers and withdrawals. The technology also embraces payment options that help clients connect to formal banking and credit services (Safaricom, 2020). The innovation to facilitate international transactions has enabled to deepening of financial inclusion within the country.

Since the onset of M-Pesa in 2007, its customer base or subscribers have increased exponentially, reaching 28.63 million by the end of 2020, with 21.99 million being mobile data customers. M-Pesa outlets are widely spread in Kenya and globally. There are 173,000 outlets in Kenya, while there are 167 in other countries (Safaricom, 2020).

The existence and use of M-Pesa services can be experienced everywhere in Kenya and even outside Kenya. This is because M-Pesa services have convenience, reliability, safety, and a vast network. This is in contrast with cash transactions that are more dangerous to carry around (Pelletier et al., 2019).

Considering the mobile phone penetration in different areas globally, it becomes clear that countries with better mobile phone access rates are typically economically stronger than countries with less connectivity (Faragó & Miklósi, 2012). As such, Kenya is considered among the most technologically advanced countries in Africa. As far as Kenya's population is concerned, talking about mobile phones is incomplete without mentioning M-Pesa, a mobile money banking service that Safaricom launched in 2007. M-Pesa has contributed positively to Kenya's financial inclusion in which it is used in the payment of goods and services, money transfers, and withdrawals.

Individuals, firms, and other organizations operate the function by first registering with Safaricom, which allocates a unique number that will be used to facilitate transactions. Most startups in Kenya transact their payments and receipts through mobile money platforms such as Airtel money, Telkom Cash, and M-Pesa. However, M-Pesa is the most popular. This is because the M-Pesa distribution network has more than 40,000 agents compared to 840 bank branches. Therefore, M-Pesa has a superior convenience than banks in customer service (Mbiti & David Weil, 2014).

The introduction of M-Pesa has rivaled other existing money transfer establishments such as Western Union, Moneygram, Postapay, etc., which had existed in the market for a long time. The competition was inevitable, with M-Pesa edging the rest, whose profit margins began to decline (Mbiti & David Weil, 2014). This is because M-Pesa has attributes such as speed, safety, reliability, and extensive network that are attractive to its subscribers or customers. The unbanked population is now able to use M-Pesa as a means to store and transfer money conveniently. Firms can also use M-Pesa to facilitate transactions since it is secure, fast, and less costly.

Firms are forms of business ownership established to make profits. Firms may consist of Sole Proprietor, Partnership, or Limited Liability Company. Firms can also be Small, Medium, or Large depending on the number of people employed (Skripak & Tech, 2016).

Firms are an integral part of the economy. They contribute immensely to the gross domestic product of the economy (GDP), which measures the wealth of any country. More importantly, firms create employment opportunities and generate tax revenue for the government besides wealth creators (Wu et al., 2015).

In this respect, the performance of firms will significantly determine the economic growth and level of development of any given country. Significant economies of the world, commonly called developed countries or the first world, have well-established firms that provide goods and services to the economy accounting for GDP. Hence, the higher the volume and value of goods and services generated by firms, the higher the GDP of the economy and the higher the country is ranked in development. The first world or developed economies have high GDP compared to the third world or emerging economies. As much as GDP may not be a comprehensive measure of welfare or wellbeing, the concept of GDP can provide a significant deal of information (Brinkman & Brinkman, 2011; Dynan & Sheiner, 2019).

The pervasiveness of mobile money in Kenya's economy has prompted the need to research whether firms adopt it as a means of transacting business. The researcher will demonstrate the extent to which firms use mobile money to enhance their performance.

1.2 Statement of the Problem

Kenyan firms are established and exist to create wealth, provide employment opportunities and enhance economic growth in the country. In the process, they engage in business transactions in order to advance their mandate and mission for which they were established. This include making and receiving payments involving suppliers, customers, employees, and utilities, among others. These transactions are effected through banks, cash, or mobile money such as M-Pesa as deemed appropriate. For a long time, firms in Kenya have been conducting their business transactions through banks.

However, transactions conducted through banks will demand bank accounts to be opened. This will entail maintaining minimum bank balances and the usual or regular bank charges will be levied. Moreover, cheque transactions require a visit to the bank whose long queues are experienced. In addition, cheques transacted through banks take time to be cleared, causing undue delay in the process. This leads to business losses as time is wasted in the cheque clearance process and on long queues. However, cash transactions are less expensive but riskier. This is because cash

is a volatile asset, which can be stolen when large amounts are involved. It can be destroyed by mutilation, fire, or, outright, pilfered. This may lead to losses that could hold back the performance and growth of firms as well as the economic development of the country.

Meanwhile, mobile money such as M-Pesa transactions can be safer, faster, convenient, and less costly to adopt. It does not require opening an account with an institution. Yet, what it needs is a subscription with a mobile network operator. This enables the mobile phone holder to make transactions at any wide range of agent networks, far more than bank branches. mobile money reduces transaction costs such as travel costs to banks or government offices. It reduces time wasted while traveling and avoids long queues experienced at service points. mobile money also avoids delay costs and leakages via corruption and intermediaries acting like tax collection agents. It mitigates the opportunity cost caused by the lost money and time. Therefore, with mobile money, consumers only invest in the handsets while the infrastructure for communication is in place or installed by mobile network operators. There is no time wastage in queues, travel to obtain service or to use service for all transactions are done at the click of the button on the mobile phone handset.

1.3 Objectives

General Objective

This research aims to ascertain the impact of mobile money on firm performance in Kenya.

The Specific Objective.

The specific objective of the study will be:

- 1 To identify the factors that influence firms in Kenya to adopt mobile money in their business transactions.
- 2 To determine the relationship between mobile money and the firm's performance measured as sales revenue and profit.
- 3 To present policy recommendations to the government based on the findings of the study.

1.4 Significance of Study

This research is essential to various stakeholders such as the Central Bank of Kenya, mobile money operators such as Safaricom, and future researchers.

This study will benefit the CBK as the regulator of financial systems in Kenya. It will enable the Central Bank of Kenya to review and revise the maximum amount mobile money customers can transact on every occasion.

The results of this study will also benefit mobile network operators, such as Safaricom, to invest more in technology in providing capital and skilled employees. This will ensure that mobile money services are not disrupted and continue to function without interruption to maintain the confidence and satisfaction of customers.

The study will also contribute new knowledge to other researchers based on the research findings. The data generated from the study will add to the stock of existing data to enhance data availability and accessibility for use by the future generation of researchers.

1.5 Organization of Paper

The rest part of the project paper will be organized as follows. Chapter Two will be on literature review focusing on the theoretical and empirical literature. Chapter Three will include the methodology. Chapter Four will present the results and discussion. The paper will conclude with Chapter Five.

2 Literature Review

2.1 Introduction

In this chapter, the researcher presents a systematic review of literature relevant to the study. The chapter will cover theoretical literature, empirical literature, and a summary of the literature.

2.2 Theoretical Literature

The study of the impact of mobile money on firm performance in Kenya will be based on the Technological, Organizational, and Environmental (TOE) theory. This theory or framework was selected because it deals with adopting new technology at firm level rather than on the individual level. This theory will be discussed by focusing on the idea's contents, the justification on the preference to use the approach, and the contribution the view will have on the research.

Tornatzky and Fleischer (1990) developed the technological, organizational, environmental theory or framework. They described three factors that influence the adoption, implementation, and use of new technology at the firm level. These factors include technological context, organizational context, and environmental context (Baker, 2018).

2.2.1 Technical Context

The technological context consists of internal and external technologies that might be useful in improving firm productivity. These include technologies that the firm already uses and those in the market, although not currently in use. Furthermore, the existing technologies in a firm attract significance in the inception process since they create a broad scope and pace of changes in technology undertaken in the firm (Baker, 2018).

Moreover, technological context takes into account the technical aspects of innovations and how the firm perceives them. Essentially, the critical focus of a firm is on innovations associated with the technology that can affect its adoption, implementation, and utilization. Therefore, only firms that perceive the invention will have a potential benefit will adopt it (Pacheco-Bernal et al., 2020).

In addition, the technological context encompasses Information Technology (IT) infrastructure consisting of Mobile Network Operators (MNO) and Agent Network (AN), both of which should be in place to facilitate the adoption of technology dealing with mobile phone banking. Therefore, for mobile money adoption, mobile network operators and agent networks are critical for the fruitful operation of mobile phone money transactions (Aron, 2018).

Hence, technological context requires firms to adopt internal and external technology including mobile money. Therefore, adoption of mobile money by firms will determine their performance in terms of sales revenue and profits.

2.2.2 Organizational Context

The organizational context connotes the firm size, scope, structure of management, and resources (HOTI, 2015). Essentially, the organizational context describes the characteristics and resources of the firm (Baker, 2018). The critical factors for technology adoption are organizational structures, financial resources, and top managerial support (Pacheco-Bernal et al., 2020).

Similarly, Khalifa (2016) studies show that large firms are likely to adopt new technologies due to their better financial resources and better skills in managing innovations.

Moreover, internal linking agents with formal or informal connections to other departments and other value chain partners can also influence the adoption of new technologies. In addition, organizations that are centralized with emphasis on formal reporting relationships may be best suited in the adoption of new technologies (Baker, 2018)

Furthermore, the communication process is essential in matters of innovation. In particular, the role of top management is necessary to encourage and support change through the adoption of new technologies (Baker, 2018). In this respect, top management is usually involved in effecting changes in the firm, including adopting innovations.

The organizational context encompasses size, structure and resources of firms. These attributes can influence firm performance. Notably, large firms with adequate resources are capable of adopting new technology such as mobile money, which can influence their performance.

2.2.3 Environmental Context

The attributes of environmental context include the industry sector, business competition, and business-government regulations (Baker, 2018). Notably, business competition may provide the impetus for adopting new technologies because of the potential profits. Hence, intense competition among firms stimulates the adoption of new technologies. Similarly, dominant firms can influence other value chain partners to adopt innovations.

Nevertheless, government regulations can have a beneficial or detrimental effect on technology adoption. For example, stringent government regulations can discourage the adoption of new technology.

Moreover, the attributes of environmental context such the firm's industry sector, business competition and government regulations can determine whether the firm adopts innovations such as mobile money. The adoption of mobile money by firms will influence their performance in terms of sales revenue and profits.

2.2.4 Relevance of TOE Theory to the Study

The TOE theory is relevant to research because it focuses on adopting technology at the firm level. Therefore, since the analysis is about mobile phone technology involving mobile money transactions by firms, the theory is appropriate for the study. Similarly, the theory describes the factors or elements necessary in adopting innovations to include the technological, organizational and environmental contexts, all of which point out to mobile money and firm.

2.2.5 Contribution of TOE Theory to the Study

The TOE theory contributes to the study as mobile money. Mobile phone technology is embraced in Kenya due to its convenience, security, low cost, and broad agent network. Furthermore, mobile money reduces transaction costs, shortens travel and waiting time. Similarly, it reduces the linkage cost within firms and suppliers exact to consumers. These factors can lead to improved firm performance.

2.3 Empirical Literature

Currently, most people in Kenya use mobile phones. Indeed, the mobile phone as a modern device has infiltrated and revolutionized the whole world. Mobile phones have also been configured and transformed to provide mobile money transaction functions such as M-Pesa, widely used in Kenya. Several authors have investigated the use of M-Pesa on the performance of firms in Kenya, in which mixed results were reported.

Mbogo (2010) investigated mobile money payments through M- Pesa in the success and growth of micro-business owners. The Nairobi study was conducted using the survey method in which questionnaires were sent and received from a sample of 409 respondents. Data were analyzed using descriptive statistics. Similarly, correlation analysis among variables was performed. Moreover, the study identified independent variables like ease of accessibility, low cost, security, satisfaction, convenience, support, intention to use, and actual use. The dependent variable was identified as the performance of micro-businesses. Consequently, after data analysis, the results showed that mobile money payments contributed to the success and growth of micro-businesses in Nairobi. Hence, mobile money payments through M-Pesa were noted to be convenient, low cost, secure, and accessible for the success and growth of micro-businesses.

While the study indicated a positive relationship between mobile money payments and micro-business growth, it did not consider the different firm sizes such as small, medium, or large firms. Furthermore, the study neglected sectors such as manufacturing, retail, wholesale, or hospitality in which the businesses operated. Nevertheless, the study was robust in data analysis using descriptive statistics as well as correlation analysis. These are essential tools for data analysis.

Lum (2011) studied the effect of mobile phones on global economic performance. This study was powerful considering business organizations contribute significantly to the economic growth of countries. In this study, M-Pesa was particularly mentioned for being a significant contributor to financial performance in Kenya.

More importantly, the study used panel data analysis of 182 countries from 1980 to 2007. Panel data analysis econometric models performed included OLS, fixed effects, instrumental variables, and two-stage most minor squares tests. The dependent variables were economic growth, and the independent variables included populations, trade openness, and democracy. Essentially, the study performed multivariate regression analysis. The study results indicated that mobile phones have a largely positive and significant effect on economic growth rates. This means that countries can benefit immensely in economic growth by adopting mobile phones for purposes of communication and in mobile money transactions.

Although this study was based on the impact of mobile phones on economic growth and development globally, it has many similarities concerning M-Pesa and the performance of firms. Indeed, firms and economic growth follow each other in tandem, for as the firm's performance improves, the economic growth increases as well.

Further, in the study by Nyaga (2013) on the impact of mobile money on the performance of small and medium enterprises in Naivasha Town in Kenya, the study collected a sample from 113 respondents. The investigation focused on awareness and uptake of various mobile money services and the impact on the performance of SMEs measured by sales, purchases, savings, and accessibility to loans.

Data were analyzed based on the dependent variable identified as performance in terms of sales, profits, and competitiveness against independent variables comprised accessibility, convenience, low cost, satisfaction, security, and support. In this connection, the study performed descriptive statistics and co-efficient of correlation and multiple regression analysis.

The results showed that the mobile money services had no positive impact on the growth of SMEs in Naivasha Town. Therefore, other factors contribute to the development of SMEs in Naivasha.

The study by Nyaga (2013) and Mbogo (2010) is similar, for both target SMEs albeit in different towns. Nevertheless, both studies produced divergent outcomes. While Mbogo (2010) study confirmed a positive relationship between mobile payments and business growth, Nyaga (2013) showed no relationship between mobile money and business performance. The difference in outcomes could be attributed to the use of different sampling techniques. Yet, both of them applied the same dependent and independent variables.

Moreover, the study by Mbiti & Weil (2014) was done when M-Pesa was rapidly picking up its presence and impact on the lives of Kenyan people. However, the study had focused only on individuals rather than firms in adopting M-pesa as a means of effecting money transactions. The study also appears to have the Western notion of banks as the only institution to handle money. The study did not mention Kenyan SACCOs (savings and credit co-operative societies) but recognized ROSCAs, a western notion regarding mobilization of individual savings. Essentially, the study did not consider the role of firms and how M-Pesa impacted their performance.

Kiganane (2015) investigated the importance of M-Pesa and its perceived effects on the performance of manufacturing firms in Thika, Kenya. The objective of the study was to establish the relationship between M-Pesa and the performance of manufacturing firms. The method of analysis was based on data collected from a sample of 120 manufacturing firms consisting of small, medium, and large, which responded to the questionnaire sent and collected from firms. The data was analyzed in which the dependent variable was performance, and the independent variable was M-Pesa.

The data analysis results showed a positive relationship between the use of M-Pesa and the performance of manufacturing firms in Thika, Kenya. Essentially, the use of M-Pesa improved the performance of firms with increased sales, profits, and worker productivity.

Taking into cognizance studies done in Nairobi, Naivasha, and Thika by Mbogo (2010), Nyaga (2013), and Kiganane (2015) respectively on the impact of M-Pesa on the performance of firms, only Nyaga (2013) did not return a positive relationship. The other two Mbogo (2010) and Kiganane (2015) indicated a positive relationship between the use of M-Pesa and firm performance. Meanwhile, all three studies used similar software packages for data analysis but

different samples that might explain the cause of differences in outcomes. Nevertheless, three studies focused on local firms, and the results could have been different if a national perspective of samples had been adopted.

2.4 Overview of Literature

The empirical literature had demonstrated the authors' diverse experiences regarding objectives, methodology, results, and conclusions. Notably, the study by Mbiti, Weil (2014) focused on the impact of M-Pesa on the lives of people in Kenya. The authors investigated the effect of M-Pesa on individual welfare. The study did not consider the impact of M-Pesa on the performance of firms.

This gap can be addressed by investigating the impact of M-Pesa on firm performance. This can be achieved by ensuring that firms have a managerial structure to support and adopt M-Pesa as new technology to facilitate financial transactions. It will also be essential to ensure that technological infrastructure such as the mobile network operator and the agent network is established to facilitate M-Pesa transactions.

Furthermore, the study by Mbogo (2010), Nyaga (2013), and Kiganane (2015) was concentrated in their local towns. This means that competition among firms was limited to the extent of not using technology widely. This gap can be addressed by having many firms compete through a broad spectrum of stations spread across the country. Competition among firms influences the adoption of new technology.

3 Methodology

3.1 Introduction

This chapter addressed the methodology used to resolve the research problem in the study. It showed the methods that were adopted to achieve the objectives of the investigation.

The chapter further discussed the theoretical framework, model specification, definition and measurement of variables, and types and sources of data. It discusses econometrics issues as well. The researcher used secondary data from the World Bank Enterprise Survey (WBES) for the 2013 and 2018 periods. Similarly, the study indicated how data was analyzed.

3.2 Theoretical Framework

The research objective was to demonstrate the relationship between mobile money and firm performance measured in increased sales revenue and profits. The performance of firms is usually described by the return on assets (ROA) or amount of profits the firm makes. Therefore, the higher the ROA or profits, the better the firm performs.

While studying the capital structure on firm performance of the US leading firms listed on S&P 500, Martis (2013) established that leverage as a ratio of debt to the capital impacts the return of assets (ROA). The study showed that leverage negatively impacts ROA. This means that firms with higher borrowing or loans will record a low performance on ROA.

However, Onalapo & Kajola's (2010) study means that a firm with debt is more profitable than without an obligation.

Consequently, these studies show that the theory of capital structure on firm performance was not conclusive. While some studies establish a positive relationship, others did not specify a positive relationship between leverage and their performance.

Furthermore, firm performance could be measured by way of profit it makes. In this respect, there were several theories attributed to gains, including the frictional theory of profits, monopoly theory of profits, managerial efficiency theory of profits, and innovation theory of profits (Sanyal, 2019). The study focused on the innovation theory of profit since the adoption of mobile money was deemed to be a new policy adoption to enhance firm performance.

Regarding the innovation theory of profits, it was presumed that entrepreneurs or firms initiated innovations, which caused economic profits to rise. The economics scholar, Schumpeter, held that the primary function of an entrepreneur was to introduce innovations in the economy, and such entrepreneurs would be rewarded with profits. The entrepreneur adopted innovation as a new policy measure to reduce the cost of production or increase the demand for the product. The adoption of mobile money by entrepreneurs or firms minimized the cost of doing business and enhanced performance measured by increased sales revenue and profits.

In this study, the innovation introduced a new system of making business transactions through mobile money instead of banking services. The system would reduce costs and improve firm performance. This was a unique and better method of organizing the process and procedures as the firm conducted its business transactions. Successful innovation would lead to profit improvement and better performance of firms arising from a reduced cost of business transactions.

3.3 Model Specification

Model specification is the description of the relations between dependent and independent variables in a regression equation. Usually, the model specification determines which independent variable should be included in or excluded from a regression equation.

The research involved the factors that influence firms to adopt mobile money in their business transactions to improve sales revenue and profits performance. This study was conducted to model mobile money using either a Probit or Logit regression, depending on the outcome of normality tests.

The Logit model is more appropriate if data deviates substantially from the standard normal distribution in regression analysis. This means that the Logit model does not require data to be normally distributed to be applied.

However, since researchers tend to favor the standard assumption of the error term in which it is generally distributed with a mean of 0 and constant variance σ^2 a Probit model is more popular. Notably, our data was analyzed using the following model:

$$\text{mobile money}_t = \gamma Z_{it} + u_{it}$$

Where,

mobile money_{it} = mobile money adoption_{it}* if mobile money adoption_{it}* > 0;
 mobile money adoption_{it} = 0 otherwise

In the model, χ_{it} Represents firm attributes such as firm size, top managerial experience, gender, education and competition in the industry. γ_z represent coefficient while u_{it} is the error term, whereas i represents entity and t represents time.

In the second process, the model was formulated by estimating the impact of mobile money on firm performance as follows:

$$\gamma_{it} = \alpha_i + \beta_i \chi_{it} + u_{it}$$

Where

γ_{it} Represents sales revenue for the firm i and t is time

α_i ($i = 1 \dots n$) is the unknown intercept for each entity (n entity – specific intercepts)

u_{it} Is the idiosyncratic error term

While χ_{it} represents other variables of the firm such as firm size, competition, , managerial attributes, including gender, experience and education.

The model consisted of performance as the dependent variable and firm size, top managerial attributes, mobile money, competition, and firm industry as independent variables.

The data was cleaned and analyzed using Stata software.

3.4 Definition and Measurement of Variables

Table 1: Variables and Measurement		
Variables	Measurement	Expected sign and literature sources
Log of sales	Natural logarithm of sales revenue	–
Firm size	Number of employees, dummy value 1 for firms with greater than 20 employees, 0 otherwise	+ve (Skripak & Tech, 2016)
Competition	Dummy value 1 if competition, 0 otherwise	+ve (Skripak & Tech, 2016)
mobile money	Dummy value of 1 if uses mobile money, 0 otherwise.	+ve (Baker, 2018)
Managerial experience	Years in the firm, dummy value 1 for Managers with more than 10 years' experience, 0 otherwise	+ve (Baker, 2018)
Skills shortage	Dummy value 1 if employees skills shortage is the reason for not adopting mobile money, 0 otherwise	+ve (Baker, 2018)
Manager gender	Dummy 1=female, 0 otherwise	+ve (Baker, 2018)
Innovation	New products, dummy value 1 if new improved products or service introduced, 0 otherwise	+ve(Rosli & Sidek, 2007)
Supplier adoption	Dummy value 1 if suppliers have adopted mobile money, 0 otherwise	+ve (Skripak & Tech, 2016)
Customer adoption	Dummy value 1 if customers have adopted mobile money, 0 otherwise	+ve (Skripak & Tech, 2016)
Large payments	Dummy value 1 if large payments is the reason for not adopting mobile money, 0 otherwise	+ve (Skripak & Tech, 2016)
High fees	Dummy value 1 if high fees is the reason for not adopting mobile money, 0 otherwise	+ve (Skripak & Tech, 2016)
Access to credit	Dummy value 1 if a line of credit available, 0 otherwise	+ve(Ganiyu et al., 2019)
Industry sector	Dummy value 1 if manufacturing, 0 otherwise	+ve (Skripak & Tech, 2016)

3.5 Data Types and Sources

This study used secondary data collected by the World Bank through the Enterprise Survey of firms in Kenya in the 2013 and 2018 periods. The objective of the enterprise survey was to promote the improvement of a business environment in which private firms operate to create a conducive climate for investment, job creation, and sustainable economic growth.

The Enterprise Survey report contained data on various firms of different sizes across ten regions in Kenya. This included firms dealing with manufacturing (food, textiles and garments, chemicals, pharmaceuticals and plastics) and services (retail, tourism).

The survey covered topics such as firm size, firm legal status, management profile, employees profile, credit facility (loans), sales, and industry sector. The unit of observation in the survey will be firms categorized as micro, small, medium, and large.

The researcher used Panel Data Analysis method. This is a combination of Time Series and Cross-Sectional methods. Panel Data Analysis is robust method suitable for the analysis of secondary data collected by the World Bank Enterprise Survey of firms in Kenya in the 2013 and 2018 periods.

3.6 Econometrics Issue

Econometrics analyzes data using statistical methods to test or develop economic theory. In panel data analysis, the methods used were OLS, fixed effects (FE), or Random Effects (RE) models (Torres-reyna, 2007). In this study, the OLS model was not adopted since it ignores heterogeneity. The model adopted was Fixed Effects following the results of Hausman test.

The researcher conducted both the FE and RE tests and stored the results. Subsequently, the Hausman test was applied to check which model between FE and RE was appropriate.

The null hypothesis was that RE was appropriate whereas the alternative hypothesis was that FE was appropriate. Consequently, since the probability value (P-Value) was statistically significant, that is, less than 5% , we rejected the null hypothesis and accepted alternative hypothesis. Therefore, Fixed Effects model was adopted.

Similarly, the researcher identified the dependent and independent variables to ensure they were appropriate for analysis. Furthermore, the researcher ensured there was no bias in the results of data analysis brought about by omitted or irrelevant variables. In this respect, various diagnostic tests on normality, multicollinearity and heteroscedasticity were done to establish the reliability and validity of the data (Kayode & Bin, 2013). Consequently, normality was done using Shapiro-Wilk test while multicollinearity was detected through the Variance Inflating Factor (VIF) test and the solution was to drop redundant variables. Similarly, heteroscedasticity was detected through

the Breusch - Pagan test and the solution was carrying out robust standard errors or weighted least squares.

4 Data Analysis, Results and Discussion

4.1 Introduction

This chapter presented an analysis of the data and discussed the results. The data used was obtained from the World Bank Enterprise Survey (WBES) for Kenya in the years 2013 and 2018. The data was cleaned and organized through generating, replacing, dropping and keeping variables based on their relevance to the study.

4.2 Descriptive and Summary Statistics

of the variables investigated.

There were 259 observations or entities in which 44% represented manufacturing firms and the rest service firms. Moreover, 53% of the firms were small, 30% were medium and 16% were large firms.

Furthermore, managers with more than 10 years' experience represented 68%, while firms that introduced new products through innovation were 63%. In addition ,39% of the firms had access to credit while 13% of the firms had female manager.

Regarding mobile money adoption, 60% Of the firms were reported to have embraced the use of mobile money. However, 75% of the firms faced competition on their products from other firms. This means that despite competition a high number of firms had adopted use of mobile money in their operations.

On reasons for not using mobile money, 3% of the firms indicated high fees, 14% indicated large payments, 2% indicated skills shortage while 7% indicated customer adoption and 8% supplier adoption. This means that the reasons firms adopted mobile money outweighed the reasons of not adopting mobile money in their operations.

Table 2: Descriptive and summary statistics

shows descriptive summary statistics of the variables investigated.

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Table 2: Descriptive and summary statistics

VARIABLES	Observations	Mean	Standard deviation	Minimum	Maximum
Manufacturing	259	0.436	0.497	0	1
Small firm	259	0.533	0.500	0	1
Medium firm	259	0.305	0.461	0	1
Large firm	259	0.162	0.369	0	1
Managerial experience	259	0.687	0.465	0	1
Log sales	259	17.63	2.090	12.43	23.29
Innovation	259	0.629	0.484	0	1
Credit access	259	0.390	0.489	0	1
Female manager	259	0.131	0.338	0	1
Competition	259	0.757	0.430	0	1
mobile money	259	0.606	0.490	0	1
High fees	259	0.0309	0.173	0	1
Large payments	259	0.143	0.351	0	1
Skills shortage	259	0.0270	0.162	0	1
Customer adoption	259	0.0734	0.261	0	1
Supplier adoption	259	0.0849	0.279	0	1

4.3 Correlation Matrix

Table 3 shows correlation matrix, which depicts the association of variables in data analysis.

The relationship or association between variables could be positive or negative. Stars showed significance at indicated level of significance while absence of stars meant it was not statistically significant.

Our research was on the impact of mobile money on the performance of firms measured in sales revenue. The objective was to determine factors that influenced firms to adopt mobile money in their business transactions. In this respect, the main variables that the researcher focused on were log of sales performance and mobile money.

There was significant negative correlation of 0.55 between log of sales and small firms. However, there was significant positive correlation between log of sales and medium firms of 0.23 and large firms of 0.46. This means that small firms performed lowly in sales while medium and large firms performed highly in sales. The low performance on small firms could be attributed to insufficient resources. This findings agree with the study of Ben Khalifa (2016) which confirmed that large firms were likely to adopt new technology due to their better financial resources and better skills in managing innovations.

The association between mobile money and firms as well as other variables had contrasting features. While the association between mobile money and small, medium as well as large firms were 0.08, -0.03 and -0.07 respectively, they were not significant. However, the association between mobile money and credit access was significant and positive at 0.13. Further, the association between mobile money and high fees was significant but negative at – 0.22. This means that firms which had credit access adopted mobile money. However, some firms declined to use mobile money due high fees.

Moreover, the association of mobile money and managers with 10 years of experience was 0.02 while that of female manger was 0.06. This means that firms with female manager adopted mobile money just as managers with more than 10 years of experience.

Table 3: Correlation Matrix

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Manufacturing	1.00														
2. Small firm	-0.24***	1.00													
3. Medium firm	0.13*	-0.71***	1.00												
4. Large firm	0.16**	-0.47***	-0.29***	1.00											
5. Managerial experience	0.17**	-0.15*	0.03	0.16**	1.00										
6. Innovation	0.03	-0.13*	0.07	0.08	0.07	1.00									
7. Credit access	0.09	-0.19**	0.04	0.21***	0.08	0.07	1.00								
8. Female manager	-0.07	0.16*	-0.11	-0.08	-0.06	-0.06	-0.05	1.00							
9. Competition	-0.63***	0.21***	-0.15*	-0.09	-0.15*	-0.06	-0.14*	0.06	1.00						
10. High fees	0.02	-0.01	-0.02	0.04	0.02	0.09	0.04	-0.07	-0.05	1.00					
11. mobile money	-0.09	0.08	-0.03	-0.07	0.02	0.00	0.13*	0.06	0.06	-0.22***	1.00				
12. Large payments	0.02	-0.19**	0.09	0.15*	0.08	0.20**	-0.01	-0.06	-0.05	0.18**	-0.51***	1.00			
13. Skills shortage	-0.05	0.06	-0.06	-0.01	-0.04	0.08	0.01	0.08	-0.02	-0.03	-0.21***	0.20***	1.00		
14. Customer adoption	-0.07	-0.09	0.10	-0.00	-0.00	0.12*	-0.10	-0.07	0.02	0.12	-0.35***	0.48***	0.23***	1.00	
15. Log of sales (KSH)	0.22***	-0.55***	0.23***	0.46***	0.17**	0.09	0.22***	-0.02	-0.26***	-0.08	0.00	0.05	-0.06	0.05	1.00
Observations	259														

* p < 0.05, ** p < 0.01, *** p < 0.001

4.4 Determinants of mobile money

Table 4 illustrated the factors that influenced firms to adopt mobile money in their business transactions. The factors reported were both positive and significant.

Table 4: Estimation of mobile money				
VARIABLES	Logit coefficients		Marginal effects	
	Small firm	0.438	(0.504)	0.0798
Medium firm	0.453	(0.531)	0.0770	(0.0852)
Managerial experience	0.324	(0.324)	0.0599	(0.0679)
Credit access	0.752**	(0.365)	0.129**	(0.0591)
Innovation	0.814**	(0.333)	0.151**	(0.0620)
Manager's gender	0.308	(0.513)	0.0520	(0.0810)
Competition	-0.279	(0.476)	-0.0479	(0.0783)
Manufacturing	-0.613	(0.405)	-0.112	(0.0751)
Constant	0.248	(0.800)		
Observations	210		210	

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

In Table 4, large firm was the reference group for firm size. The results suggested that small and medium firms had a probability of 0.438 and 0.453, respectively, higher than large firms in adopting mobile money. Further, firms whose managers had more than 10 years of experience had a 0.324 higher chance of adopting mobile money than firms whose managers had 10 years of experience or less. Furthermore, firms that accessed credit recorded a 0.752 higher chance of adopting mobile money than those that did not access credit. Similarly, firms led by female managers reported a 0.308 higher chance of adopting mobile money than those led by male.

However, firms experiencing competition had 0.279 lower probability of adopting mobile money than firms that reported no competition. Lastly, firms in the manufacturing sector had a 0.613 lower probability of adopting mobile money than non-manufacturing firms.

Moreover, the constant term suggested that, holding all else constant, a non-manufacturing and non-innovative firm that is large, and has a male manager with 10 years of experience or less, with no access to credit, and facing no competition had a probability of 0.248 of adopting mobile money. Similarly, at 5% and 10% significance levels, access to credit and innovation had a significant effect on adoption of mobile money. This was because the reported corresponding probability values were less than 5% and 10% significance level.

4.5 Determinants of Sales

Table 5: Determinants of Sales

explained the impact of independent variables on log of sales. The researcher adopted the fixed effect model following Hausman test as indicated on Table 9.

Table 5: Determinants of Sales

captured the estimation of sales revenue. Since sales revenue observed were very large numbers, the variable sales were transformed into the natural log of sales. Ordinary least squares (OLS) was the benchmark estimation model, and this was corrected for heteroscedasticity by employing robust standard error estimation. In addition, first estimating mobile money and then using the predicted values of mobile money in estimating sales was carried out through the instrumental variable (IV) regression. Panel estimation results were also reported under both the random effects model and the fixed effects model. The Hausman test suggested that the fixed effects model was appropriate in capturing firm-specific characteristics. The results discussed in this section were, therefore, those under the fixed effects estimation.

The log of sales for manufacturing firms was, on average, 1.964 lower than that for non-manufacturing firms. Moreover, the log of sales for small firms was, on average, 0.832 lower than that for large firms whereas for medium firms, it was 0.288 higher than large firms. However, the log of sales for firms that had managers with more than 10 years of experience was 0.174 higher than that for firms whose managers had 10 or fewer years of experience. Furthermore, the log of sales for firms that had innovated was, on average, 0.464 lower than those that did not.

Similarly, firms that accessed credit had a log of sales that, on average, was 0.045 lower than firms that did not access credit. In addition, the log of sales for firms that experienced competition was, on average, 0.288 lower than that for firms that had no competition. Notably, the log of sales for firms led by female managers was, on average, 0.608 higher than that for male-led firms. Similarly, the log of sales for firms that adopted mobile money was 0.131 higher than firms that did not.

The reasons identified by firms for not adopting mobile money were high fees, large payments, customer and supplier non-adoption, and shortage of skills. Hence, non-adopters that gave high fees as a reason had a log of sales that was, on average, 1.311 lower than those which gave other reasons. Further, non-adopters that gave large payments as a reason had a log of sales that was, on average, 0.25 lower than those that gave other reasons. Similarly,

non-adopters that singled out customer non-adoption as a reason had a log of sales that was, on average, 1.178 lower than those that gave other reasons.

However, non-adopters motivated by supplier non-adoption had a log of sales that was, on average, 0.926 higher than those that gave other reasons. Furthermore, non-adopters that gave skills shortage as a reason had a log of sales that was, on average, 1.636 higher than those that gave other reasons.

Table 5: Determinants of Sales

, furthermore, revealed that manufacturing and skills shortage had a significant effect on the log of sales at 5% and 10% significance levels, respectively. This suggested that manufacturing firms did not perform, on average, better than service firms. Similarly, firms that identified shortage of skills as a reason for not adopting mobile money did better than those that did not give skills shortage as a reason.

The current study established that mobile money adoption increased the log of sales, on average, by 0.131. The coefficient of mobile money was, however, not significant. This meant that the effect of mobile money on sales was not discussed further.

Table 5: Determinants of Sales					
VARIABLES	OLS	OLS Robust	Random effects	Fixed effects	Instrumental variable (IV) Regression
Manufacturing	-0.144 (0.273)	-0.144 (0.272)	-0.134 (0.277)	-1.964** (0.877)	0.458 (0.664)
Small firm	-1.630*** (0.246)	-1.630*** (0.237)	-2.855*** (0.331)	-0.832 (0.844)	-1.530*** (0.249)
Large firm	1.465*** (0.322)	1.465*** (0.301)			2.299*** (0.535)
Managerial experience	0.212 (0.229)	0.212 (0.227)	0.0962 (0.228)	0.174 (0.390)	-0.0916 (0.374)
Innovation	0.120 (0.221)	0.120 (0.212)	-0.0572 (0.210)	-0.464 (0.307)	-1.038 (0.815)
Credit	0.365 (0.222)	0.365* (0.212)	0.337 (0.212)	-0.0452 (0.317)	-0.456 (0.714)
Competition	-0.837*** (0.310)	-0.837*** (0.316)	-0.726** (0.292)	-0.288 (0.453)	-0.550 (0.434)
Manager's gender	0.450 (0.311)	0.450 (0.312)	0.469 (0.299)	0.608 (0.478)	0.146 (0.398)
mobile money	0.0183 (0.258)	0.0183 (0.260)	0.0624 (0.247)	0.131 (0.389)	
High fees	-1.386** (0.624)	-1.386** (0.545)	-1.384** (0.581)	-1.311 (0.812)	
Large payments	-0.595 (0.387)	-0.595 (0.439)	-0.542 (0.361)	-0.250 (0.564)	
Customer adoption	0.200 (0.706)	0.200 (0.835)	-0.0581 (0.657)	-1.178 (0.923)	
Skills shortage	-0.769 (0.681)	-0.769 (0.985)	-0.115 (0.631)	1.636* (0.873)	
Supplier adoption	0.736 (0.686)	0.736 (0.899)	0.915 (0.635)	0.926 (0.890)	
Medium firm			-1.157*** (0.334)	0.288 (0.653)	
mobile money estimated value					6.639 (5.374)
Constant	18.59*** (0.470)	18.59*** (0.477)	19.89*** (0.526)	19.13*** (0.865)	14.22*** (3.643)
Observations	259	259	259	259	210
R-squared	0.414	0.414		0.314	0.460
Number of panel id			179	179	

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

4.6 Diagnostic Tests

In estimating mobile money, the logit model was preferred to the probit model based on the normality test (see

Table 6: Shapiro-Wilk Normal Data Test

). Further model diagnosis suggested the absence of both multi-collinearity (see Table 7) and heteroscedasticity (see Table 8). Similarly, the Hausman test led to the adoption of the fixed effects model in estimating sales revenue (see Table 9).

5 Conclusions and Policy Implications.

5.1 Summary of findings

The research focused on the impact of mobile money on the performance of firms in Kenya. Similarly, it dealt with the factors that influenced firms to adopt mobile money in their transactions.

The research findings indicated that 60% of the firms studied had adopted the use of mobile money in their business transactions. These transactions included supplies, utilities and employee salaries.

However, on reasons for not using mobile money, 3% of the firms indicated high fees, 14% indicated large payments, 2% indicated skills shortage, while 7% indicated customer adoption and 8% indicated supplier adoption. In this regard, the main reason firms expressed for not adopting mobile money was large amounts that firms transacted which the mobile money could not accommodate. This was because the regulators had set limits of the amounts to be transacted through mobile money.

Moreover, adoption of mobile money had a positive effect on sales revenue. The coefficient of mobile money was 0.131 but it was not statistically significant.

Furthermore, the factors that influenced firms to adopt mobile money were innovation and access to credit. Firms that innovated and those that accessed credit had a probability of 0.814 and 0.752, respectively, higher than those that did not. Firms led by female managers reported a 0.308 higher chance of adopting mobile money than those led by males. Firms experiencing competition had 0.279 lower probability of adopting mobile money than firms that reported no competition. Overall, the main factors that influenced firms to adopt mobile money were innovation and credit access.

5.2 Conclusions

Mobile money technology was accepted as a fast and convenient way of making transactions between individuals and firms. While majority of firms (60%) investigated had adopted mobile money, others rejected to use mobile money due to large payments, which they handle. The mobile money platform could not accommodate the large payments due to limitations set by the regulator. This limitation caused 14% of the firms investigated that rejected to use mobile money since their business transactions involved large amounts of money.

5.3 Policy recommendation

Mobile money operators and transactions are regulated by the Central Bank of Kenya (CBK). This institution sets the maximum amount transacted in any particular occasion or event. It would therefore be appropriate for the Central Bank of Kenya (CBK) as the regulator to review its policy and enhance amount transacted through mobile money. This will enable firms to transact large amounts through mobile money technology.

5.4 Limitations

There were some challenges that the researcher encountered as the research process progressed. This was mainly in connection with data cleaning and data management of the variables that were deemed relevant to the research. In particular, the data for the two years based on Panel Data analysis was expected to be balanced, but it turned out to be unbalanced. This was because the year 2013 had 132 observations while the 2018 had 127 observations.

The panel was not balanced. Consequently, for uniformity, those observations which were present in some variables but absent in others or present for some variables in one year but absent in the other year were dropped. The observations were automatically dropped by the software during model estimation.

5.5 Areas for further research

The research focused on impact of mobile money on firm performance in Kenya. It also dealt with factors that influenced firms to adopt mobile money in the business transactions. The study focused solely on business firms in relation to mobile money. It would be interesting to explore how other organizations respond to mobile money technology.

A further research needs to be conducted to establish factors that influence government institutions such as ministries, parastatals and universities to adopt mobile money in their financial transactions. This will show clearly the extent to which mobile money is applied in Kenya.

References

- Akinyemi, B. E., & Mushunje, A. (2020). Determinants of mobile money technology adoption in rural areas of Africa. *Cogent Social Sciences*, 6(1). <https://doi.org/10.1080/23311886.2020.1815963>
- Apiors, E. K., & Suzuki, A. (2018). mobile money, individuals' payments, remittances, and investments: Evidence from the Ashanti Region, Ghana. *Sustainability (Switzerland)*, 10(5). <https://doi.org/10.3390/su10051409>
- Aron, J. (2018). mobile money and the economy: A review of the evidence. *World Bank Research Observer*, 33(2), 135–188. <https://doi.org/10.1093/wbro/lky001>
- Baker, J. (2018). oo f re ct Pr. November. <https://doi.org/10.1007/978-1-4419-6108-2>
- Bellis, M. (2019). How the Telephone Was Invented. <https://www.thoughtco.com/history-of-the-telephone-alexander-graham-bell-1991380>
- Ben Khalifa, A. (2016). Determinants of information and communication technologies adoption by Tunisian firms. *Journal of Innovation Economics*, 20(2), 151. <https://doi.org/10.3917/jie.020.0151>
- Beuermann, D. W., McKelvey, C., & Vakis, R. (2012). Mobile Phones and Economic Development in Rural Peru. *Journal of Development Studies*, 48(11), 1617–1628. <https://doi.org/10.1080/00220388.2012.709615>
- Brinkman, R. L., & Brinkman, J. E. (2011). GDP as a measure of progress and human development: A process of conceptual evolution. *Journal of Economic Issues*, 45(2), 447–456. <https://doi.org/10.2753/JEI0021-3624450222>
- Dynan, K., & Sheiner, L. (2019). GDP as a Measure of Economic Well-Being. *International Centre for Economic Research*, 1–53. <https://www.brookings.edu/wp-content/uploads/2018/08/WP43-8.23.18.pdf>
- Faragó, T., & Miklósi, Á. (2012). Cellphone evolution – applying evolution theory to an information communication system. December. <https://doi.org/10.1109/CogInfoCom.2012.6421953>
- Ganiyu, O., Adelopo, I., Rodionova, Y., & Samuel, O. L. (2019). Capital Structure and Firm

- Performance in Nigeria. *African Journal of Economic Review*, 7(1), 31–56.
<https://doi.org/10.22004/ag.econ.284999>
- HOTI, E. (2015). The technological, organizational and environmental framework of IS innovation adaption in small and medium enterprises. Evidence from research over the last 10 years. *International Journal of Business and Management*, III(4), 1–14.
<https://doi.org/10.20472/bm.2015.3.4.001>
- Kayode, E., & Bin, O. (2013). The Role of Econometrics Data Analysis Method in the Social Sciences (Education) Research. 4(7), 159–168.
- Kiganane, L. M. (2015). M? Pesa * and * its * Perceived * Effect * on * Performance * of * Manufacturing * Firms :* A * Case * Study * of * Thika * Town * in * Kenya *. 2(1), 190–201.
- Martis, R. N. (2013). Capital Structure and Firm’s Financial Performance - An Empirical Analysis of S&P500. Master Of Finance Thesis, Van Tilburg University.
- Mawejje, J., & Lakuma, P. (2019). Macroeconomic effects of mobile money: evidence from Uganda. *Financial Innovation*, 5(1). <https://doi.org/10.1186/s40854-019-0141-5>
- Mbiti, I., & David Weil. (2014). Mobile Banking: the Impact of M-Pesa in Kenya. *Igarss 2014*, 1, 1–5. <https://doi.org/10.3386/w17129>
- Mbogo, M. (2010). The Impact of Mobile Payments on the Success and Growth of Micro-Business: The Case of M-Pesa in Kenya. *Journal of Language, Technology & Entrepreneurship in Africa*, 2(1), 182–203. <https://doi.org/10.4314/jolte.v2i1.51998>
- Nyaga, M. K. (2013). the Impact of mobile money Services on the Performance of By. *Business and Public Management at KCA University*, November, 2013, 1–99.
- Pacheco-Bernal, C., Jiménez-Zarco, A. I., & Martínez-Argüelles, M. J. (2020). Understanding the Determinants for the Adoption of Mobile Market Research: An Empirical Study in the Spanish Market Research Industry. *Frontiers in Psychology*, 11(March), 1–17.
<https://doi.org/10.3389/fpsyg.2020.00288>
- Pelletier, A., Khavul, S., & Estrin, S. (2019). Innovations in emerging markets: the case of mobile

- money. *Industrial and Corporate Change*, 29(2), 395–421. <https://doi.org/10.1093/icc/dtz049>
- Rosli, M. M., & Sidek, S. (2007). Innovation and Firm Performance : Evidence from Malaysian Small and Medium Enterprises Literature Review Innovation. *Entrepreneurship Vision 2020: Innovation, Development Sustainability, Nad Economic Growth*, 1980, 794–809.
- Safaricom. (2020). Annual Report. 1–216.
- Sanyal, R. (2019). Profit Theory. Research Gate, August.
- Skripak, S. J., & Tech, V. (2016). *Fundamentals of Business*.
- Torres-reyna, O. (2007). Panel Data Analysis Fixed and Random Effects longitudinal or cross- is a dataset in which the behavior of entities are observed across time . Princeton University, Data and S(December).
- Wu, S., Lei, Y., & Li, L. (2015). Evaluation of the Contributions of Four Components of Gross Domestic Product in Various Regions in China. *PLOS ONE*, 10(4), e0121594. <https://doi.org/10.1371/journal.pone.0121594>

Appendix

Diagnostic Tests

Normality Test

The dependent variable mobile money was a dummy taking on the value of either zero or one. Estimating mobile money, therefore, required the adoption of a limited dependent variable model (binary dependent variable model). There were three possible models, namely: linear probability model (LPM), the logistic model, logit model, and the probit model. LPM was not considered due to the possibility of heteroscedasticity, and obtaining probabilities for mobile money that violate the $[0, 1]$ definition of probability. For binary dependent variables, the logistic function and the logit function exhibit similar behavior. The logit function follows extreme value (Weibull) distribution. The Probit model follows the normal distribution. The normality test was, thus, important in deciding between logit and probit models.

There were many normality tests including the Shapiro-Wilk procedure, and the Kolmogorov and Smirnov procedures. However, the Shapiro-Wilk procedure was found to be the most powerful normal data test. Therefore, the study utilized the Shapiro-Wilk procedure. The hypothesis under consideration was that the residuals were approximately normal. The decision rule was that this claim would not hold if probability values were less than the 5% significance level.

Table 6: Shapiro-Wilk Normal Data Test

revealed that log of sales, manufacturing, small firm, medium firm; managerial experience, innovation, credit access, and mobile money were normally distributed. However, large firm, competition, manager's gender, high fees, large payments, customer adoption, supplier adoption, and skills shortage were not normally distributed. Since not all variables were normally distributed, the logit model was preferred to the Probit model in estimating mobile money.

Table 6: Shapiro-Wilk Normal Data Test

Variable	Observations	W	V	Z	Probability>z	Remarks
Log of sales	259	0.99744	0.479	-1.714	0.95669	Normal
Manufacturing	259	0.99847	0.285	-2.923	0.99826	Normal
Small firm	259	0.99976	0.046	-7.194	1.00000	Normal
Medium firm	259	0.99094	1.695	1.230	0.10941	Normal
Large firm	259	0.96644	6.280	4.282	0.00001	Not normal
Managerial experience	259	0.99472	0.988	-0.027	0.51093	Normal
Innovation	259	0.99781	0.409	-2.084	0.98144	Normal
Credit access	259	0.99670	0.618	-1.123	0.86921	Normal
Competition	259	0.98803	2.240	1.880	0.03008	Not normal
Manager's gender	259	0.95488	8.442	4.972	0.00000	Not normal
mobile money	259	0.99861	0.261	-3.132	0.99913	Normal
High fees	259	0.80024	37.376	8.439	0.00000	Not normal
Large payments	259	0.95974	7.533	4.706	0.00000	Not normal
Customer adoption	259	0.91127	16.601	6.548	0.00000	Not normal
Skills shortage	259	0.77645	41.825	8.702	0.00000	Not normal
Supplier adoption	259	0.92415	14.192	6.183	0.00000	Not normal

Multi-Collinearity Test

Perfect linearity between one explanatory variable and others results into multi-collinearity. The consequence of multi-collinearity is that the estimates will not be stable and the variances will be very large. Large variances distort inferences. The current study tested for multi-collinearity using the variance-inflating factor (VIF). In using the VIF test, the decision rule was such that multi-collinearity will be deemed present if the VIF was larger than 10. Table 7 suggested that there was no multi-collinearity.

Table 7: Multi-collinearity test

Variable	Variance-inflating factor	Tolerance
Supplier adoption	3.50	0.286058
Customer adoption	3.24	0.308378
Manufacturing	1.76	0.568931
Large payments	1.75	0.570756
Competition	1.70	0.589450
mobile money	1.51	0.660135
Small firm	1.43	0.696896
Large firm	1.35	0.741404
Skills shortage	1.17	0.856864
Credit access	1.12	0.894201
High fees	1.11	0.898160
Innovation	1.09	0.916751
Managerial experience	1.08	0.925937
Manager's gender	1.06	0.945280
Mean VIF	1.63	

Heteroscedasticity Test

Heteroscedasticity arises when the random error term has no constant variance. This results into wrong standard errors that consequently lead to wrong inferences. Therefore, the current study tested for heteroscedasticity by utilizing the Breusch-Pagan procedure. The claim tested was that the error term had a constant variance and therefore homoscedastic. The decision rule was such that the claim fails to hold if the probability value given by the Breusch-Pagan procedure is less than 5% significance level. Table 8 revealed that the error term had a constant variance since the probability value was larger than 5%.

Table 8: Breusch-Pagan / Cook-Weisberg test for heteroscedasticity

Ho: Constant variance
Variables: fitted values of log of sales
Chi-square (1) = 0.71
Probability value = 0.4001

Hausman Test

In order to choose between the fixed effects model and the random effects model, the Hausman test was carried out. This involved first estimating the fixed effects model, storing the estimates, estimating the random effects model, and then executing the Hausman test. In the Hausman test, the claim investigated was that firm-specific characteristics were better captured under the random effects model which was considered appropriate. Table 9 suggested that this claim did not hold. This is because the probability value was less than the 5% significance level (see Table 9). Consequently, fixed effects model was adopted for analysis.

Table 9: Hausman Test

	(b) fixed	(B)	(b-B) Difference	Standard error
Manufacturing	-1.964429	-.133647	-1.830782	.8689217
Small firm	-.8318665	-2.855427	2.023561	.8131448
Medium firm	.2876851	-1.156957	1.444642	.5917148
Manager experience	.1741379	.0961948	.0779432	.3348238
Innovation	-.4644161	-.0572106	-.4072054	.2407147
Credit access	-.045182	.3365241	-.3817062	.2521698
Competition	-.2882703	-.7255924	.437322	.3706737
Manager gender	.6078237	.4694459	.1383778	.3964441
mobile money	.1314203	.0624303	.0689899	.3205805
High fees	-1.3106	-1.383793	.0731933	.6125915
Large payments	-.2497926	-.5424666	.292674	.4624216
Customer adoption	-1.178124	-.0581024	-1.120022	.6998427
Skills shortage	1.635728	-1.149729	1.750701	.6523536
Supplier adoption	.9264245	.9145096	.0119148	.6731811

Chi-square=30.91, degrees of freedom=14, probability>chi-square=0.0057