EFFECT OF ALTERNATIVE CHANNELS OF BANKING ON POVERTY IN KENYA

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DECLARATION

This research project is my original work and has not been submitted for a degree in any other university.

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K012/CE/14174/2009

This research project has been submitted for examination with my approval as the university Supervisor.

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DEDICATION

To my Late dad, Caleb and mother Herine who have been my inspiration throughout my academic life.

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ABBREVIATIONS AND ACRONYMS

ATMs   Automated Teller Machines

CBK   Central Bank of Kenya

CGAP   Consultative Group to Assist the Poor

GDP   Gross Domestic Product

KSh   Kenya Shillings

MFIs   Micro Finance Institutions

P2P   Person-to-Person

PEOU   Perceived Ease of Use

PU   Perceived Usefulness

USD   United States Dollar

UTAUT   Unified Theory of Acceptance and Use of Technology

OPERATIONAL DEFINITION OF TERMS

Poverty Line: This is the threshold where a person is said to be either poor or not poor. Above that line, the person is not poor while below that line the person is poor

Absolute poverty: This describes the state where a person is below poverty line and spends less than one dollar per day.

*Poverty per head ratio***:** Is the level of resources as measured by the amount of money a household a person spends in day

Financial Institution: A financial institution is an intermediary between consumers and the capital or the debt markets providing banking and investment services.

ABSTRACT

Creating sustainable alternative channels of banking has been the priority of the Kenya Government over the last decade. In the last ten years, Kenya, like other developing countries has experienced high levels of financial exclusion and poverty incidences. Financial inclusion as a consequence of alternative channels of banking is seen as a step toward poverty reduction. Within the broader context of economic empowerment, financial inclusion is seen as a crucial instrument to deal with poverty and disparities and as a result, further economic growth. Financial inclusion increased from 26.7 percent in 2006 to 75.3 percent in 2018 thanks to the invention of mobile money and agency banking. The poverty rate dropped from 46% in 2007 to 36% in 2018. Individuals are being offered financial services such as credit, payment of services, and savings through mobile money, hence expanding access to financial services. To reduce poverty, it is important that the country's population have access to appropriate financial services and products to boost their standard of living. It is noted, however, that the rate of decline in poverty was much lower than the rate of growth in alternative channels of banking. This study aimed at investigating the effect of alternative channels of banking on households' savings and poverty in Kenya. The variables investigated were agency banking, mobile banking, households' savings and poverty levels. The study used a longitudinal research methodology and monthly data from March 2007 to December 2018. The research questions were answered using descriptive and regression analysis approaches. According to the estimates, a 10% increase in mobile banking usage would result in a 0.9 percent increase in household savings, a 10% increase in agency banking usage would result in a 3.83 percent increase in household savings, and a 10% increase in household savings would result in a 1.44 percent reduction in poverty. It is proposed that the government should collaborate with other innovators such commercial banks, microfinance institutions and telecommunications firms to increase coverage and access to alternative channels of banking for enhanced financial inclusion and poverty reduction. This can partly be achieved through design and implementation of favourable policies that support growth and uptake of alternative channels of banking and relevant innovation.

CHAPTER ONE

BACKGROUND

1.1 Introduction

This chapter gives the background on development of alternative channels of banking, the level of poverty in Kenya as well as trends in alternative channels of banking and poverty in Kenya. Problem statement, research questions, study objectives and significance of the study are also presented.

1.1.1 Development of alternative channels of banking

Sadique, Shohrowardhy and Hassan (2016) defines alternative banking as the use of alternative service outlets of delivery to the traditional banking model. The term is used to refer to the practice of carrying out financial exchange electronically, without communication with the banks or visiting the bank branches. Alternative banking, according to Kumbhar (2011), refers to methods other than traditional banking for processing transactions. Branchless banking is an example of alternative banking, illustrating that it is a channel for distribution utilized to provide financial assistance without relying on bank branches. As branchless banking, alternative banking can be used as a new distribution approach operated solely by bank branches to augment an existing network for bank clients with a larger range of networks through which they can access financial services.

In 2013, 10.7% of the world's population, or almost 767 million people, lived on less than USD 1.90 per day, compared to 12.4% in 2012. (World Bank, 2013). It is estimated that 389 million people, or half of the world's population, live in Sub-Saharan Africa,

which has a higher poverty rate than the rest of the world combined (World Bank, 2013). The majority of people are excluded from the official financial sector, and there are few to none formal financial institutions that could help them increase their earnings and standard of living.

According to a report on Kenya's well-being, poverty in Kenya has remained high and is continuing to climb (Republic of Kenya, 2007). Overall poverty increased from 44.8 percent in 1992 to over 46 percent in 2007, according to the report. According to CBK (2017), the financial division came close to reaching financial requirement of the poor along with Kenyans staying in rural areas. Financial resolve was required because nations cannot work on along with advancing economic development when most of its citizens have few to no availability of financial assistance. To reduce poverty, it is important that most of the country's population have admission to befitting and granted financial aid and commodities to improve their standards of living (CBK,2017).

Financial inclusion is designed by a wide array of sensible and viable institutions at fair charges as universal coverage to a wide range of financial aid (World Bank, 2015). Financial inclusion endeavour first wants to ensure that all families and business, disregarding income level, has admission to, and put to efficient use, the fitting financial aid required to better their standard of living (World Bank, 2015). Almost two billion individuals internationally are not using structured financial services and more than half of men and women in the poorest families are unbanked (World bank, 2017).

Figure 1.1 shows the trends in financial inclusion in Kenya for the period 2006 to 2016.
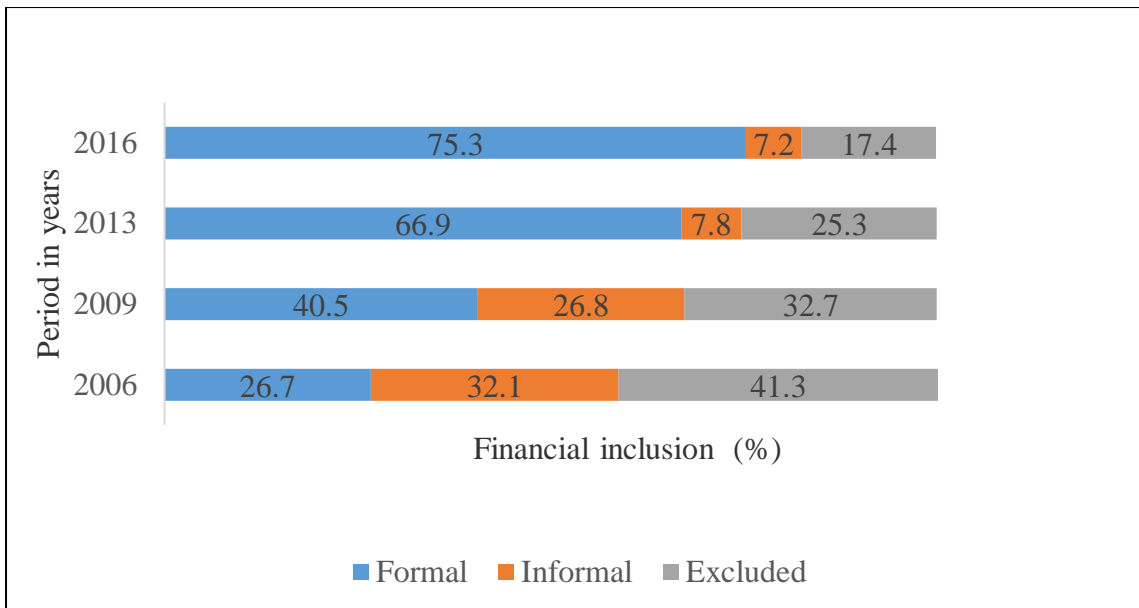
Figure 1.1: Trends in financial inclusion, 2006 – 2016.
 Source of Data: Finaccess (2016)

Figure 1.1 shows that Kenya made progress in expanding financial inclusion to about 75.3 percent in 2016 from 26.7 percent in 2006. The positive growth of 182 percent in financial deepening is attributed to the evolution of mobile banking and agency banking in 2007 and 2013, respectively (Finacess, 2016). As illustrated in figure 1.1, people who are financially excluded reduced by 34 percent from 2006 to 2016.

 Financial services facilitate the less fortunate to have improved nutrition, shelter, education for children and improved health-care and better ways of living. Alternative channels of banking, therefore, serves as an effective way to alleviate poverty in the world (Yanick, 2013).

The incessant problem with the banking system is that the financial institutions target the wealthy individuals and firms with financial muscles, leaving out the poor and rural households from accessing formal financial services (Obb, Wry & Yanfei Zhao, 2016). From that perspective, it has been touted that policies on alternative channels of banking

are aimed specifically to improve the banking sector and include the poor. Kiarie (2013), noted that poor people have been blocked from accessing the financial services in Kenya causing an increase in inequality. Most of the less fortunate individuals are left out of the formal financial systems, with few to none admission to structured financial services that can aid them accelerate their incomes and standard of living. Therefore, government efforts on financial inclusion and alternative channels involves worldwide admission to a wide range of financial services at a fair amount provided by sound and robust financial institutions. Generally, financial inclusion efforts mainly strive to make sure all business owners and household members disregard to level of income, have admission to the appropriate financial help they need to get to higher living standards (Jolevska & Andovski, 2017).

Various authors have highlighted that there are positive linkages between alternative channels of banking and poverty reduction (Lal, 2018; Aro-Gordon, 2017). Increased access to financial services is argued to increase market access which facilitates access to credit, thereby supporting a savings-investment cycle. It enables the use of capital accumulation and the creation of assets that allow poor people to reduce their vulnerability to poverty. It also reduces their vulnerability to periodic economic and social shocks (Jolevska & Andovski, 2017).

In order to reduce poverty, create jobs and wealth in underdeveloped countries, provision of credit and saving mobilization to fund investments is crucial. Arora (2016) maintains that credit plays a role in reducing poverty. Alternative channels of banking created by the government and other institutions have given the poor a chance to access credit facilities, saving products and opening of accounts. These alternative channels

overcome the barriers associated with high costs and proximity while deepening financial inclusion (Osei-Assibey, 2014).

In Kenya, micro finance institutions (MFI's) were the early adopters of the idea of targeting the low income earners. Alternative methods of banking were later adopted by local commercial banks that tailored formal financial services to meet the needs of low income and rural households in Kenya. Banks now provide customers with micro loans that require no collateral or small security like household chattels. Customers can now open an account through their mobile phones without a minimum opening balance and start saving immediately without visiting a physical branch. Financial institutions also hire agents to reach out to rural households and customers who cannot easily access branch banking for formal financial services.

The development of communication and innovation in the banking sector has made it conceivable that even without venturing into a physical monetary framework through elective banking networks, one can do most of the banking exchanges from any field (Tarannum, 2015). A revolution in the spectrum of payment solutions has been experienced to the unbanked individuals and financial institutions seeking alternate bank platforms. Certain banking platforms used are new-age banking technologies, such as automatic teller machines (ATM), internet banking, credit cards, debit card schemes, mobile banking, and banking services (Ndungu, 2015). However, while all these alternative channels are adopted in urban centers only, agency banking and mobile banking are adopted in the rural areas (Ndungu, 2015; Kumbhar, 2011).

Since its establishment, mobile banking has spread in all the continents of the world. Banks all over the globe are countering to this circumstance by bringing about mobile services which offer a range of services. Balance inquiries, cash transfers, bill payments, airtime purchases, loan applications, account openings, and SMS alerts on credits and withdrawals are among the services available. Morrall (2015) highlights that the main features of mobile banking include efficiency, security, cost effectiveness, fulfillment, reliability, improved access responsiveness and convenience. Table 1.1 shows the growth of mobile money accounts, mobile money agents, transactions and volume transacted on mobile banking in Kenya from 2007 to 2018.

Table 1.1: Mobile money accounts between 2007 and 2018.

Year	Sum of Agents	Total Number of Accounts (Millions)	Total Number of Transactions (Millions)	Value of Transactions (KSh. Billions)
2007	1,582	1.35	1.27	3.77
2008	6,104	5.08	10.21	26.99
2009	23,012	8.88	21.69	52.34
2010	39,449	16.45	29.12	75.87
2011	50,471	19.19	41.71	118.08
2012	76,912	21.06	55.96	150.16
2013	113,130	25.33	69.14	182.50
2014	123,703	25.25	85.61	225.55
2015	143,946	28.64	107.44	267.07
2016	165,908	34.96	126.35	316.77
2017	182,472	37.39	139.93	332.62
2018	211,961	45.44	155.16	343.23

Source of Data: World Bank (2018)

Table 1.1 shows that the mobile money accounts increased from 1.35 million active users in 2007 to 45.44 million active users in 2018. For the first time in 2018, mobile money accounts reached 45 million points showing the impact of an 11-year-old breakthrough in promoting financial inclusion. The popularity of mobile money transfer services continues to grow among companies and individuals, some of the past becoming unbanked using the sites as first accounts for banking exchange. Payments worth KSh 343.23 billion were done through mobile devices in 2018, which was KSh 10.61 billion or 3 percent more than the previous year at the same point.

Contrary to the years when the mobile money stages were primarily used for individual money transfers, they are already progressively used to initiate and facilitate trade deals such as the purchase of goods and products and the handling of short-term instant borrowing. Technology has shifted the focus from traditional banking to digital banking where customers have a bank in the palm of their hands. Technology has also eliminated the limitation of distance and improved the customer base of financial institution through alternative channels of banking. The volume of cash transacted on mobile banking improved from KSh.5.05 billion to KSh.3.6 trillion in 2017 which shows that people are using alternative channels of banking for savings.

Brazil is mostly regarded as a worldwide developer in the field of agency banking since it was one of the first adopter of the model (Winn, 2015). This was followed by other countries in Latin America such as Mexico, Bolivia, Peru, Colombia, Ecuador, Venezuela, and Argentina. Thereafter, the use of agency banking has spread all over the world (Shareef *et al.*, 2016).

The example from Brazil has been beneficial throughout the globe, with regard to nations which authorize contracting with agents (Timbora, 2014). The banking staff, in charge of the parent bank account, provides all banking services in Brazil including deposits, cash withdrawals, transfer of funds, bill payments, bank balance queries, and more. Initial commercial banks have a part to play in ensuring banks have all the tools of the job bank, for example, point-of-sale (POS) and readers, mobile devices, a bill-scanner, a personal identification number (PIN) for customer heritage, and in aspect-pcs connected to banks servers, according to CGAP (2011).

In Kenya, agency banking was established in 2010, and banks have continued to adopt agency banking models to improve access to financial services. In 2018, the transmission of financial services via agency banking remained on the rise. In December 2016, 18 commercial banks and 5 microfinance banks (MFBs) employed 61,290 and 2,191 bank agents, respectively, up from 53,833 and 2,068 agents in December 2016. (CBK, 2018).

The majority of staff in 89 percent of registered commercial banks worked for three companies. The highest physical regional representation was in Equity Bank with 28,663 agents, Kenya Commercial Bank (KCB) with 14,466 agents, and Cooperative Bank with 11,207 (CBK, 2018).
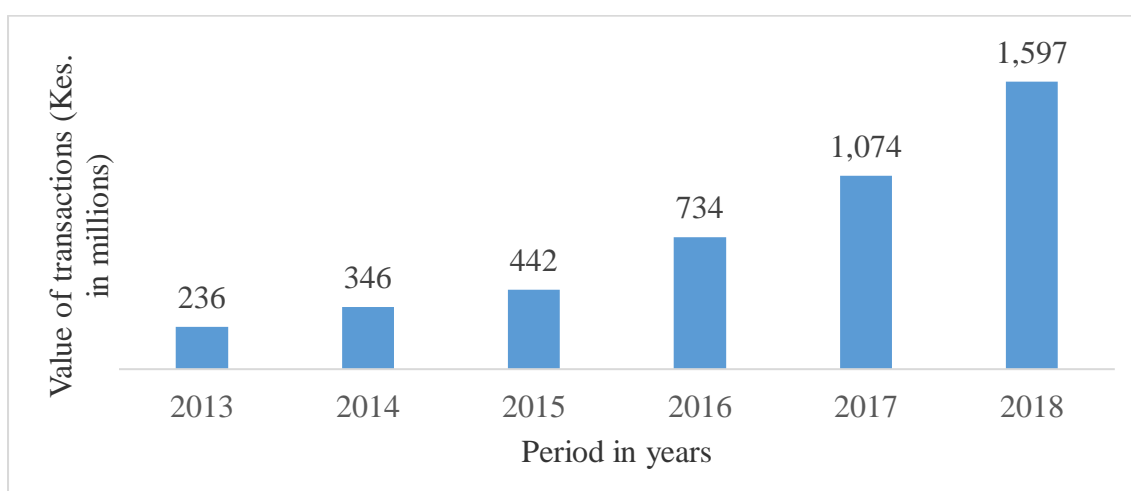
Figure 1.2: Value of Agency banking transactions in KSh. billions.
Source of Data: CBK (2018)

Figure 1.2 shows that the value transacted on agency banking increased from KSh.236 Billion in 2013 to KSh.1.597 Trillion in 2018. Kenyans used the platform to exchange more currency in 2018 than in 2017, indicating that agency banking is gaining traction in the country (CBK, 2018). According to the Central Bank of Kenya's (CBK) banking supervision report, the number of exchanges conducted by agents increased by 34% from KSh.104 million to KSh.139 million in 2017. (CBK, 2018). According to the data presented, old banking halls are becoming outdated in comparison to agency banking, a model in which most of these financial institutions extend part of their services to previously unbanked people.

In 2018, the amount of money traded through agency banking reached an all-time high of KSh.1.59 trillion, up from KSh.1.074 billion in 2016. The 48 percent increase was attributed to the model's increased efficiency, which witnessed an increase in transactions involving bill payment, fund transfers, cash deposits, and cash withdrawals (CBK, 2018). In contrast to traditional banking halls, where a teller is exclusively available during defined banking hours, agents typically give flexible schedules despite

providing a restricted variety of financial services. This has contributed to the increase on the number of banking agency outlets to 68,239 in 2018 as shown in Figure 1.3.
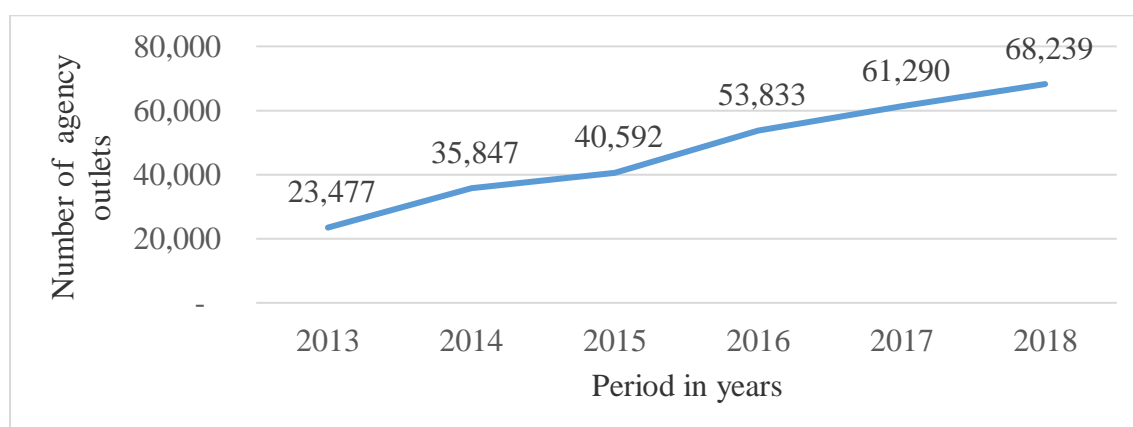
Figure 1.3: Agency banking outlets for banks
Source of Data: CBK (2017)

According to Figure 1.3, the number of agents has increased across the country, from 61,290 in 2017 to 68,239 in 2018. The inclusion of 6,949 agents meant an increase of 11% in the number of outlets. Between 2014 and 2018, three commercial banks failed, bringing the total number of commercial banks down to 40. In addition, the national branch network shrank by 23% from 1,541 in 2016 to 1,518 in 2018. (CBK, 2018).

Equity Bank has more active agents than KCB and Co-operative Bank combined, with 28,663 active agents. 90 percent of commercial bank agents in the country were represented by the three largest banks. Only 18 of the 40 operating banks in 2018 provide banking agency services (CBK, 2018).

The continued rise in agency exchange was because of the rise in the market presence of bank agents, their products and services they sold. Moreover, the rise in number shows Kenyans increasing financial deepening. According to CBK (2014), an agent driven model for banking can be a low cost-effective vehicle to contain big unbanked and underbanked non-urban constituents into the banking ecosystem. The beneficiaries

of this model would be both the commercial banks who would expand their customer base profitably and the public who would easily access the financial services (Waruguru, 2014). As large portion of the unbanked/underbanked population accept agency banking and gets added into the financial ecosystem, it would not only have effect on them personally but lead to the nation's economic and social development.

Agency banking is, therefore, among the top aspiration by the government of Kenya especially in social economic empowerment agendas such as women empowerment. This will see a lot of households be included to the financial ecosystem and realize the better ways of saving and investments which would definitely help in curbing poverty (Oduor, 2016).

1.1.2 Poverty

The international poverty line was raised to US$1.90 per day from US$1.25 per day by the World Bank in 2015. The poverty line has been updated to include fresh data on differing cost of living in different countries. Using the revised line, worldwide poverty has decreased from 902 million people in 2012 to 702 million people in 2015. (World bank, 2015). Poverty continues to be a source of worry around the world, particularly in developing countries (Rewilak, 2017). According to the World Bank (2012), nearly half of the world's population (43%) lived on less than $2 per day in 2010. In Sub-Saharan Africa, 47 percent of the population lived on less than $1.25 per day. In Kenya, around 46% of the population lives below the poverty line (World Bank, 2012). According to the 17th edition of the Kenya Economic Update, the proportion of people living on less than the global poverty line (US$ 1,90/d for 2011) dropped from 46,8percent in 2004/06 to 36,1percent in 2015/16.

Following the turn of the century, Kenya saw an increase in economic growth and an improvement in living conditions. According to government estimates of the poverty headcount rate, poverty in Kenya has reduced by 11 percentage points from 2005/06, to settle at 36.1 percent in 2015/16, signifying a decrease of 0.2 million persons in poverty, according to the latest Household Budget Survey in 2015/16.
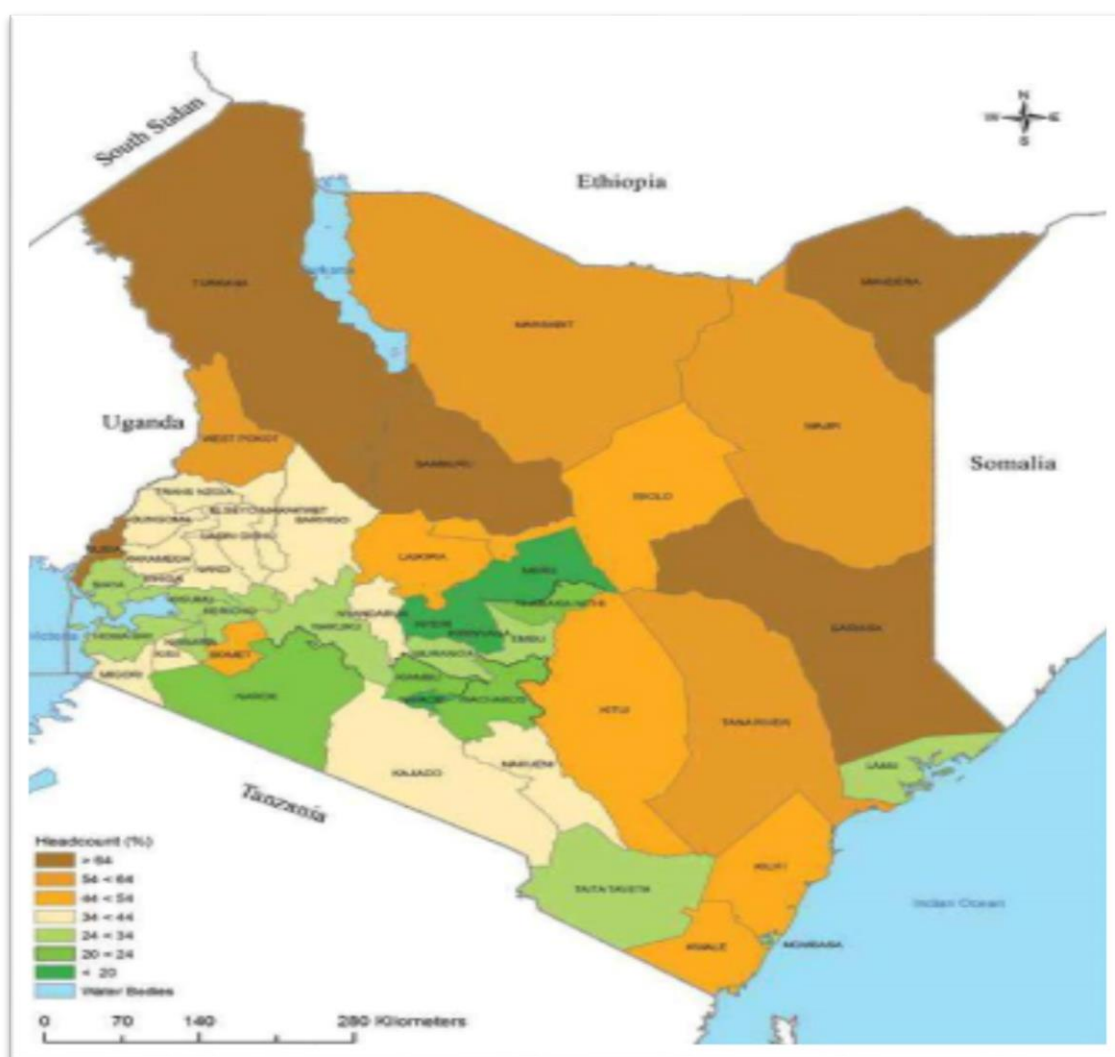
Figure 1.4: Poverty headcount rates per county, Kenya, 2015/16.
Source of Data: KIHBS 2018

Figure 1.4 shows that poverty rates in rural areas (40%) remain significantly higher than in peri-urban or core urban areas (28-29%), with the annual absolute rate of

reduction in rural areas (1.2 percentage points) being slightly slower than in peri-urban areas (1.5 percentage points), despite the fact that poverty in urban areas increased. Furthermore, even these disparities conceal regional variability, with poverty rates nearing 80% in Turkana's north east region, for example (Figure 3).

1.1.3 Alternative channels of banking and poverty

Figure 1.5 illustrates the comparison between trends of alternative channels of banking and poverty rate in Kenya between 2007 to 2018.
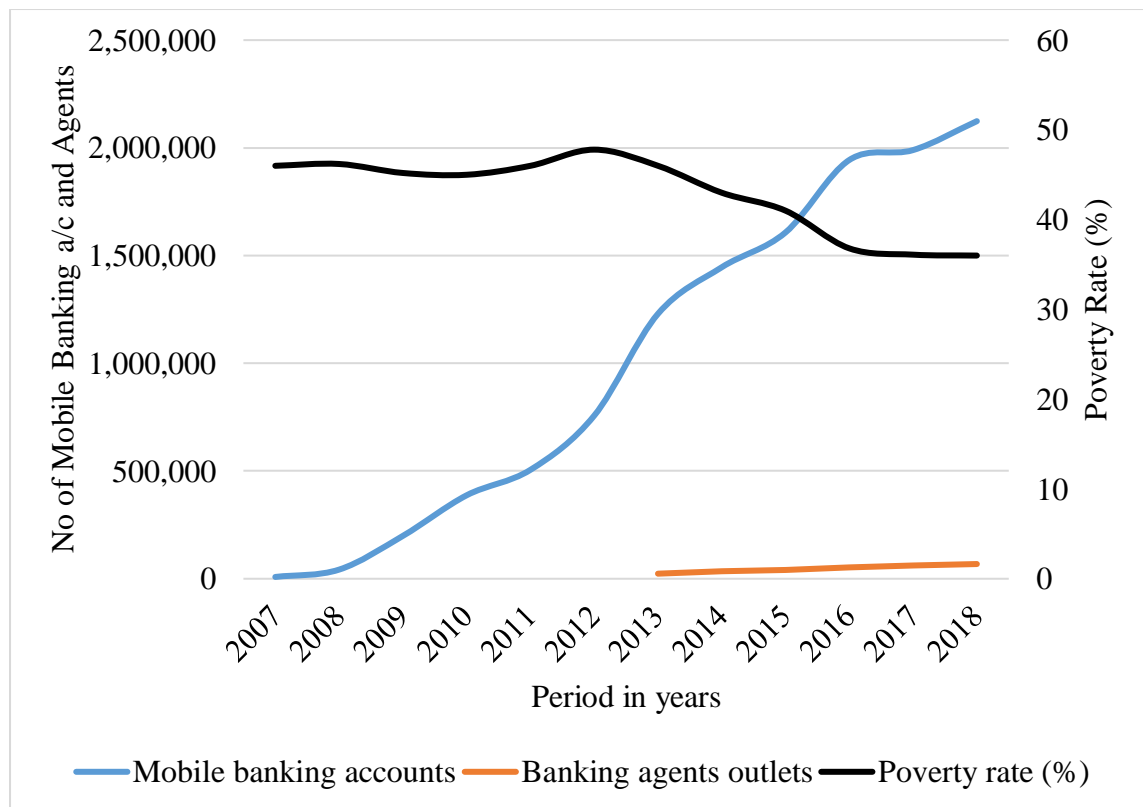
Figure 1.5: Trends of Mobile Banking, Agency Banking and poverty rate between 2007 – 2018.
Source of Data: CBK (2018)

Figure 1.5 shows that utilization of mobile banking and agency banking have been increasing significancly since evolution in 2007 and 2013 respectively. Utilization of mobile banking and agency banking increased by 161 percent and 23,987 percent, respectively between 2007 and 2018. During the same period, poverty reduced by 27

percent.The reduction in poverty was, however, not as significant as the growth of utilisation of alternative channels of banking.

In spite of the betterment, admission to formal financial services in Kenya is below par. In most cases, less fortunate people who are ignorant and have a poor, irregular, and sporadic income lack the proper alternative channel capabilities that complement their lifestyles and can help them escape poverty. Research indicate that the poor require financial tools that are befitting, malleable, convenient, fast and economical. The mobile money channel and the agent network offer the best place so far for getting in touch with the poor and unbanked.

1.2 Problem Statement

Financial inclusion has grown beyond the physical branch with each passing year as information and communications technology (ICT) is improving exposure and use of banking services worldwide (Dinizet et al., 2012). In the last 10 years since 2007, Kenya has accomplished a substantial increase in the penetration of financial services (Ngugi,2012). One of the elements that contributed to this higher degree of inclusion was the creation of financial inclusion as a regional objective in Vision 2030. Financial inclusion as a outcome of increased another route of banking has grown tremendously. In 2006, financial inclusion was at 26.7 percent. By 2017, financial deepening increased to 75.3 percent (Finacess,2017).

Poverty rate in Kenya decreased from 47 percent as of 2006 to 36 percent as of 2018, implying a 11 percent point reduction. The rate of decline in poverty was much lower

than the rate of growth in alternative channels of banking. Poverty reduction can be caused by a myriad of factors.

Ndege (2012) examined the relation between Kenya's deepening banking sector and growth of the economy, and identified a positive correlation between Kenya's deepening financial sector and economic growth. There are fluctuating argument about the impact of micro financing services in helping the poor break neediness, somewhat due to the complexity of evaluating impact at macro levels. It is conceivable that lives are improved and financial lives progressively sorted out, but to what extent does alternative channels of banking contribute to poverty reduction is subject to debate.

Banking service accessibility was measured in terms of bank branch penetration, ATM penetration, mobile banking penetration, and agent penetration (Mostak & Sushanta, 2015). Financial inclusion leads to improved living standards and poverty reduction. This study, therefore, seeks to determine the extent of utilization of alternative channels of banking.

1.3 Research questions

The research sought to answer the following questions:

  i. What is the effect of alternative channels of banking on household's savings in Kenya?
  ii. What is the effect of alternative channels of banking on poverty in Kenya?

1.4 Objectives of the study

The main objective of the study was to find out the effect of alternative banking

channels on poverty in Kenya. The research objectives are to:

i.   Establish the effect of alternative channels of banking on household's savings in Kenya.

ii.   Examine the effect of alternative channels of banking on poverty in Kenya.

1.5 Significance of the study

A study of the effect of alternative channels of banking on poverty in Kenya may be important to CBK and researchers in understanding the effect of alternative channels of banking on economic growth and poverty in Kenya. The research may chip in to the current body of knowledge and also provoke researchers to evaluate the effect of different channels of banking. The findings from this study can be useful to CBK in evaluating the effect of financial deepening on poverty reduction in Kenya.

1.6 Scope of the Study

The study was limited to two alternative channels of banking which have the highest number of active users in Kenya, namely, mobile and agency banking. The study covered the period 2007 to 2018. This was the period that followed the evolution of mobile and agency banking in Kenya. The period is long enough to capture the effect of alternative channels on poverty. Poverty rate in Kenya decreased from 47 percent as of 2006 to 36percent as of 2018, implying a 11 percent point reduction. The rate of decline in poverty was much lower than the rate of growth in alternative channels of banking.

1.7 Organization of the study

The project is divided into five chapters. In first chapter, Kenya's history and impact of alternative banking networks on poverty are discussed. This clarifies the issue as well as the significance of the analysis. In Chapter two, you'll learn how to check both theoretical and empirical literature. Chapter three delves into the methodology employed for the analysis. The study findings and discussions are presented in Chapter four, followed by the descriptive results and finally the diagnostic test results. The fifth chapter summarizes the research, draws conclusions, and makes policy recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature from the previous studies. It provides an explanation of existing theories and empirical studies of alternative channels of banking on poverty. It also presents an overview of literature.

2.2 Theoretical Literature

This segment deals with alternate banking system hypotheses. Finance development theory, unified agreement theory and technical application, financial intermediation theory and driver impact theory are the key theory that explains alternate banking channels and, ultimately, offers the theoretical framework of the subsistence effects of alternative banking channels on poverty.

2.2.1 Finance-Growth Theory

Levine (1996) proposed the finance growth theory. Financial development, according to the finance growth hypothesis, creates an effective environment for development through the 'supply leading' or 'demand-following' effect (Levine,1996:56). The scarcity of access to finance, according to finance – growth theory, is a critical element responsible for persistent economic inequality as well as stagnating progress. As a result, having access to a safe, simple, and inexpensive type of finance is seen as a necessity for promoting growth and reducing economic inequalities, as well as inadequacies, which creates an equitable playing field.

Alternative banking channels allow economically and socially disadvantaged people to better integrate into the system, contribute actively to growth, and protect themselves against economic catastrophe (Serrao et al., 2012). When it comes to the function of financial institutions in economic growth, ideal tension does arise. Supporters of the demand-following approach contend that, to some extent, the financial system does not drive economic growth; rather, the financial system simply reacts to changes in the real economy. The stock market's leading supporter disagrees with the preceding viewpoint. Bagehot is credited with the inception of the finance-led growth concept (1873). Those who support the finance-led growth hypothesis argue that the presence of a vibrant financial sector boosts growth. Schumpeter in 1911 argued that by providing efficient markets for capital, banks offer an economy to grow. According to Ndebbio, Goldsmith (1969), McKinnon (1973), and Levine and Zervos (1996) all emphasized the favorable economic growth impact of financial systems (2004). The main point of contention among supporters of the supply-side hypothesis is that financial markets progress in response to increased demand for financial services from a once-promising economy. However, because this theory does not demonstrate a solid or direct link between poverty and alternative banking channels, it was not included in the current study.

2.2.2 Unified Theory of Acceptance and Use of Technology

Venkatesh (2000) advanced the unified theory of technical acceptance and use. To order to use a data system and to observe the actions of consumers, the common principle of recognition and use of technology expectations should be defined. The common philosophy of technology adoption and use is based on four key frames: success goals, expectations of commitment, social impact and ease. The success expectancy (PE), according to Venkatesh (2003), refers to the expectation that an individual has this

system to work. Venkatesh (2003) indicated that PE is targeted at implementing and embracing open data technology explicitly and fully. Following this belief, the theory informs the prevalence and the use of mobile and agency banking in the sense that these two systems are accepted and used in regard to the level of trust by the public that they will work. If the households presented by these forms of technology believe that agency banking is form of scam, chances are that they will not use them and that potentially will not affect their level of poverty. However, if they believe that systems will work, the household will conduct their daily transactions, therefore, improving the effectiveness of their activities and consequently improving their standards of living (Munoru,2013). This argument is supported by the Facilitating Conditions (FC) which apply to the degree of conviction in the fact that the person system and technical infrastructure is keen to back the use of invention (Vankeash, 2003).

Unified theory of acceptance and use of technology hypothesizes that the development of economy in terms of poverty reduction and equality is a reflection of acceptance of alternative banking channels. The theory may be useful in discussing the utilization of alternative channels of banking. However, it does not completely relate to growth or poverty reduction of the households.

2.2.3 Financial Intermediation Theory

Brandie and Abbott (2014) advanced definition in financial intermediation. The theory's underlying assumption is that financial intermediation is a strategy involving the deposit of surplus units with financial institutions that then lent to inadequate assets. Brandie and Abbott (2014) also indicated that four procedures would differentiate financial intermediaries. Secondly, a set amount not associated with the discharge of

the fund refers to your main group of obligations or deposits. Furthermore, the investments are generally short-term and much shorter than their savings. The crucial input of broker is a good flow of funds from overflow to deficit units. According to this theory, the households who have more cash may choose to save with these intermediaries and the households with less operating cash, may choose to borrow the saved cash, therefore creating channels of saving and borrowing (Agufa, 2016).

The work of financial brokers is mainly viewed as creating specialized financial commodities (Tan & Leby, 2016). These are produced once a dealer discovers to be able to sell them for sums to offset all direct and potential costs. Stock traders are suffering from market imperfections. As such, financial traders would not thrive with no exchange or expense of information in a perfect market setting. Knowledge gaps are found in different markets between buyers and sellers. Knowledge asymmetries are particularly pronounced in the financial markets. Borrowers usually have an idea about their indirect, diligence, and moral integrity better than do loaners. But at the other side, business people have in-house knowledge about their own funding programs. The market failure hampers the transmission of data among market participants, an important consideration in financing good quality programs. Over the years, farmers and individuals residing in upcountry have been sidelined in financial addition because of insufficient consistent income and poor saving structures. However, with the advent of alternative channels such as mobile banking, farmers can make savings through their phones which increase their chances to access credit. In addition, farmers can borrow money without any security or guarantors through mobile phones. This theory hypothesizes alternative channels of banking as financial intermediaries hence a reflection of the growth and development of households financially. It is relevant in

discussing the influence of alternative channels of banking on household saving. However, it does not clearly establish the influence of financial intermediation on poverty.

2.2.4 Conduit Effect Theory

Conduit effect theory is an extension of finance poverty theory brought about by Keynes (1937). McKinnon's (1973) theory suggests that financial growth directly affects poverty by allowing people to self-finance their economic effects. The notion linking finance and poverty can be regarded on two primary fronts, according to this assertion: the indirect channel and the direct channel. The first channel shows how changes in the financial sector have a trickle-down effect on the economy. The second consequence is the direct effect, which states that financial development aids the poor who lack the financial resources to self-finance projects. This means that financial development helps the less fortunate who are bound by credit limits and thus unable to obtain financing or credit for growth due to a lack of collateral. Therefore, the developments in financial sector reduce transaction costs and information asymmetry hence allowing the poor to access funds.

Financial development boosts the poor's potential production, allowing them to maintain long-term livelihoods. This is because advancements in the financial sector increase the poor's access to financial services, increasing their asset productivity and providing them with a stable foundation from which to live better, more sustainable lives. As a result, an underdeveloped financial system perpetuates income disparity, slow economic growth, and, as a result, poverty. This theory therefore gives a solid link between alternative channels of banking and poverty since alternative channels of

banking are some of the financial innovations that leads to development in financial sector. The theory was used in anchoring the part of the study which deals with the effect of alternative channels of banking on poverty.

2.3 Empirical Literature

Numerous researches have been done to estimate the effect of financial inclusion strategies on poverty. What follows is a review of empirical literature on effect of alternative channels of banking on poverty among low income earners both in developed and developing countries.

Kegan et al, in the United States of America. (2005) work has been conducted to analyze the impact of online banking on consumer savings initiatives. A mixture of primary and secondary data was used for the analysis to predict online banking strength. The research used the SEM to create an online banking chart and a statistical analysis model for bank performance evaluation. A survey was conducted of ten local banks in the province. The study found that financial institutions which had integrated online banking systems have a tendency of doing better than those banks which have not adopted the system. The study also found that online banking enables the customers to improve on their saving ability and ultimately resulted to improvement on their asset quality. However, the study failed to investigate whether low-earning households experienced the same effects. Additionally, the use of different data types may result to varying results. Further, Kegan *et al.,*(2005) was confined to online banking performance in United States of America in which the results of the study findings may not be applied in Kenya because the society is not a cashless economy.

Shichenga (2010) has been conducting research on factors that affect poverty levels in Busia. All primary and secondary household details were used in the analysis in the county of Busia. The collection of data took place using KIHBS 2005/6 questionnaires and secondary results. The study employed a descriptive research design. The study variables were household size, household age, education level, land size, occupation, number of livestock and poverty indicators. The study found that household size, household age, occupation, land size and number of livestock had a positive significant effect on poverty levels, while education had a positive effect and statistically insignificant effect. The study concluded that the insignificant impact was a result of lack of mobility of factors. Nonetheless, Shichenga (2010) study was generalized to factors affecting poverty levels in Busia and did not focus on alternative channels of banking or any method of financial inclusion as predictors of poverty level.

In India, Nandhi (2012) researched on the effect of mobile banking on saving practices of low income earners. The study espoused the use of descriptive research design. The study used primary data collection methods targeting low income earners in the cities of Delhi, Bilhar and Jharkhand. A total of 311 respondents were drawn from the study population. The study found that mobile banking lead to improvement in saving of 90 percent of the mobile user while 40 percent indicated that their saving practice improved after they had opened mobile money account. The main finding is that credit through mobile phones did not significantly contribute to growth of low income earners, especially due to high interest rates. The study by Nandhi (2012) therefore, presented contradicting results. It showed that while mobile banking improved savings, credit opportunities did not facilitate growth of low income earners. The main weakness of

the study by Nandhi (2012) is that it did not take into consideration other variables that might affect savings such as education level and age.

In India, Avesh *et al,*. (2013) investigated the influence of rural banking among rural consumers. The study variables were the types of banking accessible in rural areas and various services offered by those banks. The study used descriptive research design and employed the use of primary data as well as secondary data collected from 200 rural consumers through administration of structured questionnaire survey. The study found that the concept of alternative channels of banking and technology are new to the rural consumer. The main deficiency of the study is that it failed to estimate specifically the extent of utilization of alternative channels of banking among the poor, which is the focus of the current study.

Shkvarchuk and Slav'yuk (2019) conducted research to assess the characteristics of household financial behavior as one of the most important elements affecting country competitiveness. The study is based on data from Ukraine's State Statistics Service and spans the years 2001 to 2017. They discovered that the significant rise in inflation from 24.9 percent in 2014 to 43.3 percent in 2015 was the reason Ukrainian households were not only unable to build savings, but also had to rely on previous savings to subsidize present consumption requirements.

The impact of mobile banking services on saving behavior in West Africa was studied by Loaba (2021). They find that using mobile banking services increases the chance of formal and informal saving by 2.4 percent and 0.83 percent, respectively, using the Global Findex Database, 2017 and jointly estimating a multinomial logit model and a

probit model. Women are more likely to have informal savings, but using mobile banking services enhances their chances of having formal savings. The chance of using mobile banking services increases with increased education, employment (particularly in the public sector), and income. These findings show that the relationship between mobile phone companies and financial institutions should be improved.

Abubakar (2014) analyzed the impact on saving levels of commercial banks in Nigeria of electronic banking. The research took panel details from 2006 to 2012 into consideration. The actual investment has been transferred to telephone and Internet banking and a complete wealth has been regressed using multiple techniques of regression on the Internet and mobile banking. The study shows that the total importance of telephone and Internet banking has been calculated by mobile banking. The study found that there was a considerable affinity between electronic mobile banking and customer saving rates among the citizens in Nigeria. The study also established that there was a considerable correlation between internet banking and total deposit. Nevertheless, the study failed to establish the effect of savings on households and if mobile banking impacted positively on the lives of users.

In Nigeria, Adelakun (2015) investigated the relationship between savings, investment, and economic growth. The study used an error correction model to analyze time series data spanning twenty-nine years. As a result, the rate of inflation has a negative impact on saving, whereas the rate of interest has a positive impact on saving. Bonsu and Muzindutsi (2017) investigated the macroeconomic factors of household consumption expenditure in Ghana using a multivariate cointegration technique. Annual time records from 1961 to 2013 make up the sample period. The short- and long-run correlations

between selected macroeconomic variables and household consumption in Ghana were captured using the vector autoregressive model and Johansen cointegration technique. They found that greater inflation can lead to increased inflation uncertainty, which can lead to a reduction in consumption spending through a precautionary savings channel.

In their study, Aizenman, Cheung, and Ito (2019) argue that while conventional logic suggests that lowering the policy interest rate will stimulate consumption and investment while discouraging people from saving, low interest rates may actually encourage people to save more to compensate for the low rate of return. Their article illustrates that a low-interest rate environment can have diverse effects on private saving across country groups in different economic conditions, using data from 135 countries from 1995 to 2014.

In Kenya, Njenga (2014) explored the influence of mobile banking services among rural population. Njenga (2014) tried to establish the range of mobile banking utilization and what influenced rural population to use mobile banking services. The study applied cross-sectional survey research design and employed both primary and secondary data types. The study used financial inclusion as the dependent variable and gauges of mobile banking as the independent variables. The study found that mobile banking channels of banking implementations circulate around improved network coverage, good connections besides reduced costs to make certain of low-cost to all anticipation consumers. In addition, the study found that urban regions had more mobile banking users compared to rural areas. The study also established that mobile banking service providers lowered the mobile money transaction cost so as to encourage both the urban and rural users. Although the study gave insights on mobile banking utilization, the

study did not report whether mobile banking improved the lives of the rural households or not, as measured by the poverty levels of the households.

Nyakanini (2014) delved into the relationship between mobile banking and poverty degree among the old individuals in Kiambu County, Kenya. The study applied primary data on study variables which were, mobile banking, savings, household income, investments and assets. The study used descriptive research design. The results of the study indicated that mobile banking have a significant influence on poverty eradication among elderly in Kiambu County. The study also established that through the usage of mobile phones the elderly in Kiambu County feel more economically empowered by keeping few funds in M-pesa before it can be used for a certain purpose. It was also clear from the study that poverty reduction is accountable to a lot of reason and mobile money banking is one of the many reasons. The study, however, failed to establish the extent of poverty reduction due to utilization of mobile money banking.

Ngugi (2015) investigated the country's relationship between mobile banking and financial inclusion. The study's goal was to look into the function and financial inclusion of Kenya's mobile banking networks. Basic data was used in the analysis. The report followed a concise research design utilizing mobile banking canals as the independent variable and as the contingent variable financial inclusion. The study showed the beneficial effect on the monetary rise in Kenya of mobile money transmission networks. The study also found that mobile banking systems have significantly increased the financial markets, primarily through non-monetary financial products. Mobile banking systems in both urban and rural areas in Kenya also have significantly enhanced financial connectivity. Although mobile banking played a role

in financial addition, the study failed to establish the extent of utilization of mobile banking which contributes to financial deepening among other alternative channels of banking like Agency banking.

Wamaitha (2016) explored the interaction between small and medium companies (SMEs) and mobile banking in Nairobi City County's Gikomba market. The goal of the study is to look into the function of mobile banking in saving and investing. The study adopted the use of descriptive research design and used primary data to target Gikomba market entrepreneurs. The total sample of the population was 310 entrepreneurs and data obtained using questionnaires. Both descriptive and inferential statistics were used to assess quantitative data. The findings revealed that mobile banking was a secure place to save; transaction times were swift and efficient, and mobile banking enabled saving without the awareness of others. However, the study did not empirically show the effect of mobile banking savings on growth and development of people at Gikomba market.

In Kenya, Suri and Jack (2016) investigated the impact of mobile phone financial services on poverty reduction. Time series data from 2008 to 2016 were used in the study. The study included both qualitative and quantitative research methods. Descriptivism and inferential statistics were used to analyze the data. The study found that mobile money has a considerable influence on poverty reduction since it added to the efficiency of the portion of consumption over time. Mobile money makes the task of labor more efficient, leading to a significant poverty decline in Kenya. The study has reported that exposure to mobile money services has risen from extreme poverty (living on less than $1,25 monthly), by an additional 194 thousand–or 2percent-daily per capita

consumption of families in Kenya since 2008. The study showed that Kenyans earned more resources and experienced financial problems among other benefits through the use of such programs. Although the study established the effect of mobile phone financial services on poverty eradication in Kenya, the study failed to investigate the contribution of mobile money in poverty eradication because other factors could lead to poverty eradication.

2.4 Overview of Literature

The literature examined provides gives a justification about the effect of alternative channels of banking on savings. Theoretical literature reviewed put emphasis on the savings practices of low income earners. The empirical literature established different results on the effect of alternative channels of banking on savings. The past studies used different data in analysis. Most studies used descriptive research statistics, among them include Shichenga (2010), Nandhi (2012), Avesh *et al,*. (2013) and Ngugi (2015). Abubakar (2014) used panel data while Suri and Jack (2016) used both qualitative and quantitative data. The studies investigated effect of alternative channels of banking on customer savings, saving practices, and poverty eradication.

In a number of respects, this study differs from the empirical studies examined. First, the studies have tried to aim on the influence of alternative channels of banking on rural population; none of them has found the extent of utilization of alternative channels of banking by the poor. In order to fill that knowledge gap, this study focused on the effect of alternative channels of banking on households' savings and poverty levels.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter discussed the methods that would be used to conduct the research. It looked at the research design, theoretical framework, model specification, variable definition and operationalization, data types and sources, as well as data collection procedures and analysis.

3.2 Research Design

The principal objective of this study is to determine the effect of alternative channels of banking on poverty in Kenya. The study employed a longitudinal research design since it helped find the effect of utilization of alternative channels of banking on poverty. The design was appropriate since it allows the analysis of duration and permits the measurement change in a variable from one period to another (Gujarati, 2003).

3.3 Theoretical Framework

The focus of this study is to estimate the effect of alternative channels of banking on poverty. The study is based on Conduit effect theory. In this example, advancements in the financial sector increase the poor's access to financial services. Therefore, the development in financial sector reduces transaction costs, increases savings and allowing the poor to access funds. The model was extended to incorporate other variables.

Assume that poverty status (P) depends on utilization of alternative channels of banking (A) such as mobile banking and agency banking and t is the period under review. The poverty status function is therefore expressed as

$$P_t = f(A_t)\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.3.1$$

According to the arguments of the Conduit effect theory, the level for utilization of alternative channels of banking is always affected by the level of saving. Therefore, the poverty status model is extended to accommodate the level of saving on P.

$$A_t = f(S_t)\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.3.2$$

Where St is the level of savings. Incorporating (3.2) into the poverty reduction function (3.1) indicates that poverty status is motivated by the levels of savings. This is then expressed as

$$P_t = A_t(S_t)\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots..\dots\dots\dots\dots\dots...3.3$$

Therefore, from equation 3.3 it can be noted that poverty is determined by the saving level of the poor.

3.4 Model Specification

From the equation 3.3 and building on the variables identified through literature review on the effect of alternative channels of banking on poverty, the general form of the model takes the form:

$$P_t = f(S_t, A_t, M_t, int_t, inf_t,)\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.3.4$$

Where P represents poverty status, S indicates savings done on agency banking and mobile banking, t refers to the period under review, A refers to agency banking

utilization, M is the mobile banking utilization, *int* is commercial banks savings interest rates and *inf* is the 12-month inflation rates.

The effect of alternative channels of banking on household's savings is determined using equation 3.5.

$$lnS_t = \beta_0 + \beta_1 lnA_t + \beta_2 \, lnM_t + \beta_3 int_t + \beta_2 \, inf_t +$$

$$\varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.3.5$$

The effect of alternative channels of banking on poverty is determined using equation 3.6.

$$lnP_t = \beta_0 + \beta_1 lnS_t + \beta_2 lnA_t + \beta_3 lnM_t + \beta_3 int_t + \beta_2 \, inf_t +$$

$$\varepsilon_t \ldots\ldots\ldots\ldots\ldots.3.6$$

Where β_i are the partial regression coefficients for $i = 0,1,2$ and 3 lnP_t is the log of poverty status in time t. lnS_t is the log of savings on agency banking and mobile banking at time t. lnA_t is the log of agency banking utilization at time t. lnM_t is the log of mobile banking utilization at time t, int is commercial banks savings interest rates and inf is the 12-month inflation rates and E_t is the error term.

3.5 Definition and Measurement of Variables

Poverty status (P_t): Is the poverty level as measured by the amount of money a household spends in day. This was measured by poverty head count ratio.

Household savings on Agency banking and Mobile banking (S_t) – Is a type of alternative channels of banking where households' deposits, saves and access credit facilities. It was measured by the total number of savings done through agency banking and mobile banking accounts. Agency and mobile banking are channels used by households to channels their savings to the financial institutions.

Utilization of Agency banking (A_t): Is a retail outlet engaged by financial institution to process clients' transactions. This was measured by reported values transactions by financial institutions at time t.

Commercial banks savings interest rates (int_t): Is the amount of money a bank or a financial institution pays a depositor for holding their money with the bank.

12-month inflation rates (inf_t): Is the percentage change in the monthly consumer price index (CPI).

Utilization of Mobile banking (M_t): it is the act of making financial transactions on a mobile device. This was measured by reported values of transactions by financial institutions at time t.

3.6 Data type and Source

Data on poverty status, households' savings, mobile banking utilization, agent banking utilization,commercial banks savings interest rates and 12-month inflation rates was sourced from Central Bank of Kenya database. The data was time series spanning from March 2007 to December 2018. Poverty status data was poverty headcount ratio, households' savings was measured using the total monthly savings done through agent and mobile banking, agent banking utilization was measured by monthly number of agents accounts, mobile banking utilization was the monthly number of mobile banking accounts registered, commercial banks savings interest rates was measured by the rate of returns to the depositor and 12-month inflation rates through percentage change in price.

3.7 Data Collection and Refinement procedures

Data was collected from the specified sources and was taken through diagnostic tests. All the data collected was recorded on the data collection guide.

3.8 Diagnostic Tests

Diagnostic tests were carried out to check that the estimated model was suitable for obtaining consistent coefficient estimations. For the stationary test, the researchers used the Augmented Dickey Fuller (ADF) test. Individual impacts, time trends, and time effects are all included in the test. If the data fail to be stationary at level, differencing is done to make it stationary (Cheung, 1995).

Normality assumption was tested using histograms with normal distribution line. According to Kim (2013), histogram of the residuals should show a normal distribution of bell-shape curve. Linearity of the data was tested using Pearson Correlation of Moments.

Additionally, the study tested for multicollinearity. Multicollinearity refers to high correlation of independent variables. The problem of multicollinearity causes wrong calculations of regression coefficients. Multicollinearity happens when the independent variables are overly associated with one another, according to the study (Munkemuller *et al.*, 2013). Tolerance and variance inflation factor (VIF =1/T) were used to test multicollinearity. The influence of one independent variable on all other independent variables is measured by tolerance. T=1-R2 in the first phase regression analysis determines tolerance in this study. Multicollinearity is a hazard when tolerance is close to zero (Field, 2009, Williams, 2015). A VIF of 10 or more indicates severe

multicollinearity. According to Gujarati (2003), the problem can be addressed by dropping some of the highly correlated variables. Alternatively, the researcher can conduct bivariate regression instead of multivariate regression to estimate the individual effects of independent variables on dependent variable. Multicollinearity was tested using Variance Inflation Factors (VIF).

The study also tested for heteroscedasticity. Heteroscedasticity is a term used in regression analysis to describe the residuals or error term. Heteroscedasticity is defined as a systematic variation in the spread of residuals across a range of measured values. Because regression presupposes that all residuals are chosen from a population with a fixed variance, heteroscedasticity is a concern. The presence of heteroscedasticity would lead to inflated regression coefficients. However, it can be addressed by using robust standard errors. Heteroscedasticity was tested using Breusch Pagan test.

3.9 Data Analysis

The first objective of the study seeks to assess the effect of alternative channels of banking on saving and the second objective of the study is to determine the effect of alternative channels of banking on poverty. Monthly time series data was presented using descriptive statistics such as mean, minimum, maximum, and standard deviation from March 2007 to December 2018. Prior to inferential analysis, diagnostic tests discussed in section 3.9 were conducted. The study objectives were addressed using multiple regression analysis guided by model 3.5 and 3.6.

CHAPTER FOUR

EMPIRICAL FINDINGS

4.1 Introduction

The findings and discussion of the study are presented in this chapter. The descriptive results, trend analysis, and diagnostic test results are all included. The empirical findings are also presented and discussed in this chapter. The empirical findings are provided in accordance with the research goals.

4.2 Descriptive Statistics

The study sought to analyze alternative channels of banking, level of households' savings and poverty levels. The study obtained monthly secondary data from March 2007 to December 2018 from the Central Bank of Kenya. Descriptive analysis was conducted to give descriptive statistics on the variables. Measures of central tendency and data distribution were incorporated in the summary statistics. Table 4.1 shows an overview of the findings.

Table 4.1: Measures of Dispersion

Variable	Measures of Dispersion				No of Observations
	Mean	**Min**	**Max**	**Std. Dev.**	
Poverty (Headcount ratio, %)	43.0	35.3	54.9	0.045	142
Household savings (KSh. Billion)	175.39	22.6	33.48	0.863	142
Mobile banking accounts (Number in Millions)	20.89	0.02	20.89	1.23	142
Banking agents	88,187	307	211,961	1.671	142
Interest rates on savings	2.51	1.25	7.01	1.88	142
Inflation rates	8.03	1.85	19.72	4.54	142

As shown in Table 4.1, the mean poverty headcount, which was used as a proxy measure for poverty was 43.0 percent with a standard deviation of 0.045 over the period of study. The values of poverty head count ratio ranged from a minimum of 35.3 percent to 54.9 percent. This means that, on average, 43.0% of Kenya's population lived below the poverty level from 2007 to 2018. The computed mean for the period 2007-2018 was lower than the poverty levels at 46.8 per cent in 2005/06 but higher than the poverty levels of 36.1 per cent in 2015/16 as reported in the Kenya Integrated Household Budget Survey (KIHBS, 2016).

Table 4.1 also shows that the mean monthly household savings through mobile and agent banking was KSh 175.39 billion for the period covering March 2007 to December 2018. The minimum and maximum household savings reported was KSh 22.6 billion and KSh 330.48 billion, respectively. As illustrated in Table 4.1, the minimum and maximum number of mobile banking account registered over the period of study was 20,000 accounts and 20.89 million accounts, respectively. The mean monthly mobile banking accounts over the period of study was 20.89 million. Based on the KNBS census of 2019, Kenya's population was 47.56 million. This means that almost half of the Kenyan population have a mobile banking account.

Further, descriptive results indicated that on average 88,187 bank agents were registered monthly for the period covering March 2007 to December 2018. The minimum and maximum number of agents account registered over the same period was 307 and 211,961, respectively.

Table 4.1 illustrates that the mean interest rates on commercial banks savings was 2.51 percent with a standard deviation of 1.88 over the period of study. The interest rates on savings ranged from a minimum of 1.25 percent to 7.01 percent. In addition, the average inflation rates was 8.03 percent with a standard deviation of 4.54 over the period of study. The inflation rates ranged from a minimum of 1.85 percent to 19.72 percent.

4.3 Diagnostic Tests

Diagnostic tests such as unit root tests, were conducted before running the model to establish whether the data held the assumption of ordinary linear regression model.

4.3.1 Unit Root Tests

Before estimating the several stated models to meet the study objectives, the researcher performed a unit root test to see if any of the variables in the model were non-stationary, in order to rule out spurious regressions and erroneous inferences. The sequence of integration of the time series was determined using Augmented Dickey-Fuller (ADF) unitroot tests. Table 4.2 displays the results of the unit root testing.

Table 4.2: Unit Root Tests

Variable	Levels	Levels with time trend	First Difference	Order of Integration
Poverty headcount ratio (%)	-2.953**	-5.901*	-36.136*	I(0)
Household savings	0.101	-2.542	-11.033*	I(1)
Utilization of mobile banking	2.166	-0.080	-9.697*	I(1)

Utilization of agency banking	1.298	-3.175***	-12.532*	I(1)
Interest rates on savings	-0.556	-1.464	-8.239*	I(1)
Inflation rates	-0.772	-1.139	-6.231*	I(1)

*, **, *** denotes statistical significance at the 1, 5 and 10 percent level respectively

Except for the poverty headcount ratio, all of the variables had a unit root at all levels, according to the Z-statistic in Table 4.2. However, after differencing all of the variables, stationarity was achieved. This means that the poverty headcount ratio is of order zero, whereas all the other variables are of order one. The non-stationarity in household savings, mobile banking usage, agency banking usage, interest rates, and inflation rates might be attributable to trends or time-specific effects, as proven by a unit root test that incorporated the temporal trend. After de-trending, utilization of agency banking attained stationarity at 10 percent level, however, household savings, utilization of mobile banking, interest rates, and inflation rates attained stationarity at one percent level after differencing them as shown in the last column of Table 4.2.

4.4 Empirical Results

In this section, the effects of the alternative channels of banking on households savings and also on poverty are presented and discussed.

4.4.1 Effect of alternative channels of banking on household's savings in Kenya

The first objective of the study was to establish the effect of alternative channels of banking on household's savings in Kenya. Table 4.3 shows the regression results, that the effect of alternative channels of banking on household savings with the dependent variable being log of household savings.

Table 4.3: Effect of Alternative Channels of Banking on Household Savings

Variable	Coefficients	Std. Erro	t	P>t
Log of utilization of mobile banking	0.890*	0.332	2.68	0.00
Log of first lag of utilization of mobile	-0.799*	0.269	-2.97	0.00
Log of utilization of agency banking	-0.051	0.232	-0.22	0.82
Log of first lag of utilization of agency	0.383***	0.227	1.69	0.09
Log of interest rates on savings	0.132	0.098	1.34	0.18
Log of first lag of interest rates	0.019	0.099	0.19	0.85
Log of inflation rates	0.170**	0.080	2.12	0.03
Log of first lag of inflation rates	-0.060	0.079	-0.76	0.44
Constant	20.330*	0.795	25.5	0.00
Number of observations	130			
Adjusted R-Squared	0.9582			
F(8, 121) Statistic	370.84			
Prob > F	0.0000			

*, **, *** denotes statistical significance at the 1, 5 and 10 percent level respectively

The adjusted R-squared value indicate that, 0.9582 of the variations in household savings of Kenya are explained jointly by the contemporaneous and first lag of: utilization of mobile banking, the utilization of agency banking, interest rates, and inflation rates.

Table 4.3 shows the results of the test for the joint effect of the explanatory factors on household savings. The F-statistic was 370.84, with a p-value of 0.0000, which was significant statistically at the one percent level of significance. Hence, the utilization of mobile banking, the utilization of agency banking, interest rates, and inflation rates does have a joint effect on household savings. This shows that, the included explanatory variables does have a joint effect on household savings. The estimation results in Table

4.3 further produced a constant term of 20.33 which was statistically significant at the one percent level of significance. This indicates that there are other important and key variables which have an effect on household savings but were not included in the model.

The regression findings illustrated in Table 4.3, gives a coefficient of 0.890 on contemporaneous utilization of mobile banking and a coefficient of -0.799 on the first lag of utilization of mobile banking. Household savings were affected by both the contemporaneous and lagged utilization of mobile banking, as the two were statistically significant at the one percent level of significance, with combined elasticities of 0.091. The measured elasticities for contemporaneous and lagged utilization of mobile banking implied that a 10 percent increase in utilization of mobile banking would lead to a 0.9 percent increase in household savings. Loaba (2021) in West Africa came to the same conclusion, showing that using mobile banking services improves the possibility of informal saving by 0.83 percent.

A coefficient of 0.383 on lagged utilization of agency banking was produced. At the ten percent level of significance, the positive coefficient of agency banking utilization on household savings is statistically significant. This indicates that increased use of agency banking would result in increased household savings. The coefficient of 0.383 indicates that the elasticity of family savings to the use of agency banking is 0.383. According to the findings, a 10% rise in agency banking usage would result in a 3.83 percent increase in household savings. In similar vein, a study by Abiona and Koppensteiner (2020) found that savings for emergency only relate to 3 per cent of transactions.

The results in Table 4.3 also gave a coefficient of 0.170 on inflation rates. At the 5% level of significance, the positive coefficient of inflation rates on household savings is statistically significant. This demonstrates that rising inflation rates lead to increased household savings. The coefficient of 0.170 indicates that the elasticity of savings by households to inflation rates is 0.170. According to the findings, a 10% increase in inflation rates would result in a 1.7 percent increase in household savings. The findings contradict those of Adelakun (2015), who concluded that inflation has a negative impact on saving in Nigeria. Higher inflation, on the other hand, may increase inflation uncertainty, reducing consumption spending through a precautionary savings channel (Bonsu & Muzindutsi, 2017).

4.4.2 Effect of Alternative Channels of Banking on Poverty

The second objective of this study was to examine the effect of alternative channels of banking on poverty. Table 4.4 gives the estimation results.

Table 4.4: Effect of Alternative Channels of Banking on Poverty Headcount

Variable	Coefficients	Std. Error	t	P>t
Log of Households' Savings	-0.059	0.076	-	0.43
Log of first lag of Households' Savings	-0.144***	0.076	-	0.06
Log of utilization of mobile banking	0.020	0.146	0.1	0.89
Log of first lag of utilization of mobile banking	-0.004	0.119	-	0.97
Log of utilization of agency banking	-0.062	0.099	-	0.53
Log of first lag of utilization of agency banking	0.093	0.098	0.9	0.34
Log of interest rates on savings	-0.080***	0.042	-	0.06
Log of first lag of interest rates	-0.003	0.042	-	0.94
Log of inflation rates	0.014	0.035	0.4	0.68
Log of first lag of inflation rates	0.000	0.034	-	0.99
Constant	8.428*	0.897	9.4	0.00

Number of observations	130			
Adjusted R-Squared	0.7541			
F(10, 119) Statistic	40.56			
Prob > F	0.0000			

*, **, *** denotes statistical significance at the 1, 5 and 10 percent level respectively

The adjusted R-squared values indicate that, 0.7541 of the variations in poverty in Kenya are explained jointly by the contemporaneous and first lag of: the household savings, the utilization of mobile banking, the utilization of agency banking, interest rates, and inflation rates. The estimation results in Table 4.4 also produced a constant term of 8.428 which is statistically significant at the one percent level of significance, which indicates that there are other key variables which have an effect on poverty but were excluded in the model. Table 4.4 shows the results of the test for the joint effect of the explanatory variables on poverty. The F-statistic was 40.56, and the associated p-value was 0.0000, which was statistically significant at the 1% level of significance. As a result, household savings, mobile banking usage, agency banking usage, interest rates, and inflation rates all have a combined effect on poverty. This demonstrates that the explanatory variables included in the analysis have a combined effect on poverty.

The regression results presented in Table 4.4, gives a coefficient of -0.144 on the first lag of households' savings. At the ten percent level of significance, the negative coefficient of household savings on poverty is statistically significant. This indicates that increasing household savings would result in a decrease in poverty. The value of 0.144 indicates that the poverty elasticity to household savings is 0.144. According to the findings, a 10% increase in household savings would result in a 1.44 percent reduction in poverty. Similar, findings were established in a study by Nyakanini (2014)

that household savings through M-pesa made the elderly in Kiambu County to feel more economically empowered.

The estimation results in Table 4.4 further produced a coefficient of -0.080 on interest rates. At the ten percent level of significance, the negative coefficient of interest rates on poverty is statistically significant. This demonstrates that a rise in interest rates would result in a decrease in poverty. The elasticity of poverty to interest rates is 0.080, as indicated by the coefficient of 0.080. According to the findings, a 100% increase in interest rates would result in an 8% reduction in poverty. The study findings negate those by Manasseh et al. (2018) who observed that low interest rates could boost borrowing and expenditure by assessing households' purchasing power and cutting borrowing costs, so raising people's living standards.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the research, draws conclusions, and makes policy recommendations. The policy recommendations are based on the findings of the study and are designed to be simple to implement.

5.2 Summary

This study was conducted to estimate the effect of alternative channels of banking on poverty in Kenya. The specific objectives of the study were to establish the effect of alternative channels of banking on households' savings, and to examine the effect of alternative channels of banking on poverty in Kenya. The motivation of conducting the study was led by the fact that financial inclusion in Kenya has been growing rapidly in terms of mobile money banking and agent banking services. Though poverty rates were decreasing over the period of study, there was no established link between the alternative channels of banking and poverty rates in Kenya.

For this investigation, secondary timeseries data for the period from March 2007 to December 2018 was employed. The period was based on the available data in Central Bank of Kenya database. Descriptive analysis was conducted to describe the data in terms of central tendency. Diagnostic testing was done to establish whether the data violated or held the regression assumption. Inferential statistics involving regression analysis was conducted to aid in answering the research questions.

The first objective of the study was to establish the effect of alternative channels of

banking on household's savings in Kenya. The contemporaneous and lagged utilization of mobile banking have an effect on household's savings in Kenya. An increase in utilization of mobile banking by a 10 percent would lead to a 0.9 percent increase in household savings. In addition, an elasticity of households' savings to utilization of agency banking of 0.383 was realized, indicating that a 10 percent increase in utilization of agency banking would lead to a 3.83 percent increase in households' savings. An elasticity of households' savings to inflation rates of 0.170 was produced, implying that a 10 percent increase in inflation rates would lead to a 1.7 percent increase in households' savings.

The second objective of this study was to examine the effect of alternative channels of banking on poverty. An elasticity of -0.144 of poverty to household savings was realized, implying that a 10 per cent increase in household savings would lead to a 1.44 per cent reduction in poverty. In addition, the elasticity of poverty to interest rates was -0.080, indicating a 10 per cent increase in interest rates would lead to a 0.8 percent reduction in poverty.

5.3 Conclusion

The study has found out that alternative channels of banking changes affect the households' savings levels in Kenya. Utilization of mobile banking had statistically significant effect on households' savings levels but not on poverty rates. Utilization of agency banking had statistically insignificant effect on household savings and on poverty rates. Basing on the results, increase in utilization of mobile banking increases households' savings, while increase in households' savings reduces the poverty rates. The study concludes that mobile banking as an alternate channel of banking is critical

based on the findings, in ensuring increased savings among households, which consequently will reduce the number of people living below poverty lines.

5.4 Recommendations

In order to remedy this issue, the following suggestions were made on the influence of alternative channels of banking on savings and poverty rates in Kenya.

i. **Increase utilization of moblile banking to stimulate savings and enhance savings culture in Kenya.**

The Kenyan government in collaboration with other innovators such Kenya Commercial Bank, financial institutions and telecommunications firms should aim to increase channels of banking through developing favorable polices and on alternative channels of banking and innovation. Moreover, digital technologies, particularly mobile banking, have the potential to help narrow financial inclusion gaps to capture the remaining unbanked population. To improve on the savings culture, telecommunication companies in collaboration with financial institutions should build trusting, long-term financial relationship with households through various channels and innovative ways of savings while not offering the same financial immediacy as loans. This will increase universal need for saving products that mitigate the households' exposure to over-indebtedness and financial shock.

ii. **Increase household savings and reduce poverty rates in Kenya.**

While poverty rates cannot be reduced overnight, the government should opt at improving the savings culture in the country which will gradually reduce poverty rates as more people venture into investments and businesses. In conjunction with creating the appropriate environment of financial inclusion and savings, the government should develop interventions that can assist in the development of the required legislative and

institutional framework, as well as the creation of a fair playing field that allows inclusive firms to access the capital they require to start and expand hence reducing the poverty rates.

5.5 Areas of Further Research

A number of areas need research to have a comprehensive understanding of alternative channels banking and poverty in Kenya. For further understanding of effects of alternative channels of banking, future study could focus on the following topics.

     i.   Effect of alternative channels of banking on economic growth in Kenya

    ii.   Effect of alternative channels of banking on income inequality in Kenya

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APPENDICES

Appendix 1: Secondary Data Used in the Study in Raw Form

Table A1: Raw Data

Year	Month	Poverty Headcount Ratio	Savings (billion)	Banking accounts (millions)	Agents	LogPoverty	LogSavings	LogBanking	LogAgents	CBIR Savings	Inflation rates	ln interest rates	ln inflation rates
2007	March	0.459	32.36	0.02099	307	-0.338	1.51001	-1.6779	2.487138	1.43	2.19	0.3576744	0.7839016
2007	April	0.52	31.64	0.05494	362	-0.284	1.50024	-1.2601	2.558709	1.35	1.85	0.3001046	0.6151857
2007	May	0.455	30.85	0.10773	447	-0.342	1.48926	-0.9677	2.650308	1.57	1.96	0.4510756	0.6729445
2007	June	0.495	24.91	0.17565	527	-0.305	1.39637	-0.7553	2.721811	1.54	4.07	0.4317824	1.403643
2007	July	0.539	24.23	0.2685	681	-0.268	1.38435	-0.5711	2.833147	1.65	5.48	0.5007753	1.701105
2007	August	0.431	22.6	0.43256	819	-0.366	1.35411	-0.364	2.913284	1.6	5.3	0.4700036	1.667707
2007	September	0.512	42.46	0.63576	960	-0.291	1.62798	-0.1967	2.982271	1.67	5.53	0.5128236	1.710188
2007	October	0.414	44.34	0.87596	1196	-0.383	1.6468	-0.0575	3.077731	1.64	5.38	0.4946962	1.682688
2007	November	0.549	48.62	1.1332	1379	-0.26	1.68681	0.05431	3.139564	1.65	6.08	0.5007753	1.805005
2007	December	0.464	52.63	1.34527	1582	-0.333	1.72123	0.12881	3.199206	1.67	5.7	0.5128236	1.740466
2008	January	0.46	56.9	1.5891	1812	-0.338	1.75511	0.20115	3.258158	1.72	9.4	0.5423243	2.24071
2008	February	0.462	59.96	1.82153	2067	-0.335	1.77786	0.26044	3.31534	1.7	10.58	0.5306283	2.358965
2008	March	0.458	71.48	2.07553	2329	-0.339	1.85418	0.31713	3.367169	1.72	11.9	0.5423243	2.476538
2008	April	0.461	69.56	2.37346	2606	-0.337	1.84236	0.37538	3.415974	1.71	16.12	0.5364934	2.780061
2008	May	0.459	67.74	2.71813	2770	-0.339	1.83085	0.43427	3.44248	1.71	18.61	0.5364934	2.923699
2008	June	0.461	65.99	3.03852	3011	-0.337	1.81948	0.48266	3.478711	1.7	17.87	0.5306283	2.883123
2008	July	0.459	63.54	3.36719	3378	-0.338	1.80305	0.52727	3.52866	1.67	17.12	0.5128236	2.840247
2008	August	0.466	71.72	3.72618	3761	-0.332	1.85564	0.57126	3.575303	1.68	18.33	0.5187938	2.908539
2008	September	0.465	74.39	4.14304	4230	-0.332	1.87151	0.61732	3.62634	1.73	18.73	0.5481214	2.930126
2008	October	0.463	75.04	4.42028	4781	-0.335	1.87529	0.64545	3.679519	1.74	18.74	0.5538851	2.93066
2008	November	0.466	75.24	4.75139	5399	-0.332	1.87645	0.67682	3.732313	1.61	19.54	0.4762342	2.972464
2008	December	0.465	76.41	5.08247	6104	-0.332	1.88315	0.70607	3.785615	1.65	17.83	0.5007753	2.880883
2009	January	0.466	77.47	5.47828	7304	-0.332	1.88913	0.73864	3.863561	2.1	13.22	0.7419373	2.581731
2009	February	0.448	78.1	5.81602	7512	-0.349	1.89265	0.76463	3.875756	2.13	14.69	0.7561221	2.687167
2009	March	0.456	79.56	6.28952	13358	-0.341	1.90069	0.79862	4.125741	1.9	14.6	0.6418539	2.681021
2009	April	0.448	80.38	6.53192	14790	-0.348	1.90515	0.81504	4.169968	1.91	12.42	0.6471033	2.519308
2009	May	0.45	81.73	6.8427	16029	-0.347	1.91238	0.83523	4.204906	1.67	9.61	0.5128236	2.262804
2009	June	0.45	82.31	7.19062	16641	-0.347	1.91545	0.85677	4.221179	2.08	8.6	0.7323679	2.151762
2009	July	0.453	83.37	7.42641	18504	-0.344	1.92101	0.87078	4.267266	1.67	8.44	0.5128236	2.132982

Year	Month											
2009	August	0.451	86.57	7.7141	18780	-0.346	1.93737	0.88729	4.273696	1.65	7.36	0.5007753	1.99606
2009	September	0.448	96.35	8.01624	19803	-0.349	1.98385	0.90397	4.296731	1.65	6.74	0.5007753	1.90806
2009	October	0.454	95.79	8.36803	20631	-0.343	1.98132	0.92262	4.31452	1.85	6.62	0.6151857	1.890095
2009	November	0.452	95.03	8.61529	22476	-0.345	1.97786	0.93527	4.351719	1.71	5	0.5364934	1.609438
2009	December	0.449	93.35	8.88258	23012	-0.348	1.97011	0.94854	4.361954	1.73	5.32	0.5481214	1.671473
2010	January	0.454	92.42	9.4767	24850	-0.343	1.96577	0.97666	4.395326	1.75	5.95	0.5596158	1.783391
2010	February	0.453	91.53	9.67495	25394	-0.344	1.96156	0.98565	4.404731	1.81	5.18	0.5933268	1.644805
2010	March	0.452	88.45	9.97211	27622	-0.345	1.9467	0.99879	4.441255	1.81	3.97	0.5933268	1.378766
2010	April	0.447	97.1	10.2026	29570	-0.349	1.98722	1.00871	4.470851	1.85	3.66	0.6151857	1.297463
2010	May	0.454	101.44	10.4928	31036	-0.343	2.00621	1.02089	4.491866	1.76	3.88	0.5653138	1.355835
2010	June	0.449	102.69	10.9147	31902	-0.348	2.01153	1.03801	4.503818	1.75	3.49	0.5596158	1.249902
2010	July	0.448	104.58	13.4701	32974	-0.349	2.01945	1.12937	4.518172	1.55	3.57	0.4382549	1.272566
2010	August	0.451	107.71	14.5893	33864	-0.346	2.03226	1.16403	4.529738	1.5	3.22	0.4054651	1.169381
2010	September	0.451	109.67	15.2239	33968	-0.345	2.04009	1.18253	4.53107	1.47	3.21	0.3852624	1.166271
2010	October	0.449	110.35	15.7346	34572	-0.348	2.04277	1.19686	4.538725	1.46	3.18	0.3784365	1.156881
2010	November	0.446	117.37	16.075	35373	-0.35	2.06956	1.20615	4.548672	1.4	3.84	0.3364722	1.345472
2010	December	0.449	125.46	16.4463	36198	-0.348	2.09851	1.21607	4.558685	1.45	4.51	0.3715636	1.506297
2011	January	0.462	126.15	16.6901	37009	-0.336	2.10089	1.22246	4.568307	1.25	5.42	0.2231435	1.690096
2011	February	0.461	134.75	16.8928	37309	-0.336	2.12953	1.2277	4.571814	1.41	6.54	0.3435897	1.877937
2011	March	0.46	135.24	17.4653	38201	-0.337	2.13111	1.24218	4.582075	1.37	9.19	0.3148108	2.218116
2011	April	0.456	136.32	17.7573	38485	-0.341	2.13456	1.24938	4.585291	1.38	12.05	0.3220835	2.489065
2011	May	0.463	136.34	17.9239	39449	-0.334	2.13462	1.25343	4.596036	1.38	12.95	0.3220835	2.561096
2011	June	0.457	137.69	18.1469	42840	-0.34	2.1389	1.2588	4.631849	1.37	14.48	0.3148108	2.672768
2011	July	0.462	138.34	18.3082	43577	-0.336	2.14095	1.26265	4.639257	1.37	15.53	0.3148108	2.742774
2011	August	0.459	139.92	18.6128	44762	-0.338	2.14588	1.26981	4.650909	1.37	16.67	0.3148108	2.813611
2011	September	0.458	143.61	18.7921	46234	-0.339	2.15718	1.27398	4.664961	1.35	17.32	0.3001046	2.851862
2011	October	0.458	144.53	18.834	47874	-0.339	2.15996	1.27494	4.6801	1.33	18.91	0.285179	2.939691
2011	November	0.459	157.88	18.8916	49091	-0.338	2.19833	1.27627	4.691002	1.41	19.72	0.3435897	2.981633
2011	December	0.457	156.74	19.191	50471	-0.34	2.19518	1.2831	4.703042	1.59	18.93	0.463734	2.940748
2012	January	0.476	154.96	19.2097	52315	-0.323	2.19022	1.28352	4.718626	1.62	18.31	0.4824262	2.907447
2012	February	0.477	148.31	19.2393	53685	-0.321	2.17117	1.28419	4.729853	1.69	16.69	0.5247285	2.81481
2012	March	0.482	147.83	19.38	55726	-0.317	2.16976	1.28735	4.746058	1.72	15.61	0.5423243	2.747912
2012	April	0.482	147.7	19.46	56717	-0.317	2.16938	1.28914	4.753713	1.58	13.06	0.4574249	2.569554
2012	May	0.474	147.07	19.53	59057	-0.324	2.16752	1.2907	4.771271	1.59	12.22	0.463734	2.503074
2012	June	0.474	146.93	19.58	61313	-0.324	2.16711	1.29181	4.787553	1.46	10.05	0.3784365	2.307573
2012	July	0.478	146.19	19.6943	63165	-0.321	2.16492	1.29434	4.800477	1.66	7.74	0.5068176	2.046402

Year	Month												
20 12	August	0.476	158. 41	19.71	644 39	-0.323	2.1997 8	1.2946 9	4.809 149	1.58	6.09	0.457 4249	1.806 648
20 12	September	0.476	161. 29	19.79 56	673 01	-0.322	2.2076 1	1.2965 7	4.828 022	1.55	5.32	0.438 2549	1.671 473
20 12	October	0.48	162. 3	20.02	709 72	-0.319	2.2103 2	1.3014 6	4.851 087	1.6	4.14	0.470 0036	1.420 696
20 12	November	0.48	162. 62	20.25	752 26	-0.318	2.2111 7	1.3064 3	4.876 368	1.58	3.25	0.457 4249	1.178 655
20 12	December	0.481	183. 1	21.06	769 12	-0.318	2.2626 9	1.3234 6	4.885 994	1.6	3.2	0.470 0036	1.163 151
20 13	January	0.468	181. 18	21.41 81	855 48	-0.33	2.2581 1	1.3307 8	4.932 21	1.65	3.67	0.500 7753	1.300 192
20 13	February	0.468	180. 11	21.80 24	883 93	-0.33	2.2555 4	1.3385	4.946 418	1.61	4.45	0.476 2342	1.492 904
20 13	March	0.455	179. 8	22.32 92	932 11	-0.342	2.2547 9	1.3488 7	4.969 467	1.42	4.11	0.350 6568	1.413 423
20 13	April	0.464	176. 5	23.01 85	963 19	-0.333	2.2467 4	1.3620 8	4.983 712	1.45	4.14	0.371 5636	1.420 696
20 13	May	0.461	174. 07	23.47	100 584	-0.336	2.2407 2	1.3705 1	5.002 529	1.53	4.05	0.425 2677	1.398 717
20 13	June	0.463	165. 85	23.75	103 165	-0.334	2.2197 2	1.3756 6	5.013 532	1.73	4.91	0.548 1214	1.591 274
20 13	July	0.452	165. 35	23.87	105 669	-0.345	2.2184	1.3778 5	5.023 948	1.64	6.03	0.494 6962	1.796 747
20 13	August	0.452	164. 43	23.97	108 559	-0.345	2.2159 8	1.3796 7	5.035 666	1.67	6.67	0.512 8236	1.897 62
20 13	September	0.467	164. 07	24.27	110 432	-0.331	2.2150 3	1.3850 7	5.043 095	1.64	8.29	0.494 6962	2.115 05
20 13	October	0.458	183. 22	24.43	111 697	-0.339	2.2629 7	1.3879 2	5.048 042	1.63	7.76	0.488 58	2.048 982
20 13	November	0.465	188. 43	24.9	112 947	-0.333	2.2751 5	1.3962	5.052 875	1.58	7.36	0.457 4249	1.996 06
20 13	December	0.462	191. 24	24.94 65	113 130	-0.335	2.2815 8	1.3970 1	5.053 578	1.58	7.15	0.457 4249	1.967 112
20 14	January	0.433	204. 52	25.24 92	114 107	-0.364	2.3107 4	1.4022 5	5.057 312	1.56	7.21	0.444 6858	1.975 469
20 14	February	0.426	204. 76	25.32 63	115 015	-0.371	2.3112 5	1.4035 7	5.060 754	1.49	6.86	0.398 7761	1.925 707
20 14	March	0.435	205. 35	25.39 72	116 196	-0.362	2.3124 9	1.4047 9	5.065 191	1.56	6.27	0.444 6858	1.835 776
20 14	April	0.43	205. 51	25.45 56	116 581	-0.367	2.3128 3	1.4057 8	5.066 628	1.53	6.41	0.425 2677	1.857 859
20 14	May	0.438	206. 45	25.69 02	117 807	-0.359	2.3148 1	1.4097 7	5.071 171	1.54	7.3	0.431 7824	1.987 874
20 14	June	0.434	211. 84	25.75 68	120 781	-0.363	2.3260 1	1.4108 9	5.081 999	1.5	7.39	0.405 4651	2.000 128
20 14	July	0.428	215. 36	25.81 52	121 419	-0.369	2.3331 7	1.4118 8	5.084 287	1.33	7.67	0.285 179	2.037 317
20 14	August	0.429	217. 34	25.92 84	122 462	-0.368	2.3371 4	1.4137 8	5.088 001	1.5	8.36	0.405 4651	2.123 458
20 14	September	0.423	219. 31	25.99 6	123 703	-0.374	2.3410 6	1.4149 1	5.092 38	1.51	6.6	0.412 1096	1.887 07
20 14	October	0.426	221. 98	26.11 64	124 179	-0.371	2.3463 1	1.4169 1	5.094 048	1.55	6.43	0.438 2549	1.860 975
20 14	November	0.423	224. 32	26.13 92	124 708	-0.374	2.3508 7	1.4172 9	5.095 894	1.52	6.09	0.418 7103	1.806 648
20 14	December	0.436	224. 39	26.13 99	125 826	-0.361	2.351	1.4173	5.099 77	1.85	6.02	0.615 1857	1.795 087
20 15	January	0.406	225. 21	26.20 8	127 187	-0.391	2.3525 9	1.4184 3	5.104 443	1.58	5.53	0.457 4249	1.710 188
20 15	February	0.409	231. 8	26.22 65	128 591	-0.388	2.3651 1	1.4187 4	5.109 211	1.53	5.61	0.425 2677	1.724 551
20 15	March	0.412	233. 66	26.29 95	128 706	-0.385	2.3685 8	1.4199 5	5.109 599	1.53	6.31	0.425 2677	1.842 136
20 15	April	0.416	234. 28	26.33 3	129 218	-0.381	2.3697 4	1.4205	5.111 323	1.9	7.08	0.641 8539	1.957 274
20 15	May	0.416	250. 45	26.46 45	129 735	-0.381	2.3987 2	1.4226 6	5.113 057	1.48	6.87	0.392 0421	1.927 164
20 15	June	0.417	248. 93	26.50 28	131 761	-0.38	2.3960 8	1.4232 9	5.119 787	1.85	7.03	0.615 1857	1.950 187
20 15	July	0.403	245. 83	26.73 82	133 989	-0.395	2.3906 3	1.4271 3	5.127 069	1.37	6.62	0.314 8108	1.890 095

Year	Month											
2015	August	0.403	244.72	27.0497	136042	-0.395	2.38867	1.43216	5.133673	1.5	5.84	0.4054651	1.764731
2015	September	0.414	243.86	27.312	138131	-0.383	2.38714	1.43635	5.140291	1.71	5.97	0.5364934	1.786747
2015	October	0.409	242.06	27.537	140612	-0.388	2.38392	1.43992	5.148022	1.68	6.72	0.5187938	1.905088
2015	November	0.407	239.46	28.064	142386	-0.39	2.37923	1.44815	5.153467	1.32	7.32	0.2776318	1.99061
2015	December	0.404	239.31	28.6447	143946	-0.394	2.37896	1.45704	5.1582	1.56	8.01	0.4446858	2.080691
2016	January	0.374	239.23	29.0976	146710	-0.427	2.37886	1.46386	5.16646	1.56	7.78	0.4446858	2.051556
2016	February	0.36	236.4	29.489	148982	-0.444	2.37365	1.46966	5.173134	1.4	6.84	0.3364722	1.922788
2016	March	0.37	255.12	30.696	150987	-0.432	2.40674	1.48708	5.17894	1.35	6.45	0.3001046	1.86408
2016	April	0.369	256.36	31.296	152547	-0.433	2.40885	1.49549	5.183404	1.49	5.27	0.3987761	1.66203
2016	May	0.365	256.86	31.386	153762	-0.438	2.4097	1.49674	5.186849	1.59	5	0.463734	1.609438
2016	June	0.372	258.25	31.438	154908	-0.429	2.41204	1.49745	5.190074	1.6	5.8	0.4700036	1.757858
2016	July	0.364	260.96	32.336	156349	-0.439	2.41657	1.50969	5.194095	1.67	6.4	0.5128236	1.856298
2016	August	0.367	261.55	32.757	157855	-0.435	2.41755	1.5153	5.198258	1.68	6.26	0.5187938	1.83418
2016	September	0.363	266.57	33.291	160076	-0.44	2.42581	1.52233	5.204326	3.78	6.34	1.329724	1.846879
2016	October	0.365	267.79	33.343	162441	-0.438	2.42779	1.523	5.210696	6.08	6.47	1.805005	1.867176
2016	November	0.364	269.85	33.435	162465	-0.439	2.43112	1.5242	5.21076	6.52	6.68	1.874874	1.899118
2016	December	0.372	271.64	33.919	164674	-0.429	2.43399	1.53044	5.216625	6.37	6.35	1.851599	1.848455
2017	January	0.368	271.91	34.037	165109	-0.434	2.43443	1.53195	5.217771	6.09	6.99	1.806648	1.944481
2017	February	0.353	275.31	34.178	165908	-0.452	2.43982	1.53375	5.219867	6.81	9.04	1.918392	2.201659
2017	March	0.362	278.92	34.205	167072	-0.441	2.44548	1.53409	5.222904	5.89	10.28	1.773256	2.3302
2017	April	0.362	280.79	34.281	167353	-0.441	2.44838	1.53505	5.223634	5.67	11.48	1.735189	2.440606
2017	May	0.353	282.25	34.286	167775	-0.452	2.45063	1.53512	5.224727	5.85	11.7	1.766442	2.459589
2017	June	0.359	286.72	34.578	169480	-0.445	2.45746	1.5388	5.229118	5.63	9.21	1.728109	2.22029
2017	July	0.356	288.98	34.957	170389	-0.449	2.46087	1.54353	5.231442	6.4	7.47	1.856298	2.010895
2017	August	0.358	311.75	35.333	173731	-0.446	2.49381	1.54818	5.239877	5.94	8.04	1.781709	2.084429
2017	September	0.355	307.33	35.537	173774	-0.45	2.4876	1.55068	5.239985	6.43	7.06	1.860975	1.954445
2017	October	0.364	306.57	36.0008	176986	-0.439	2.48653	1.55631	5.247939	6.92	5.72	1.934416	1.743969
2017	November	0.364	298.15	36.3906	181456	-0.439	2.47443	1.56099	5.258771	6.93	4.73	1.93586	1.553925
2017	December	0.369	297.23	37.3868	182472	-0.433	2.47309	1.57272	5.261196	6.91	4.5	1.93297	1.504077
2018	January	0.362	292.09	37.8418	188029	-0.441	2.46552	1.57797	5.274225	6.97	4.83	1.941615	1.574847
2018	February	0.363	292.08	38.4185	192117	-0.44	2.4655	1.58454	5.283566	7.01	4.46	1.947338	1.495149
2018	March	0.366	290.95	39.34	196002	-0.436	2.46382	1.59483	5.292261	6.85	4.18	1.924249	1.430311
2018	April	0.362	290.22	40.2881	197286	-0.442	2.46273	1.60518	5.295096	6.72	3.73	1.905088	1.316408
2018	May	0.357	313.74	41.729	200227	-0.447	2.49657	1.62044	5.301523	6.64	3.95	1.893112	1.373716
2018	June	0.355	314.16	42.581	201795	-0.45	2.49715	1.62922	5.30491	6.6	4.28	1.88707	1.453953
2018	July	0.357	320.89	42.613	202387	-0.447	2.50636	1.62954	5.306183	6.53	4.35	1.876407	1.470176

20 18	Augu st	0.364	323. 1	43.55 88	202 627	-0.438	2.5093 4	1.6390 8	5.306 697	6.52	4.04	1.874 874	1.396 245
20 18	Septe mber	0.357	323. 55	44.27 23	203 359	-0.447	2.5099 4	1.6461 3	5.308 263	6.33	5.7	1.845 3	1.740 466
20 18	Octob er	0.358	328. 3	45.43 71	205 745	-0.446	2.5162 7	1.6574 1	5.313 329	5.7	5.53	1.740 466	1.710 188
20 18	Nove mber	0.353	329. 09	46.23 34	206 312	-0.452	2.5173 1	1.6649 6	5.314 524	5.38	5.58	1.682 688	1.719 189
20 18	Dece mber	0.362	330. 48	47.69 43	211 961	-0.442	2.5191 5	1.6784 7	5.326 256	5.13	5.71	1.635 106	1.742 219