



# Determinants of awareness and adoption of mobile money technologies: Evidence from women micro entrepreneurs in Kenya



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## ABSTRACT

Over the last decade mobile phone based money services continue to expand in most of the developing countries. The spread of the technology is believed to reduce transaction costs and promote market integration. Even with the introduction of mobile money technologies, financial exclusion remains endemic especially with regard to gender aspect. This paper analyses women entrepreneur's adoption of mobile money services in Kenya. The results suggest that women's membership to table banking groups would easily influence awareness and consequently increase adoption of mobile payments services. Also, we established that women's control of enterprise finances and decision making significantly impact on awareness and usage of mobile money technologies. However, women are less likely to adopt mobile banking technology perceived to be out of reach for their communities and those that have hidden charges irrespective of having knowledge of their existence.

## 1. Introduction

Globally mobile phone coverage has widely expanded from 1 billion users in 2000 to 6 billion in 2015 (GSMA, 2015). A Large part of the coverage is taking place in developing countries (Russell & Ciesliek, 2012). In Sub-Saharan Africa, > 60% of the population is connected to mobile coverage with > 367 million new phone subscribers by mid-2015 (GSMA, 2015). The ability to access mobile network coverage provides opportunities for micro-entrepreneurs to reduce business transaction cost and improve on efficiency (Aggarwal & Klapper, 2012). Increasingly, the expansion of mobile technologies has not only revolutionized the way business is conducted but has provided solutions to financial exclusion challenges (Asongu & Asongu, 2017; Omwansa & Sullivan, 2013).

Kenya has experienced phenomenal growth of mobile money services that have permeated in every sector of the economy. The technology has changed how people transact business and interact with one another (Hughes & Lonie, 2007). It has provided quick and secure person-to-person money transfers, cashless payment of goods and services, and links to bank accounts (Donovan, 2012). However, Kenya still grapples with disparities in the adoption of mobile technologies. A number of authors have examined the nature of mobile technology divide. For instance Kim, Shin, and Lee (2009); Malaquias and Hwang (2016); Zhou, Lu, and Wang (2010) investigated the dynamics of trust and usage of mobile banking. The issue is critical, given that consumers

are exposed to mobile banking furtures that can be ambiguous and inflexible compared to convectional banking technologies such as automated teller machine.

Considering the rising use of mobile money services and related innovations in Kenya, this study examines determinants of adoption of different mobile money technologies by women micro entrepreneurs in Kenya. We categorize mobile money technologies into four major types: (i). Mobile money transfer - services allowing users to send or receive money through mobile phones, (ii). Mobile banking services- allowing customers of financial institutions to access their bank accounts and transact via mobile phones, (iii). Mobile payments - services allowing cashless payments for goods and services, (iv). Group transaction services – allowing members of table banking groups to send savings and loan repayments to virtual groups accounts.

## 2. Literature review

Financial inclusion levels in Sub-Saharan Africa still lag behind other regions; only 25% of the adult population owns a bank account (Costa & Ehrbeck, 2015) in comparison to 39% of the population in Latin America and the Caribbean countries (Blechman, 2016). To spur economic growth and reduce poverty levels, microfinance policies that encourage financial inclusion have been established (Demirgüç-Kunt & Klapper, 2013). Mobile money has the potential to bring efficiency to banking sector by facilitating micro banking services at the convenience

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of clients. Suri and Jack (2016) observe that mobile phones can efficiently provide 100% financial services to the lower end of the market. Also, the innovation can provide loan disbursements, repayments, and savings exclusively through mobile money (Kikulwe, Fischer, & Qaim, 2013).

Despite the deepening of mobile money technology outreach, adoption is largely determined by access to relevant information. Studies on information systems theory advanced by Davis (1989) observe that adoption process starts with exclusive knowledge of particular technology and later the decision to reject or use the innovation. In addition (Zhou et al., 2010) reports that information regarding technology is a prerequisite before the adoption takes place. However, by its very nature, mobile phone is considered as the link that facilitates the flow of information between inventors and adopters (Chauhan, 2015). Indeed mobile phone technology has been proven to have higher propensity to create awareness of innovations than traditional information dissemination sources such as newspapers, and radio (Donovan, 2012).

Past studies have confirmed that mobile phones and related technologies are indeed improving the livelihoods of rural communities in developing countries. Murendo and Wollni (2016) found that the adoption of new mobile technologies has the potential to increase agricultural productivity. While investigating effects of the information service on crop varieties, Kirui, Okello, and Nyikal (2012) note that information delivered via mobile phone enables farmers to increase yields. Further, knowledge awareness explicitly implies learning and understanding characteristics of a particular innovation.

Diffrent authors have examined the nature of cell phone technologies in remittances between rural and urban areas (Adams & Cuecuecha, 2013; Kikulwe et al., 2013) while other studies have focused on the role of cell phones in linking poor communities to micro-credit markets (Kaffenberger, 2011; Stuart & Cohen, 2011), Hughes and Lonie (2007) found that access to the mobile phone did improve rural communities market participation, credit access, and spatial arbitrage. However, these studies did not empirically consider factors related to micro-entrepreneurs decisions to adopt mobile money. Nevertheless, the convenience, speed of transaction, as well as lower cost of transferring funds has led to the integration of mobile money technologies in other fronts. Asongu and Asongu (2017) showed that remittances sent through mobile money tend to reduce the impact of negative economic shocks for households, thus providing a form of insurance.

In Kenya, the use of mobile phone technology has become a study case study of financial inclusion. The value of mobile phone-based money transaction had reached \$1.5 billion by 2015, with an average value of individuals transfers records valued at \$190.3 million (FSD, 2016). From an enterprise perspective, mobile money has increased transfers between business partners (Mbiti & Weil, 2011). This has reduced transaction costs and promoted market integration and exchange. Indeed, studies have identified the potential impacts of mobile money. However, there are a few studies that have empirically analyzed determinants of awareness and adoption of money technologies. This study specifically focused on women entrepreneurs who are likely to be financially excluded from access to formal financial services in Sub-Saharan Africa.

### 3. Materials and methods

This paper is based on data collected through a survey that was conducted between 2016 January and February 2016 in Nakuru, Kenya. The target population of the study was women micro-entrepreneurs participating in table banking groups. Table banking is a credit kitty raised by group members through monthly savings and interest on both long- and short term credit. Using community based organizations and programmes that promoted table banking groups; multistage sampling procedure was used to select the respondents. The respondents were clustered into table banking groups, using purposive

sampling, 392 women micro-entrepreneurs were selected to participate in the study survey.

#### 3.1. Empirical frame work

To empirically establish factors that influence awareness and the adoption of mobile money services, the study focused on mobile technology features. We classify features of mobile wallet technologies into; (i) mobile money transfer services, (ii) mobile banking services, (iii) mobile payments, (iv) group transactions. With reagrd to empirical model researchers in the past have widely considered the approach of evaluating the adoption of technologies using contingent valuation models. However, contingent valuation models used in the past studies are limited when analyzing the extent of adoption technologies. Two step Heckman model has been applied in some studies because it allows for selection bias. Unfortunately, it is not applied in randomly selected samples studies. In this study, we use double hurdle model to allow for randomly selected samples as recommended by Jones (1989).

In the first hurdle, we apply *Probit model* to determine the probability of women entrepreneurs awareness of available mobile technology. While in the second hurdle *Tobit model* is used to determine the extent of adoption of mobile technologies. According to Mignouna, Manyong, Mutabazi, and Senkondo (2011), the model is specified as;

$$\begin{aligned} y_{11}^* &= w_i' \alpha + \mu_i \\ y_{12}^* &= x_i' \beta \alpha + \mu_i \\ y_{11}^* &= x_i' \beta \alpha + \text{if } y_{11}^* > 0 \text{ and } y_{12}^* > 0 \end{aligned} \tag{1}$$

where  $y_{11}^*$  is denoted as latent variable describing women entrepreneurs knowledge level regarding the four types of mobile technologies while  $y_{12}^*$  is a latent variable describing the extent of women's adoption of the technologies,  $\mu_i$  represent the error terms distributed as  $\mu_i \sim N(0, 1)$  and  $\mu_i \sim N(0, \delta^2)$ . In such case Yen and Jones (1997) recommend allowing for heteroscedasticity that can be estimated using maximum likelihood expressed as;

$$\begin{aligned} L(\alpha, \beta, h, 0) &= \prod_0 \left[ 1 - \varnothing(w_i' \alpha) \varnothing\left(\frac{x_i'}{\delta_i}\right) \right] \times \\ &\prod_1 \left[ (1 + \theta^2 y_i^2)^{-\frac{1}{2}} \varnothing(w_i' \alpha) \alpha_i^{-1} \varnothing\left(\frac{T(\theta y_1) x_i' \beta}{\sigma_i}\right) \right] \end{aligned} \tag{2}$$

In non-linier model it becomes difficult to estimate coefficient directly, we therefore calculate marginal effects to provide a better understanding of the magnitudes of the extent of adoption as recommended by (Green, 2012). This is expressed as;

$$E(y_i | y_i > 0) = \varnothing\left(\frac{x_i \beta}{\sigma_i}\right)^{-1} \int_0^\infty \left( \frac{y_i}{\sigma_i \sqrt{1 + \theta^2 y_i^2}} \varnothing\left(\frac{T(\theta y_1) x_i' \beta}{\sigma_i}\right) \right) \tag{3}$$

### 4. Results

Descriptive analysis was used to show the characteristics of women entrepreneurs. Overall we observe that the average education level was ten years of schooling which is an equivalent of secondary education under the Kenyan education system. Information presented in Table 1 suggests that only 35% of sampled women belonged to business associations while majority attended a business training event. Further results indicated that 78% of the women micro-entrepreneurs owned and managed a personal bank account; this was higher than the national bank account ownership which stands at 28%. The descriptive statistics indicate that only 35% of women were household heads.

#### 4.1. Knowledge and usage of available mobile money services

More than half of the respondents were aware of the mobile money

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