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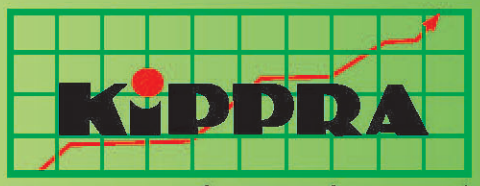

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Role of Fintech in Enhancing Financial Inclusion in Arid Areas in Kenya

Githinji Njenga and Rose Ngugi

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Kenya Institute for Public Policy
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Abstract

The arid areas in Kenya have the lowest development indicators. Studies have evidenced that fintech is a channel for financial inclusion, which is instrumental in increasing the asset base of the poor through savings and investments. This aids in breaking cycles of poverty. This study assessed the use of fintech in enhancing financial inclusion in arid areas by assessing the factors influencing fintech adoption, the contribution of fintech to financial inclusion, and the effect of fintech in improving welfare in arid areas. The study adopted the diffusion of innovation theory and used a cross-section dataset from the Finaccess Household Survey, 2021. The results show that the adoption of fintech is aided by ICT gadgets such as ownership of a mobile phone. That said, the high costs of fintech services including service fees and therefore affordability of the services is a deterrent to adopting fintech. In the arid areas, partly because financial institutions are few, having a bank account or being a member of a SACCO did not serve as a significant source of information to register with a mobile platform or use fintech services such as savings and transactions. The type of economic activity highly influenced the adoption of fintech services. For example, farming and self-employed had a higher probability of adopting fintech. Fintech had a significant effect on financial inclusion, although using fintech for financial transactions had a lower probability of deepening financial inclusion. Furthermore, the adoption of fintech predicted a lower probability of vulnerabilities. As such, the policy interventions proposed to enhance the adoption and use of fintech in arid areas include creating an enabling environment to facilitate access to and use of affordable phones to boost access with affordable services; embracing a holistic approach to financial sector development given the interdependency and complementarity among the various channels of financial services; and prioritizing financial inclusion in addressing developmental needs such as enhancing the coping mechanism to shocks.

Abbreviations and Acronyms

SSA	Sub-Saharan Africa
FI	Financial inclusion
SDGs	Sustainable Development Goals
GCP	Gross County Product
SACCOs	Savings and Credit Cooperatives
MFIs	Microfinance Institutions
TRA	Theory of Reasoned Action
TAM	Technology Acceptance Model
UTAUT	Unified Theory of Acceptance and Use of Technology

Table of Contents

List of Tables and Figures

List of Tables

List of Figures

1. Introduction

The application of digital technology to financial services (Fintech) is reshaping the future of finance (Feyen et al., 2023). While Setiawan et al. (2021) term fintech as a game changer in bringing financial products to the unreached and unbanked population, Ezzahid and Elouaourti (2021) indicate that fintech is a channel of financial inclusion. Ndung'u (2022) observes that fintech evolution has turned financial exclusion into financial inclusion (FI) in Sub-Saharan Africa (SSA). Financial inclusion facilitates individuals and businesses to access useful and affordable financial products and services such as transactions, payments, savings, credit, and insurance. Therefore, their economic needs are met and delivered responsibly and sustainably (Ndung'u and Oguso, 2021). Financial inclusion is instrumental in the achievement of the Sustainable Development Goals (SDGs), including no poverty (SDG 1), zero hunger (SDG 2), good health and wellbeing (SDG 3), quality education (SDG 4), decent work and economic growth (SDG 8), and reduced inequality (SDG 10).

Kenya hosts around 20 per cent of the entire SSA fintech landscape and is ranked the second largest fintech hub in Sub-Saharan Africa after South Africa (Ernst and Young, 2019). The uptake of fintech has been propelled by increased usage of mobile phones, which has spurred innovation in mobile money. The availability of cheaper smartphones and improved ICT infrastructure in the country has contributed to the increase in the use of mobile phones. Consequently, the penetration of smartphones increased from 53.4 per cent in 2021 to 60.2 per cent in December 2022 (Communications Authority, 2023). Before the development of the M-Pesa platform in 2006, only 18.5 per cent of the Kenyan population were accessing formal financial services, mainly bank accounts. As of 2021, 83.7 per cent of the population were accessing formal financial services. Thus, it is undeniable that fintech is driving financial inclusion in Kenya (Central Bank of Kenya, Kenya National Bureau of Statistics and Financial Sector Deepening, 2021a).

Financial inclusion is critical in increasing the asset base of poor and vulnerable populations through savings and investments. Thus, it can aid in breaking the cycles of poverty even for the arid and semi-arid lands (ASALs) of Kenya. The ASALs occupy about 89 per cent of land in Kenya with about 14 million people. The average multidimensional poverty rate for arid areas is 75.9 per cent compared to the national rate of 53.0 per cent (Kenya National Bureau of Statistics, 2020). The economy of arid areas is dominated by mobile pastoralism, while semi-arid areas have a more mixed economy, including rain-fed and irrigated agriculture, agro-pastoralism, bio-enterprise, and conservation or tourism-related activities. Ensuring sustainable food and nutrition security in ASALs remains a primary challenge as recognized in the Sessional Paper No. 8 of 2012 on National Policy for the Sustainable Development of Northern Kenya and other Arid Lands (Government of Kenya, 2012). Despite the challenges faced by the ASALs, the Sessional Paper recognizes the hidden strengths and enormous resources that can be harnessed not only to sustain livelihoods in the ASALs but also to contribute to national development.

This study, therefore, assessed the use of fintech in enhancing financial inclusion in arid areas and its role in improving welfare. Specifically, the study looked at the factors influencing the adoption of fintech, the contribution of fintech to financial inclusion, and the effect of fintech on welfare in arid areas. Though the focus was on arid areas, a comparative analysis with the overall country was done to infer the differences or similarities.

The rest of the paper is organized as follows: Section two presents the stylized facts; Section three is a review of the literature; Section four is the methodology; Section five presents the results; and Section six concludes the study and gives policy recommendations.

2. Socio-economic Status of Arid Areas

2.1 Social and Economic Status in Arid Areas

There are nine (9) arid counties in Kenya: Baringo, Samburu, Mandera, Turkana, Garissa, Tana River, Wajir, Marsabit, and Isiolo. Turkana and Marsabit counties are the largest counties in the country, each covering about 12 per cent of the total country land area (Table 2.1). The rainfall in arid counties is low, averaging annually between 57.99mm and 375mm per year. Therefore, the main economic activity for arid counties is livestock production. Baringo and Tana River counties, however, have both livestock production and crop farming.

The food poverty rate is high in most arid counties. It is only Isiolo County whose food poverty rate of 28.9 per cent is below the national rate of 30.5 per cent. Mandera County leads at 65.5 per cent followed by Turkana County (63.4%), Samburu (60.2%), and Marsabit (55.6%). Stunting levels, reflecting the wellbeing of a population, is within the country's prevalence rate of 18.0 per cent. This is except for Samburu County, which ranks third in the country with a rate of 31.0 per cent. The gross enrolment in pre-primary, primary, and secondary education levels in arid counties is low. Wajir, Marsabit, and Garissa counties have slightly above half the pre-primary age population accessing education, compared to the national gross enrolment rate of 111.2 per cent. On the primary education level, except for Baringo County, other counties have a gross enrolment rate below the national rate of 97.3 per cent. Lastly, at the secondary education level, all the counties have gross enrolment rates that are below the national rate of 76.5 per cent.

2.2 Banking System in the Arid Areas

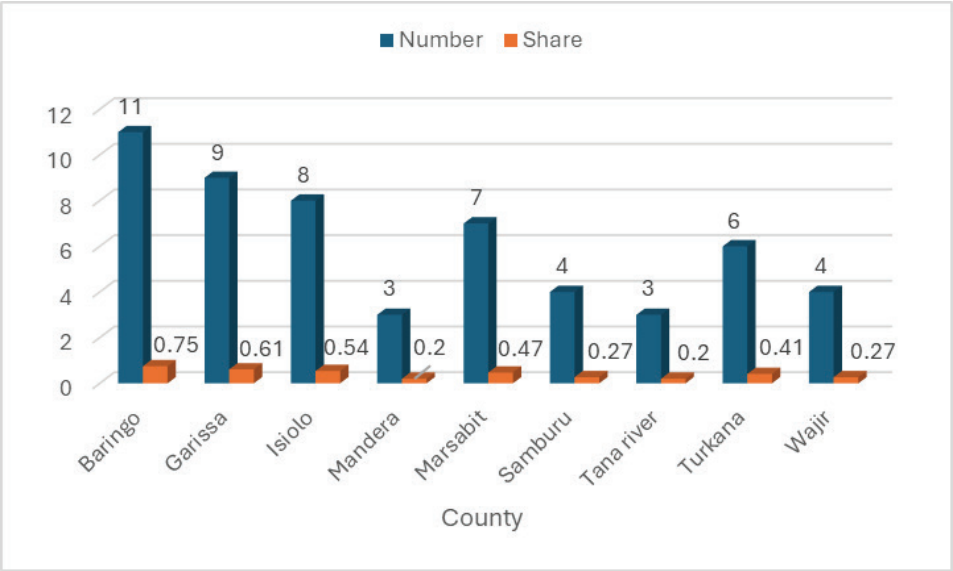
There is a presence of commercial banks in all the nine counties. The number of bank branches is, however, low. Baringo County leads with 11 branches followed by Garissa and Isiolo with nine (9) and eight (8) branches, respectively (Figure 2.1). The microfinance bank branches are only in five (5) counties, with Baringo County having three (3) branches. Isiolo, Marsabit, Samburu, and Turkana counties each have one (1) branch.

Table 2.1: Social and economic status in arid areas

County	County land area to total country land area (%)	Average rainfall per annum (mm)	Population involved in livestock production/crop farming (%)	Food poverty rate (%)	Stunting levels (% of children under five years)	Pre-primary education level gross enrolment rate (%)	Primary education level gross enrolment rate (%)	Secondary education level gross enrolment rate (%)
Baringo	2	220.3	80	33.9	21	131.8	97.5	69.3
Samburu	4	306.1	80	60.2	31	66.4	68.9	40.2
Mandera	5	66.1	72	65.5	21	78.4	45	18.7
Turkana	12	200	83	63.4	23	166.4	74.4	33.8
Garissa	8	375	90	47.2	9	56.5	37.1	20.5
Tana River	7	57.99	80	49.5	21	94	68.9	34.3
Wajir	10	240	80	40.1	12	52.7	34.6	23.3
Marsabit	12	127.4	81	55.6	19	53.3	53	19.6
Isiolo	4	306.1	80	28.9	14	103.8	58.4	27.4

Source: County Integrated Development Plans 2023-2027 (Various); KNBS (2022); KNBS (2020); and Ministry of Education (2020)

Figure 2.1: Bank branches in arid areas



Source: Central Bank of Kenya (2023)

2.3 Financial Inclusion in the Arid Areas

The formal financial inclusion in arid counties is shown in Table 2.2.

Table 2.2: Financial inclusion in arid areas

County	Formal inclusion (financial services and products)	Financial literacy levels (%)	Usage of financial services and products (%)			
			Overall bank usage	Mobile bank accounts	Saccos usage	Mobile money usage
Baringo	74.9	22.7	41.0	12.6	11.4	72.4
Samburu	68.6	25.3	30.9	12.0	9.5	62.9
Mandera	83.8	15.8	10.9	6.6	0.6	83.7
Turkana	60.3	26.6	24.5	13.0	1.3	58.1
Garissa	60.7	24.8	3.8	2.2	0.3	60.7
Tana River	71.3	56.9	8.6	3.8	5.2	70.9
Wajir	86.5	15.5	10.4	4.3	0.7	85.9

Marsabit	78.4	29.8	9.7	3.6	2.8	77.8
Isiolo	87.8	26.7	38.3	22.6	7.8	86.6

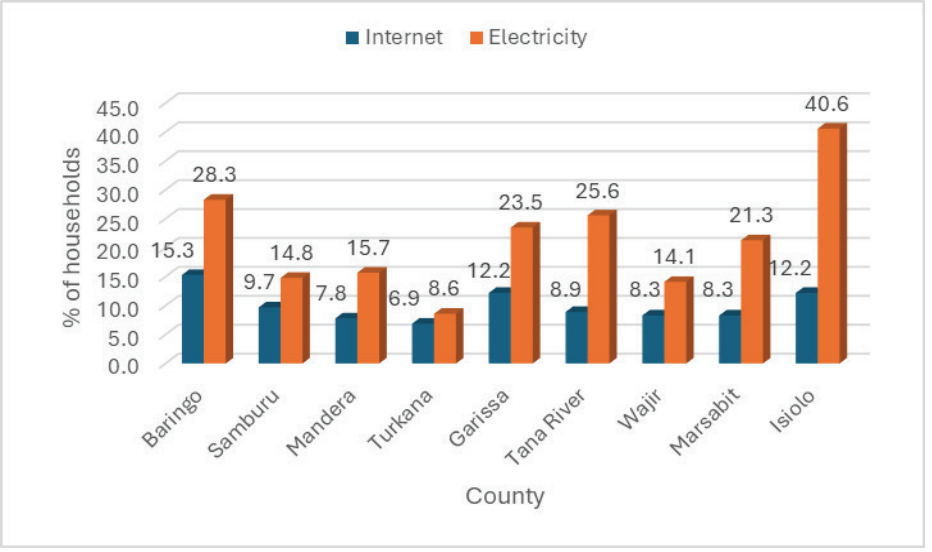
Source: Central Bank of Kenya, Kenya National Bureau of Statistics and Financial Sector Deepening (2022)

Isiolo and Wajir counties have a formal inclusion rate higher than the national rate of 83.7 per cent, at 87.9 per cent and 86.5 per cent, respectively. These two counties have high rates of mobile money usage, implying a close relationship between mobile money usage and formal financial inclusion. Overall, mobile money usage is higher across counties compared to usage of mobile bank and SACCOs. Turkana and Garissa counties have the lowest levels of financial inclusion at 60.3 per cent and 60.7 per cent, respectively. Tana River County has the highest levels of financial literacy (measured by knowledge of the cost of borrowing) at 56.9 per cent followed by Marsabit County at 29.8 per cent.

2.4 Status with Fintech Enablers

The use of the Internet among households in arid counties is generally low (Figure 2.2). Baringo County leads with 15.3 per cent followed by Isiolo County at 12.2 per cent. Turkana County has the least number of households using the Internet at 6.9 per cent. Usage of electricity as the main source of lighting is high in Isiolo County with 40.6 per cent of households. Baringo and Tana River counties follow at 28.3 per cent and 25.6 per cent, respectively. Electricity connectivity in households has implications on facilitating technology infrastructure such as ICT gadgets and Internet connectivity through power.

Figure 2.2: Internet and electricity usage in arid counties



Source: KNBS (2019)

3. Factors that Influence the Use of Fintech

3.1 Theories on Technology Adoption

Literature has several theories that determine the drivers of technology adoption. In the Theory of Perceived Risk (Bauer, 1960), the main driver is the risk that consumers actively perceive because they do not understand product information. Thus, if consumers perceive the product to have low risk and therefore safe, then they are likely to use the product (Taylor, 1974). The Diffusion of Innovation Theory (Rogers, 1962) explains how an idea or product gains momentum over time and diffuses through a specific population. The theory posits that the process of innovation is informed by invention, the channels of communication, time, and the social system. Further, human resources and networks are important, particularly for the adoption of innovation (Rogers, 1995).

The Theory of Reasoned Action (TRA) (Ajzen and Fishbein, 1980) indicates that user acceptance or rejection of an innovation or system is influenced by attitudes, subjective norms, and behavioural intention. The Technology Acceptance Model - TAM) (Davis, 1989), which is an extension of TRA, has two constructs: perceived ease of use and perceived usefulness of information technology. Perceived ease of use refers to the extent to which an individual believes that technology does not necessitate much physical or mental effort. Perceived usefulness is described as the extent to which individuals believe that using a particular technology would improve the efficacy of their job performance. TAM focuses on perceptions, behaviour, convenience, and usefulness of information technology to increase its adoption (Ntwiga, 2019).

The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) integrated eight (8) theoretical models on acceptance and use of technology. UTAUT identifies four constructs that influence the acceptance and use of technology by individuals. The first one is performance expectancy (perceived usefulness, extrinsic motivation, job-fit, relative advantage, outcome expectations); effort expectancy (perceived ease of use, complexity); social welfare (subjective norms, social factors, image); facilitating conditions (perceived behavioural control, facilitating conditions, compatibility). These four constructs are moderated by age, gender, experience, and voluntariness of use. Venkatesh et al. (2012) extended UTAUT to UTAUT2 where three new constructs consisting of hedonic motivation, price value, and habit were added.

3.2 Empirical Literature

3.2.1 Drivers of fintech adoption

Ntwiga (2019) used TAM and 2016 FinAccess Household Survey data to assess how fintech shapes the dynamics of consumer credit usage in Kenya. The study shows that consumer perceptions of cost influence credit usage in Kenya. Similarly, Morocco, Ezzahid and Elouaourti (2021) indicate that costs and fees are major barriers to financial inclusion, including mobile banking. However, in Indonesia, transaction fees in mobile money generate intention in its use since they are not

too expensive, and services provided by mobile money are commensurate with the costs incurred (Sari and Imronudin, 2022).

Jaya et al. (2019) analyzed the barriers to "last mile" financial inclusion: cases from northern Kenya (Marsabit and Samburu counties) and found that illiteracy, innumeracy, and unfamiliarity with technology were barriers for women to fully uptake digital products. Similarly, in Kenya (Narok County), women enterprises did not adequately use online banking due to limited literacy levels (Melubo and Musau, 2020). Ntwiga (2019) further indicates that the source of financial advice, and financial literacy influences fintech credit usage in Kenya. In Vietnam, actual financial knowledge is positively correlated with access to fintech services (Nguyen, 2022). Financial literacy influences sharia financial technology in Indonesia (Bustami and Saifrizal, 2022). In analyzing user innovativeness and fintech adoption in Indonesia, however, Setiawan et al. (2021) found that financial literacy was the least important variable in predicting fintech adoption.

Melubo and Musau (2020) show that women enterprises in Kenya (Narok County) did not adequately use online banking due to limited Internet availability. Also, Ndung'u and Moturi (2020) in assessing the determinants of mobile fintech uptake in the Kenyan microfinance sector and using the Technological-Organizational-Environmental Model found that technology availability, and infrastructure (Internet) significantly influenced the uptake of mobile fintech in the sector. In Nigeria, Internet penetration has a significant impact on financial inclusion (Nwafor, 2018).

Consumer perceptions of trust influence fintech credit usage in Kenya (Ntwiga 2019). Also, users in Kenya and Uganda who trust mobile money agents were likely to use more digital financial platforms than others (Mugume and Bulime, 2022). Ndung'u and Moturi (2020) show that perceived technology benefits significantly influence the uptake of mobile fintech in Kenya. Jack and Suri (2011) found similar findings, which revealed that M-Pesa users with a bank account are much more likely to save on M-Pesa due to safety. Siano et al. (2022) in their exploratory study found that security/safety concerns of theft and cyber fraud are drivers of mobile banking in Nigeria. The study further shows that prompt information about users' financial transactions (savings and withdrawals) immediately through short message service alerts are important drivers. Mobile money agent credibility and service quality stimulate customer empowerment and enhance trust in Ghana (Shaikh et al., 2023). A study on the Bangladesh market by Hassan et al. (2022) showed that trust and perceived benefit facilitate the adoption intention towards mobile fintech services. In Jordan, Al-Okaily (2021) used TAM and indicated that perceived usefulness and perceived enjoyment have a significant and positive influence on users' decision to use fintech services.

Siano et al. (2022) indicate that the social influence of friends, relatives, policy makers, and social trends are drivers of mobile banking in Nigeria. Also, Hassan et al. (2022) indicate that significant positive effects of social influence facilitate adoption intention towards mobile fintech services in Bangladesh. The study used UTAUT to determine the drivers influencing the adoption intention towards mobile fintech services in Bangladesh. However, Sari and Imronudin (2022) found no significant effect of social influence on the intention to use mobile money in Indonesia.

3.2.2 Individual characteristics

Kweyu and Ngare (2013) show that gender affects the adoption of mobile banking services in Kenya, with males more willing to adopt technology than females. Also in Kenya, Van Hove and Dubus (2019) found that those who do not have access to a SIM card or have access to a SIM but do not have an M-Pesa account were predominantly female. Demombynes and Thegeya (2012) examined the mobile savings phenomenon in Kenya and found that in the rural areas, individuals who are male and married were more likely to save. Antonijević et al. (2022) found significant differences worldwide between men and women in all segments related to financial inclusion; that is, using a mobile phone or the Internet to access an account; using the Internet to pay bills or to buy something online, and making or receiving digital payments. Chen et al. (2022) in a cross-country study of 28 countries show that 29 per cent of men use fintech products compared to 21 per cent of women. Nguyen (2022) indicates that in Vietnam, men have a higher propensity to use fintech services than women. On fintech and financial inclusion in Saudi Arabia, males are more financially included than females (Khan and Alhadi, 2022).

Kweyu and Ngare (2013) analyzed the perception of mobile banking services in Kenya and found that age affects the adoption of mobile banking services predominantly by people who are aged 40 years and below. Nguyen (2022) indicates that in Vietnam, younger people have higher fintech usage compared with older people. In India, fintech apps appeal to the newer generation of banking customers, who expect multi-channel access and round-the-clock services and being connected by smartphones (Nanduri, 2021).

Empirical results on income are mixed. Personal income affects the adoption of mobile banking services in Kenya (Kweyu and Ngare, 2013). Similarly in Kenya, Van Hove and Dubus (2019) indicate that those who do not have access to a SIM card or have access to a SIM but do not have an M-Pesa account are predominantly poor. In Saudi Arabia, the rich are financially inclusive, especially the high-income group (Khan and Alhadi, 2022). However, the less financially empowered customer segment provides the needed impetus for the continuous usage of mobile money services in Ghana (Shaikh et al., 2023). On employment, Ezzahid and Elouaourti (2021) found that being a participant in the labour market fosters financial inclusion in Morocco.

Educational background affects the adoption of mobile banking services in Kenya (Kweyu and Ngare, 2013). Further evidence shows that the uneducated in Kenya do not have access to a SIM card or have access to a SIM but do not have an M-Pesa account (Van Hove and Dubus, 2019). While in Saudi Arabia the educated are financially inclusive (Khan and Alhadi,2022), evidence from Morocco shows that having high educational attainment fosters financial inclusion (Ezzahid and Elouaourti, 2021).

3.2.3 Fintech contribution to welfare

Kyungha (2022) shows that mobile money has enabled women in Kenya to benefit from instant remittance and payment services and has offered a means of storing money safely. Ouma et al. (2017) analyzed mobile financial services and financial inclusion in Kenya, Uganda, Malawi, and Zambia using the FinAccess data and found that the use of mobile phones increases savings among poor and low-income households. Suri and Jack (2016) showed that mobile money lifted 2.0 per cent of Kenyan households out of poverty and increased per capita consumption levels. Jack and Suri (2014) examined the impact of reduced transaction costs of mobile money on risk sharing in Kenya. The findings showed that M-Pesa users were able to fully absorb large negative income shocks (such as severe illness, job loss, livestock death, and harvest or business failure) without any reduction in household consumption. By contrast, consumption for households without access to M-Pesa fell on average 7.0 per cent in response to a major shock. Demombynes and Thegeya (2012) in examining the mobile savings phenomenon in Kenya revealed that those with registered M-Pesa accounts were 32 per cent more likely to have some savings. Mbithi and Weil (2011) analyzed the impact of M-Pesa on several economic and social outcomes using a balanced panel of 190 sub-locations in Kenya. The study findings revealed little evidence linking the use of M-Pesa accounts as a place to store wealth. Instead, M-Pesa improved individual outcomes by promoting banking and increasing transfers.

Farmers' use of digital financial services has positive effects on reduction in their vulnerability, thus coping with risk (Wang and He, 2020). In China, fintech innovation can significantly promote household consumption and entrepreneurship (Luo et al., 2022). Zhang et al. (2020) link the index of digital financial inclusion with China Family Panel Studies (CFPS) data. Their findings show that fintech development is positively correlated with household income, and the positive effect is larger for rural households than the urban counterpart, suggesting a benign distributive impact.

On cross-country studies, Loko and Yang (2022) covered 114 countries and revealed that fintech development leads to significant welfare improvement for women. Chinoda and Mashamba (2021) analyzed the interaction between financial technology, financial inclusion, and income inequality in a panel of 25 African countries over the periods 2011, 2014, and 2017. The study found that financial inclusion mediates the financial technology-income inequality relationship, thus playing a fundamental role in reducing income inequality in Africa. Demir et al. (2022) found that fintech significantly reduces inequality at all quantiles of the inequality distribution in higher-income countries. Finally, Asongu and Nwachukwu (2018), using a sample of 93 countries, concluded that the use of mobile phones to pay bills or to send or receive money is significantly and negatively associated with income inequality but only in upper-middle-income countries.

4. Methodology

This section discusses the theoretical framework, empirical specification, measurement of variables, data sources, and descriptive statistics.

4.1 Theoretical Framework

The Diffusion of Innovation Theory (Rogers, 1962) was adopted for this study. Several models have been developed, including the Technology Acceptance Model, which is related to this theory. The theory posits that the uptake of new technology is influenced by the nature of the technology itself, the channels used to propagate the use of the technology, the prevailing socio-economic systems that the potential adopters find themselves using, and the individual characteristics of the adopters.

Innovation

The key innovation considered in this study was financial technology (fintech). Fintech is the adoption of new technology to improve and automate the delivery and use of financial services.

Technology infrastructure

The adoption of fintech requires the adopters to have access to critical technology infrastructure, including ICT gadgets, Internet connectivity, and electricity to power the fintech system. For example, ownership of mobile phones facilitates transactions whenever and wherever one is as long as there is Internet connectivity (Laukkanen, 2007; Gillespie, 2007). Mobile phones can also use USSD code where Internet connectivity is not available.

Fintech systems

The fintech system quality, specifically the speed of connection and download time, influences the use of mobile services (Kleijnen et al., 2004). When the user perceives system quality to be high, the attitude to use (mobile services) fintech becomes more positive. If consumers perceive the transaction cost of digital financial services as affordable, they are likely to adopt it and use it (Lule et al., 2012). Further, the security of the fintech system services enables building trust that helps to grow and develop financial technology (Lule et al., 2012).

Communication channels

Adopters of innovations get information from various channels, including campaigns in the media, reference groups, and intermediaries. For example, those with bank accounts get to learn about mobile banking by interacting with their bank. Further, financial literacy helps individuals compare financial products and services and make appropriate, well-informed financial decisions (Morgan and Trinh, 2017). Financially literate people can make informed financial choices regarding savings, investing, borrowing, and more (Klapper et al., 2015). Therefore, financial literacy is important in accessing digital financial services such as savings, credit, insurance, and payment services.

Social and economic systems

Digital tools are increasing access to and use of financial services. Those who were disproportionately excluded from the traditional financial system including the youth, women, and small businesses can access and use financial services. Internet connectivity has opened rural areas in terms of connectivity, and this has enhanced financial inclusion.

Individual characteristics

Individual characteristics such as gender, age, youth, marital status, persons with disability, and income and employment status have been shown by literature to influence the adoption of technology.

4.2 Empirical Framework

In this section, a detailed empirical framework used for analysis is presented. This includes a model on the adoption of fintech; the contribution of fintech to financial inclusion and the relationship between fintech and household vulnerability.

4.2.1 Factors that influence the adoption of fintech

From the theoretical framework, it is deduced that the adoption of fintech is influenced by technology that supports fintech, information channels for creating awareness about the innovation, socio-economic systems that the adopters find themselves, and individual characteristics. As such:

$$FINTECH = f(Technology, information\ channel, socio\text{-}economic\ systems, individual\ characteristics) \quad (1)$$

Dependent variable

The construction of the dependent variable (FINTECH) considered those who use at least one of the following services: online forex trading account digital/ crypto/community currencies, registered on mobile bank, registered with mobile banking products, registered with mobile money and mobile money products. Any respondent who did not use any of these services was considered non-fintech inclusive.

The fintech products considered were digital loans that one gets through the phone download apps; loans from mobile banking; loans from Fuliza; savings through the mobile money provider (such as M-Pesa, Airtel money, Tcash, Tangaza, MobiKash, Equitel); savings through mobile banking (such as Mshwari, KCB M-Pesa, MCoppCash, Eazzy loan, Timiza, HF Whizz). These are the products covered by FINACCESS 2021.

Thus, FINTECH = 1 if using fintech products and services, excluding transactions and zero if otherwise.

Other variables used as a proxy for financial technology include the following:

- FINTECH2 which considered FINTECH plus transactions made using mobile platforms through fintech. These transactions included monthly bills, school fees, bills to the government, and daily expenses, for example paying for goods at the shop, sent money inside and outside Kenya, received money from outside and inside Kenya, and bills for medical treatment.
- MMBREG which is registration with mobile money and mobile banking, where MMBREG = 1 if registered at least in one of the platforms and 0=otherwise.
- MMSAVE which is saving using mobile money and mobile banking where MMSAVE = 1 when a respondent is using at least one of the platforms and 0=otherwise.
- TRANSACT which is a transaction using mobile platforms. This includes monthly bills; school fees; bills to the government; daily expenses, for example, paying for goods at the shop; sent money inside and outside Kenya; received money from outside and inside Kenya; and bills for medical treatment. TRANSACT = 1 if using the mobile platforms for financial transactions and 0=otherwise.

Finally, all the dependent variables interacted with ARID = 1 if arid county and 0 if otherwise to help in comparing the arid counties with other counties for differences and similarities.

Independent variables

On technology, the following variables were considered:

- OWNPHONE is the ownership of a mobile phone to facilitate the use of mobile platforms. This is the ownership of a mobile phone that can use the Internet or USSD Code. OWNPHONE = 1 if owning a mobile phone and 0 if otherwise.
- MMBCOST is the cost of service that includes the service fee and inability to afford the service. MMBCOST= 1 if the cost of service is identified as a constraint for using a mobile platform and 0 if otherwise.
- MMBQUALITY is the quality of service that includes frequent downturns, fraud, and poor customer care. MMBQUALITY = 1 if the quality of service is identified as a constraint in using mobile platforms and 0 if otherwise.
- MMBACCESS is access to the service that include too young to access, blocked line, changed number, barred, and do not need it. MMBACCESS = 1 if access to service is identified as a constraint for using mobile platforms and 0 if otherwise

Information channel was proxied by:

- BANKREG which is owning a bank account, was used as a proxy for

communicating information on mobile platforms. *BANKREG* = 1 if one has a bank account and 0 if otherwise.

- SACCOREG is SACCO membership and was also used as a proxy for communicating information on mobile platforms. SACCOREG = 1 if one is a member of a SACCO and 0 if otherwise.

Socio-economic system was measured using:

- Sources of income and employment, include farming, employed, casual workers, self-employed, transfers from NGOs and government, support from friends and family, rental, returns on investment, and pension. For analysis, the variable was constructed as follows:
  - (i) FARMING =1 if the income source is farming and 0 if otherwise.
  - (ii) EMPLOYED = 1 if the income source is employed including casual workers and zero otherwise.
  - (iii) SELF-EMPLOYED = 1 if the income source is self-employed and 0 if otherwise.
- RESIDENCE captures rural and urban areas. RESIDENCE = 1 if residing in urban areas and 0 if otherwise.

Individual characteristics include:

- GENDER = 1 if male and 0 if female.
- AGE = Number of years.
- MARITAL = 1 if married and 0 if otherwise.
- PWDs = 1 if a person has a disability and 0 if otherwise.

4.2.2 Contribution of fintech to financial inclusion

Fintech is seen to facilitate financial inclusion including individuals with low income, irregular flows of income, and those far from physical distance from bank branches or financial service points (Ndung'u and Oguso, 2021). This study tried to measure the level of financial inclusion with and without the fintech products, but the difference was negligible at 89.99 and 89.70 per cent, respectively. This is attributed to the fact that in some cases, fintech products are used to access other financial services. For example, using mobile banking to access banks; using mobile phones to access microfinance, SACCO, and making contributions to a group. As such, this study looked at the relationship between financial inclusion and financial technology as follows:

INCLUSION = f(FINTECH, Control variables) *(2)*

Dependent variable

INCLUSION is a measure of financial inclusion that excludes direct financial technology products such as mobile money and mobile banking. Further, INCLUSION interacted with ARID to enable comparing the arid and non-arid counties.

Independent variables

- FINTECH is as measured above including mobile money and mobile banking services. We included FINTECH2, which includes the transactions.

In addition, the following measures of financial technology were considered:

- MMFINTECH = 1 if mobile money including registering and using services and 0 if otherwise.
- MBFINTECH = 1 if mobile banking including registering and using services and 0 if otherwise.
- Other variables included: MMBREG; MMBSAVE; TRANSACT; MMBCOST; MMBQUALITY; and MMBACCESS as defined earlier on.

The control variables included the following:

- Individual characteristics including, GENDER: AGE; MARITAL; and PWDs, which are as defined earlier on.
- Sources of income and employment including FARMING; EMPLOYED; and SELF-EMPLOYED as defined earlier on.
- RESIDENCE as defined earlier on.

4.2.3 Effect of fintech on welfare

The use of digital tools can increase access to and use of financial services. This benefits especially those who had been excluded from the traditional financial system (Sahay et al., 2020). As a result, households can enlarge their asset base with access to financial products and services, enabling them to reduce their vulnerabilities. Such vulnerabilities include having access to adequate food, being able to meet medical costs, and paying school fees. As such:

VULNERABILITY = f (FINTECH, control variables) *(3)*

Dependent variable

Vulnerability was constructed from considering three aspects: going without enough food to eat; going without medicine or medical treatment that was needed; and a child or any person you support sent home for lack of school fees. The study considered the often occurrence of the three aspects. Therefore,

VULNERABILITY = 1 if any of these vulnerabilities is reported and 0 if otherwise.

Independent variables

The variables are as defined earlier on including FINTECH; MMFINTECH; MBFINTECH; MMBREG; MMBSAVE; TRANSACT; MMBCOST; MMBQUALITY; MMBACCESS; GENDER; MARITAL; PWDs; FARMING; EMPLOYED; SELF-EMPLOYED and RESIDENCE. We included youth measured as YOUTH = 1 when 34 years and below and 0 if otherwise.

4.3 Data Type and Sources, Construction of Variables, and Descriptive Statistics

This study used cross-section data set from the Finaccess Household Survey 2021. The survey assesses the financial needs of Kenyans, their use of financial services and products, and how financial services can be improved to meet their needs and livelihoods. The survey targeted individuals aged 16 years and above within households across all the 47 counties. The sample for the survey was drawn from the Kenya Household Master Sample Frame (K-HMSF) developed from the 2019 Kenya Population and Housing Census.

A total of 22,024 eligible households were successfully interviewed, representing 66 per cent in rural areas and 34 per cent in urban areas. Aspects covered in the survey include access to financial services and products, their usage, quality, and their impact. The survey respondents were individuals. Given that the main objective was to assess the use of fintech in financial inclusion, the cross-section data was the most appropriate to use because it is rich in individual attributes.

The variables used in the analysis are summarized in Table 4.1.

Table 4.1: Summary of the dependent and independent variables

Variable	Measurement
Financial inclusion indicators	
INCLUSION	1 = accessing and using financial products and services excluding direct fintech products and 0 = otherwise
INCLUSION2	1 = accessing and using financial products and services, including direct fintech products and 0 = otherwise
Financial technology measures	
FINTECH	1 = using fintech products and services and 0 = otherwise
FINTECH2	1 = using fintech products and services including transactions and 0 = otherwise
MMBERG	1 = registered at least on one of the platforms and 0 = otherwise
MMSAVE	1 = respondent is using at least one of the platforms and 0 = otherwise
TRANSACT	1 = using mobile platforms for transactions and 0 = otherwise
MMBCOST	1 = cost of service identified as a constraint for mobile platform and 0 = otherwise
MMBQUALITY	1 = quality of service identified as a constraint in using mobile platforms and 0 = otherwise
MMBACCESS	1 = access to service identified as a constraint for mobile platforms and 0 = otherwise
BANKREG	1 = has a bank account and 0 = otherwise
SACCOREG	1 = a person is a member of a SACCO and 0 = otherwise
MMFINTECH	1 = mobile money including registering and using services and 0 = otherwise
MBFINTECH	1 = mobile banking including registering and using services and 0 = otherwise
OWNPHONE	1 = own mobile phone and 0 = otherwise
Individual characteristics	
GENDER	1 = male and 0 = otherwise
AGE	Number of years
YOUTH	1 = youth and 0 = otherwise
MARITAL	1 = married and 0 = otherwise
PWDS	1 = person with disability and 0 = otherwise
Socio-economic factors	
FARMING	1 = farming and 0 = otherwise
EMPLOYED	1 = employed including casual workers and 0 = otherwise
SELF-EMPLOYED	1 = self-employed and 0 = otherwise
RESIDENCE	1 = resides in urban area and 0 = otherwise

Source: Authors' compilations

4.4 Descriptive Statistics

The descriptive statistics for the various variables are presented in Table 4.2. Over 70 per cent of those sampled were using fintech services, with a slightly higher level among those in non-arid areas. Mobile banking had the least users while savings using mobile money services was lower in arid areas. Generally, fintech was used to facilitate financial transactions (Table 4.3).

Table 4.2: Descriptive statistics

	Overall counties			Arid counties			Arid vs non-arid pairwise comparison of means (std error)
Variable	**Mean**	**Min**	**Max**	**Mean**	**Min**	**Max**	
Financial inclusion indicators							
INCLUSION	0.8999	0	1	0.8646	0	1	-0.0428(0.0053)
INCLUSION2	0.8970	0	1	0.8617	0	1	-0.0428(0.0054)
Financial technology measures							
FINTECH	0.7781	0	1	0.7190	0	1	-0.0716(0.0074)
FINTECH2	0.8351	0	1	0.7806	0	1	-0.0660(0.0066)
MMFINTECH	0.7749	0	1	0.7169	0	1	-0.0702(0.0074)
MBFINTECH	0.2999	0	1	0.1414	0	1	-0.1920(0.0080)
MMBERG	0.7544	0	1	0.7039	0	1	-0.0611(0.0076)
MMSAVE	0.5285	0	1	0.3984	0	1	-0.1576(0.0088)
TRANSACT	0.7566	0	1	0.6493	0	1	-0.1299(0.0075)
MMBCOST	0.1485	0	1	0.2085	0	1	0.0747(0.0063)
MMBQUALITY	0.0033	0	1	0.0086	0	1	0.0064(0.0010)
MMBACCESS	0.1837	0	1	0.1976	0	1	0.0168(0.0069)
BANKREG	0.2847	0	1	0.1136	0	1	-0.2074(0.0079)
SACCOREG	0.0936	0	1	0.0374	0	1	-0.0681(0.0051)
OWNPHONE	0.8083	0	1	0.8128	0	1	0.0054(0.0080)
Individual characteristics							
GENDER	0.4240	0	1	0.4320	0	1	0.0099(0.0088)
AGE	38.8967	16	116	36.5762	16	100	-2.8144(0.3048)
YOUTH	0.4863	0	1	0.5376	0	1	0.0662(0.0088)
MARITAL	0.5457	0	1	0.5859	0	1	0.0489(0.0088)
PWDs	0.1339	0	1	0.1043	0	1	-0.0358(0.0060)

Socio-economic factors							
FARMING	0.2917	0	1	0.3709	0	1	0.0962(0.0080)
EMPLOYED	0.4334	0	1	0.3377	0	1	-0.1162(0.0088)
SELF-EMPLOYED	0.1722	0	1	0.1801	0	1	0.0099(0.0067)
RESIDENCE	0.3437	0	1	0.3795	0	1	0.0433(0.0084)

Source: Central Bank of Kenya; Kenya National Bureau of Statistics and Financial Sector Deepening (2021b)

Table 4.3: Types of transactions and economic activity

	Paying monthly bills	Paying school fees	Paying daily expenses	Paying bills to government	Sending money	Receiving money
Farming						
Mobile money	14.71	8.75	13.31	1.68	40.41	55.67
Mobile banking	0.14	0.35	0.14	0.14	0.21	0.35
Paybill/tbills	0.14	3.36	3.08	0.42	1.05	0.28
Employed						
Mobile money	28.02	12.7	17.47	3.77	62.97	70.44
Mobile banking	0.77	0.92	0.23	0.31	0.62	0.62
Paybill/tbills	16.17	4.54	5.31	1.39	1.15	0.31
Self-employed						
Mobile money	26.37	11.67	17.72	3.17	55.33	64.55
Mobile banking	0.72	0.43	0.29	0	0.29	0.58
Paybill/tbills	14.55	6.48	8.21	1.59	2.16	1.01
Arid counties						
Mobile money	19	8.65	12.45	2.03	47.74	57.59
Mobile banking	0.42	0.31	0.16	0.13	0.23	0.39
Paybill/tbills	11.2	3.25	3.64	0.91	0.86	0.31

Source: Central Bank of Kenya; Kenya National Bureau of Statistics and Financial Sector Deepening (2021b)

Relating the individual characteristics to the levels of financial inclusion, the results show a negative correlation between youth and PWDs. There was also a negative correlation with those doing farming in the arid areas (Table 4.4). At both national and arid counties level, there was a high correlation between residing in urban areas and the levels of financial inclusion. Moreover, there was a positive correlation between ownership of a phone and registering with the fintech platforms (Table 4.5).

Table 4.4: Relating individual and socio-economic factors to financial inclusion – pairwise correlation

	Overall counties		Arid counties	
	INCLUSION	**FINTECH**	**INCLUSION**	**FINTECH**
GENDER	-0.0043	0.0387	0.0155	0.0631
YOUTH	-0.1010	-0.0904	-0.0685	-0.0405
MARITAL	0.1916	0.2197	0.1278	0.1797
PWDs	-0.0206	-0.0685	-0.0240	-0.0160
FARMING	0.0742	0.0489	0.0130	-0.0204
EMPLOYED	0.1370	0.1557	0.1220	0.1798
SELF-EMPLOYED	0.1216	0.1428	0.0946	0.0447
RESIDENCE	0.0974	0.1541	0.1060	0.1648

Source: Central Bank of Kenya; Kenya National Bureau of Statistics and Financial Sector Deepening (2021b)

Table 4.5: Relating telephone to mobile services – pairwise correlations

	Overall counties			Arid counties		
	Mobile money	**Mobile banking**	**Transac-tion**	**Mobile money**	**Mobile banking**	**Transac-tion**
Own phone	0.0403	0.0133	0.0363	0.0378	0.0072	0.0327
Internet	-0.0004	0.0161	0.0096	0.0089	0.0076	0.0133
Type of phone	-0.0031	0.0158	0.0101	0.0090	0.0130	0.0231

Source: Central Bank of Kenya; Kenya National Bureau of Statistics and Financial Sector Deepening (2021b)

5. Results

This section presents the probit results on factors that influence the usage of fintech, the contribution of fintech to financial inclusion, and the effect of fintech on welfare.

5.1 Adoption and Use of Fintech in Arid Counties

The study used FINTECH as a dependent variable together with registration with mobile money and mobile banking (MMBREG) and the use of fintech for transactions to analyze the adoption of financial technology comparing the arid counties with the overall country (Table 5.1). Further, the study considered the use of fintech in savings.

Fintech is characterized by infrastructure that facilitates the use of technology, including the ownership of a mobile phone and other ICT gadgets. Ownership of a mobile phone was a key driver in the adoption of fintech in arid areas. However, this did not cut across all fintech products and services. While mobile phone ownership had a higher probability of registering for mobile money and mobile banking at the country level, the same was not significant in arid areas. In the case of arid counties, mobile phone ownership had a high probability of using fintech for transaction purposes.

That said, the cost of technology service, the quality of the system offering the service, and the accessibility of the technology can be a major constraint in ensuring all are fintech-included. The results showed that the costs of fintech, including service fees and affordability of the service, predicted a significantly lower probability of adopting fintech. Ntwiga (2019) and Ezzahid and Elouaourti (2021) also found costs and fees to be barriers to fintech uptake. On customers being unable to access the services because they were too young to access, blocked their line, changed phone number, they were barred, or did not need the service, this predicted a lower probability of adopting fintech in arid areas. However, for the quality of the system supporting fintech system, when viewed with frequent downturns, fraud, and poor customer care, the results for arid areas were generally not significant. Thus, access and quality of technology play a key role in growing fintech. In Ghana, fintech service quality stimulated customer empowerment and enhanced trust (Shaikh et al., 2023).

Having an account with banks and SACCOs was used as a proxy for the channel of disseminating information about fintech. Most of the time, people get to know about the use of mobile money wallets and Internet banking from having an account with financial institutions. Thus, the expectation was that the adoption of fintech would be complemented by having an account with a bank and being a member of a SACCO. The results showed that overall, in arid areas, this does not play a significant role. For the arid areas, having a bank account or being a member of a SACCO had a lower probability of registering with a mobile platform account or using fintech services, such as savings and transactions.

The socio-economic system that the households find themselves in can influence the ability to adopt fintech. Those in rural areas, practicing farming and the self-employed had a higher probability of adopting fintech, since it offers them an opportunity to access financial services when the traditional banks are not available or accessible. Being employed in arid areas had a lower probability of registering for mobile services and using mobile services to save.

Finally, the study looked at the individual characteristics that support the adoption of fintech. Important to note was the non-linear relationship with age for some of the services and products. For example, the non-youth had a lower probability of registering for mobile money and mobile banking and saving through the same platforms. Younger people have higher fintech usage compared to older people (Nguyen, 2022; Kweyu and Ngare, 2013). Further, the PWDs had a lower probability of adopting fintech while males and those married had a higher probability of adopting fintech. Other studies have shown that men have a higher propensity to use fintech services than women (Kweyu and Ngare, 2013; Chen et al., 2022; Nguyen, 2022).

5.2 Fintech Contribution to Overall Financial Inclusion

Fintech in general made a significant contribution to financial inclusion. However, using fintech for financial transactions had a lower probability of deepening financial inclusion (Table 5.2). Further, mobile money fintech had a higher probability of deepening financial inclusion compared to mobile banking in arid areas. It may be attributed to the fact that with mobile money, one can use the USSD code compared to mobile banking where one needs to have Internet connectivity. Therefore, with the situation in the arid areas, the use of mobile banking would be limited by Internet coverage. Melubo and Musau (2020) have shown limited use of online banking in Kenya due to limited Internet availability. Nwafor (2018) also indicated that Internet penetration had a significant impact on financial inclusion in Nigeria. Similarly, the use of mobile platforms for saving had a lower probability of enhancing financial inclusion in arid areas. However, at the national level, fintech products and services had a high probability of growing financial inclusion. With fintech, one can access or use other financial services, thus reflecting the integration with other services where, for example, banks are integrating fintech in their services, such as mobile banking, Internet banking and mobile money wallets.

Considering the quality and ability to use fintech, a key factor that is critical in deepening financial inclusion in arid areas is accessibility. If customers are not able to access fintech services because their mobile lines are blocked, or barred, then this will have a lower probability of growing financial inclusion with fintech. Fintech users expect multi-channel access and round-the-clock services and being connected by smartphones (Nanduri, 2021). The cost of fintech services, including service fees and the affordability of the service does not constrain financial inclusion in arid areas, although it does at the national level.

Table 5.1: Adoption of fintech

	FINTECH	FINTECH ARID	MMBREG	MMBREG ARID	MMSAVE	MMSAVE ARID	TRANSACT	TRANSACT ARID
Own phone	0.0286 (0.88)	0.0185 (0.041)	0.0210 (0.014)	0.0113 (0.132)	0.0131 (0.215)	0.0015 (0.800)	0.0289 (0.003)	0.0138 (0.067)
Mmcost	-0.1396 (0.000)	-0.0031 (0.698)	-0.2893 (0.000)	-0.0828 (0.000)	-0.2224 (0.000)	- 0.0437 (0.000)	-0.2340 (0.000)	-0.0403 (0.000)
Mmquality	0.1203 (0.020)	0.0536 (0.006)	-0.0679 (0.000)	-0.0101 (0.432)	-0.0399 (0.039)	0.0007 (0.941)	-0.0394 (0.035)	0.0051 (0.692)
Mmaccess	0.0489 (0.006)	-0.0254 (0.004)	-0.2602 (0.000)	-0.0847 (0.000)	-0.2050 (0.000)	-0.0393 (0.000)	-0.1269 (0.000)	-0.0541 (0.000)
Bankreg	0.1152 (0.003)	0.0055 (0.804)	0.3148 (0.000)	-0.0810 (0.000)	0.2652 (0.000)	-0.0258 (0.000)	0.2495 (0.000)	-0.0790 (0.000)
Saccosreg	0.1388 (0.013)	0.0001 (0.997)	0.1181 (0.000)	-0.0446 (0.000)	0.0817 (0.000)	-0.0164 (0.062)	0.1319 (0.000)	-0.0311 (0.011)
Farming	0.0759 (0.000)	0.0551 (0.000)	0.0200 (0.020)	0.0538 (0.000)	0.0570 (0.000)	0.0246 (0.000)	0.0644 (0.000)	0.0651 (0.000)
Employed	0.1217 (0.000)	0.0017 (0.833)	0.0586 (0.000)	-0.0145 (0.035)	0.0510 (0.000)	-0.0104 (0.055)	0.1092 (0.000)	0.0001 (0.986)
Self employed	0.1052 (0.000)	0.0294 (0.016)	0.0972 (0.000)	0.0102 (0.226)	0.1281 (0.000)	0.0798 (0.002)	0.1389 (0.000)	0.0240 (0.005)
Age	-0.0027 (0.161)	-0.0027 (0.006)	0.0194 (0.000)	0.0016 (0.100)	0.0142 (0.000)	0.0025 (0.003)	0.0097 (0.000)	-0.0017 (0.074)
Age2	0.0001 (0.478)	0.0000 (0.087)	-0.0002 (0.000)	-0.0003 (0.006)	-0.0002 (0.000)	-0.00004 (0.000)	-0.0001 (0.000)	0.0000 (0.782)
PWDs	0.0151 (0.487)	0.0103) (0.347)	-0.074 (0.495)	-0.0187 (0.065)	-0.0243 (0.074)	- 0.0187 (0.026)	-0.0052 (0.674)	-0.0039 (0.699)
Maritals	0.0777 (0.000)	0.0068 (0.413)	0.0544 (0.000)	0.0393 (0.000)	0.0275 (0.002)	0.0176 (0.000)	0.0720 (0.000)	0.0238 (0.000)
Gender	-0.460 (0.000)	0.0163 (0.022)	0.0193 (0.008)	0.0172 (0.004)	0.0058 (0.506)	0.0750 (0.001)	-0.0265 (0.001)	0.0166 (0.006)
Resident	0.0764 (0.000)	0.0537 (0.000)	0.0710 (0.000)	0.0605 (0.000)	0.0353 (0.000)	0.0271 (0.000)	0.0874 (0.000)	0.0715 (0.000)

Source: Authors' computation

Note: Significance level in parenthesis

Those in farming and self-employed had a higher probability of enhancing financial inclusion in arid areas when compared to the employed. Those in urban areas had the highest probability of deepening financial inclusion in arid areas. This is because people in urban areas are generally engaged in business activities in which many are self-employed. There was a lower probability of financial inclusion among the youth and PWDs. Males who are married tended to have a higher probability of inclusion. This is because men are more willing to adopt technology than women (Kweyu and Ngare, 2013).

Table 5.2: Financial inclusion and fintech

	Model 1		**Model 2**		**Model 3**		**Model 4**	
	F-ALL	**FI-ARID**	**FI-ALL**	**FI-ARID**	**FI-ALL**	**FI-ARID**	**FI-ALL**	**FI-ARID**
Ownphone	0.0113 (0.096)	0.0094 (0.275)	0.0884 (0.205)	0.0104 (0.230)	0.0112 (0.101)	0.0083 (0.331)	0.0130 (0.061)	0.0092 (0.283)
Mmcost	-0.0178 (0.005)	0.0314 (0.000)	-0.0034 (0.585)	0.0274 (0.002)	-0.0179 (0.005)	0.0296 (0.001)	-0.0242 (0.000)	0.0314 (0.000)
MMquality	-0.0179 (0.211)	0.0148 (0.340)	-0.0191 (0.168)	0.0148 (0.338)	-0.0799 (0.169)	0.0145 (0.341)	-0.0245 (0.095)	0.0157 (0.304)
MMaccess	-0.419 (0.000)	-0.0378 (0.000)	0.0385 (0.000)	-0.0349 (0.000)	0.0415 (0.000)	-0.0407 (0.000)	0.0316 (0.000)	-0.0372 (0.000)
Age	0.0016 (0.046)	-0.0013 (0.245)	0.0019 (0.010)	-0.0013 (0.241)	0.0016 (0.043)	-0.0015 (0.189)	0.0013 (0.100)	-0.0016 (0.161)
Age 2	-0.0000 (0.380)	-0.0000 (0.788)	0.0000 (0.203)	0.0000 (0.772)	0.0000 (0.369)	0.0000 (0.657)	0.0000 (0.481)	0.0000 (0.870)
PWDs	0.0169 (0.058)	-0.0176 (0.123)	0.0144 (0.095)	-0.0171 (0.134)	0.0161 (0.071)	-0.0133 (0.237)	0.0182 (0.043)	-0.0187 (0.099)
Maritalstatus	0.0383 (0.000)	0.0282 (0.000)	0.0298 (0.000)	0.0302 (0.000)	0.0377 (0.000)	0.0283 (0.000)	0.0381 (0.000)	0.0269 (0.000)
Gender	-0.0283 (0.000)	0.0015 (0.835)	-0.0237 (0.000)	0.0000 (0.998)	-0.0288 (0.000)	0.0078 (0.237)	-0.0299 (0.000)	0.0028 (0.687)
Resident	-0.0086 (0.229)	0.0492 (0.000)	-0.0186 (0.008)	0.0530 (0.000)	-0.0092 (0.199)	0.0633 (0.000)	-0.0066 (0.362)	0.0490 (0.000)
Farming	0.0528 (0.000)	0.0761 (0.000)	0.0431 (0.000)	0.0792 (0.000)	0.0531 (0.000)	0.0784 (0.000)	0.0543 (0.000)	0.0792 (0.000)
Employed	0.0582 (0.000)	-0.0466 (0.000)	0.0438 (0.000)	-0.0411 (0.000)	0.0572 (0.000)	-0.0327 (0.000)	0.0604 (0.000)	-0.0440 (0.000)
Self-employed	0.1102 (0.000)	0.0105 (0.282)	0.0980 (0.000)	0.0162 (0.099)	0.1085 (0.000)	0.0300 (0.002)	0.1097 (0.000)	0.0206 (0.035)

	Model 1		Model 2		Model 3		Model 4	
	F-ALL	FI-ARID	FI-ALL	FI-ARID	FI-ALL	FI-ARID	FI-ALL	FI-ARID
Fintech	0.3451 (0.000)	0.0445 (0.000)	0.2799 (0.000)	0.0808 (0.000				
Fintechtransact			0.1079 (0.000)	-0.0623 (0.000)				
MMfintech					0.3285 (0.000)	0.0789 (0.000)		
Mbfintech					0.1024 (0.000)	-0.1392 (0.000)		
MMbreg							0.2972 (0.000)	0.1025 (0.000)
MMbsave							0.1406 (0.000)	-0.0898 (0.000)

Source: Authors' computation

Note:

- *FI-ALL is financial inclusion for all counties; FI-ARID is financial inclusion for arid counties; ARID is a dummy variable interacted with INCLUSION2.*
- *Significance level in parenthesis*

5.3 Fintech as a Strategy for Welfare Improvement in Arid Counties

The scope of vulnerability considered includes vulnerability to food, medicine, and fees. The results showed that the adoption of fintech predicted a lower probability of vulnerabilities. The probability was higher for the arid areas than in the overall sample for the various measures of financial technology (Table 5.3). This means that fintech plays a significant contribution in facilitating those in arid areas to accumulate assets. Savings through mobile platforms predicted the probability of reducing vulnerability. They play a significant role in smoothing consumption and financing investments.

On the ability to access and use fintech services, the results showed that when the costs of service were high due to service fees and inability to afford the service, this predicted a high probability of vulnerability. Jack and Suri (2014) indicated that reduced transaction costs of mobile money enabled users to fully absorb large negative income shocks. Further, with frequent downturns, fraud, and poor customer care, customers will not use the fintech services, and this means a higher predicted vulnerability. This means that when households need support to smooth their consumption and fintech can facilitate the same, this cushions the households against vulnerabilities.

On sources of income, the results showed a higher probability of vulnerabilities for the self-employed and those in farming, attributable to the high-income risk. This is corroborated by the results that those in rural areas had a higher probability of vulnerability compared to those in urban areas. Those who are employed are cushioned on their income flow and, therefore, their exposure to vulnerability was lower.

The youth had a higher probability of vulnerability and those who are married and the males. Most likely, the youth are not able to access fintech services because of their economic status. Further, males are the breadwinners and if there is a shock to their income, then this has implications on coping with vulnerabilities. For the PWDs, the predicted probability of vulnerability was lower. This may be because some of them receive social protection, which serves to cushion them from vulnerabilities.

Table 5.3: Vulnerability and fintech

	Model 1		**Model 2**		**Model 3**	
	V-ALL	**V-ARID**	**V-ALL**	**V-ARID**	**V-ALL**	**V-ARID**
Mmcost	0.0419 (0.000)	0.0356 (0.000)	0.0450 (0.000)	0.0398 (0.000)	0.0400 (0.000)	0.0317 (0.000)
MMquality	0.0060 (0.720)	0.0329 (0.048)	0.0076 (0.647)	0.0364 (0.028)	0.0064 (0.701)	0.0352 (0.033)
MMaccess	-0.0058 (0.570)	-0.0750 (0.000)	0.0022 (0.789)	-0.0634 (0.000)	-0.0035 (0.683)	-0.0681 (0.000)
Youth2	-0.0367 (0.000)	0.0494 (0.000)	-0.0354 (0.000)	0.0513 (0.000)	-0.0339 (0.000)	0.0541 (0.000)
PWDs	0.0574 (0.000)	-0.0481 (0.000)	0.0580 (0.000)	-0.0471 (0.000)	0.0563 (0.000)	-0.0493 (0.000)
Maritalstatus	0.0293 (0.000)	0.0345 (0.000)	0.0285 (0.000)	0.0337 (0.000)	0.0303 (0.000)	0.0359 (0.000)
Gender	-0.0300 (0.000)	0.0081 (0.266)	-0.0313 (0.000)	0.0066 (0.368)	-0.0306 (0.000)	0.0082 (0.260)
Resident	-0.0631 (0.000)	0.0615 (0.000)	-0.0639 (0.000)	0.0617 (0.000)	-0.0611 (0.000)	0.0665 (0.000)
Farming	0.0169 (0.058)	0.0913 (0.000)	0.0172 (0.053)	0.0935 (0.000)	0.0206 (0.021)	0.0983 (0.000)
Employed	0.0607 (0.000)	-0.0626 (0.000)	0.0604 (0.000)	-0.0616 (0.000)	0.0649 (0.000)	-0.0527 (0.000)
Self-employed	0.0357 (0.001)	0.0147 (0.162)	0.0339 (0.001)	0.0132 (0.207)	0.0439 (0.000)	0.337 (0.001)

	Model 1		Model 2		Model 3	
	V-ALL	V-ARID	V-ALL	V-ARID	V-ALL	V-ARID
Fintech	-0.0468 (0.000)	-0.0814 (0.000)				
Fintech2			-0.0424 (0.000)	-0.0795 (0.000)		
Mmbreg					0.0085 (0.452)	0.0393 (0.000)
Mmbsave					-0.0475 (0.000)	-0.1071 (0.000)
Fintechtransact					-0.0354 (0.000)	-0.0809 (0.000)

Source: Authors' computation

Note:

- *V-ALL is the vulnerability for all counties; V-ARID is the vulnerability for arid counties*
- *Significance level in parenthesis*

6. Conclusion and Policy Recommendations

6.1 Conclusions

This study assessed the factors influencing fintech adoption, the contribution of fintech to financial inclusion, and the effect of fintech on welfare in arid areas. The results show that adoption of fintech in the arid areas requires having the right technology in place, including ownership of a mobile phone. However, this is not enough as fintech needs to be accessible in terms of line connection with affordable service fees. While banks play a key role in the fintech system, the limited banking services seem not to drive the adoption of fintech. In the arid areas, fintech seems to offer opportunities to those in rural areas and practicing farming, and those in self-employment that do not get services from the traditional banking sector. As such, they provide a demand for fintech services.

On the contribution of fintech to financial inclusion, it is evident from the results that fintech is a pathway to financial inclusion, especially through mobile money services. Mobile money services can be accessed with or without enablers such as the Internet. However, the use of fintech just for financial transactions does not give the impetus required for financial inclusion. Accessibility and use of financial services are to some extent defined by the cost of service. The cost of fintech does not seem to have a constraining factor on financial inclusion. It is possible that because of limited options for financial services, those in the arid areas will not be constrained by costs to use fintech as the readily available platform for financial services.

Finally, on the effect of fintech on welfare, being financially included, especially through fintech helps to reduce vulnerability. Therefore, households can smoothen their consumption and accumulate assets from the savings enabled through fintech. Those at the bottom of the pyramid, including farmers, MSEs, and the youth are exposed to a high-income risk. This implies that fintech offers an opportunity to respond to such vulnerabilities.

6.2 Policy Recommendations

The study proposes the following interventions to accelerate fintech usage in arid areas to enhance financial inclusion:

- Create an enabling environment for the adoption and use of fintech. This includes enhancing access with affordable phones, providing ID cards, ensuring the lines are not blocked and they are not blacklisted. In addition, address issues related to fraud, downtime, customer care, and trustworthy agents. Further, there is a need to enhance affordability by offering friendly service fees.
- Embrace a holistic approach to financial sector development. This is critical given the interdependency among the various channels and the existing complementarity given the scope of services provided by each channel.

- Prioritize financial inclusion to address development issues. This is because financial inclusion through fintech influences the coping mechanism with vulnerabilities.

References

Ajzen, I., and Fishbein, M. (1980), *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.

Al-Okaily, M., Al Natour, A.R., Shishan, F., Al-Dmour, A., Alghazzawi, R. and Alsharairi, M. (2021), "Sustainable fintech innovation orientation: A moderated model". *Sustainability*, 13, 13591.https://doi.org/10.3390/su132413591.

Antonijević, M., Isidora Ljumović, I. and Đina Ivanović, D. (2022), "Is there a gender gap in financial inclusion worldwide?" *Journal of Women's Entrepreneurship and Education*, 1-2: 79-96.

Asongu, S. A. and Nwachukwu, J. C. (2018), "Comparative human development thresholds for absolute and relative pro-poor mobile banking in developing countries". *Information Technology and People*, 31(1): 63-93.

Bustami, K and Saifrizal, M. (2022), "Financial literacy capabilities in increasing financial inclusion through Sharia fintech". *Economic Journal*, 11(03).

Central Bank of Kenya (2023), Banking Supervision Annual Report 2022. Nairobi: Central Bank of Kenya.

Central Bank of Kenya, Kenya National Bureau of Statistics and Financial Sector Deepening (2022), FinAccess Household Survey: County perspective. Nairobi: CBK, KNBS and FSD.

Central Bank of Kenya, Kenya National Bureau of Statistics and Financial Sector Deepening (2021a), 2021 FinAccess Household Survey. Nairobi: CBK, KNBS and FSD.

Central Bank of Kenya, Kenya National Bureau of Statistics and Financial Sector Deepening (2021b), FinAccess Household Survey Data Set. Nairobi: CBK, KNBS and FSD.

Chen, S., Doerr, S., Frost, J, Gambacorta, L. and Song S, H. (2021), The fintech gender gap. Bank for International Settlements, Working Papers, No 931.

Chinoda, T and Mashamba, T. (2021), "Fintech, financial inclusion, and income inequality nexus in Africa". *Cogent Economics and Finance*, 9:1, 1986926, DOI: 10.1080/23322039.2021.1986926.

Communications Authority (2023), Second quarter sector statistics report for the financial year 2022/2023 (1st October–31st December 2022). Nairobi: Communications Authority.

County Government of Baringo (2023), Integrated Development Plan 2023-2027: Delivering as one to transform the lives of the people of Baringo to the highest standard of living. Kabarnet: County Government of Baringo.

County Government of Garissa (2023), Third Garissa County Integrated Development Plan (2023-2027: Economic recovery, reengineering basics,

climate change, and people-responsive socio-economic transformation of Garissa County. Garissa: County Government of Garissa.

County Government of Isiolo (2023), County Integrated Development Plan 2023-2027: An equitable and prosperous county. Isiolo: County Government of Isiolo.

County Government of Mandera (2023), Third County Integrated Development Plan 2023-2027. Mandera: County Government of Mandera.

County Government of Marsabit (2023), Third County Integrated Development Plan 2023-2027. Marsabit: County Government of Marsabi.

County Government of Samburu (2023), Third Integrated Development Plan 2023-2027: Accelerating socio-economic transformation for an inclusive and resilient economy. Maralal: County Government of Samburu.

County Government of Tana River (2023), Third County Integrated Development Plan 2023-2027. Hola: County Government of Tana River.

County Government of Turkana (2023), Third County Integrated Development Plan 2023-2027. Turkana: County Government of Turkana.

County Government of Wajir (2023), County Integrated Development Plan 2023-2027: Building an equitable, resilient, and sustainable future for socio-economic transformation. Wajir: County Government of Wajir.

Davis, F.D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology". *MIS Quarterly*, 13,3: 319-340.

Demir, A., Pesqué-Cela, V., Yener Altunbas, Y. and Murinde, V. (2022), "Fintech, financial inclusion, and income inequality: A quantile regression approach". *The European Journal of Finance*, 28,1: 86-107. DOI: 10.1080/1351847X.2020.1772335.

Demombynes, G. and Thegeya, A. (2012), Kenya's mobile revolution and the promise of mobile savings. Policy Research Working Paper 5988. Washington, D.C: World Bank.

Ernst & Young (2019), Fintechs in Sub-Saharan Africa: An overview of market developments and investment opportunities. London: Ernst & Young Global.

Ezzahid, E. and Elouaourti, Z. (2021), "Financial inclusion, mobile banking, informal finance, and financial exclusion: micro-level evidence from Morocco". *International Journal of Social Economics*, Vol. 48 No. 7, pp. 1060-1086. https://doi.org/10.1108/IJSE-11-2020-0747.

Feyen, E., Harish N., and Matthew S. (2023), Fintech and the future of finance: Market and policy implications. Washington, DC: World Bank. doi:10.1596/978-1-4648-1914-8.

Gillespie, P. (2007), Mobile banking: Does it have a future? Available at www.forrester.com/Research/LegacyIT/Excerpt/0,7208,25430,00.html.

Government of Kenya (2012), Sessional Paper No. 8 of 2012 on National policy for the Sustainable Development of Northern Kenya and other Arid Lands 'releasing our full potential'. Nairobi: Government of Kenya.

Hassan, M.S., Islam, M.A., Sobhani, F.A., Nasir, H., Mahmud, I., and Zahra, F.T. (2022), "Drivers influencing the adoption intention towards mobile fintech services: A study on the emerging Bangladesh market". *Information*, 13:349. https://doi.org/10.3390/info13070349.

Jack, W. and Suri, T. (2011), Mobile money: The economics of M-Pesa. Working Paper No. W16721. Cambridge, MA: National Bureau of Economic Research.

Jack, W. and Suri, T. (2014), "Risk sharing and transactions costs: Evidence from Kenya's mobile money revolution". *American Economic Review*, 104: 183-223.

Jaya, T., Emily, S., and Naziha, S. (2019), "Barriers to "last mile" financial inclusion: Cases from northern Kenya". *Development in Practice*, 29(8): 988-1000. DOI: 10.1080/09614524.2019.1654432.

Kenya National Bureau of Statistics (2023), 2023 Gross County Product: Measuring the economic evolution of counties. KNBS, Nairobi.

Kenya National Bureau of Statistics (2022), Kenya Demographic and Health Survey 2022, Volume 1. KNBS, Nairobi.

Kenya National Bureau of Statistics (2021), The Kenya Poverty Report Based on the 2021 Kenya Continuous Household Survey. KNBS, Nairobi.

Kenya National Bureau of Statistics (2020), Comprehensive Poverty Report 2020: Children, Youth, Women, Men and the Elderly-From National to County Level. KNBS, Nairobi.

Kenya National Bureau of Statistics (2019), Kenya Population and Housing Census: Volume IV Distribution of Population by Socio-Economic Characteristics. Nairobi: Kenya National Bureau of Statistics.

Khan, S. and Alhadi, F, A, F. (2022), "Fintech and financial inclusion in Saudi Arabia". *Review of Economics and Finance*, 20: 857-866.

Klapper, L., Lusardi, A. and Van Oudheusden, P. (2015), Financial literacy around the world. Washington DC: Standard and Poor's Ratings Services Global Financial Literacy Survey.

Kleijnen, M., Wetzels, M. and de Ruyter, K. (2004), "Consumer acceptance of wireless finance". *Journal of Financial Services Marketing*, 8(3): 206-17.

Kweyu, M. and Ngare, P (2013), "Factor analysis of customers perception of mobile banking services in Kenya". *Journal of Emerging Trends in Economics and Management Sciences*, 5(1):1-8.

Kyungha. K. (2022), "Assessing the impact of mobile money on improving the financial inclusion of Nairobi women". *Journal of Gender Studies*, 31(3):306-322, DOI: 10.1080/09589236.2021.1884536.

Laukkanen, T. (2007), "Internet vs mobile banking: Comparing customer value perceptions". *Business Process Management Journal*, 13(6): 788-97.

Loko, B. and Yang, Y. (2022), Fintech, female employment, and gender inequality. WP/22/108, IMF, Washington DC.

Lule, I., Omwansa, T.K. and Waema, T.M. (2012), "Application of technology acceptance model (TAM) in M-banking adoption in Kenya". *International Journal of Computing and ICT Research*, 6(1): 31-43.

Luo, S., Sun, Y. and Zhou, R. (2022), "Can fintech innovation promote household consumption? Evidence from China family panel studies". *International Review of Financial Analysis*, 82.

Mbithi, I. and Weil, D.N. (2011), Mobile banking: The impact of M-Pesa in Kenya. Working Paper Series, Working Paper 17129. Massachusetts: NBER.

Ministry of Education (2020), Basic Education Statistical Booklet. Nairobi: Ministry of Education.

Melubo, K. and Musau, S. (2020), "Digital banking and financial inclusion of women enterprises in Narok County, Kenya". *International Journal of Current Aspects in Finance, Banking and Accounting*, 2(1): 28-41. https://doi.org/10.35942/ijcfa.v2i1.104.

Morgan, P.J. and Trinh, L. Q. (2017), Determinants and impacts of financial literacy in Cambodia and Viet Nam. ADBI Working Paper 754. Tokyo: Asian Development Bank Institute. Available: https://www.adb.org/publications/determinants-and-impacts-financial-literacy-cambodia-and-viet-nam.

Mugume, R. and Bulime, E. W. N. (2022), "Post COVID 19 recovery for African economies: Lessons for digital financial inclusion from Kenya and Uganda". *African Development Review*, 34: S161–S176. https://doi.org/10.1111/14678268.12652.

Nanduri, S. (2021), "Digital Finance: Fintech for Financial Inclusion and Sustainability". *Turkish Online Journal of Qualitative Inquiry*, 12 (6): 5135-5142.

Ndung'u, J, M. and Moturi, C, A. (2020), "Determinants of mobile fintech uptake in Kenyan microfinance sector". *Current Journal of Applied Science and Technology,* 39(28): 102-114.

Ndung'u, N., and Oguso, A. (2021), "Financial sector development and financial inclusion in Africa: Gaps, challenges and policy options". In A.H. Ahmad, D.T. Llewellyn, and V. Murinde (eds), *Inclusive financial development*. Cheltenham: Edward Elgar Publishing. https://doi.org/10.4337/9781800376380.00008.

Ndung'u, N. (2022), Fintech in sub-Saharan Africa. WIDER Working Paper 2022/101. https://doi.org/10.35188/UNU-WIDER/2022/235-5.

Nguyen, T.A.N. (2022), "Does financial knowledge matter in using fintech

services? Evidence from an emerging economy". *Sustainability*, 14: 5083. https://doi.org/10.3390/su14095083.

Ntwiga, D.B. (2019), Can FinTech shape the dynamics of consumer credit usage among the un(der)banked? KBA Centre for Research on Financial Markets and Policy Working Paper Series, No. 34. Nairobi: Kenya Bankers Association (KBA).

Nwafor, M.C. (2018), "Nexus between Internet penetration and financial inclusion in Nigeria". *International Journal of Research and Innovation in Social Science*, II(X).

Ouma, S.A., Odongo, T.M. and Were, M. (2017), "Mobile financial services and financial inclusion: Is it a boon for savings mobilization?" *Review of Development Finance*, 7: 29-35.

Rogers, E.M. (1995), *Diffusion of innovations*, 4th ed New York: The Free Press.

Sahay, R., Eriksson V.A.U., Lahrech A., Khera P., Ogawa S., Bazarbash M., and Beaton K. (2020), The promise of fintech: Financial inclusion in the post-COVID era. MCM Departmental Paper 20/09.

Sari, R.P. and Imronudin (2022), "Analysis of financial inclusion through fintech innovation". *Journal of Management and Islamic Finance*, 2 (2): 184-203. DOI: https://doi.org/ 10.22515/jmif. v2i2.5680.

Setiawan, B., Nugraha, D.P., Irawan, A., Nathan, R.J. and Zoltan, Z. (2021), "User innovativeness and fintech adoption in Indonesia". *Journal of Open Innovation: Technology, Markets and Complexity*, 7: 188. https://doi.org/10.3390/joitmc7030188.

Shaikh, A.A., Glavee-Geo, R., Karjaluoto, H. and Hinson, R.E. (2023), "Mobile money as a driver of digital financial inclusion". Technological Forecasting and Social Change", 186.

Siano, A., Raimi, L., Maria Palazzo. M. and Panait, P.C. (2020), "Mobile banking: An innovative solution for increasing financial inclusion in Sub-Saharan African countries: Evidence from Nigeria". *Sustainability*, 12; doi:10.3390/su122310130.

Suri, T. and Jack, W. (2016), "The long-run poverty and gender impacts of mobile money". *Science*, 354 (6317): 1288–92.

Taylor, J. W. (1974), "The role of risk in consumer behavior: A comprehensive and operational theory of risk taking in consumer behavior". *Journal of Marketing*, 38(2):54-60. https://doi.org/10.1177/002224297403800211.

Van Hove, L. and Dubus, A. (2019), "M-Pesa and financial inclusion in Kenya: Of paying comes saving?" *Sustainability*, 11(3): 568.

Venkatesh, V., Morris, M, G., Davis, G, B. and Davis, F, D. (2003), "User acceptance of information technology: Toward a unified view". *MIS Quarterly*, 27 (3):425-478.

Venkatesh, V., Thong, J. Y. L. and Xu, X. (2012), "Consumer acceptance and use of information technology: Extending the Unified theory of acceptance and use of technology". *MIS Quarterly*, 36(1): 157–178. https://doi.org/10.2307/41410412.

Wang, X. and Guan, J. (2017), "Financial inclusion: Measurement, spatial effects and influencing factors". *Applied Economics*, 49(18): 1751–1762.

Wang, X. and He, G. (2020), "Digital financial inclusion and farmers' vulnerability to poverty: Evidence from rural China". *Sustainability*, 12: 1668; doi:10.3390/su12041668.

World Bank (2021), The drive for financial inclusion: Lessons of World Bank Group Experience. Approach Paper, World Bank, Washinton USA.

Zhang, X., Zhang, J., Wan, G. and Luo, Z. (2020), "Fintech, growth, and inequality: Evidence from China's household survey data". *Singapore Economic Review*, 65, (01): 75-93.

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