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Analyzing the Mobile-Banking Adoption Process among Low-Income Populations: A Sequential Logit Model

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1. Introduction

The development of the internet and mobile telephony has had a considerable impact on the lives of many individuals in both developed and developing countries, and particularly the way they conduct their economic activities. In developing economies, the remarkable expansion of these innovations has generated a large amount of research, as well as a great deal of hope about their potential for financial inclusion (Mishra and Singh, 2013; Warren, 2007) and for reducing poverty (Porteous, 2007). Mobile telephony is seen in its own right as a tool for socio-economic activity and, increasingly, as a means for promoting economic and social development in developing countries. One of the subjects that has attracted considerable attention in the world of electronic transactions is providing banking and payment services via the internet or mobile phones. Yet experts, whether professionals or academics, have focused their attention more on mobile telephony, whose adoption rate is much higher than that of the Internet in developing countries (Hanafizadeh et al., 2014).

The concept of 'mobile-banking' is generally used to refer to the new technologies that enable access to banking services via mobile phones. According to Zhou et al. (2010), "mobile-banking, also referred to as cell phone banking, is the use of mobile terminals such as cell phones and personal digital assistants (PDAs) to access banking networks via the wireless application protocol *(WAP)"*. Mobile-banking provides financial services such as balance inquiry, transaction history, money transfers, and bill payment via a mobile-phone, a smartphone or a PDA (personal digital assistant) (Laukkanen, 2007). The term m-banking is generally used in a broad sense (Shaikh and Karjaluoto, 2015). In a more narrow sense, mobile-banking can be defined as using mobile phones to provide formal financial services. In a broader sense, it includes payment services commonly known as m-payments, internet banking services, and other miscellaneous services that mobile phones make possible (see Lin, 2011, p. 252). As Shaikh and Karjaluoto (2015) noted, researchers use various terms to refer to mobile banking, including branchless banking, m-payments, m-transfers, m-finance, or pocket banking. Defining the precise definition of this concept is beyond the scope of this paper, especially as there is considerable ongoing discussion about how to define it. For a broader discussion of this term, see Shaikh and Karjaluoto (2014). In this article, we consider m-banking in its broad sense as defined by Porteous (2007), namely, providing traditional banking services (savings and credit) via mobile phones, as well as payment services (m-payments) and transfers (m-transfers). We also consider that customers interact with a bank through a portable device.

Today, mobile banking is the main technological innovation being discussed in economic and social development, especially among low-income groups (Acker, 2008; Alzouma, 2008; Donner, 2007, 2008; Waverman, Maschi and Fuss, 2005). According to Anderson (2010), m-banking provides simple banking services to low-income populations in developing countries. This is a new channel of transmission of formal financial services to those who have been excluded from the traditional banking sector. One of the best known and most successful experiments in Africa is M-Pesa in Kenya. M-banking is increasingly raising high hopes regarding financial inclusion and providing payment services to low-income populations (Anderson, 2010). Many researchers and professionals believe that this innovation will revolutionize banking (Laukkanen, 2007), especially as this channel is much less expensive than traditional banks. According to Dasgupta et al. (2011), the emergence of mobile banking may be a good commercial opportunity for banks to provide their services to rural people who are unable to access the Internet. Today, the usefulness of mobile banking for consumers is well established. M-banking services create value for consumers in terms of the independence and their availability it provides (Mallat et al., 2004). However, despite

these undeniable advantages, m-banking has not been adopted in many societies (Hanafizadeh et al., 2014; Mishra and Singh, 2013).

This is notably the case in Senegal, where mobile-banking is in its experimental phase and is not widespread in the country's economic culture. However, this innovation is raising high hopes that financial inclusion will progress, due to the high level of mobile telephone use in Senegalese society. This penetration, in fact, has grown remarkably in recent years, with a diffusion rate that has increased from 10% in 2005 to 77% in 2011[1]. In 2009, Senegal had a coverage rate of 55%, exceeding the 37.5% estimated African average and double that of the least developed countries whose average is estimated at 25%. At the same time that mobile telephone use has expanded rapidly, there has been very little penetration of banking services among the population. The rate of access to financial services is less than 13% when we take into account microfinancing, and only 6% when considering the traditional banking sector alone. The challenge for banking services is considerable and thus it is essential to seek ways to increase access to financial services via mobile phones. This is even more relevant since compelling experiences have occurred elsewhere, such as in Kenya with M-Pesa.

However, there is currently no study on the factors that determine the adoption of mobile banking in Senegal. This lack of research does not only concern Senegal; it is true for almost all the countries of the West African Economic and Monetary Union (UEMOA) and sub-Saharan Africa in general. Most of the literature on the mobile-banking deals with Asian countries and primarily studies adoption in general without distinguishing the different stages of the adoption process. Moreover, much of this literature has focused on the impact on the supply side – such as technical features – on the decision to adopt m-banking (See Lin H., 2011; Shaikh A.A. 2015). The role of socio-economic characteristics on the demand side has been less discussed in the literature, particularly in the pioneering studies in this field.

The purpose of this article is to highlight the socioeconomic factors that explain the adoption of mobile banking, using data collected from households in the suburbs of Dakar. We use a sequential logit model to try to identify the determinants at each stage of the adoption process. We start from the postulate that the adoption of m-banking is a three step process. In the first stage, the stage of "knowledge", the individual must have heard about m-banking. In the second stage, that of "possession," the person tests the product, which presupposes that he/she has possession of it. At the third stage, that of "adoption" strictly speaking, the individual uses the product. To the best of our knowledge, this article is the first to empirically study the factors that determining the adoption of m-banking by considering a sequential decision-making process. It is also the only study that distinguishes the difference between the adoption of an m-banking application and adoption of m-banking services. Compared to the usual literature on m-banking, this contribution brings several additional lighting. It not only shows that the adoption of m-banking is a process with several phases, but it opens an interesting discussion of the distinction between the adoption of the application and adoption of products or services of m -banking. In what follows, we try to identify the determinants of these different stages in the adoption of m-banking (section 4), after a brief review of the literature on the subject (section 2) and presenting the methodology and the nature of our data sample (section 3). Finally, we conclude (Section 5).

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[1] http://www.artpsenegal.net/telecharger/document_Rapport_annuel_2011_400.pdf. This document provides data from the Senegalese governments' Regulatory Authority for Telecommunications and Posts.

2. Literature on the Adoption of M-banking

A group of recent studies have focused on mobile banking in developing economies (Hanafizadef et al., 2014; Oliveira T. and al., 2014; Lee and Chung, 2009; Schierz et al., 2010; Shaikh A.A. 2015; Mishra and Singh, 2013…). However, these studies have focused on the adoption of m-banking without differentiating the various stages of the adoption process. Essentially, this literature has not sought to specifically study adoption factors among low-income groups, which is what the present study seeks to do. Furthermore, these studies examine the context of Asia and Eastern Europe; yet no study, to our knowledge, has been conducted in the West African context, or particularly in Senegal. This article is the first to empirically study the factors that determining the adoption of m-banking in that country.

Two major groups of research can be distinguished in the literature. The first analyzes the role of socio-economic and cultural factors on the adoption of m-banking, and the second, the impact of technological features on the decision to adopt[2].

As for the first series of studies, they focus on the influence that certain characteristics, such as those of an individual, his/her family and his/her social and physical environment, have on a person's ability and willingness to adopt mobile banking. Recent empirical studies have highlighted the importance of certain socio-demographic characteristics on adoption of ICTs. Laforet and Li (2005) conducted a study on the determinants of the adoption and use of mobile banking and internet banking in China. Their results show a higher adoption rate among men than women. They also found that perceived risk, the skills needed to use m-banking, and culture constituted obstacles to adopting m-banking in China. By focusing on gender in their study of Singapore, Riquelme and Rios (2010) revealed that ease-of-use and social norms were factors that influenced adoption more for women than for men. In a study conducted in Kenya on M-Pesa, Mbiti and Weil (2011) identified age, level of education, standard of living, and where people lived as determinants of m-banking adoption. Bankole et al. (2011) demonstrated that culture was the most important factor influencing the adoption behavior of mobile banking users in Nigeria. Amin and Ramayah (2010) have also shown, using a multiple regression model, that attitude and social influence has a significant impact on the adoption of SMS banking in Malaysia. Suoranta and Matilla (2004) found that information sources, age, and household income significantly influence mobile banking adoption.

As for the second group of studies, there is a growing body of literature that analyzes the impact of technology features on individuals' intention to adopt[3].These studies generally take the technology acceptance model (David, 1989) as their analytical framework and the diffusion of innovation theory (Rogers, 1995). For example, Brown et al. (2003), using Rogers' diffusion of innovation model (1983), show that the banking needs and risk perception are the main factors explaining the adoption of m-banking in South Africa. In Tunisia, Nasri and Charfeddine (2012) show that the ease-of-use and the security of technology affect a product's adoption, while Lee et al. (2011) explain that it is the quality of the system, the quality of information and the quality of the system interface that determine the level of user satisfaction. Lee and Chung (2009), using DeLone and McLean's model, show that system quality and information quality significantly influence customer trust and

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[2] For a more complete and recent literature review on m-banking, see Shaikh, A., and Karjaluoto H. (2015)

[3] For the most recent studies, see Baptista and Oliveira, 2015; Mohammadi, 2015…

satisfaction. In Iraq, Hanafizadeh et al. (2014) identified eight factors determining the use of m-banking: perceived usefulness, ease-of-use, trust, cost of use, risk perception, the need for personal interaction, credibility, and compatibility with the customers' lifestyles. Similar results have been found by Lin (2011). Through a comparison of means, this study showed that the perception of relative advantage, ease-of-use, and compatibility greatly influenced the attitude of individuals towards m-banking and their adoption behavior. Other studies conducted in Finland (Suoranta, 2003, *in* Laukkanen, 2007), Australia (Wessels and Drennan, 2010) and Somalia (Sayid et al., 2012), show that compatibility, communication, testability, perception of risk, ease-of-use, usefulness, safety, and social factors are important in the adoption of m-banking. Cracknell (2004) noted that the accessibility of mobile banking services and their availability were the main factors of adoption. Some studies have found a link between individuals' perceptions and socio-economic characteristics.

In addition to the aspects related to the individual and the technology in question, the adoption of m-banking may be influenced by other factors. For example, the literature shows that the degree of adoption and diffusion of m-banking systems may be limited by the extent of the infrastructure on which m-banking systems are built. Although wireless technologies are widespread throughout the world, including in the poorest countries, there are inequalities in their distribution. Academic studies highlight the factors explaining inequality in the adoption of ICTs. Dekimpe et al. (1998) pointed to factors such as GDP/head, which represents a country's level of wealth, the size of the basic technology installed, which reflects the level of investment in basic infrastructure, and the degree of international experience with this technology, which indicates its degree of openness and internationalization. Gruber and Verboven (2001a; 2001b) found that certain market characteristics, such as entry regulations, certain standards, competitiveness and the availability of the operator, were determinant. Kiiski and Pohjola (2002) suggested explanations such as access costs, education, and proficiency in English. Other studies highlight the culture, the time lag between creating an innovation and its integration in the production process (Takada and Jain, 1991), the willingness to pay, urbanization, and access to information about products (Talukdar et al., 2002).

3. Data and Methodology

3.1. Description of the data sample

The data used in this study comes from the second phase of the project entitled "Adoption and impact of using mobile banking on the well-being of Households: the case of the Dakar suburbs," a project led by the *Consortium for Economic and Social Research* (CRES). In the first part of the project, a sample of 900 households was selected by the method of quotas in the suburbs of Dakar. The criteria used were the residential area, the gender of the household head, and the age of household head. Information was collected on the household, household members, their knowledge and use of mobile banking, and economic activity. In the second phase of the project, households whose per capita income was in the range of 10% above and below the poverty line in Dakar were selected. Among the households that meet this criterion, a sample of 400 households was randomly selected. This sample was randomly divided into two groups of households. The first group had mobile account banking and training in its use. The second group received no training. The final sample of the second phase was composed of 127 households and 648 individuals.

Over half the sample (53%) were employed and the majority (52%) of them were self-employed (Table 1). Mainly, they worked in trade (36.7%) and production or transformation (27.47%). 51.2% of the sample were women and the youngest person was aged 15, the oldest 88, with the average age being 35 years.

Table 1: Sample Breakdown by Gender, Employment, Type of Employment and Sector

| Variable	Category	Number	%	Cumulative %
Sex	Male	316	48.8	48.8
	Female	332	51.2	100.0
Age	Average	35.6	-	-
	Maximum	15	-	-
	Minimum	88	-	-
Employed	Yes	348	53.7	53.7
	No	300	46.3	100.0
Type of Employment	Salaried Employee	68	19.5	19.5
	Employer	27	7.8	27.3
	Self-employed	182	52.3	79.6
	Piecework	15	4.3	83.9
	Domestic Help	24	6.9	90.8
	Apprentice	24	6.9	97.7
	Other	1	0.3	98.0
	No Answer	7	2.0	100.0
Sector	Agriculture/Animal Husbandry/Forest/Fisheries	8	2.3	2.3
	Mines/quarries	1	0.3	2.6
	Manufacturing/processing	89	25.6	28.2
	Construction	21	6.0	34.2
	Water/Electricity/Gas	2	0.6	34.8
	Transport/Communications	18	5.2	39.9
	Commerce/sales	119	34.2	74.1
	Banks/Insurance	5	1.4	75.6
	Domestic/Servants	21	6.0	81.6
	Government Administration	20	5.7	87.4
	Other	20	5.7	93.1
	No Answer	24	6.9	100.0

Source: the authors

As shown in Figure 1, a high proportion of the sample (70%) had a monthly income below 100,000 CFA Francs (the equivalent of $206 USD). 41% of the sampled individuals earned less than 50,000 CFA Francs per month ($103 USD), and 25% had an income between 100,000 and 300,000 CFA Francs. Only a small proportion (3%) had an income over 500,000

CFA Francs ($ 1,028 USD). There was a low level of income in the sample, which may lead to little use of m-banking. Indeed, using m-banking, even its most basic functions, namely payment and transfer services, often requires a minimum income.

Figure 1: Income Level of the Sample
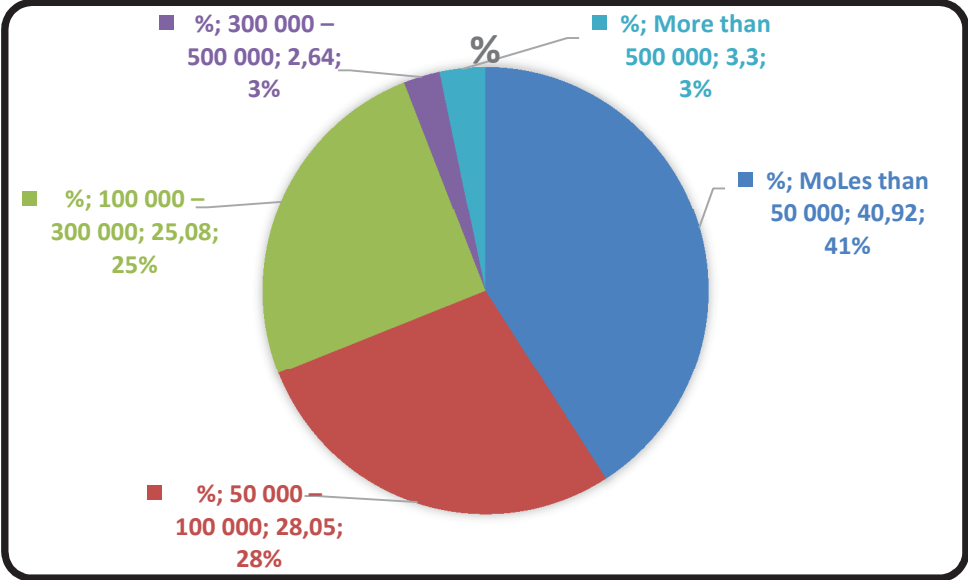
The average number of people contributing to household expenses was 2 contributors, and their average contribution was 38% of household expenses. Over 95% of the sample knew about m-banking and 72% of them had heard about it through television or radio, and 21% through posters, newspapers or event marketing (Figure 2). Note that the individuals in the sample are poor and less literate, thus the probability that they learn through the internet and the written press is naturally low.

Despite the large number of the sample that had heard about m-banking, only 16.8% possessed it and 11.27% had adopted it. The low level of adoption may be due to low levels of income, but also of education, which equips the user with the cognitive abilities needed to better appropriate this service.

Table 2: Number of Individuals who Possess or Use M-banking

Variable	No	Yes	Total
Contribution to household expenses	396	252	648
	61.10%	38.90%	100%
	28	620	648
Know about m-banking	4.32%	95.68%	100
	539	109	648
Possess m-banking	83.18	16.82	100
Use m-banking	575	73	648

	88.73	11.27	100

Nearly 70% of respondents used m-banking for buying phone airtime and half of them received special offers. Nearly 60% of people felt that the Orange Money system was not satisfactory and 63% found the system difficult to use, which is probably related to the low literacy levels in our sample.

Figure 2: Source of Knowing about M-banking
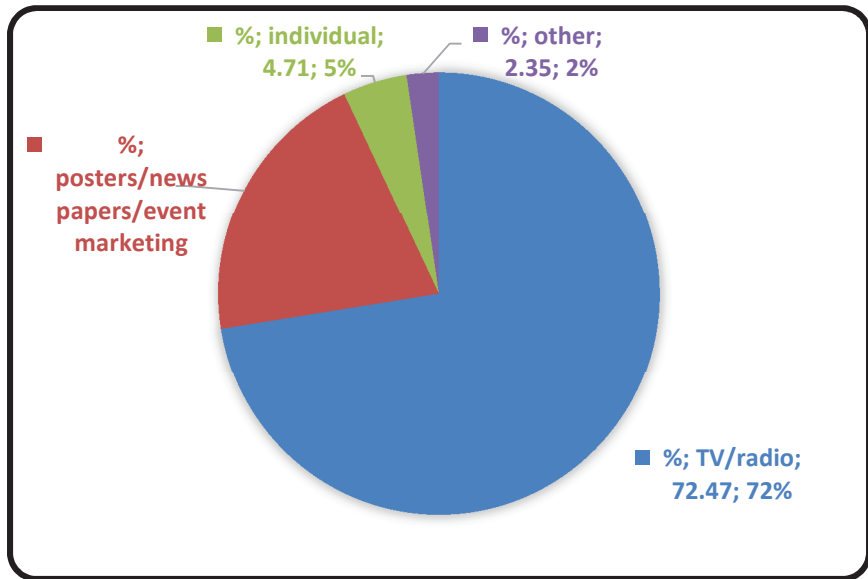
Table 3, below, gives us information on the use made of m-banking and the user's perception of this innovation. Nearly 70% of individuals use the m-banking to buy phone credit, and half of them, to be eligible for telephone credit promotions. The purchase of credit thus appears to be the main m-banking service. In fact every Wednesday Orange systematically makes a promotion that consists in offering 150% of the same amount of telephone charge purchased. This promotion may be one of the reasons why people use Orange money services. Individuals generally use m-banking to make basic operations. This is mainly due to the fact that this innovation is new and being tested at the time of the study. At this stage of product development, the lack of real knowledge of services and lack of trust are barriers to the use of innovation, particularly for sensitive transactions such as savings and the transfer of funds. Nearly 60% of individuals believe that the orange money system is not satisfactory and 63% found the system difficult to use, this is probably related to the low literacy level of our sample.

Table 3: M-banking Users

| Variable	No	Yes	Total
Use to purchase mobile phone minutes	23	50	73
	31.5%	68.5%	100.0%
Use to take advantage of promotions, offers	37	36	73
	50.7%	49.3%	100.0%
	38	35	73
M-banking helps save time	52.1%	47.9%	100.0%
	42	31	73
Satisfied with the m-banking service	57.5%	42.5%	100.0%
	45	28	73
The system is safe	61.6%	38.4%	100.0%
	46	27	73
The system is easy to use	63.0%	37.0%	100.0%
	57	16	73
The system is available everywhere	78.1%	21.9%	100.0%
	45	28	73
The system provides accurate information	61.6%	38.4%	100.0%
	47	26	73
The system provides complete information	64.4%	35.6%	100.0%
The system provides information in a timely	48	25	73
manner	65.80%	34.20%	100.00%
Navigation is easy	45	28	73
	61.60%	38.40%	100.00%
The interface is easy	44	29	73
	60.30%	39.70%	100.00%
	47	26	73
I quickly became familiar with the UI	64.40%	35.60%	100.00%
	43	30	73
System meets expectations	58.90%	41.10%	100.00%
	43	30	73
The system does its job well	58.90%	41.10%	100.00%
Signing up for m-banking was a good	40	33	73
decision	54.80%	45.20%	100.00%
Overall satisfaction	40	33	73
	54.80%	45.20%	100.00%
	40	33	73
Would recommend m-banking	54.80%	45.20%	100.00%

Source: the authors

Individuals who did not know about m-banking were mainly those people born before 1950, while those who possessed or used it were still working in the labor market (figure 3). As shown in Figure 4, not knowing about m-banking primarily concerned people with a low level of education, while adoption was higher among the more educated population.

Figure 3: Sample distribution according to the level of knowledge about and adoption of m-banking and date of birth
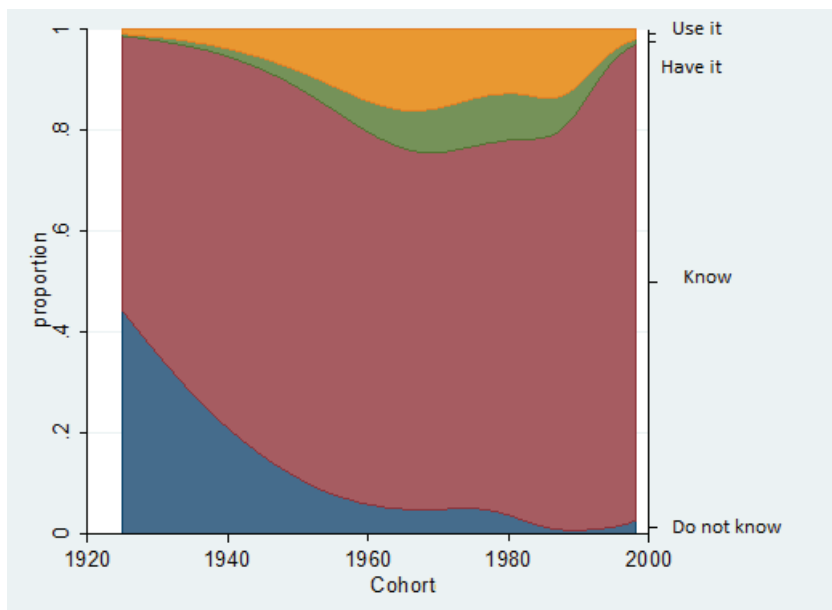
Source: the authors

Figure 4: Sample distribution according to the level of knowledge and adoption of m-banking and the number of years of education
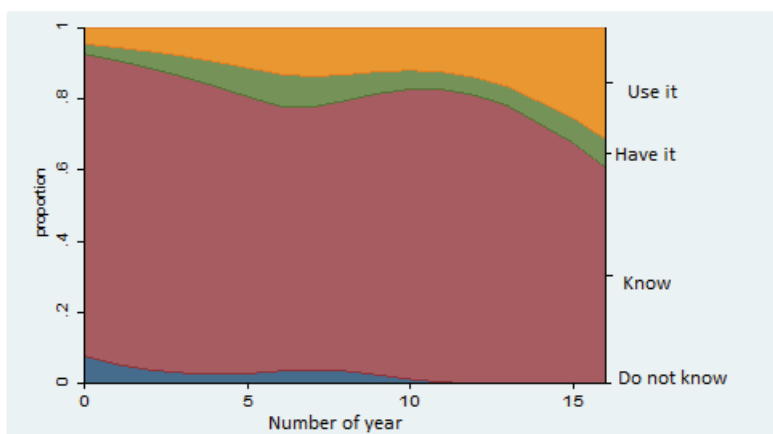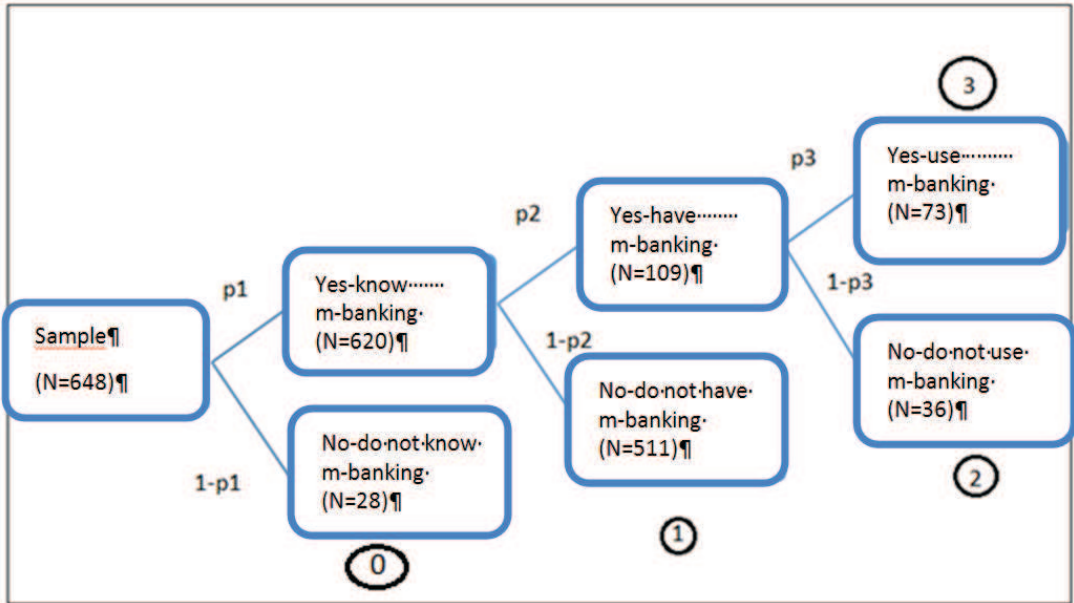

Source: the authors

3.2.Methodology

The adoption of m-banking is described here as a process with three phases: knowledge, possession and adoption. As a first step, an individual must know about the product and its usefulness. Then, it must test the product. If the product is accessible and its advantages are observable, the person can then adopt it. Therefore, the steps "knowledge" and "possession" of the product are steps that users must necessarily move through to "adopt" a product. It is

thus a sequential decision-making process described by a decision tree, where at every step people make choices after assessing their future utility gains, as shown in Figure 5.

In this article, we consider that adoption is a three-phase process: knowledge, possession and use (or adoption). In the first phase, the individual becomes aware of the product. This "knowledge" phase is the starting point of any adoption process. In the second phase, that of possession, the individual acquires the product. The third phase is the adoption itself, in which the individual actually uses the product or service. In this process, the adoption actually starts from the first phase. Logically, before owning the m-banking application and using its services, one must know what it is (stage 1 of the process). Then, before being able to use m-banking services, a person must possess the product (stage 2 of the process). It is only when these two conditions are met that one can then truly use the services of mobile banking (stage 3 of the process). Many people are familiar with an innovation and its usefulness and yet, do not use it. Here, we tried to uncover the reasons why through model 1. Many people also have products without using them; model 2 allows us to grasp why. Among those with technical support, some actually use the product, and model 3 explains the reasons why. Some individuals may have the support without realizing it but these cases are extremely rare and were removed from stage 1 of our analysis. We can consider that the second stage of the process (possession) is the partial adoption phase (partial adoption or pre-adoption), and the third step (use) is the full adoption phase (full adoption or post-adoption).

Figure 5: Process of Adoption

Source: the authors

The sequential logit model (Tutz, 1991) used here is known by various names in the literature: the sequential response model (Maddala, 1983), the nested dichotomous model (Fox, 1997), or the Mare model (Shavit and Blossfeld 1993). This model shows that the probability of transitioning from one stage to another corresponds to the effect of an individual's socio-economic characteristics weighted by the expected utility after passing to the next the stage, the risk of passing the stage, and the variance of the indicator variable to pass or not pass. At each step of the process, the characteristics of the individual affect the probability of transitioning to the next level. This probability is given by:

$$p_{ki} = \frac{exp(\alpha_k + \beta_k X_{ki})}{1 + exp(\alpha_k + \beta_k X_{ki})} \qquad \text{If } y_{k-1i} = 1$$

X_{ki} represents the characteristics of individual i for step k.

We assigned a number niv to each level achieved. Those who did not know about m-banking were given the number 0; those who knew about it but did not possess it, the number 1; those who possessed it but had not adopted it, 2; and those who had adopted it, 3. The average level achieved for each individual, given his/her socio-economic characteristics, was determined by:

Equation 1: Determination of Average Level in the Adoption Process

$$E(niv) = (1 - p_1) \times l_0 + p_1(1 - p_2)l_1 + p_1 p_2(1 - p_3)l_2 + p_1 p_2 p_3 l_3$$

Variation in an individual's characteristics affected the probability of transition and was calculated by the formula:

$$\frac{\partial E(niv)}{\partial X_{ki}} = \{1 \times \hat{p}_{1i}(1 - \hat{p}_{1i}) \times [(1 - \hat{p}_2)l_1 + \hat{p}_2(1 - \hat{p}_3)l_2 + \hat{p}_2 \hat{p}_3 l_3 - l_0]\}\beta_1$$
$$+ \{\hat{p}_{1i} \times \hat{p}_{2i}(1 - \hat{p}_{2i}) \times [(1 - \hat{p}_3)l_2 + \hat{p}_3 l_3 - l_1]\}\beta_2$$
$$+ \{\hat{p}_{1i}\hat{p}_{2i} \times \hat{p}_{3i}(1 - \hat{p}_{3i}) \times [l_3 - l_2]\}\beta_3$$

The marginal effect of an individual's characteristics on the average level achieved was a weighted sum of different levels:

$$\frac{\partial E(niv)}{\partial X_{ki}} = w_1 \beta_1 + w_2 \beta_2 + w_3 \beta_3$$

The contribution of each level to achieving the level of adoption is given by $w_i \beta_i$. The weight w_i refers to the risk of not passing the level multiplied by the variance of the indicator variable of passing or not passing the level, and the expected utility if s/he passes the level. For example, for the first level 1, the risk variance is $\hat{p}_{1i}(1 - \hat{p}_{1i})$ and the utility if the individual passes level 1 is $[(1 - \hat{p}_2)l_1 + \hat{p}_2(1 - \hat{p}_3)l_2 + \hat{p}_2 \hat{p}_3 l_3 - l_0]$, which is the sum of the utility of each higher level, minus the utility at level 0, in other words, l_0.

4. Results

The model identified age as the main determinant of knowing about m-banking, the first stage of the adoption process. Beyond the threshold set at 45 years, age negatively influenced the probability of knowing about m-banking, and this influence was significant at 10%. Apart from this variable, no other factor significantly appeared as a key determinant in the first stage of the adoption process. Moreover, it seems true that even individuals who had little or no education had heard about this new technology, mainly because of the effectiveness of advertising.[4] This result is consistent with the descriptive analysis shows that over 95% of individuals surveyed know the m-banking. The low proportion of individuals who ignore the m-banking concerns people belonging to the older portion of our sample. At this stage of the process, factors related to education, employment and income do not come in. This is consistent with the channel through which individuals are aware of this innovation. As we have shown above, 72% of individuals have experienced innovation through television or

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[4] It is true that innovations like Yobantel and Orange Money have been the subject of extensive advertising campaigns on television, especially during flagship programs such as wrestling, the most-watched movies on TV, etc. This result, in terms of knowing about m-banking, is the result of the effectiveness of the companies' communication strategy.

radio. Now these communication media are now widely available in the suburbs of Dakar, including in the less affluent households

From the second stage of the process, that of possession, the importance of cognitive factors such as education (literacy and the number of years of schooling) as well as income level, membership in a ROSCA (rotating credit and savings scheme), and having a micro-enterprise appeared as determinants of possession of m-banking. The ability to read and write positively influenced the probability of possessing m-banking and this influence was significant at 10%. The number of years of schooling influenced the probability of possessing m-banking even more and this influence was very significant (1%). Indeed, although it is not necessary to be educated to be aware of technology, possessing it requires at least knowing how to read and write to be able to use it. Salary positively influenced the probability of having m-banking and this influence was significant at 10%. Age also appeared to be a factor that positively influenced the possession of m-banking, with a significance level of 5%.[5] Membership in a ROSCA (rotating credit and savings scheme) also positively influenced the possession of mobile banking, and this influence was significant at 10%. Indeed, in a ROSCA (rotating credit and savings scheme), mobile phones are very useful, especially for coordination between members and managing small businesses. Having a business was also a key determinant of the possession of the m-banking. The variable business positively influenced the possession of mobile banking and this influence was significant at 0.1%. This variable appears to be the most significant, which can be explained by the usefulness of mobile phone service in business activities. The number of users in the household very significantly influence the probability of the individual to possess the m-banking. Income (salary) appears as a significant determinant of possession of m-banking. But its influence is negative, which can be explained by the fact that the acquisition of this innovation is not the fact of individuals with large incomes. Beyond a certain income threshold, individuals must have other conventional means of making their financial transactions and payments.

At the final stage of the adoption process, we see that only the variables *number of years of schooling, salary,* and *entrepreneur* had a significant influence on the probability of adopting m-banking. Wages were not a key factor in possession, but appeared in the third stage as an explanatory factor for adoption. This can be explained both by the cost of access to mobile banking and the importance of this tool according to a person's income level. Indeed, since the cost of access to this service is almost zero, wage level can not be an explanatory element of access. However, this factor can be decisive for adoption, to the extent that the interest in using m-banking appears at a certain income level. This is essentially a vulnerable population with a very low level of professional insertion into the labor market. In this kind of population, we can see why income level would be an important element of adoption: the few people who have a good income level are those who are working in manufacturing or sales businesses and clearly see the interest in using this type of innovation to facilitate business management as well as to reduce certain transaction costs.

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[5] This result seems to contradict the result on the variable *age*, but these two results are in fact consistent. Indeed, the population that "possesses" mobile banking includes few very elderly individuals. However, between the generations of working age, the younger generations who are still in school, and those entering the labor market, the relationship to mobile telephony is not the same. For example, those who are of working age feel a greater need to have a phone than those who are young and at school. Those who have jobs or who run a business feel the need to use mobile phones even more strongly. It is correct that these factors go hand-in-hand with age. However, beyond a certain threshold, age becomes a factor that negatively influenced possession of m-banking.

Table 4: Estimates of the Sequential Model

	_1_2_3v0	_2_3v1	_3v2
Sex	-0.042	0.030	0.503
	(0.07)	(0.10)	(0.99)
Literate	0.803	1.821	-1.560
	(0.78)	(3.33)****	(1.29)
Num. years schooling	0.079	0.080	0.127
	(0.78)	(2.16)**	(1.94)*
Contribution	-0.930	0.677	-0.386
	(0.95)	(1.41)	(0.47)
Log wages	0.058	1.473	-1.353
	(0.03)	(2.38)**	(0.97)
Num. users in the household	0.038	1.751	0.478
	(0.06)	(6.62)****	(1.03)
c.lnsalaire#c.age	0.025	-0.029	0.074
	(0.62)	(2.09)**	(1.96)*
Age>45 years	-1.649		
	(2.40)**		
Age		0.038	-0.023
		(3.01)***	(0.66)
Bank/ microfinance		0.390	-0.928
		(1.14)	(1.62)
ROSCA (rotating credit and savings scheme)		0.511	0.505
		(1.61)	(0.78)
Enterprise		1.455	-1.595
		(4.67)****	(2.48)**
_cons	2.938	-6.644	1.427
	(4.43)****	(7.93)****	(0.94)

* $p<0.1$; ** $p<0.05$; *** $p<0.01$; **** $p<0.001$

5. Conclusion and discussion

This study aims to identify the determinants of m-banking adoption by using a sequential logit model. Unlike most studies on this topic, this article considers the adoption of m-banking as a three-phase process: knowledge, ownership and adoption (or use). In the population studied here, several different profiles of individuals could be identified based on their relationship to m-banking. Some people knew about m-banking and its uses but did not have an m-banking account (Orange Money or Yobantel). Others knew about the product and had a mobile banking account, but did not use it for their transactions. Others, however, had a mobile banking account and actually used it to make financial transactions or payments. These different profiles may arise from distinct socioeconomic characteristics. However, the empirical literature has not yet addressed the question of consumer choices for m-banking. This study highlights the key factors at each stage of the process. It shows that in the first stage of the process that of knowledge, only the age of the individual appears as a determinant of the adoption of m-banking. Beyond the limit of 45 years old, age negatively influences the

probability of knowing about m-banking. Factors related to education, employment and income played no role. Moreover, it appears that a large proportion of individuals (72%) knew about m-banking through television or radio. In the second stage of the process, cognitive factors appeared as determinants of having m-banking. The ability to read and write and the number of years of study were factors explaining the probability of possessing m-banking. Also, having a job or belonging to a co-op appeared as determinants of possession of m-banking, the second stage of the process. In the third and last stage of the process, the number of years of study and wages were the only determinants of the adoption of m-banking. These results show that the different profiles of adoption of m-banking correspond to individuals' different socioeconomic characteristics. This study found that cognitive and financial factors were not decisive in the first stage of the process, that of knowledge. However, as the adoption process advances, cognitive aspects became increasingly significant.

Compared to the traditional literature on m-banking, this study contributes several new findings. It showed not only that the adoption of m-banking is a process with several phases, but also that there is an important distinction between the adoption of the application and adoption of products or services of m-banking.

While deconstruction of the adoption process is not common in the literature, it is fundamental for several reasons. First, there is the implicit assumption in the literature that possession automatically implies use; that they are one and the same thing and that all those with m-banking necessarily use it. However, our survey shows that among the 109 individuals who had m-banking, 73 individuals used it and 36 did not use it. This is tangible proof that use does not necessarily follow from possession within the adoption process. Next, it should be noted that in terms of mobile phones, adding an application (software) is not necessarily the same thing as adopting the telephone support (hardware) in question. With mobile phones, it is usually assumed that it is used to receive and make calls. In this case, it is logical to consider that possession means using and adopting. However, when a phone has an app, it does not mean that one is actually using it. Many people have applications on their phones and do not use them for reasons of their own. Here, in this case, Orange Money and Yobantel are applications, m-banking accounts that individuals are free to open and use to pay bills, transfer money, buy phone plans, etc. Possession in this case does not necessarily correspond to use. Moreover, the reasons for possession are not necessarily the same as those that explain adoption. Finally, it is essential to differentiate between ownership and adoption by analyzing the determinants of the adoption of m-banking, as this article has done. We seek here to emphasize the difference between the adoption of an m-banking application - we term this possession - and adoption services -which we call use.

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