

## Demographic Factors Influencing the Adoption of Mobile Phones in the Utilization of Formal Financial Services by Smallholder Farmers in Kenya

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### Abstract

The study aimed at assessing the demographic factors influencing adoption of mobile phones in the utilization of formal financial services by smallholder farmers in Kenya. Financial access household survey showed that 80 percent of Kenyan adults own a formal bank account. Whilst significant advances have been made in financial technology products, their penetration and usage among smallholder farmers in utilizing financial services and particularly the demographic factors influencing them remains unestablished. Research into more innovative, intermediated solutions, effective participation and inclusion of appropriate community-based groups in mobile financial services is, therefore, necessary. The target population for this study were smallholder farmers from Nakuru, Busia and Kirinyaga Counties in Kenya. Simple random sampling and Convenience sampling techniques were used to select 496 smallholder farmers as respondents for the study. Data was collected using copies of a researcher developed questionnaire and data collection sheet. Quantitative data was analysed using multiple linear regression analysis with the aid of SPSS software. The findings revealed that demographic factors were important in predicting mobile phone utilization for formal financial services among smallholder farmers in Kenya. Therefore, the study recommends that mobile phone mobile service providers should collaborate with financial service providers to enable the farmers upgrade their phones to access more financial services platforms.

**Key Terms:** Mobile phones, utilization of formal financial services, smallholder farmers, financial inclusion, technology, demographic factors.

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## Introduction

Technology usage in finance has been rapidly increasing in the developing world - Kenya included - in the last two decades. Penetration of financial services has risen, and there is need to address the take-up of mobile finance applications that move beyond mobile transfers to encompass mobile payments and account-based services, thus addressing a broader range of financial needs. Mobile networks can support the financial needs of poor and marginalized groups, if those who do not own phones, or lack access within their immediate vicinity are helped to access. Research into more innovative, intermediated solutions, effective participation and inclusion of appropriate community-based groups in mobile financial services is necessary. Duncombe (2012) and Porteous (2007) defined mobile finance applications as 'transformational' since they target the currently unbanked populations, leading to greater financial inclusion.

Mobile-phone-based money-transfer service 'M-Pesa' owned by a telecommunication company in Kenya, Safaricom, is widely used by many Kenyans (Beck, & Maimbo, 2012). According to Pulver, et al., (2009), by the year 2009, Safaricom's M-Pesa network had approximately 9,000 agents compared with the bank network of 996 branches (Central Bank of Kenya, 2009). Johnson and Arnold (2012) investigated the capacity of the mobile technology in their ability to cause transformational shift in the Kenyan market and whether there is evidence that this expansion is overcoming barriers to access by the

previously unbanked population such as employment, gender, age, education and location. The M-Pesa was reportedly perceived not as a substitute but as more of a complementary service to core banking services. Can this complementarity be harnessed to enhance access for the unbanked, given that the core financial services exhibit strong entry barriers?

The expansion of digital payment platforms has offered the opportunity to link poor people with providers of savings, credit, and insurance products (Radcliffe, & Voorhies, 2012). Further, advanced account administrations developments and business sector improvements have opened open doors for lower-salary individuals with deficient money related administration choices (McKee, et al., 2015). In Kenya, digital financial services have been a runaway example of overcoming adversity and the entrance to a formal budgetary administration enhanced from 19 per cent in 2006 to 67 per cent in 2013, which corresponds with the ascent of computerised money related administrations in Kenya. A large portion of citizens in Kenya have replied that they have used either or a blend of monetary administrations that is banks, funds and credit co-agents, microfinance establishments, computerised monetary administrations suppliers or casual gatherings (European Investment Bank, 2014). However, the impact of these innovations in financial access on the smallholder utilization of formal financial services in Kenya has not been established.

**Table 1: Usage of Financial Service Providers by Livelihood in Kenya (%)**

	Agriculture	Employed	Casual labour	Own business	Dependent	Other
Bank usage(overall)	26.0	77.2	29.8	51.5	27.4	51.2
Mobile bank accounts	9.9	32.4	16.9	25.4	11.9	26.9
Banks(excluding mobile bank accounts)	21.2	71.7	20.5	42.5	21.3	47.5

SACCO	12.8	38.0	4.8	12.8	3.4	17.0
Mobile financial service	64.6	93.2	68.2	83.7	59.8	57.7
Microfinance	2.9	4.0	1.8	7.2	2.6	5.4
Insurance	17.8	66.5	13.4	27.6	11.1	27.6
Pension	5.4	53.8	8.8	9.1	3.5	15.1

Source: Fin Access (2016)

As shown in Table 1, the uptake of formal financial services from banks indicate that people who earn their living from Agriculture are trailing at 26 per cent compared to those who are employed (77.2%), casual laborers (29.8%), owners of businesses (51.5%), dependents (27.4%), and others (51.2%). Among the users of mobile bank accounts, Agriculture is 9.9 per cent Employed is 32.4 per cent Casual labour is 16.9 per cent own business is 25.4 per cent Dependent is 11.9 per cent and others are 26.9 per cent Comparing other formal financial services like pension and insurance shows that Agriculture lags behind in utilization of formal financial services. It therefore means that the formal financial sector tends to be tilted away from those who derive their livelihood from agriculture since they have low uptake of formal financial services.

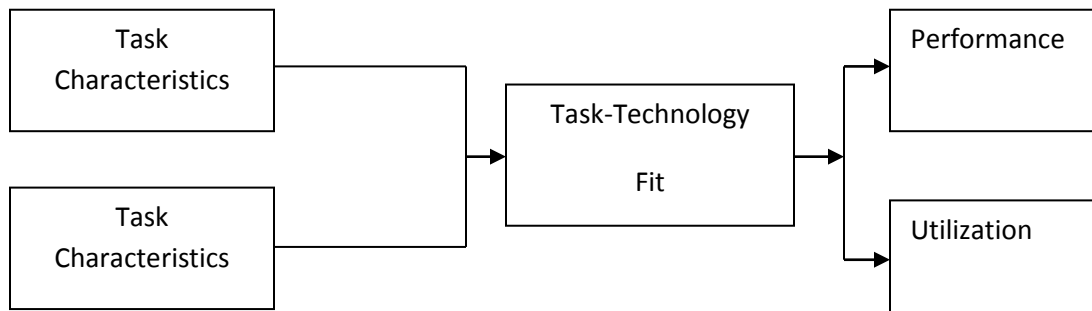
Financial access household survey showed that 80 percent of Kenyan adults own a formal bank account. However, ownership of bank accounts has not resulted in increased uptake of formal financial services by the smallholder farmers since usage of bank accounts is only 17 percent. Low utilization of formal financial services and inadequacy of financial inclusion approaches has contributed to low productivity in the agricultural sector. Whilst significant advances have been made in financial technology products, their penetration and usage among smallholder farmers in

utilizing financial services and particularly the demographic factors influencing them remains unestablished. Research into more innovative, intermediated solutions, effective participation and inclusion of appropriate community-based groups in mobile financial services is, therefore, necessary.

#### LITERATURE REVIEW

##### Task Technology Fit (TTF) Theory

It is recorded that positive impact on individual performance is more likely if the capabilities of information communication and technology (ICT) match the tasks that the user must perform (Goodhue, & Thompson, 1995). The factors of interest in measuring task-technology fit include floatability, authorization, and compatibility, eases of use/training, production timeliness, systems reliability and relationship with users. Figure 1 below depicts a Task Technology Fit model, whereby, the success of an information system is dependent on the fit between task and technology. This success could be individual performance (Goodhue, & Thompson, 1995) or group performance (Zigurs, & Buckland, 1998). Task-technology fit has been shown to be generally relevant for mobile information systems (Gebauer, & Shaw, 2004).



Source: Goodhue and Thompson (1995)

Studies on mobile information system technology have focused mainly on the functionality that is provided by the technology, paying less attention to the context in which the technology is being used (Perry, et al., 2001). Non-functional features, such as weight and size, play a more prominent role in mobile than in non-mobile use contexts (Gebauer, & Ginsburg, 2006; Turel, 2006) while functional requirements may shift depending on whether the business context is mobile or non-mobile (Gebauer, & Shaw, 2004; Perry, et al., 2001; Zheng, & Yuan, 2007). Observable changes of business tasks with respect to technology requirements, require the assessment of the applicability of the theory of task-technology fit to mobile technologies and mobile use contexts, and careful determination of the needs for theory adjustments and extensions (Jungles, & Watson, 2006; Lystinen, & Yoo, 2002).

Kirui et al. (2012) in their study found a very high awareness of mobile phone-based money transfer services among the smallholder farmers and established that there is the main usage of money sent through mobile money transfer for farming activities. The study concludes that since the mobile money transfer services addresses a unique financial challenge of accessing financial services among farmers in the rural areas, as such it should have a wide coverage. Salami et al. (2010) shows that the share of

commercial banks' loans to agriculture has been very low compared to manufacturing, trade, and other services sectors, hence affecting expansion and technology adoption. This study will therefore consider the impact of technology on utilization of formal financial services by the smallholder farmers.

#### Demographic Factors

Ellis et al. (2010), noted that age had a positive statistically significant relationship with credit from banks, Saccos, MFI and ASCAS. Additionally, more credit was advanced to couples than to singles. Similarly, Johnson and Arnold (2012) and World Bank (2014) also found that older people are more likely to use formal financial services as compared to the younger people. Further, findings by Ndi (2011) showed that people above 55 years and below 25 years are least likely to use bank accounts as compared to those in the age group between 35 and 44 years. Education was found to be strongly associated with bank use. Specifically, 39% of persons that possess secondary education had a bank account, which was significantly higher compared with persons without formal education or only with primary education (Johnson, & Arnold 2012). This clearly shows that demographic characteristics of age, marital status and education level affected financial inclusion.

An investigation depicting the influence of demographic characteristics on investment on financially included youth was done in Nyeri and Kirinyaga counties (Kiai, et al., 2016). The study showed that investments by financially included youth were statistically influenced by gender, age, marital status and level of education. However, the Place of residence was not statistically significant although had influence. The study recommended that financial institutions take into account demographic factors while coming up with their financial products and services. Simiyu et al. (2012) conducted a study on the gender empowerment and access to financial services in Machakos County, Eastern Kenya, using a descriptive method. However, the contextual focus of this study is Machakos County, which is significantly different from other counties in Kenya. The findings show that more people used Mpesa services as compared with other mobile money transfer services. In particular, more women than men were empowered after the adoption of Mobile money transfer services. However, access to Mobile money transfer services has had both negative and positive results on gender roles and the negative implication may become a social cost to innovation.

Financial education is the process by which individuals improve their knowledge of financial products. This is achieved through passing of information, which enables people to become more confident, make informed financial decisions and know where to go for financial support Organization for Economic Co-Operation and Development (OECD), 2010). In a study conducted by Cole et al. (2009) on leading theories of low demand for financial services in emerging markets, the study found that financial education programme had modest effects, increasing demand for bank accounts only for those with limited education or financial literacy. In contrast, small subsidies greatly increased demand for bank account. In comparison between small subsidies and financial literacy, the study showed that financial trainings had little hope in improving

accounts uptake by farmers. In a similar study by Cole and Shastry (2009) aimed at establishing the effect of education, cognitive ability and financial literacy on financial market participation, the study established that normal school education affected saving behaviour. The study also established that financial literacy did not affect individual saving skills. The study was carried out on school graduates. The study found out that those students who graduated prior to introduction of compulsory financial literacy programme in school had identical saving skills as those who graduated after studying financial literacy programme.

#### Mobile Banking Factors

Kirui et al. (2010) examined the awareness and use of m-banking services among rural farmers in Kenya. Their study also assessed the factors conditioning the use of such services. The study found high awareness of m-banking services among the smallholder farmers. It also found that education, distance to a commercial bank, membership to farmer organizations, distance to the m-banking agents and endowment with physical and financial assets affect the use of m-banking services.

Agufa (2016) carried out a study on the effect of digital finance on financial inclusion in the banking industry in Kenya. The research design used was descriptive statistics. This study found that agency banking and internet banking had a negative insignificant relationship with financial inclusion. Similarly, a study by Agufa (2016) also found that agency banking, mobile banking and internet banking had an insignificant negative relationship with financial inclusion Kikulwe et al. (2014) analysed the impact of mobile money use among smallholder farm households. The factors influencing the adoption of this innovation were analysed with a probity model while impact was analysed using panel models. The findings suggested that mobile money services could be welfare enhancing for smallholder farm households, who constitute the majority

of the rural poor. In Kenya, mobile money also seems to be widely accessible.

#### **METHODOLOGY**

The study adopted a cross-sectional survey research design since it allowed the collection of data from several cases in different contexts at the same time while ensuring that a variety of views over the same issue are captured in a short time increasing the external validity of the study. The study covered smallholder farmers from Nakuru, Kirinyaga and Busia Counties in Kenya. These locations are within the same Livelihood Zones. Livelihood zones are areas within which people share broadly the same pattern of livelihood, that is, the same production system - agriculture or pastoralist as well as the same patterns of trade and exchange (Lawrence, et al., 2011). Nakuru County falls within the Highland Tropics; the county is one among those that harbor many different cropping and livestock activities and is viewed as the bedrock of food security in Kenya. An estimated 80 per cent of residents depend on agriculture for their livelihoods, with major farm enterprises among smallholder farmers being maize, beans, Irish potatoes, pyrethrum, vegetables, zero grazed dairy cows, sheep and goats. It serves as a representative cosmopolitan agricultural county. Kirinyaga County is a county in the former Central Province of Kenya. Agriculture is the backbone of County's economy, with a mix of agro and livestock farming. Busia County in the former Western Province is the gateway to Kenya from neighboring Uganda. Agriculture is the main economic activity in the county among the small-scale farmers, with production of maize, beans, groundnuts, cassava, sorghum, vegetables and fruits.

The study adopted a descriptive cross-sectional survey research design and targeted 3,666,294 smallholder farmers from three counties, that is, Nakuru, Busia and Kirinyaga in Kenya from which a sample size 560 of smallholder farmers was selected. Simple random sampling was used to select the three counties and sub-counties while convenience sampling was used to select the smallholder farmers for study in each ward. 496 smallholder farmers were selected in Nakuru, Kirinyaga and Busia counties. Data was collected using copies of a researcher developed semi-structured questionnaire, which were administered to randomly selected smallholder farmers. Descriptive and multiple linear regression analyses were then conducted using SPSS software in order to address the study objective.

#### **RESULTS AND DISCUSSIONS**

##### **Technological factors influencing the utilization of formal financial services**

The study sought to evaluate the influence of technological factors on utilization of formal financial services among smallholder farmers in Nakuru, Busia and Kirinyaga counties in Kenya. Technological factors evaluated were; mobile phone ownership, use of mobile phones to access formal financial services and perceived benefits of technology in to access formal financial services. The study found that 95.8 per cent of the respondents owned a mobile phone, a figure that falls within the 96 per cent range indicated by the Communication Commission of Kenya (CCK, 2015). Those without a mobile phone are 4.2 per cent. Consequently, the study sought to determine mobile phone ownership across demographic patterns of the farmers. The findings are given in Table 2.

**Table 2: Ownership of Mobile Phone across Demographic Patterns**

Demographic	Category	Do you have a mobile phone		Total	Chi-Square (P-value)
		Yes	No		
Gender	Male	273	5	278	9.252a
	Female	202	16	218	0.002
Age group of Respondent	18-30 years	43	3	46	
	31-40 years	103	3	106	
	41-50 years	126	2	128	17.431a
	51-60 years	102	1	103	0.002
Marital status of the household head	> 60 years	101	12	113	
	Married	379	11	390	
	Separated	11	1	12	10.576a
	Widow/Widower	65	8	73	0.014
Education level	Single	20	1	21	
	Never attended school	49	13	62	
	Primary	219	8	227	
	Secondary	158	0	158	52.252a
	Tertiary	43	0	43	0.000
County	University	6	0	6	
	Busia	103	10	113	
	Nakuru	283	9	292	7.823a
	Kirinyaga	89	2	91	0.020

Table 2 shows that mobile phone ownership among male farmers (98%) was significantly higher than that of the female farmers (92%). Mobile phone ownership among farmers in the 51 – 60 years age group (99%) was significantly higher than in the other age groups, though curiously farmers aged above 60 years tended to score the second highest level of phone ownership (98%) was significant across all demographic aspects of the farmers. Mobile ownership was highest among the married household heads (97%) and lowest among widowed/widowers (87.7%). Farmers with secondary school level of education and above all owned mobile phones (100%) compared to 96% for those who had primary school

level of education and 73% for those who did not attend school. Across counties, Kirinyaga County farmers registered the highest level of mobile phone ownership (97.8%) compared to Nakuru (96.8%) while Busia County farmers had the lowest mobile phone ownership (90.3%).

#### **Use of Mobile Phones to Access Formal Financial Services**

The high levels of mobile phone ownership led to study to seek to establish whether the farmers used their mobile phones to receive communication on formal financial services (banks, mobile money, microfinance Sacco). The results are given in Table 3.

**Table 3: Use of Mobile Phones to Access Formal Financial Services**

	Never	Seldom	Sometimes	Often	Always
Use	Freq (%)	Freq (%)	Freq (%)	Freq (%)	Freq (%)
Depositing	39(8)	32(7)	157(32)	175(35)	72(15)
Withdrawals	31(6)	13(3)	147(30)	206(42)	78(16)
Paying for utilities like electricity, water	261(53)	6(1)	39(8)	149(30)	20(4)
Buying goods	197(40)	17(3)	81(16)	165(33)	15(3)
Paying school fees	425(86)	6(1)	18(4)	12(2)	14(3)

The results in Table 3 indicate that majority of the farmers often used their mobile phones for making deposits (35%), withdrawals (42%), paying for utilities like electricity, water (30%) and purchase of goods (33%). The observation that majority (42%) used their mobile phones to withdraw cash suggests that most of them were probably paid for their goods through mobile money. The finding that the farmers preferred to use mobile phones for withdrawals as compared to deposits and, hence, savings fails to support

those of Ouma et al. (2017) whose study revealed that availability and usage of mobile phones to provide financial services promotes the likelihood of saving at the household level. However, it emerges from the findings that majority of the farmers did not prefer using mobile money to pay school fees for their children (86%). The study consequently sought to examine the utilization of mobile phones financial services across the demographics of the farmers.

**Table 4: Demographic factors and use of mobile phones to access formal financial services**

Demographics		Use of Mobile Phones for Access of Formal Financial Services				
		Deposits	Withdrawals	Utilities	Purchases	Paying Fees
Gender	Chi-Square	12.007a	8.953a	8.298a	32.555a	7.309a
	(P-value)	0.017	0.062	0.081	0.000	0.12
Age group of farmers	Chi-Square	37.988a	23.225a	31.325a	35.168a	19.833a
	(P-value)	0.002	0.108	0.012	0.004	0.228
Marital status of the household head	Chi-Square	26.269a	5.384a	16.552a	27.214a	8.446a
	(P-value)	0.01	0.944	0.167	0.007	0.749
Education level	Chi-Square	49.656a	31.117a	62.905a	40.190a	28.452a

	(P-value)	0.000	0.013	0.000	0.001	0.028
Household Size	Chi-Square	49.946a	50.556a	71.797a	61.380a	69.537a
	(P-value)	0.249	0.231	0.005	0.043	0.008
County	Chi-Square	202.138a	214.738a	95.892a	146.095a	49.623a
	(P-value)	0.000	0.000	0.000	0.000	0.000

It is evident from Table 4 that the use of mobile phones to access formal financial services was significant across the demographics of the farmers. In particular, mobile phones were significantly used to access formal financial services across all the three counties ( $p \leq 0.05$ ) and across all the education levels ( $p \leq 0.05$ ). However, there were variations regarding the use of mobile phones to access financial services across the other demographics; mobile phone use for access to financial services was across gender of the farmers was significantly associated with deposits, purchases and payment of fees ( $p \leq 0.05$ ). Across the age groups, the use of mobile phones was significantly associated with deposits, utilities and purchases ( $p \leq 0.05$ ) while in terms of marital status; mobile phone use was significantly associated with deposits and purchases ( $p \leq 0.05$ ). Household size mobile phone use was significantly associated with utilities, purchases and payment of bills ( $p \leq 0.05$ ).

These findings are in line with those of Johnson and Arnold (2012) and World Bank (2014) who found that older people are more likely to use formal financial services as compared to the younger people. This was further supported by Ndi (2011) who opined that people above 55 years and below 25 years are least likely to use bank accounts as compared to those in the age group between 35 and 44 years who are most likely to use the bank accounts. Education was found to be strongly associated with bank use. Specifically, 39 per cent of persons that possess secondary education had a bank account, which was significantly higher compared

without formal education or only with primary education (Johnson & Arnold 2012).

The findings suggest that there has been significant increase in mobile phone utilization across the demographic patterns of smallholder farmers in a span of a decade. An analysis of a survey of mobile phone ownership and usage across Kenya in 2009 had shown that distinct regional, gender-associated, and socioeconomic variations existed with mostly low ownership among rural communities and poor people (Wesolowski, et al., 2012). The most recent studies have shown that the gap between those with mobile phones and those without seems to have narrowed in Kenya as compared with other regions (CCK, 2015). Global Findex Data (2017) suggest that mobile phones could go a long way toward helping to surmount some of the barriers that hinder unbanked adults from accessing financial services. The implication of having a mobile phone is beneficial since it brings within reach a wider range of financial services through mobile-based money platforms.

#### **Regression of demographics on mobile phone utilization for formal financial services**

The study aimed at testing for significance of demographic factors influencing mobile phone utilization for formal financial services among smallholder farmers in Kenya. The mobile phone factors considered were; making deposits, withdrawals, paying for utilities like electricity, water,

purchase of goods and paying school fees for their | children. The results are given in Table 5.

**Table 5: Demographic factors on mobile phone utilization for formal financial services**

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	10.281	0.879		11.698	0.000
Age group of respondent	0.043	0.124	0.016	0.345	0.730
Gender of Respondents	0.222	0.302	0.033	0.733	0.464
Marital status of the household head	0.213	0.118	0.082	1.806	0.072
Size of household	0.029	0.065	0.022	0.454	0.650
Education level	1.334	0.18	0.342	7.395	0.000
R	.367a	F	14.603		
R Square	0.135	Sig.	.000b		
Adjusted R Square	0.125				

The Multiple linear regression analysis in Table 5 shows that the relationship between the dependent variable and all the independent variables pooled together and had a model coefficient of determination,  $R = 0.367$  and a corresponding adjusted R-square of  $R_{adj} = 0.125$  which indicates that the model could explain up to 12.5% of the variations in the mobile phone utilization for formal financial services. The results in Table 5 further indicate that there is a significant difference between the demographic factors and mobile phone utilization for formal financial services among smallholder farmers in Kenya ( $F_o = 14.603 > F_c = 2.21$ ;  $\alpha < 0.05$ ;  $df = 5, 469$ ;  $p < 0.05$ ). This finding confirms that by the model predicted in Table 5 and shows that it is indeed significant. It is also evident that the most significant demographic factor influencing the mobile phone utilization for formal financial services among smallholder farmers in Kenya is the education level ( $\beta = 7.395$ ;  $p = 0.000$ ). Therefore, this led to the rejection of the null hypothesis;

$H_o$ : There is no significant relationship between demographic factors and mobile phone utilization for

formal financial services among smallholder farmers in Kenya

The findings in the model agrees with Kirui et al. (2012) who found a very high awareness of mobile phone-based money transfer services among the smallholder farmers and also established that there is predominant use of remitted funds for agricultural related purposes (purchase of seed, fertilizer for planting and topdressing, farm equipment/implements, leasing of land for farming, wages for labour). Theoretically, the findings support the central argument of the Task-technology fit that individual performance is more likely if the capabilities of information communication and technology (ICT) match the tasks that the user must perform (Goodhue, & Thompson, 1995). Such factors include floatability, authorization, and compatibility, eases of use/training, production timeliness, systems reliability and relationship with users.

#### CONCLUSIONS AND RECOMMENDATIONS

**Conclusions:** The study found that 95.8% of the farmers owned a mobile phone consistent with the 96% range

indicated by the Communication Commission of Kenya (CCK, 2015). Farmers with secondary school level of education and above all owned mobile phones compared to for those who had primary school level of education and for those who did not attend school. Majority of the farmers often used their mobile phones for making deposits, withdrawals, paying for utilities like electricity, water and purchase of goods. However, majority of the farmers did not prefer using mobile money to pay school fees for their children. Further, there were variations regarding the use of mobile phones to access financial services across the demographics. Majority used their mobile phones to withdraw cash suggesting that most of them were probably paid for their goods through mobile money. The use of mobile phones to access formal financial services was significant across the demographics of the farmers. Therefore, the study concludes that demographic factors were important in predicting mobile phone

utilization for formal financial services among smallholder farmers in Kenya

**Recommendations:** It emerged from the findings that while most farmers owned mobile phones, the farmers' utilization of the phones to obtain financial services varied; mostly the phones were used for paying them for their products. However, the farmers were not using the phones application extensively to access other formal financial services perhaps owing to the limitations of the phones themselves, as most were not using smartphones. Therefore, the study recommends that mobile phone mobile service providers should collaborate with financial service providers to enable the farmers upgrade their phones to use more financial services platforms. At the national level, policy makers should encourage more investment in the development of smallholder farmer applications to encourage more technology adoption.

### References

- Agufa, M. M. (2016). *The Effect of Digital Finance on Financial Inclusion in the Banking Industry in Kenya*. (Unpublished Thesis), University of Nairobi, Nairobi, Kenya.
- Beck, T., & Maimbo, S. M. (Eds.). (2012). *Financial Sector Development in Africa: Opportunities and Challenges*. World Bank Publications.
- Cole, S., & Kartini, S. (2009). Smart Money: The Effect of Education, Cognitive Ability, and Financial Literacy on Financial Market Participation, *Harvard Business School Working Paper* 09-071.
- Communications Commission of Kenya, Annual Report for the Financial Year 2014–2015; Retrieved from: [www.ca.go.ke/index.php/annual-reports](http://www.ca.go.ke/index.php/annual-reports).
- Duncombe, R. (2012). An Evidence-Based Framework for Assessing the Potential of Mobile Finance in Sub-Saharan Africa. *The Journal of Modern African Studies*, 50(03), 369–395.
- Gebauer, J., & Shaw, M. J. (2004). Success Factors and Impacts of Mobile Business Applications: Results from a Mobile E-Procurement Study. *International Journal of Electronic Commerce*. 8(3) 19-41.
- Goodhue, D. L., & Thompson, R. L. (1995). Task-Technology Fit and Individual Performance. *Mis Quarterly*, 213-236.
- Johnson, S., & Arnold, S. (2012). *Inclusive Financial Markets: Is Transformation Underway in Kenya?* Development Policy Review, 30(6), 719-748.
- Kikulwe, E. M., Fischer, E., & Qaim, M. (2014). *Mobile Money, Smallholder Farmers, and Household Welfare in Kenya*. *Plos One*, 122(3), 879–924.

- Kirui, O. K., Okello, J. J., & Nyikal, R. A. (2012). Awareness of Mobile Phone-Based Money Transfer Services in Agriculture by Smallholder Farmers in Kenya. *International Journal of Ict Research and Development in Africa (Ijictrda)*, 3(1), 1-13.
- Kirui, O. K., Okello, J. J., & Nyikal, R. A. (2010). Awareness and Use of M-Banking Services in Agriculture: The Case of Smallholder Farmers in Kenya. Paper Presented at the 2010 Aaae Third Conference/Aeasa 48th Conference.
- Lawrence, M., King, A., & Holt, J. (2011). *The Practitioners Guide to Household Economy*. Approach. Retrieved from: [Http://Www.Feg-Consulting](http://www.feg-consulting.com)
- Lystinen, K., & Yoo, Y. 2002a. Issues and challenges in ubiquitous computing. *Communications of the ACM*. 45(12), 63-65.
- McKee, K., Kaffenberger, M., & Zimmerman, J. (2015). Doing digital finance right: The case for stronger mitigation of customer risks. *Focus Note 103*, CGAP. Retrieved from: <http://www.cgap.org/sites/default/files/Focus-Note-Doing-Digital-Finance-Right-Jun-2015.pdf>
- Ndii, D. (2011). *Financial inclusion: Recent developments and lessons from Kenya*. Financial Sector Deepening Publication.
- Ouma, S. A., Odongo, M. T., & Were, M. (2017). Mobile financial Services and financial Inclusion: Is It a Boon for Savings Mobilisation? *Review of Development Finance*, 7, 29 – 35.
- Perry, M., O'hara, K., Sellen, A. Brown, B., & Harper, R. (2001). Dealing with Mobility: Understanding Access Anytime, Anywhere. *Acm Transactions on Computer-Human Interaction*, 8, 4, 323-347.
- Porteous, D. (2007). Just How Transformational Is M-Banking. *Commissioned by Finmark*.
- Pulver, C., Jack, W., & Suri, T. (2009). The Performance and Impact of M-Pesa. *Fsd Kenya*.
- Radcliffe, D., & Voorhies, R., (2012). *A Digital Pathway to Financial Inclusion*. Retrieved from: SSRN: <https://ssrn.com/abstract=2186926> or <http://dx.doi.org/10.2139/ssrn.2186926>
- Kiai, R. M., Ng'ang'a, S. I., Kinyanjui, J. K., & Kiragu, D. N.(2016).The Influence of Demographic Characteristics on Investment on Financially Included Youth in Nyeri and Kirinyaga Counties. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 6 (4), 196–204.
- Salami, A., Kamara, A. B., & Brixiova, Z. (2010). *Smallholder Agriculture in East Africa: Trends, Constraints and Opportunities*: African Development Bank Tunis.
- Simiyu, W., Stevie, M. N., & Benson, A. M. (2012). Gender Empowerment and Access to Financial Services in Machakos County, Eastern. *Journal of Modern African Studies*, 30(1), 163-175.
- Wesolowski, A., Eagle, N., Noor, A. M., Snow, R. W., & Buckee, C. O. (2012). Heterogeneous Mobile Phone Ownership and Usage Patterns in Kenya. *Plos One*, 7(4), E35319.
- Zheng, W., & Yuan, Y. (2007). Identifying The Difference Between Stationary Office Support and Mobile Work Support: A Conceptual Framework”, *International Journal of Mobile Communications*, 5 (1), 107 – 122
- Zigurs, I., & Buckland, B. K. (1998). “A Theory of Task-Technology Fit and Group Support System Effectiveness”, *Management Information System Quarterly*, 22 (3), 313 – 334.