THE IMPACT OF GENDER IN THE UTILIZATION OF DIGITAL FINANCIAL SERVICES IN KENYA

SAMWEL MWANGI NGAHU

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SUPERVISOR: PROF. PETER MURIU

RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF ECONOMICS AND DEVELOPMENT STUDIES(DEDS), UNIVERSITY OF NAIROBI, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTER OF ARTS IN ECONOMICS.

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DECLARATION

This research project is my original work and has not been submitted, either in part or in full, to any other institution or body for the purpose of earning a degree.

SIGNATURE: _____ DATE: 29/11/2023

NAME: SAMWEL MWANGI NGAHU

REG. NO.:   X50/66067/2013

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

SIGNATURE: _____

DATE:_____29/11/2023 PROF. PETER MURIU

DEDICATION

This research is dedicated to the entire family for standing by me throughout my academic life. God bless you so much.

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I am grateful to my supervisor, Prof. Peter Muriu for his encouragement, guidance, and commitment to assist me through this project, for his invaluable counsel and insight.

Am also indebted to my family for the moral support they have given me throughout my academic life.

Over and above, all is the almighty God through whom all things are possible and have their being.

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ABSTRACT

This study sought to estimate the impact of gender in the utilization of digital financial services.

(DFS) in Kenya using the 2021 FinAccess Survey, which is a joint initiative of the Kenya National Bureau of Statistics (KNBS), Financial Sector Deeping (FSD) Kenya, and the Central Bank of Kenya (CBK). We employed the Probit Model to identify the gender differences in access to DFS in Kenya. The findings showed the significance of education level, gender, digital credit, mobile ownership, age, and income levels in explaining the utilization of diverse digital financial services, including digital credit. A significant 78 percent reported using digital financial services (DFS) in the country. We recommend heightened enactment and implementation of policies targeting the enhancement of income, mobile ownership, and educational attainment among individuals, which could facilitate the utilization of available digital financial services in Kenya, particularly among women. To overcome barriers related to mobile ownership, the implementation of subsidized smartphone initiatives and expansion of network coverage in rural and underserved areas have emerged as pivotal strategies. These actions would effectively improve access to digital financial services by increasing mobile ownership, particularly among women.

CHAPTER ONE INTRODUCTION

1.1. Background of the study

Economic growth and poverty reduction depend on access to cheap banking. Better and more complex financial institutions lead to larger reductions in poverty and income inequality as well as faster economic growth. Providing financial services to those living in poverty, especially women, also improves possibilities and builds resilience (Pazarbasioglu et al.,2020). However, in the least affluent global economies, 65% of people lack access to the most fundamental transaction accounts, limiting their ability to conduct safer and more efficient money transfers. These accounts also act as foundational gateways to broader financial services such as credit, insurance, and savings. In developing economies, merely 20% of adults utilize formal financial institutions to handle their savings, with the majority resorting to less formal and often costlier means.

Gender disparities in financial inclusion still exist in Sub-Saharan Africa, despite significant efforts to promote economic opportunities and equality for women, particularly with the introduction of Digital Financial Services (DFS) (Chamboko et al.,2018; Parlasca,2022). Recent research (Johnen & Mußhoff, 2023; Were et al,2021) demonstrates that, in sub-Saharan Africa, there are notable disparities in the ways in which men and women use financial services. Men are more prone to use DFS than women, which is reflected in the disparities in the items that they use. As women are more likely than males to employ informal services, it is possible that these services offer value that cannot be obtained through other means. According to the data, men are more likely than women to send and receive money using mobile money as well as to purchase airtime. However, compared to males, women use mobile money more frequently to obtain and store value.

DFS has revolutionized the financial landscape in Kenya and across the globe (Tiony,2023;

Ndung'u,2018). Kenya has been a pioneer in the adoption of mobile money services, primarily led by M-Pesa, which was launched in 2007. Since then, digital financial services have become an integral part of the financial ecosystem, offering a wide range of services such as mobile banking, online payments, savings, and credit. The rapid growth and adoption of these services has had a profound impact on financial inclusion and economic development in Kenya.

Over the last ten years, there has been a substantial evolution in Kenya's financial sector, and this evolution has been greatly influenced by digital financial services' pivotal role in expanding financial inclusion. The FinAccess survey, conducted in 2021, has four pillars of financial inclusion measurement: impact/welfare, quality, usage, and accessibility. According to the 2021 Survey, formal financial inclusion increased from 82.9 percent in 2019 to 83.7 percent in 2021 when measured by the access dimension. The proportion of financial inclusion in the 2006 baseline survey is 26.7%. The percentage of adults who denied access to formal and informal financial services and products by providers increased from 11.0 percent in 2019 to 11.6 percent in 2021. The 2006 baseline survey found that 41.3% of the respondents fit this category (FSD,2021).

According to the survey results, there have been fewer differences in gender-based access to financial services, with the gap closing from 8.5 percent in 2016 to 4.2 percent in 2021. This has allowed women to participate more actively in formal economic activities. Financial technology benefits everyone, even those in the lowest quintile of wealth and those without formal education. The results of the survey also show that in comparison to 2019, there was a decrease in monthly usage of mobile money in 2021, but an increase in daily and weekly usage. The reasons for this could be as follows: the government's stance on cashless transactions to stop the COVID-19

epidemic from spreading, the function of mobile money in meeting families' monetary needs, the waiver of transaction fees on mobile money, and users' self-caution during the pandemic.

Understanding gender differences in digital financial service utilization is crucial for several reasons. First, policymakers and financial service providers must design strategies and products that are more inclusive and tailored to women's specific needs and challenges. Second, in Kenya, taking proactive steps to address these disparities has the potential to greatly enhance women's economic empowerment in addition to promoting financial inclusion. Finally, it has broader implications for research in finance, gender studies, and digital technology.

However, a closer examination of these statistics reveals gender disparities in the utilization of digital financial services. This study aims to investigate and understand gender differences in Kenya's digital financial service utilization.

1.2. Problem statement

While Kenya has made commendable progress in advancing financial inclusion through digital financial services, gender disparities in access and utilization continue to be a significant concern (Reynolds et al,2023; Githu,2023; Wandeda,2023). The primary focus of this study was to address the gender disparities that currently exist in the use of digital financial services. It makes an effort to closely examine the extent of these gender differences in Kenya's use of digital financial services.

Examining how quickly men and women adopt services such as internet banking, mobile money, and other digital financial goods is one part of the process. Furthermore, this study aims to identify

and examine the obstacles and difficulties women encounter when adopting and using digital financial services.

These challenges may encompass limited access to technology, lower digital literacy, and sociocultural factors that influence women's financial decision making. Third, there are implications for financial inclusion by investigating gender differences in digital financial service utilization. This study seeks to determine how these disparities impact the overall financial inclusion in Kenya. Understanding these implications is vital for policymakers and financial institutions striving to expand their financial access to underserved populations. Fourth, policy and programmatic interventions as research will contribute to the formulation of evidence-based policy recommendations and programmatic interventions aimed at bridging the gender gap in digital financial services utilization. Such interventions may include educational programs, targeted marketing, and financial products designed to cater to women's unique needs.

1.3. Research Questions

Therefore, this study aimed to answer the following research question:

i) How do gender differences impact Kenya's utilization of digital financial services?

ii) What are the policy implications and insights of the study?

1.4. Objectives of the study

The general objective was to examine the impact of gender in Kenya's digital financial service utilization. The specific objectives are:

i) To investigate and understand these gender differences in Kenya's digital financial service utilization.

ii) To draw insights and policy implications from the study.

1.5. Significance of the study

This research holds substantial significance for a wide array of stakeholders, bearing implications for research and policy. The following points highlight the significance of this study. The findings of this study will serve as a foundation for formulating policies at national and regional levels in Kenya. Policymakers can leverage these results to design gender-sensitive strategies to promote digital financial inclusion, thereby fostering economic empowerment for women. In addition, by addressing gender disparities in digital financial service utilization, this study contributes to the enhancement of financial inclusion in Kenya. By expanding access to credit, savings, and other financial services, a more inclusive financial ecosystem helps not only women, but also the economy.

Furthermore, by identifying and resolving the obstacles that women encounter in accessing and utilizing digital financial services, this study has the potential to support their economic emancipation. Positive knock-on effects on different facets of their lives may result from empowerment.

Finally, this study adds to the expanding corpus of research on gender studies, financial inclusion, and digital financial services. Scholars, researchers, and academics interested in these fields will be invaluable resources.

CHAPTER TWO LITERATURE REVIEW

2.1. Theoretical Literature

Silber (1983) introduced the theory of financial innovation, a critical framework for understanding the evolution of financial systems and their impact on economic development. This theory posits that financial innovation is a dynamic process that is driven by economic, technological, and regulatory changes. It encompasses the development of new financial instruments, intermediaries, and markets that respond to emerging needs and opportunities.

Financial innovations encompass the development of novel financial assets such as securitized securities or derivatives, as well as the extension of financial services to underserved or unserved groups. The theory also emphasizes the role of financial intermediaries and the regulatory environment in facilitating or hindering financial innovation. Particularly when considering developing nations such as Kenya, Silber's paradigm offers a useful prism through which to view the evolving financial service market.

Kenya's rapid expansion of digital financial services has brought both benefits and challenges when the theory of financial innovation is applied to gender disparities in the use of these services. On the one hand, financial innovations in Kenya, such as mobile money platforms like M-Pesa, have made financial services more accessible to a wider range of people, including women, by giving them ways to transfer, save, and get credit.

However, sex disparities persist in the use of these services. Women, particularly those in rural areas, may face barriers related to digital literacy, cultural norms, and social constraints that limit

their engagement in digital financial services. Thus, Silber's theory highlights the need for continuous financial innovation to overcome these barriers and tailor services to meet the unique needs of female users. Moreover, policy and regulatory changes have the potential to promote gender equality and financial inclusion in Kenya's digital financial service sector.

Stiglitz and Weiss (1981) presented a groundbreaking economic theory known as the credit rationation theory, which fundamentally reshapes our understanding of how financial markets operate. This theory departs from traditional economic models that assume perfect information and frictionless markets. Instead, Stiglitz and Weiss argued that in the real world, information is often imperfect, and lenders may not have complete knowledge of borrowers' creditworthiness. This information asymmetry can lead to credit rationing, a phenomenon in which some borrowers are denied access to credit or are offered it in unfavorable terms, even though they might be willing to pay higher interest rates.

The theory postulates that credit rationing occurs because borrowers have better information about their own creditworthiness than lenders, creating the risk of adverse selection and moral hazard in credit markets. Lenders, faced with this risk, may opt to limit the amount of credit they extend, especially borrowers, who are perceived as riskier. Stiglitz and Weiss' credit rationation theory highlights the significance of information asymmetry in credit markets and provides a theoretical foundation for understanding various lending practices and their consequences in the financial sector.

This theoretical framework is relevant to the context of gender differences in digital financial services. Women, especially in many developing countries, have historically faced credit constraints due to cultural, social, and economic factors. Applying the credit rationalization theory to gender disparities in financial inclusion, it becomes apparent that women may be more vulnerable to credit rationing because they often have limited access to financial information, collateral, or formal credit history. Digital financial services have the potential to mitigate these gender-based disparities by providing a platform for collecting and sharing alternative data, improving credit assessment models, and reducing the information asymmetry between lenders and borrowers. By leveraging digital technologies, financial service providers can develop more inclusive and accurate credit evaluation mechanisms, which may help overcome gender-based credit rationing and enable greater economic empowerment and the participation of women in the financial sector. However, it is essential to recognize that the success of such efforts depends on addressing broader societal and institutional factors that contribute to gender inequalities in access to education, employment, and digital technology. When applied to this context, credit rationalization theory underscores the critical role of information and access to financial services in addressing gender disparities and promoting economic inclusion.

In their seminal work in 1973, Robert McKinnon and Ronald Shaw introduced the concept of financial deepening and the idea that financial intermediaries such as banks play a crucial role in economic development. McKinnon and Shaw's Financial Intermediation Theory emphasized the importance of savings mobilization, credit allocation, and the provision of payment services in fostering economic growth. These financial intermediaries can help channel savings into productive investments and allocate credit efficiently, ultimately promoting economic development. When applying this theoretical framework to gender differences in digital financial

services, it becomes evident that women's limited access to formal financial intermediaries and reduced participation in the traditional banking sector exacerbate gender disparities. Digital financial services have the potential to improve this situation by creating more inclusive platforms for savings, payments, and access to credit, thereby empowering women economically and enhancing financial inclusion. However, addressing gender disparities in digital financial services necessitates technological innovation as well as policy and regulatory changes to ensure that women can fully benefit from the potential for financial deepening and intermediation in the digital era.

2.2. Empirical literature

Pazarbasioglu et al., (2020) argued that in order to reduce poverty and promote economic progress, it is essential to have affordable access to financial services. Countries with more complex and sophisticated financial systems experience more economic advancement and significant reductions in the rates of poverty and inequality. Financial service accessibility also strengthens the resilience of impoverished communities, particularly women, and increases opportunities. Even in most developed economies, 65% of individuals lack access to the most basic transactional accounts, which limits their capacity to send and receive money securely and effectively. These accounts also serve as points of entry for a wider range of financial services, including credit, insurance, and savings. Only 20% of adults in developing nations save money through conventional financial institutions; the remaining adults use costlier and less organized means.

According to Agur et al. (2020), a significant amount of emphasis has been placed on digital financial services because of the COVID-19 outbreak and the need to maintain social distance. These programs enable governments to effectively disburse funding to individuals in need of

immediate assistance by facilitating social distancing. Fast access to online payments and financial assistance are also advantageous for many households and enterprises. However, if digital financial services expand quickly during crises without the right laws and safeguards in place, inherent threats to stability and security could worsen. However, initiatives aimed at encouraging the use of digital financial services should avoid making user inequality worse.

Amidu (2023) explored the correlation between gender dynamics, digital financial services (DFS), and vulnerability to COVID-19 within informal settlements. Employing the ordinary least squares (OLS) analytical approach, this study unveiled that men residing in informal settlements showed a higher probability of encountering individuals who had contracted COVID-19 or had succumbed to it compared to women. However, due to social inequalities, women are at greater risk during the pandemic. This is because groups that are already marginalized in society are more susceptible to pandemics and have difficulty putting preventative and remedial measures in place. Additionally, this study discovered that digital financial services played a moderating role in reducing the vulnerability of informal settlement residents.

Borgonovi et al. (2018) reported that various factors support the digital gender gap, strengthen the foundation of evidence for policymaking, and offer policy guidelines for contemplation in all the G20 nations. The study concluded that barriers to accessibility, expenses, low levels of education, and the existence of deeply rooted prejudices and social standards prevented women from fully utilizing the potential brought about by the digital revolution. Furthermore, the relatively lower enrollment of girls in educational fields essential for success in the digital era, such as science, technology, engineering, mathematics, and information and communication technologies,

combined with the reduced utilization of digital tools by women and girls, has the potential to result in wider disparities and increased inequality.

Antonijević et al.,(2022) study compared and contrasted men and women in seven financial inclusion-related segments: One, having a financial institution account; Two, maintaining savings within a financial institution.; Three, borrowing from a financial institution; Four, having a credit card; Five, accessing an account via a mobile device or the Internet; Six, using the Internet to make purchases or pay bills; and seven sending and receiving digital payments. The Global Findex Database 2017 served as the foundation of this study. This study used the Wilcoxon signed-rank test, which revealed statistically significant disparities in financial inclusion between men and women across all segments. In view of this, the authors suggested that several governments, such as those in Saudi Arabia, Kenya, Turkey, Hong Kong, Italy, Spain, Trinidad and Tobago, and Bahrain, formulate comprehensive strategies for financial inclusion. These plans should prioritize improving and expanding women's financial participation, specifically by facilitating digital payment methods and improving access to bank accounts.

Reynolds (2023) investigated disparities between genders in awareness of and engagement with mobile money (MM) in eight nations with low to middle incomes. The study employed information extracted from three successive rounds of the Financial Inclusion Insights Survey, covering the period between 2013 and 2016.
 This encompassed sociodemographic aspects like age, marital status, literacy, education, employment, income, and financial literacy, alongside supplementary factors such as owning a mobile phone, possessing formal identification, and having a bank account. Gender and mobile money (MM) use did not appear to be correlated in any way in developed MM markets, such as

Kenya, Tanzania, and Uganda. However, significant gender differences in MM consumption persist in developing economies such as Bangladesh, India, Indonesia, Nigeria, and Pakistan. It is interesting to note that in these areas, men's access to bank accounts and phones showed stronger correlations with MM usage than did women. Furthermore, in these regions, gender disparity in MM adoption has grown over time.

Zwane et al., (2023) study investigated whether and in what ways male and female users of online banking in an emerging economy like Swaziland have varying perceptions regarding the use of online banking systems. A self-administered survey was employed to gather information from over 280 banking clients in two Swaziland regions. The results indicate no notable differences between male and female customers. Nevertheless, both genders expressed discomfort and dissatisfaction with the current online banking system in Swaziland.

Ghosh (2022) uses district-level survey data analysis to examine how technology impacts the advancement of financial inclusion for women in India. According to the research, women are less likely than males to open accounts using a phone and are only 9% more likely to actively utilize their mobile phone accounts. Similarly, women who possessed mobile phones had lower account and usage rates, especially in the post-PMJDY era. The results also show that different groups of women have different experiences of using mobile phones, especially those who are impoverished. The analysis highlights the significance of putting thoughtful policies in place to narrow the gender gap in mobile device usage to further close the gender gap in financial inclusion.

According to Yeyouomo et al. (2023), from 2011 to 2017, fintech companies in Sub-Saharan Africa (SSA) have a significant impact on eliminating gender disparities in financial access. The focus of

this study is financial innovation in underdeveloped nations. A multilevel Tobit regression model was used to analyze panel data and provide the empirical findings. The study's outcomes indicate that fintech companies help narrow the gender disparity in financial inclusion by addressing gender gaps in accessing and utilizing financial services. Additionally, they raise questions about whether fintech development alone can completely bridge this gap and suggest that it may require coordinated policy initiatives specifically designed to address and close the gender gap.

Were et al. (2021) used regression and descriptive analyses to examine the differences between genders in Tanzania's financial inclusion. With the advent of mobile phone money services, access to and usage of formal financial services have improved, particularly for women; yet, the sector is still lagging behind. Using data from the 2017 FinScope Tanzania survey, the study found that married women were less likely than men to utilize mobile money and banking services. Similarly, the survey reveals that women are more likely to choose to save or keep money at home than borrow or join savings clubs. Gender differences in financial inclusion can be attributed to several factors, such as poor income, insufficient financial literacy, and restricted access to digital tools like telephones. The authors argue that it is equally important to understand how preferences differ between genders. Policies that assist saving organizations, raise women's educational attainment, and improve their financial literacy are necessary to expand women's access to formal financial services.

Kamau et al. (2023) investigated gender disparities in the context of Kenya's growing adoption of digital financial services to investigate the connection between high debt levels and financial literacy. Analysis was done on data from the FinAccess Household Survey 2021's primary and secondary data sources. The results show that there is a tendency toward a decline in the gender

disparity in financial services use and access. Nonetheless, there are persisting differences between women and men when it comes to the use of various financial products, financial literacy, and debt management. The results indicate a distinct preference among women for informal credit services, such as chambers, as opposed to formal channels, whereas men exhibit a preference for formal avenues.

Additionally, this study highlights that formal education and financial literacy play pivotal roles in decreasing the probability of experiencing excessive debt. It also emphasizes the fact that women are typically less financially literate than males, which raises the possibility that they will become too indebted. A considerable need for financial education has been identified by researchers. Although more than 25% of the participants are aware of credit reference bureaus, only roughly 25% are able to access and use them efficiently. Only a small portion of respondents effectively access and use these bureaus, despite their significance in closing information gaps, improving credit pricing, and lowering default rates.

Wandeda et al. (2023) examined the correlation between digital financial inclusion and financial well-being in Kenya with a particular focus on gender analysis. The average impact of digital financial inclusion on Kenyan women's financial well-being was estimated, and propensity score matching techniques were used to assess the likelihood that these women would adopt it. The study found that several sociodemographic characteristics, including age, area of residence, education level, marital status, and religion, had an impact on women's adoption of digital financial services through the analysis of data from 22,024 households in the Financial Access Survey 2021. These distinctions between digital financial users and non-users are particularly noteworthy.

Tiony(2023) investigated how digital financial services affect Kenya's financial inclusion. This study examines the growth of digital financial services in Kenya, usage trends, and their influence on financial inclusion using secondary data analysis. The results show a significant increase in the number of people with bank accounts, indicating a move toward digital platforms to improve financial inclusion. Compared to traditional savings accounts, credit choices, and banking services, these digital financial services are more widely used and more accessible. This is especially true for mobile money platforms, such as M-Pesa. This study also emphasizes the economic benefits and empowerment brought about by digital financial services, such as increased livelihood, financial resilience, and a decline in poverty and inequality.

Roy and Patro (2022) carefully reviewed the corpus of recent literature as part of their in-depth investigation. Their objective was to identify and delineate a multitude of elements that influence women's participation in financial services, examine the ensuing gender disparity, and emphasize the critical significance of cultivating women's improved financial inclusion. 75 peer-reviewed publications published between 2000 and 2021 were examined in this study, and the results were presented methodically in accordance with a conceptual paradigm.

The synthesized information underscores the existence of gender-related gaps in financial inclusion, predominantly influenced by demand-side factors. Additionally, several socioeconomic and cultural factors have been identified as influencing women's exclusion from financial services. Based on a thorough evaluation of the literature, this study offers new areas of interest for future research, such as digital finance, financial self-confidence, and financial literacy. These areas are thought to be crucial for advancing women's financial inclusion.

Mushtaq et al., (2023) analyzed the knowledge framework of research related to women's financial inclusion and provided a comprehensive summary of the studies conducted in this domain up to the present. A bibliometric analysis of 235 publications indexed in Scopus was conducted. In this investigation, VOSviewer was used to perform reference co-citation analyses, evaluate keyword networks, examine co-authorship trends, and examine citations. Prominent figures in the subject were identified by this investigation, with Ghosh emerging as the most prolific author. The analysis also identified the top journals—World Development in particular—in this field.

Furthermore, it identified important institutions concentrating on green consumer research, The World Bank, USA, being one of the most notable, and highlighted particular geographic areas where significant research on this topic has been concentrated, with India leading the way. In addition, the study identified four primary themes that summarize the corpus of research on women's financial inclusion.

Khera (2022) provided an illustration of how the expansion of digital financial services, which encompass financial transactions carried out via mobile devices or the Internet, is transforming people's lives by increasing accessibility to financial services for disadvantaged populations. However, this transformation does not benefit all the demographics equally. There is a significant lack of representation of women in financial and technological fields. The authors suggest that broadening access to conventional financial services for both genders could diminish income disparities within countries, emphasizing that when more women gain access to these services, the benefits of reducing inequality become more pronounced.

2.3 Overview of the Literature

A series of studies conducted in various regions explored gender disparities in financial inclusion. Studies have shown that when women try to use official financial services, they often face barriers. The disparities in income levels, financial knowledge, and accessibility of digital tools are among the variables that give rise to these hurdles. Policy recommendations have been made to address these issues, including improving women's education and financial literacy. Furthermore, it has been underlined how crucial it is to control the rapid expansion of digital financial services, particularly during emergencies, such as the COVID-19 epidemic. To address this imbalance in income distribution, there is a growing focus on enhancing the accessibility of conventional financial services. Fintech companies have been identified as having the potential to eliminate gender differences in financial access.

These studies also highlight the critical need to improve educational opportunities for women in fields that are essential for the digital age as well as the need to address the societal and cultural barriers that prevent women from entering the financial services and digital technology sectors. It is also noted that there are differences in gender inequality between various markets and nations and that the use of mobile money is influenced by factors such as bank account accessibility and mobile phone ownership. Overall, these studies provide valuable insights into the multifaceted issue of gender disparities in financial inclusion, and offer recommendations for policymakers, academia, and researchers to address these challenges.

Using a probit model and data from the 2021 FinAccess Survey, this study investigates how women use digital financial services. It also aims to identify the obstacles and difficulties that women encounter when embracing and utilizing digital financial services. This study also aims to

determine how gender disparities impact financial inclusion in Kenya, and how this knowledge can help policymakers and financial institutions expand their financial access to underserved populations. Understanding these implications is of utmost importance to policymakers and financial institutions seeking to expand their financial access to underserved populations.

CHAPTER THREE METHODOLOGY

3.1 Introduction

This section presents the materials and methods used to investigate gender differences in Kenya's utilization of digital financial services. This study focuses on consumer theory and employs an empirical model based on the probit model estimation using the 2021 FinAccess survey conducted by the Kenya National Bureau of Statistics (KNBS). This chapter also addresses the potential econometric issues.

3.2 Theoretical framework

Consumer behavior theory determines consumer demand for digital financial services (DFS). Consumers derive utility from consuming DFS. Utility, U, is a function of consumption and DFS.

$$U = f(C, DFS) \qquad (1)$$

The consumer wants to maximize utility subject to budget constraints.

$$Y = (CP_C + DFSP_f) \qquad (2)$$

P_C and P_f denote the price of other consumer goods and DFS, respectively. Maximizing the utility function subject to budget constraints provides the optimal DFS and other consumer goods levels. From equation (2), DFS utilization and, specifically, DFS services depend on the prices of DFS services, such as ownership of a mobile phone and other expenditures.

3.3 Model specification

DFS utilization was assumed to be binary. The individual decides whether to utilise DFS services, and it can be assumed that in deciding to seek DFS, they compare the expected benefits (DFS_A^*) from utilization and the expected benefits (DFS_N^*) from non-utilisation. An individual decides to seek DFS if the benefits outweigh the costs of non-utilisation; that is,

$$\text{DFS}_i^* = (\text{DFS}_A^* - \text{DFS}_N^*) > 0 \tag{3}$$

Where DFS_i^* is an unobservable latent variable. We only can observe if an individual utilises DFS services ($\text{DFS}_i = 1$) or otherwise ($\text{DFS}_i = 0$). DFS_i^* can be expressed as a function of observable characteristics as:

$$\text{DFS}_i^* = \delta' Z_i + u_1, with\ \text{DFS}_i = 1\ if\ [\text{DFS}_i^* > 0] \tag{4}$$

Where $\text{DFS}_i = 1$ if an individual seeks DFS services and zero otherwise; δ is a vector of parameters to be estimated; Z is a vector of explanatory variables that DFS services utilisation decision; and u_1 is the error term with mean zero and variance σ_1^2. The probability of DFS utilization can be specified as follows:

$$Prob\ (DFS_i = 1) = Prob\ (DFS_i^* > 0) = Prob(u_1 > -Z_i\delta) = 1 - F(-Z_i\delta) \tag{5}$$

Where F is the cumulative distribution function for u_i.

We will estimate the following empirical model as follows:

$$\boldsymbol{DFS_i = \beta_0 + \beta_1 Gender_i + \beta_2 Controls_i + \mu_i}$$

Where DFS_i is the dependent variable representing whether individual utilizes digital financial services and 0 if otherwise, $Gender_i$ is a binary variable representing gender(1 for male, 0 for female); $Controls_i$ represents a vector of control variables including mobile phone ownership, income of the individual, internet use, access to digital credit, age and age squared, highest educational level of individuals, and residential status of individual i while μ_i represents the error term.

Table 3.1 shows the definitions and measurements of all variables to be employed in this study.

Table 3.1. Description and measurement of variables

Variables	Measurement	Predicted Sign
Utilizes digital financial services	Dummy value of 1 if an individual utilizes DFS, 0 otherwise.	Dependent variable
Gender	Dummy 1=male, 0 female	Positive
Internet use	Dummy value of 1 if an individual uses the internet, 0 otherwise.	Positive/ Negative
Mobile Phone Ownership	Dummy value of 1 if an individual owns a phone, 0 otherwise.	Positive/ Negative
Income	Monthly income (KES)	Positive/negative
Age	Respondents age in years	Positive/negative

Age squared	Square term for age in years	Positive/negative
Education	Categorical 0-No education, 1-Primary Education, 2-Secondary Education, 3-Tertiary Education, 4-Other	Positive
Access to digital credit	Dummy value 1 if a line of digital credit available, 0 otherwise	Positive

Source: Literature reviews used in the study

3.4 Data source

The Kenya National Bureau of Statistics' (2021) FinAccess survey will be used in this investigation.

This household survey, which is nationally representative, offers data on household finances and related limitations with focus on individuals aged 16 years and above living within conventional households in Kenya. The data is publicly available in the Kenya National Bureau of Statistics Website(https://www.knbs.or.ke/).

3.5 Econometric approach

3.5.1 Multicollinearity

High correlation or linear dependency between independent variables in a regression model is referred to as multicollinearity, and it can affect how the coefficient estimates are interpreted and remain stable. This makes it difficult to isolate the effects of individual variables and can lead to unreliable or variable estimates (Gujarati & Porter,2003). Multicollinearity detection involves examining correlation matrices and variance inflation factors (VIF). Removing linked variables,

changing variables, or applying sophisticated methods like Principal Component Analysis (PCA) or ridge regression are some possible solutions (Gujarati, 2022). Addressing multicollinearity is crucial for reliable and interpretable regression results and enhances the overall robustness of the analysis.

3.5.2 Heteroscedasticity

Heteroskedasticity refers to unequal variance in the error terms of a regression model, which can bias coefficient estimates and affect the reliability of statistical inferences. They can be detected using informal(graphical) or formal tests. Heteroscedasticity can be adjusted using robust standard errors (Gujarati & Porter, 2003). Properly addressing heteroskedasticity is important to obtain reliable and efficient estimates and ensure valid statistical inferences in regression analyses (Gujarati,2022).

CHAPTER FOUR EMPIRICAL FINDINGS

4.1 Introduction

This chapter presents the empirical results regarding gender differences in the utilization of digital financial services in Kenya. Data analysis, including interpretation of the findings, is also presented in this chapter. The probit model estimation was followed by an analysis of the average marginal effects, a correlation analysis, and summary statistics.

4.2 Summary statistics

The findings indicated that households had an average age of 39 years out of the 22024 respondents sampled in the study, with 66 percent residing in rural areas and 34% residing in urban areas. Regarding education, 18 percent had received no formal education, 40% had completed primary schooling, 30 percent had attained secondary education, and 12 percent had achieved higher education; less than 1 percent pursued other educational paths. Respondents with at least a primary education are more likely to utilize digital financial services than those with no education.

A significant 78 percent reported using digital financial services (DFS) in the country. Additionally, 80 percent owned a mobile phone, 98 percent of respondents acknowledged utilizing digital credit services, and less than 2 percent did not used digital credit services.

Interestingly, 85.3 percent of the respondents claimed that they had never used the Internet, with only 15 percent confirming its usage. The average monthly income of the respondents was Ksh.8301.

Table 4.1 Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Digital services financial utilization	22024	0.776	0.417	0	1
Gender	22024	0.59	0.492	0	1
Age	22024	38.897	17.212	16	116
Monthly income	19619	8301.659	12614.768	100	400000
Mobile ownership	22024	0.804	0.397	0	1
Education					
None	22024	0.181	0.385	0	1
Primary	22024	0.402	0.49	0	1
Secondary	22024	0.301	0.459	0	1
Tertiary	22024	0.115	0.319	0	1
Other	22024	0.001	0.034	0	1
Residence					
rural	22024	0.656	0.475	0	1
urban	22024	0.344	0.475	0	1
Digital credit					
Yes	22024	0.983	0.128	0	1
No	22024	0.017	0.128	0	1
Internet use					
No	22024	0.853	0.354	0	1
Yes	22024	0.147	0.354	0	1

4.3 Correlation Analysis

The investigation utilized a correlation matrix to assess the magnitude and direction of the relationships among the independent variables. The table indicates that there is no strong correlation that could potentially undermine the accuracy of the study's estimations. This is evident, as most of the correlation coefficients in the matrix are below |0.5|, signifying a lack of significant correlation between the variables being examined.

Table 4.2: Matrix of Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Gender	1.000											
(2) Age	-0.065	1.000										
(3) Monthly income	0.097	0.004	1.000									
(4) Mobile ownership	0.052	-0.008	0.176	1.000								
(5) No education	-0.141	0.304	-0.080	-0.179	1.000							
(6) Primary education	0.050	0.062	-0.166	-0.010	-0.382	1.000						
(7) Secondary education	0.038	-0.250	0.005	0.048	-0.304	-0.539	1.000					
(8) Tertiary education	0.036	-0.100	0.340	0.159	-0.169	-0.300	-0.239	1.000				
(9) Other	0.005	0.002	0.011	0.008	-0.015	-0.027	-0.021	-0.012	1.000			
(10) Residence	-0.009	-0.174	0.222	0.163	-0.143	-0.132	0.127	0.190	0.009	1.000		
(11) Digital credit	0.011	-0.055	0.078	0.058	-0.062	-0.068	0.022	0.146	-0.004	0.101	1.000	
(12) Internet use	0.041	-0.114	0.212	0.151	-0.177	-0.131	0.109	0.253	0.021	0.200	0.111	1.000

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Table 4.3: Variance inflation factor (VIF)

	VIF	1/VIF
Gender	1.038	.963
Age	26.229	.038
Age squared	25.972	.039
Monthly income	1.233	.811
Mobile ownership	1.189	.841
Primary education	2.146	.466
Secondary education	2.308	.433
Tertiary education	1.919	.521
Other	1.007	.993
Residence	1.149	.87
Digital credit	1.034	.967
Internet use	1.155	.866
Mean VIF	**5.532**	.

It is evident from both Tables 4.3(VIF) that the explanatory variables display a low level of correlation, indicating the absence of multicollinearity issues.

4.4 Estimation results

Table 4.4 shows gender disparities in digital financial service utilization in Kenya. The results of the probit model are shown in the first column and the marginal effects are shown in the second column.

Table 4.4 Probit model regression and the marginal effects

	(1) Probit Model	(2) Marginal Effects
Gender	0.0609**	0.00780**
	(0.0292)	(0.00374)
Age	0.0987***	0.0127***
	(0.00403)	(0.000526)
Age squared	-0.000956***	-0.000123***
	(0.0000419)	(0.00000544)
Monthly income	0.0000182***	0.00000233***
	(0.00000248)	(0.000000320)
Mobile ownership	2.371***	0.304***
	(0.0327)	(0.00352)
Primary education	0.388***	0.0601***
	(0.0380)	(0.00636)
Secondary education	0.469***	0.0707***
	(0.0440)	(0.00706)
Tertiary education	0.985***	0.127***
	(0.0786)	(0.00930)
Other	0.484	0.0725
	(0.441)	(0.0554)
Residence	0.0476	0.00610
	(0.0331)	(0.00424)
Digital credit	1.072***	0.138***
	(0.287)	(0.0369)

Internet use	0.0261	0.00335
	(0.0485)	(0.00622)
_cons	-3.506***	
	(0.0936)	
N	19619	19619

4.5 Discussion of the estimation results

The interpretation of the results is based on marginal effects because they are easy to compute and interpret. The gender variable significantly and positively influences the utilization of DFS. This showed that the likelihood of men utilizing DFS was higher than that of women by 0.78%. This could be due to the societal expectations or norms that may impact financial decision-making, thereby limiting women's autonomy in financial matters. The results confirm our hypothesis that males are more likely to utilize DFS than their female counterparts. Additionally, this finding is in line with that of Chamboko et al. (2022).

The relationship between age and the utilization of DFS displayed a significant and positive influence on individuals up to turning point at 51.62 years of age. This suggests that the likelihood of DFS utilization is related to age in a U-shaped fashion ceteris paribus with usage of DFS increasing with age until reaching a turning point of $tp = (-((0.0127))/2*-0.000123) = 51.62$ years. However, a negative and significant impact exists between age squared and use of digital credit services. This points to a non-linear effect. Therefore, as age increases by one year, the likelihood of using DFS is expected to rise by 1.3% up to the age 51.62 and then this probability decreases in higher age brackets, as evidenced by the negative coefficients associated with age squares.

These findings are supported by similar studies by Chamboko (2022) and Wambire (2020), reinforcing the observed connection between age and the adoption of digital financial services.

The income-related coefficients were positive and statistically significant. The use of DFS by an individual was significantly positively correlated with monthly income level. An additional income is associated with more DFS utilization. Conventionally, as income grows, individuals gain access to necessary technology for digital financial services. Higher earnings expand financial needs, prompting utilization of diverse DFS offerings. Increased income often correlates with greater comfort and familiarity with digital tools, fostering adoption of DFS. These results are in line with those of the earlier studies by Kamau et al. (2023) and Tiony (2023).

The ownership of mobile devices demonstrates a clear and meaningful positive effect with the utilization of digital financial services (DFS). More precisely, an individual possessing a mobile device showed a 30 percent increase in the likelihood of utilizing digital credit services. This finding aligns with that of a previous study by Parlasca et al. (2022), Muthiora (2015), and Pazarbasioglu (2020) identified a significant and positive relationship between mobile ownership and the utilization of digital financial services.

Educational background significantly affects an individual's engagement with digital financial services. Individuals with primary education have a 6% chance of utilizing DFS compared to those with no education, while those with secondary education exhibit a 7.1% likelihood compared to individuals without any education. Remarkably, among varied educational levels, those with tertiary education notably demonstrate a significant 12.7% likelihood of using DFS in

contrast to those without education. Additionally, individuals with alternative educational backgrounds show a 7.3% probability compared to those lacking any education. This result emphasizes the importance of education to gain the utilization of digital credit services. Therefore, raising educational attainment may result in an increase in the nationwide use of digital financial services. This result is consistent with research conducted by Kamau et al. (2023), which highlights the critical role that education, particularly financial literacy, plays in encouraging the use of digital financial services in Kenya.

There is a notable positive and significant influence between digital credit and DFS utilization. For digital credit, there is an anticipated 14 % increase in the use of DFS. The results are in line with the literature by Bazarbash and Beaton (2020). Our research shows variables such as place of residence and internet usage were found to be statistically significant. This means that they do not influence DFS utilization.

CHAPTER FIVE CONCLUSIONS

5.1 Introduction

This study is summarized and concluded in this chapter by using empirical data. Policy implications also exist for results and potential study areas.

5.2 Summary of the findings

The focus of this study is to explore the impact of gender in the utilization of digital financial services in Kenya, utilizing the 2021 Kenya National Financial Access dataset. The primary objective was to scrutinize the influence of gender differences on the utilization of digital financial services within Kenya. Our results showed that 78 percent reported using digital financial services (DFS) in the country. The results highlight a greater prevalence of digital financial services usage among men than among women. Moreover, the study identifies age, income level, education, and ownership of mobile devices as the primary influencers driving the utilization of digital financial services in Kenya.

Additionally, our research revealed that a significant portion of the population engages in digital financial services, particularly digital credit. Men and individuals with higher income levels, greater educational achievements, and ownership of mobile devices are more inclined to utilize digital financial services such as digital credit in Kenya than women.

Moreover, those with primary, secondary, and higher education, as well as alternative educational backgrounds, exhibit a likelihood of using digital financial services, contrasting sharply with individuals without formal education. However, our findings indicate that area of residence and Internet access did not exhibit any correlation with the utilization of digital financial services in Kenya.

5.3 Conclusions

The exploration of impact of gender in digital financial service (DFS) utilization in Kenya, based on the 2021 Kenya National Financial Access dataset, uncovers compelling insights. With 78 percent reporting DFS usage, the study underscores a notable gender gap, revealing higher prevalence among men than women. Key influencers driving DFS utilization encompass age, income, education, and mobile device ownership. Specifically, men and individuals with higher income, education levels, and mobile devices exhibit greater inclination toward DFS, notably digital credit. Education emerges as a critical factor, indicating contrasting usage patterns between those with and without formal education backgrounds. Surprisingly, despite expectations, area of residence and Internet access show no correlation with DFS utilization. These findings illuminate the need for targeted interventions to bridge gender-based disparities and enhance access to digital financial services, emphasizing education and mobile device ownership as pivotal avenues for promoting financial inclusion in Kenya.

5.4 Policy recommendations

The significance of education level, gender, digital credit, mobile ownership, age, and income levels in explaining the utilization of diverse digital financial services, including digital credit, has been established.

Policies targeting the enhancement of income, mobile ownership, and educational attainment among individuals could facilitate the utilization of digital financial services in Kenya, particularly among women. To overcome barriers related to mobile ownership, the implementation of subsidized smartphone initiatives and expansion of network coverage in rural and underserved areas have emerged as pivotal strategies. These actions would effectively improve access to digital financial services by increasing mobile ownership, particularly among women. Furthermore, advocating gender-inclusive mobile policies and customized service packages from mobile network operators would play a crucial role in narrowing the existing digital divide.

Educational initiatives are equally vital, necessitating the development of digital literacy training programs specifically aimed at women. These programs would empower women to navigate digital platforms confidently, thereby facilitating better access to educational resources and financial tools. Collaborations with educational institutions to deliver discounted educational content through mobile platforms, using digital credit, can also be instrumental in encouraging learning among women. Additionally, integrating financial education curricula in schools, emphasizing digital finance and credit management, could instill responsible financial habits and enhance financial literacy at a young age.

To improve income, tailored financial literacy programs should be established to engage community leaders and NGOs to ensure widespread comprehension of the benefits and responsible use of digital credit. Accessible microcredit schemes designed for women could be

facilitated through partnerships between financial institutions and community organizations, offering reduced interest rates, or special initiatives focused on income-generating activities. Moreover, incentivizing women entrepreneurs through tax breaks or grants to engage in digital financial services could further drive their participation in the formal financial sector.

5.5 Areas for further research

The examination encompasses 47 counties in Kenya, utilizing the 2021 Kenya National Financial Access (Fin Access) dataset. To broaden the scope, future investigations should focus on specific counties or regions, delving deeper into their distinct geographical characteristics. Additionally, employing decomposition methods in future studies could offer insights into a more comprehensive understanding of the socioeconomic and demographic factors contributing to and driving the gender gap in the utilization of digital financial services in Kenya.

REFERENCES

Agur, I., Peria, S. M., & Rochon, C. (2020). Digital financial services and the pandemic: Opportunities and risks for emerging and developing economies. *International Monetary Fund Special Series on COVID-19, Transactions*, *1*, 2-1.

Amidu, M., Akakpo, A. A., Mensah, J. K., & Asiedu, E. (2023). Gender, digital financial services and vulnerability in the era of pandemics: A cross-sectional analysis. *F1000Research*, *11*, 1218.

Antonijević, M., Ljumović, I., & Ivanović, Đ. (2022). Is there a Gender Gap in Financial Inclusion Worldwide?. *Journal of Women's Entrepreneurship and Education*, (1-2), 79-96.

Borgonovi, F., Centurelli, R., Dernis, H., Grundke, R., Horvát, P., Jamet, S., ... & Squicciarini, M. (2018). Bridging the Digital Gender Divide Include, Upskill, Innovat.

Chamboko, R., Heitmann, S., & Van Der Westhuizen, M. (2018). Women and digital financial services in Sub-Saharan Africa: Understanding the challenges and harnessing the opportunities.

Financial Sector Deepening (FSD) Kenya (2021).*Financial Acess in Kenya: Results of the 2019 National Survey*.FSD Kenya, Nairobi.

Ghosh, S. (2022). Gender and financial inclusion: does technology make a difference?. *Gender, Technology and Development*, *26*(2), 195-213.

Githu, J. M. (2023). Legal & regulatory framework for digital financial services in Kenya: A case for urgent reforms.

Gujarati, D. N. (2022). *Basic econometrics*. Prentice Hall.

Gujarati, D. N., & Porter, D. C. (2003). *Basic Econometrics,* McGraw-Hill. New York.

Johnen, C., & Mußhoff, O. (2023). Digital credit and the gender gap in financial inclusion: Empirical evidence from Kenya. *Journal of International Development*, *35*(2), 272-295.

Kamau, A., Misati, R., Ngoka, K., Odongo, M., & Were, M. (2023). Digital Financial Services and Implications of Financial Literacy on Gender and Over Indebtedness: The Case of Kenya. *African Economic Research Consortium*.

Khera, P., Ogawa, S., Sahay, R., & Vasishth, M. (2022). The digital gender gap. *Finance & Development*.

McKinnon, R. I. (2010). *Money and capital in economic development*. Brookings Institution Press.

Mushtaq, R., Dastane, O., Rafiq, M., & Başar, B. D. (2023). Women financial inclusion research: a bibliometric and network analysis. *International Journal of Social Economics*.

Nanziri, L. E. (2020). Women, Inclusive Finance and the Quality of Life: Evidence from Zambia. *Women and Sustainable Human Development: Empowering Women in Africa*, 285-303.

Ndung'u, N. (2018). The M-Pesa technological revolution for financial services in Kenya: A platform for financial inclusion. In *Handbook of blockchain, digital finance, and inclusion, volume 1* (pp. 37-56). Academic Press.

Parlasca, M. C., Johnen, C., & Qaim, M. (2022). Use of mobile financial services among farmers in Africa: Insights from Kenya. *Global Food Security*, *32*, 100590.

Pazarbasioglu, C., Mora, A. G., Uttamchandani, M., Natarajan, H., Feyen, E., & Saal, M. (2020). Digital financial services. *World Bank*, *54*.

Reynolds, T. W., Biscaye, P. E., Leigh Anderson, C., O'Brien-Carelli, C., & Keel, J. (2023). Exploring the gender gap in mobile money awareness and use: evidence from eight low and middle income countries. *Information Technology for Development*, 1-28.

Roy, P., & Patro, B. (2022). Financial inclusion of women and gender gap in access to finance: A systematic literature review. *Vision*, *26*(3), 282-299.

Silber, W. L. (1983). The process of financial innovation. *The American Economic Review*, *73*(2), 89-95.

Stiglitz, J. E., & Weiss, A. (1981). Credit rationing in markets with imperfect information. *The American economic review*, *71*(3), 393-410.

Tiony, O. K. (2023). The Impact of Digital Financial Services on Financial Inclusion in Kenya. *American Journal of Industrial and Business Management*, *13*(6), 593-628.

Wandeda, D. O., Poulard, D., Kipkorir, K. M., Ikiriinya, C. K., Lentimalei, J. W., Michael, K., ... & Ntutu, J. (2023). Digital Financial Inclusion and Financial Health in Kenya: Gendered Analysis. *African Journal of Economic Review*, *11*(3), 55-68.

Were, M., Odongo, M., & Israel, C. (2021). *Gender disparities in financial inclusion in Tanzania* (No. 2021/97). WIDER Working Paper.

Yeyouomo, A. K., Asongu, S. A., & Agyemang-Mintah, P. (2023, March). Fintechs and the financial inclusion gender gap in Sub-Saharan African countries. In *Women's Studies International Forum* (Vol. 97, p. 102695). Pergamon.

Zwane, S., Wannenburg, E., & de Jager, J. (2023). Gender Differences and the Usage of Online

Banking Services in Swaziland. *Journal of Business and Social Review in Emerging

Economies*, *9*(3), 233-244.