

Determinants of Mobile Phone Usage for E-Commerce among Micro and Small Enterprises in the Informal Sector of Kenya

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Abstract

Studies done on the usage of Information and Commutation Technologies (ICTs) for e-commerce in the informal sector have mostly concentrated on the roles of computers and internet usage, and give contradicting results on the determinants and benefits of using these technologies. Evidence on factors leading to the mobile phones usage for business among Micro and Small Enterprises (MSEs) in Kenya is lacking. This paper investigates determinants of mobile phone usage among informal MSEs in Kenya. Primary data was collected from a survey of 384 MSEs in Nairobi County. Linear probability model, logit and probit models were used to estimate the determinants of mobile phone usage in e-commerce. The results of the study show that education level is the prime determinant of mobile phone usage for e-commerce. Number of employees and gender of MSEs also have a significant effect on the mobile phone usage for e-commerce. The study recommends the training of MSEs in the mobile phones applications for business and the government should create an enabling environment for MSEs to use mobile phone for e-commerce.

Key words: Mobile phone usage, e-commerce, informal sector, MSEs, and Education

1. Introduction

The Kenyan informal sector is largely composed of micro and small enterprises (MSEs) characterized by a range of commercial activities which are mainly operated by individuals either alone or with assistance of family members. There is no consensus on the definition of the informal sector because of the heterogeneous activities associated with it; however, there are similarities such as low initial capital requirements for investment, limited resources coming from the MSE or members of the extended family rather than financial institution; the operations rely on friends and social networks, while advertisements heavily rely on the MSEs marketing capabilities rather than engaging marketing agencies. Many MSEs in the informal sector have limited growth rate due to their small-scale activities, reliance on unskilled labour, poor infrastructure, lack of security, lack of access to credit, and unfavourable regulatory framework (Litondo, 2013). Despite the limitation of the informal sector, MSEs are a major contributor to the Kenyan economy. This sector creates value addition in manufacturing because of its low capital requirement in business start-ups, and potential of alleviating poverty through job and wealth creation.

ICTs refer to a diverse set of technological tool and resources to create, disseminate, store, bring value addition, and manage information (Vikas, 2000). New ICTs offer many possibilities for rural communities in communicating and exchanging information and have revolutionized the way people live, conduct businesses, and social activities (Barntt, 1996 and Norrish, 1998). ICTs have also been defined as electronic means of capturing, processing, storing and communicating information (Heeks, 1999). According to Hukins (2002) information is the most important element for productivity, competitiveness, and increased wealth. If ICTs are embraced, they have the potential to create wealth for the poor. ICTs together with the ability to use it and adapt it, is the critical factor in generating and accessing wealth, power and knowledge in our time. The ICT that is most preferred in the informal sector is the mobile phone (Litondo, 2013). However, there is limited quantitative information on the factors that enable operators in the informal sector to use mobile phones for business transactions.

This paper therefore, attempts to address this knowledge gap by establishing determinants of mobile phones usage for e-commerce the informal MSEs sector.

2. Literature Review

According to the Committee for Economic Development (CED) (2002) report, MSEs have at least two of the following characteristics: Management of the business is independent, usually managers are also the owners, capital is supplied by an individual owner or a small group, the area of operation is local, employers and owners reside in one home community although the markets served need not be local, the size of the firm is small relative to the industry. The size of the top bracket varies widely, so that what might seem large in one field would definitely be small in another. Litondo (2013) categorised MSEs in the Kenyan context under the following criteria: *i*) Micro enterprises employ up to 10 workers including the working owner. Small enterprises are those that employ more than 10 and up to 20 employees. It should be noted that no MSEs observed were in the category of 10-20 employees. Frempong and Essegbey (2006) explained that formality plays an important role in the type of ICT facility used by MSEs. The ownership of fixed lines computers and fax and internet belonged to the formal sector, while the usage of mobile phones was more pronounced in informal MSEs. The reasons given were that most informal sector players operate in temporary and makeshift structures, most often sited at unauthorized places, therefore the nature of such structures require ICTs such as mobile phones that can be carried along when the business relocates.

Diffusion of ICTs is a first step in taking MSEs across the threshold of full ICT use. Duncombe et al. (2006) came up with a step-by-step approach that could minimize the risk of MSEs adopting e-commerce as follows: a) the first step consists of simple messaging mobile communication; b) in the second step computers are introduced and information can be exchanged via the internet; c) in the third step company information is published using the web; d) the fourth step advances to interactions via the web; e) the fifth step extends the interactions to e-commerce transaction; f) the final step is where the full utilization of ICTs is realized, in this step businesses are linked electronically and business processes are streamlined by networking. Litondo (2013) stipulates that most of the MSEs in Kenya, as this study indicates are at the first step; they have not advanced beyond this stage and yet many e-commerce transactions were taking place. Contrary to what Duncombe et al (2006) say substantial e-commerce can occur at the first stage of the ICT progression.

Electronic commerce or e-commerce is a term used to describe all commercial and related commercial activities facilitated through the use of information technology and network technologies such as internet, extranet and intranets and mobile phones, i.e. ICTs. E-commerce refers generally to all forms of electronic transactions relating to commercial activities by MSEs and individuals that are based upon the processing and transmission of digitized data, including, text, sound and visual images (OECD, 1999). E-commerce involves sales of goods and services over wired and wireless technologies for example, mobile phones by businesses, individuals, governments or other organizations and it integrates traditional commerce operations (Litondo, 2013).

Tandon (2002) argues that barriers to e-commerce adoption are spread very unevenly leading to some MSEs having strong e-commerce opportunities while others have none. He further states that e-commerce in developing countries is characterized by: a) very uneven distribution of infrastructure; b) uneven distribution of ICTs access capabilities between various social groups; d) large portions of mobile phones are not internet-enabled; e) lack of large mass of local customers using or with potential to use e-commerce; f) absence of e-commerce culture, for example, dislike of operational transparency, and preference for personal contact in commerce. Litondo (2013) argues that contrary to Tandon's assertion, mobile phones are owned by the many of citizens in Kenya and the least developed countries at large, and therefore, it would be safe to assume that local customers use or have the potential to use them for e-commerce.

Findings of a study undertaken by Mitullah (2006) on assessment of the e-readiness of small and medium sized enterprises in the ICT sector in Botswana, with special emphasis to information access indicated that the majority of the MSEs were small-sized and were largely not e-ready to participate in the global electronic business environment. The reasons cited were lack of awareness, inadequate policy and legislative framework, poor telecommunication and electricity infrastructures, poor e-commerce infrastructure, inadequate government support, lack of access to credit, investment barriers, and the lack of ICT skills. The above assessments are based on computer technology and not mobile telephony in particular.

Nonetheless, they also apply to mobile phone usage for e-commerce. According to Biggs and Kelly (2006) converging ICTs, in this case, computer and mobile technologies are an enabler of socio-economic development. However, socio-economic development is not going to happen automatically just by stimulating local businesses, reforming the government to facilitate entrepreneurship or improving the education level of the population. Most of Sub-Saharan Africa (SSA) has real obstacles that are usually ignored in ICT programmes, if they are not identified and included in a strategic plan may be magnified and may result in a lower level of socio-economic development.

A study carried out by Opiyo and K' Akumu (2006) on the ICT applications in the informal sector in Kenya concluded that there is need to prevent further marginalization of the informal sector by availing ICT services which are mixed appropriately and also properly allocated, since this would enable them to access markets and other business information that can assist them to make their economic activities more vibrant. They further suggest that there is a need to understand and acknowledge the drivers and pressures leading to the adoption of new technologies such as mobile phones in the lower ends of the informal sector which have been neglected in the literature. Chowdhury and Wolf (2003) suggest that investigations are needed to reveal the complementary factors that impact on the links between ICTs and MSE's performance and may provide additional impetus for investments.

3. Materials and Method

The effect of the determinants of mobile phone usage of business is estimated by LPM, probit, and logit models. In previous studies, Ntale (2013) used the LPM, probit and logit models to estimate the determinants of economic activity diversification among the small-scale farmers. McKenzie and Sakho (2007) used the Logit model to estimate the impact of tax registration on firm profitability. The working assumption of this paper is that, the MSEs are rational, and therefore, use their mobile phones for business depending on the benefits they perceived in the use of mobile phones. Specifically, MSEs' decisions to use mobile phones for the business were analyzed using the predictor models shown below:

Linear Probability Model (LPM)

$$P_i = bX + u_i \quad (1)$$

Probit model

$$P_i = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^Z e^{-\frac{1}{2}Z^2} dZ \quad (2)$$

Logit model

$$P_i = \frac{1}{1 + e^{-Z^*}} \quad (3)$$

Where P_i is the probability of MSE i using his or her mobile phone, e is a natural number (≈ 2.718), π is a mathematical constant (≈ 3.141), Z_i is the logit or probit index of MSE i ; the logit or probit index Z_i is the measure of benefits that MSE i perceives in using a mobile phone. As Z_i becomes infinitely large ($+\infty$), the more the probability that an MSE i will use his/her mobile phone. The logit and probit indices of MSE i can be expressed in linear form in equation 4 and logit and probit models in equation 5:

$$M_i = \beta_0 + \beta_1 PC_i + \beta_2 W_i \beta_3 L_i + \varepsilon_i \quad (4)$$

$$Z_i = \beta_0 + \beta_1 PC_i + \beta_2 W_i \beta_3 L_i + \varepsilon_i \quad (5)$$

Where,

In the linear model, M_i is a dummy variable that takes a value of one if an MSE i uses a mobile phone for business purposes and a value of zero if otherwise. In the logit and probit models Z_i is an index of perceived benefit of using a mobile phone as already explained in equation 3. PC_i is a vector for owner characteristics of an MSE; W_i are the attributes of MSE i ; L_i is the location of MSE i ; β_0 , β_1 , β_2 , and β_3 are parameters estimated by the Maximum Likelihood Estimates (MLE) in logit and probit and OLS in LPM; ε is a disturbance term for MSE i which is assumed to follow a logistic distribution.

3.1 Data Analysis and Discussions

Quantitative description was used to estimate the extent of mobile phones usage among the MSEs in informal sector. LPM, logit, and probit models were used to predict the determinants of mobile phones usage in e-commerce.

3.2 Quantitative Description

Primary data of 384 MSEs in the informal sector was collected from 8 divisions of Nairobi County, namely: Westlands, Dagoretti, Makadara, Kamukunji, Embakasi, Langata, Starehe, and Kasarani. The study found out that 95% of the MSEs possessed mobile phones and 84% use them to transact business. The cost of the handset and airtime were given as reasons for not possessing a mobile phone and for not using the phone for e-commerce. The findings are a clear indication that a mobile phone is intensively used in for business transactions in the informal sector. The reason for this widespread use of a mobile in e-commerce could be that it is affordable, easy to use, and portable. One can carry it home after business hours, and even transact business after closing the business premises. It can also act as bank, where those registered with mobile money transfer services such as M-pesa, Yu Cash and Airtel Money can store money in the phone and transport the money securely to different locations.

At the time of the study, M-pesa was very popular with MSEs, with 75 percent of those having mobile phones registering with this money transfer service. New product by other service providers on the market were not investigated in this study, but it is safe to assume that many MSEs have also registered with this money transfer services. M-pesa, the product of Safaricom mobile service provider is used for money transfers at affordable prices as compared to costs at banking institutions. The M-pesa delivery and receiving points are all in accessible areas, and are in many cases part and parcel of the MSEs.

The invention of the mobile money transfer system is greatly assisting MSEs with their financial business transactions. For example, they can pay for the goods without travelling to the point of sale; they can receive money from debtors while working, and can securely transport the money to different locations. Even if the mobile phone is stolen, the money would still be safe on the mobile account; moreover even if the money is sent to the wrong person accidentally, the service providers can trace it and recover it for the sender. Investigations on the intensity of the usage of mobile phones revealed that an average of 5 calls had been made during the last 2 days prior to the start of the survey. The maximum number of calls was 30 while 26 people out of the 294 using mobiles for business had not made any calls at all.

This pattern of calls could be an indication that most MSEs preferred to send electronic messages via short message services (SMS) rather than make telephone calls, since the cost of airtime was cited as one of the constraints on using a mobile phone. Sending messages to customers is a cheaper way of communicating via the mobile phones compared to talking. There were some MSEs that were using the mobile for business calculations, but no effort was made to quantify this usage. About 92 percent of MSEs that were using mobiles for business transactions said that their sales had increased as a result of using mobiles. This suggests that the mobile could be improving the performance of MSEs.

The correlation of the age of the business and the mobile usage for business shows some positive relationship, although not a very strong one. A 1% increase in the mean age of a business is associated with a 0.026% increase in the probability of usage of mobile phone in e-commerce. The relationship of total sales and the use of mobile phone for business transactions is not very strong, whereby a 1% increase in total sales is associated with a 0.146% increase in the probability of using a mobile phone. Education and mobile usage have a positive correlation although not a very strong one, as a 1% increase in the average education of the owner of an MSE is related to a 0.146% increase in the probability of using a mobile for e-commerce. Education level plays an important role in Entrepreneurship as it enables individuals to be broad minded and receptive to new ideas (Schultz 1980 and Ntale, 2013). Furthermore, in Global Entrepreneurship Monitor (GEM) report, Minniti (2004) indicated that low level of education in South Africa contributed to lack of mind set and skills of entrepreneurship.

3.3 Predictor Models' Estimations

The inferential data analysis is based on the assumption that mobile phone usage is a function of education level, age of business, and number of employees controlled by other owner and MSE characteristics plus location of MSE. The table in the appendix gives the estimates of the models.

In the LPM, an additional year of education increases the probability of using a mobile phone for business by 1.8% (t -value = 2.48). The marginal effect for the logit model shows that an additional year of education increases the probability of using a mobile phone in e-business by 1.63% (z -value = 2.57). In the probit estimates, a year of education increases the probability of using a mobile by 1.78% (z -value = 3.30). The results concur with Ntale (2013) emphasis on the importance of the level of education in forming an entrepreneurial mind which can utilize technology to exploit available business opportunities. These results make a lot of sense as some mobile phone applications are very complicated and required a high level of education for MSE to apply them for businesses. Conversely, it may be argued that business ownership is not an intellectual activity and that the educated MSE will get tired quickly by the many tedious tasks which form the remit of most entrepreneurial MSEs. Experience has shown that one does not require a university degree to use a mobile phone for business however; it is likely a moderate education level and a trade qualification of an MSE are more suited to successful usage of mobile phones for business. Furthermore, the Ministry of Education introduced the National ICT strategy for Education and Training this will empower the young people going through the education system to be able to use ICTs to come up with new products.

The age of business has some influence on the decision to use a mobile for business purposes. However, that influence is statistically insignificant. The number of employees is another important determinant of usage of mobile phone in business transactions. In the LPM, an additional employee increases the chance of using a mobile phone for e-business by 3.53% (t -value = 1.77). In the logit model, an additional employee increases the usage probability by 6.6% (z -value = 2.17), while in the probit model an addition to the number of employees increases the probability of using a mobile phone by 5.8% (z -value = 2.09). These results are intuitive because when an MSE has many employees, one would expect greater exchange of business messages and calls among employees and between them and other businesses. The results are also in line with the correlations results which showed a positive association between the number of employees and the probability of using a mobile phone for business transactions.

The R^2 of the linear model is 0.038, meaning that 3.8% of the changes in the probability of using a mobile phone in business transactions can be explained by the variables included in the model (p -value for the F -statistic = 0.008). The logit model has a pseudo R^2 of 0.05 and the p -value of the χ^2 -statistic = 0.003, while the R^2 of the probit model is 0.051 with a p -value of 0.0025 for the χ^2 . The null hypothesis that all the explanatory variables in the model together have no effect on the usage of mobile phones for e-commerce is rejected since the error being made by rejecting the null hypothesis is very small in all the models (less than 1 percent).

After controlling for other variables, notably age of owner, type of business the neighbour runs, the education level of the neighbour, the type of business and places where the MSE is located, education still comes out as an important factor in determining the usage of mobile phones for business transactions. The effect of the number of employees is also strong, except in the linear model, where it is not statistically significant. Gender is another important determinant of mobile use, whereby being a man increases the probability of using a mobile phone for e-business by 8.37% (t -value = 1.96) in the linear model.

In the logit model, the increase is by 6.5% (z -value = 1.95), and an increase of 7.4% (z -value = 2.10) in the probit model. Peer effects or social interaction effects might be high within the sector because having an educated neighbour increases the probability of using a mobile for e-business by 11.42% (t -value = 2.45) in LPM. 9.8% (z -value = 2.39) in the logit model, and by 10.85% (z -value = 2.10) in the probit model. The type of industry also determines whether an MSE is likely to use a mobile phone for e-commerce or not. In the LPM, the MSE in the manufacturing industry have a 28.7% higher chance of using a mobile phone for e-business than MSEs in other industries. The logit model shows an increase of 11.43% (z -value = 3.61) in the probability of using a mobile phone. The probit model suggests a 12.8% (z -value = 2.28) higher chance. These findings are as expected since in the manufacturing industry; there are a lot of business interactions between suppliers and firms. Similarly customers make orders and therefore, need to be alerted when their goods are ready. The R^2 for the linear model after controlling for other covariates is 14.43% and the p -value for the F -statistic is 0.0003. The results clearly indicate that the null hypothesis that the owner characteristics, firm attributes, and the environment in which the MSE operates together have no impact on the usage of mobile phones for e-business can be rejected.

4. Conclusion and Recommendations

The study has established that education level is a major determinant of MSEs using mobile phones for business in the informal sector. This implies that education provides a foundation from which MSEs can undertake personal and professional development initiatives necessary for them to use mobile phones for business. The results indicate that education equips the MSEs with knowledge and skills to deal with stakeholders like bankers, customers and suppliers. This is plausible because education is identified as a prime determinant of mobile phone usage for business. Although the study findings indicate that education level is important to mobile phone usage in business, it is yet to be established whether; the type of education that can also serve as a determinant of mobile phone usage in business, since this study concentrated on level of education. While, it is undisputed that education matters in mobile phone usage for business; poor education can be overcome by informal education and imitation of those who are educated in the use of mobile phones for business. The study established that the neighbours' education level has a significant effect on the mobile phone usage in business. The researchers suggest that education per se does not guarantee mobile phone usage in business, but rather influences strategic choices undertaken by educated MSEs for mobile phone usage in business. The researchers acknowledge that there are other underlying education determinants of mobile phone usage in business that need to be investigated.

The observations from the field revealed that some of the informal operators like what they are doing although there are others that have no choice but to be in this sector because it is easy to enter and exit. It would be useful if the focus on usage of mobile phones in e-commerce in Kenya shifted from individual operators to developing a national education system that would support a range of private, public, and MSE initiatives to bring ICT within the reach of the majority of people. This would include regulatory structure, business support and training, public-information and content-creation networks, and technical assistance.

The study recommends that the Kenyan government implements her plans to facilitate countrywide access to ICT infrastructure as it is elaborated in the government's 2006 National Information and Communication Technology policy whereby the use of ICT in schools, colleges, university and other educational institutions in Kenya are meant to improve the quality of teaching and learning. MSEs in the informal sector should be educated on different applications of mobile phones, since many phones on the market have features that would be useful for business transactions, yet very few people understand how to use them.

ICT institutions in Kenya train people on computer usage, but none trains them on mobile phone usage, a technology that is transforming lives for the better in the informal sector. Literacy classes in computer applications should continue to be encouraged as computers are the platform for mobile usage. Innovations in mobile telephony would depend on how much one understands the functions of the computer. The training should not only concentrate on computer studies but also mobile phones usage in business. There is need to popularize the connection between the computers and other ICTs like mobile phones which are widely used.

There is a lot of talk about third generation mobile phones 3Gs, Blackberries and mobile modems, but no effort is being made to educate the public on business benefits of these new technologies. It seems as if the target for public discussion of these innovations is for a particular group in the society, yet many people in the country have mobile phones, and are using them extensively for e-commerce. The Communications Commission of Kenya has the mandate to ascertain that every citizen in Kenya makes an informed choice when using the mobile for e-commerce or any other purpose.

Some mobile phones have computer features therefore MSEs should make use of such mobile phones to design their products. The study has established that MSEs in the manufacturing field have a high chance of using mobile phones for business. Therefore, MSEs should be educated on Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) Packages in order to make more efficient and effective. These computer programs can help MSEs to come up with quality and standardized products, but many MSEs in the informal sector are not aware.

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Appendix

Determinants of mobile phone use for e-business (absolute *t*-Statistics in parentheses)

Variables	Model parameters estimates (marginal effects)					
	LPM		Logit		Probit	
<i>Owner and firm characteristics</i>						
Education level	.0183 (2.48)	.0224 (3.01)	.0163 (2.57)	.0164 (3.36)	.0178 (2.57)	.0190 (3.30)
Age of business	.0036 (1.03)	.0038 (0.93)	.0039 (1.12)	.0033 (1.13)	.0042 (1.17)	.0042 (1.20)
No. of employees	.0353 (1.77)	.0226 (1.07)	.0603 (2.17)	.0490 (2.10)	.0582 (2.09)	.0546 (1.83)
Owner age		-.0031 (1.25)		-.0021 (1.37)		-.0024 (1.29)
Gender (1 = male)		.0837 (1.96)		.0654 (1.95)		.0735 (2.10)
Neighbour education		.1142 (2.45)		.0987 (2.39)		.1085 (2.69)
Neighbour same business (1 = yes)		.0663 (1.50)		.0473 (1.54)		.0463 (1.34)
Type of premises (1= permanent)		.0572 (1.29)		.0366 (1.25)		.0370 (1.09)
Retail industry (other sectors omitted)		.1499 (1.08)		.0768 (0.72)		.0997 (0.94)
Manufacturing industry		.2868 (1.96)		.1143 (3.61)		.1282 (2.28)
Service industry		.1829 (1.28)		.0602 (1.07)		.0799 (1.06)
<i>Division dummies (comparison location is Kasarani)</i>						
Westlands		.1083 (1.25)		.0730 (2.43)		.0790 (1.56)
Dagoretti		.1154 (1.35)		.0584 (1.74)		.0669 (1.33)
Makadara		.1068 (1.20)		.0676 (2.09)		.0707 (1.31)
Kamukunji		.0314 (0.36)		.0371 (0.90)		.0422 (0.72)
Embakasi		-.1647 (1.92)		-.1402 (1.26)		-.1544 (1.70)
Langata		-.0474 (0.54)		-.0054 (0.09)		-.0077 (0.11)
Starehe		.0521 (0.61)		.0390 (0.96)		.0416 (0.72)
Constant	.5714 (6.69)	.2784 (1.33)				
R^2	0.0377	0.1443				
Pseudo R^2			0.0500	0.2009	0.0515	0.2005
<i>F</i> – Statistics (<i>P</i> -value)	4.05 (0.0076)	2.71 (0.0003)				
χ^2 - statistics (<i>P</i> -value)			13.92 (0.0030)	53.54 (0.0000)	14.34 (0.0025)	53.45 (0.0000)
Observations	314	308	314	308	314	308

Source: Litondo, 2013