

Product specific determinants of Mobile Money Adoption Evidence from Egypt during COVID-19 Pandemic

المحددات الخاصة بالمنتج لإثبات اعتماد الأموال عبر الهاتف المحمول من مصر خلال جائحة كورونا

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Abstract:

The paper aims to examine the factors affecting users' adoption intentions of mobile money in Egypt during the COVID -19 using a binomial logit model. Our econometric estimation results show that, in general, perceived benefits, ease of use, and proximity of points of sale are the significant variables that specify the adoption of mobile money in Egypt. Moreover, socio-demographic characteristics showed different results. Women are more concerned about the perceived benefits and ease of use while men added other concerns: the time taken to conduct a transaction and the proximity to sale points. For individuals with lower income, ease of use is the primary determinant, while for those with higher income, it is the proximity of points of sale and safety, which determines the adoption of mobile money services. Finally, for young individuals, under the age of 30, perceived benefits, ease of use, and the proximity of points of sale are the main determinants of mobile money service use.

Keywords: COVID-19 Pandemic, Mobile money, financial inclusion, Egypt.

المستخلص:

تهدف الورقة إلى دراسة العوامل التي تؤثر على نوايا المستخدمين لتبني الأموال عبر الهاتف المحمول في مصر خلال COVID -19 باستخدام نموذج لوجاري ذي الحدين. تُظهر نتائج تقديرنا الاقتصادي القياسي ، بشكل عام ، أن الفوائد المتصورة ، وسهولة الاستخدام ، والقرب من نقاط البيع هي المتغيرات المهمة التي تحدد اعتماد الخدمات المالية عبر الهاتف المحمول في مصر. علاوة على ذلك ، أظهرت الخصائص الاجتماعية والديموغرافية نتائج مختلفة. تهتم النساء أكثر بالمزايا المتصورة وسهولة الاستخدام

بينما يضيف الرجال مخاوف أخرى: الوقت المستغرق لإجراء المعاملة والقرب من نقاط البيع. بالنسبة للأفراد ذوي الدخل المنخفض ، فإن سهولة الاستخدام هي المحدد الأساسي ، بينما بالنسبة لذوي الدخل المرتفع ، فإن القرب من نقاط البيع والأمان هو الذي يحدد اعتماد خدمات الأموال عبر الهاتف المحمول. أخيراً ، بالنسبة للشباب ، الذين تقل أعمارهم عن ٣٠ عاماً ، تعتبر الفوائد المتصورة وسهولة الاستخدام وقرب نقاط البيع من العوامل الرئيسية المحددة لاستخدام خدمة الأموال عبر الهاتف المحمول.

الكلمات المفتاحية: جائحة كوفيد-١٩ ، نقود الهاتف المحمول ، الشمول المالي ، مصر.

Introduction

The information and communication technologies ICTs rapid diffusion and spread all over the globe had positively impacted many economies. Bourreau and Pénard (2016) confirm that the digital revolution is a reality in all sectors of the economy. Adding the success of the first M-PESA in Kenya in 2007, there is a growing interest in mobile money usage in many developing countries. Woodford (2001) observed a significant change in the financial sector due to further diversification of the mobile telephone service. Indeed, since the beginning of the 2000s, telephone operators mobile, relying on commercial banks, offer a new service with high added value; mobile payment or mobile money is defined as a monetary transaction between two parties, through a mobile device capable of securely processing financial transactions over a wireless network, Ondrus and Pigneur (2005). In developing countries, mobile money entails a wide range of services. That is why according to Mbiti and Weil (2013), mobile money is a set of mobile telephone network services, allowing users to deposit funds in their SIM card, transfer funds by short messages, make withdrawals, pay bills. Through mobile money, financial and banking transactions such as remittance transfers, airtime purchase, utility bills, school fees payments, savings, and mobile banking can occur (IFC, 2011). In doing so, mobile money is considered a payment instrument, like classic payments. Several previous studies have aided in the understanding of Mobile payment adoption intentions in various contexts. However, there are still gaps in determinant variation and theoretical evidence of various perspectives in emergency situations. In 2017, The State of the Industry Report on Mobile Money estimates that in Egypt, cash-in and cash-out transactions represent

most mobile money flows, digital transactions grew twice the rate, driven mainly by bill payments and bulk disbursements.

According to Egypt's Central Bank reports, services of mobile money in Egypt take multiple forms. For instance, virtual card number VCN; person to merchant services P2M; merchant to merchant M2M; person to person P2P; cash in or out through an ATM; and international money transfers. Table 1 summarizes the use of mobile payments in Egypt (CBE, 2018). In 2017, The National Payment Council of Egypt, which was established in February as a way to promote mobile money to transform the country to a cashless economy gradually and to reduce the volume of transactions occurring outside of the formal banking sector and achieve the goal of making digital financial services a primary mean of payments in Egypt.

Despite that, the Egyptian market has a great potential where the spread of social media usage and the high internet penetration rate (44.3% which is equal to 37.9 million users) in addition to a very high SIM penetration rate (109%) combined with a high percentage of smartphone penetration rate (48%) and more than 31 million mobile internet users with an annual growth of 3.35%, all this predicts a promising future to transform to a cashless society. To protect the most vulnerable consumer groups, policymakers and many mobile money providers and regulators have responded with a slew of initiatives aimed at two broad goals: 1) restricting the spread of the COVID-19 virus by promoting digital payments; and 2) lowering the cost of living burden on people who use digital payments (GSMA,2020). Increase transaction limits for mobile financial services in Egypt to EGP 30,000 a day and EGP 100,000 per month for individuals, and EGP 40,000 per day and EGP 200,000 a week for companies.

This article aims to add to this literature by examining the role of the product's specific factors in adopting mobile money in Egypt following the COVID 19 pandemic. The Unified Theory of Acceptance and Use of Technology (UTAUT) seems to be a good theoretical model for understanding the adoption of this modern mobile application. However, it should be noted that socioeconomic factors remain essential in measuring the impact of product-specific factors. This analysis is justified for several reasons. On the one hand, there are no recent studies on the determinants of mobile money adoption in Egypt. On the other hand, controlling adoption factors provides an operational

analysis framework for practitioners, such as banks and telecommunication operators, for researchers and regulatory authorities. We use a binomial logit model to identify the determinants of the product's specific factors to mobile money adoption. Section 2 presents the literature review; the rest of the article is organized as follows: we describe the study design, data, and analytical approach in Section 3. Then, we present our analysis results, the theoretical model, and discussion of findings. Finally, we summarize the study results presented in this paper and offer concluding remarks and future research suggestions.

I. Literature review

The literature can be divided into three main trends depending on the topic discussed. The first approach is interested in analyzing the impact of mobile money on the conduct of monetary policy. (Woodford, 2000; Goodhart, 2000; Weil; Mvogo, 2016). Using both an empirical and theoretical approach, the proponents of this approach lead to somewhat controversial results. The second pattern of literature is described by Hamdi (2010), Assadi and Cudi (2011), Della Peruta (2018), Okello Candiya, Ntayi, Munene, and Akol Malinga (2018), and Abor, Amidu, and Issahaku (2018), who concentrate on the impact of mobile money on the supply of financial services, provided that mobile money promotes financial inclusion of households that were previously excluded from the conventional banking system. This trend demonstrates how mobile payments, as well as mobile banking, can help boost financial inclusion and economic growth. Mobile money, on the other hand, is called mobile banking because it provides access to the banking network as well as conventional banking services (Porteous, 2007; Lin, 2011).

The final trend, which focuses on developing countries, examines the factors that influence the adoption of this innovation based on its characteristics. Nonetheless, the focus of this research remains on the understanding of mobile money as a bank rather than a payment instrument (Fall, Ky & Birba, 2015; Baptista & Olivera, 2015; Dasgupta, Paul & Fuloria, 2011; Mohammadi, 2015). The findings of these studies are undoubtedly important in understanding the factors that influence mobile banking adoption, but they fall short when it comes to the perception of mobile money as a payment instrument. In developed countries, however, mobile money is used as a payment instrument

rather than a mobile banking product. Duncombe and Boateng (2009) conducted a survey to learn more about the relationship between cell phones and financial services in developing countries. They discovered a large body of literature on demand evaluation and adoption; as a result, they proposed that future research be directed toward promising areas for developing countries, especially microfinance and, more specifically, finance for the vulnerable.

Though focusing on mobile money adoption, this study goes in line with Duncombe and Boateng's suggestion. In reality, a mobile money study in a country like Egypt is inevitable in finance for the poor, even though households are concerned since a big part of the population still outside the traditional banking system who access financial services through mobile money.

Badran (2016) studied MM services' socioeconomic adoption factors in Egypt using a Nielsen syndicated survey of MM users. The empirical study's findings reveal that Egypt's mobile money user profile is an affluent, university-educated, and male user. However, the theory of early adopters is not evident in Egypt's case. Urbanization plays no role in the socioeconomic adoption factors controlled for in the estimated model. Go (2018) using multiple regression analysis to estimate behavioral intention determinants to adopt mobile money. His results show that among other variables, perceived usefulness, facilitating conditions, perceived risk, and perceived financial cost are significant determinants of mobile money adoption. Findings highlight the importance of customer awareness about the potential benefits of using mobile money and strengthen communications to provide additional value and greater convenience in performing financial transactions.

Age, schooling, jobs, and having a bank account, according to Akinyemi and Mushunje (2020), are factors that explain both the adoption and the amount of money sent using mobile money technology.

Our study takes part in the third trend of literature on mobile money. The study highlights mobile money payment instruments' role by focusing on the importance of product-specific determinants of mobile money adoption in Egypt and their impact on adopting an innovation, as demonstrated by Rogers (1995) and Moore and Benbasat (1991).

According to Thaler(1985) when consumers engage in a specific action, they appear to consider the possibility of a beneficial outcome. For Park,

Ahn, Thavisay & Ren (2019) perceived benefits are consumers' expectations of the practical benefits of M-payment services, which influence their adoption decisions. Perceived advantages contribute to a greater understanding of users' mental expectations of adoption intentions in a variety of innovations, including online shopping and mobile banking. In comparison to conventional payments, the contactless feature of M-payments assists users in preserving social distance by avoiding direct and indirect connections from cash or point-of-sale terminals during a transaction process. This feature helps users to express their thoughts on the perceived mental and physical advantages of personal safety while also providing comfort and usefulness when using M-payment technology as a means of financial exchange in the COVID-2019 pandemic. As a result, the following theory considers perceived advantages to be a mental factor influencing users' adoption intentions of M-payment during the COVID-19 pandemic.

In short, The variables from the updated UTAUT model (for describing users' technical perceptions) and perceived benefits (as the variable of MAT, reflecting users' mental cognitions and psychological approval of using M-payment under COVID-19 pandemic conditions) were jointly used to assess users' adoption intentions of M-payment under COVID-19 pandemic conditions in Egypt. The questionnaire is included in Appendix A. Furthermore, this study revises the UTAUT model by incorporating performance expectancy, effort expectancy, and social influence with additional variables, perceived security, confidence, and perceived benefits from MAT.

II. Theoretical framework

As shown in Table 1, several researchers investigated various factors affecting M-payment adoption through the study of theoretical frameworks and variables to support relevant information and awareness of the intent of M-paid adoption by users. Few research, however, have examined the adoption intentions decided concurrently in an emergency situation. The study of literature includes several case studies and reports on the status and environments of mobile money in various countries.

Table 1. Literature reviews related to different factors influencing adoption of Mobile payment

Theoretical Frameworks	Factors	Reference
UTAUT	Risk Security Trust Performance Expectancy (Hedonic and Utilitarian) Social Influence Effort Expectancy Self-Efficacy Facilitating Conditions	Khalilzadeh; Ozturk.and Bilgihan, 2017
TAM	Perceived ease of use Perceived usefulness Trust Self-efficacy Subjective norms Personal innovativeness	Shankar and Datta, 2018
Mental accounting theory	Technology anxiety Social influences. Multidimensional benefits (Convenient; Economic; Information security; Enjoyment; Experiential; Social) Attitudes towards using.	Park; Ahn; Thavisay and Ren, 2019
TAM	Perceived ease of use Perceived usefulness Subjective norms Attitude Perceived security	Ramos de Luna,; Liébana-Cabanillas; Sánchez-Fernández, and ; Muñoz-Leiva, 2018
Expectancy-value theory, Task–technology fit	Characteristics Capability Task–technology fit Utilization Benefits	Hsiao, 2019

Source: Daragmeh, A., Sági, J., & Zéman, Z. (2021)

The theory of the Unified Theory of Acceptance and Use of Technology (UTAUT) , developed by Venkatesh et al. (2003), shows how the product-specific determinants of a new product play a significant role in adopting the latter. Khalilzadeh et al. (2017) validated that security and confidence have a strong impact on customers' adoption intentions of M-payments in the restaurant industry by integrating security-related factors with the UTAUT model . Marinkovic et al. (2020) extended the UTAUT model with new variables (perceived confidence and satisfaction) to assess customers' M-commerce use intentions. Furthermore, UTAUT has been combined with other models to assess users' behavioral intentions. Chaix and Torre (2015) define three main product-specific determinants factors likely to influence the adoption of mobile money: first, the basics, which are the advantages of services provided by this means of payment (quality of service, transaction cost, number of transactions, interoperability); second, the associated costs, i.e., real or psychological difficulties relating to the adoption of mobile money; finally, externalities or network effects. For the first determinant, it is essential to note that mobile money has several advantages over other existing payment systems and electronic funds transfer: ubiquity, saving time, convenience of use, low transaction costs. These advantages are driving the adoption of mobile money. In this regard, Shy and Tarkka (2002) and Van Hove (2004) show that the more user cost (subscription cost associated with the transaction cost) is higher, the less households adopt new financial products. Also, mobile money is easy to use, especially since it is compatible with other payment means, such as using a banking account. According to Tornazky and Klein (1982) Forman (2005), such compatibility is an essential factor in adopting new technology.

Meanwhile, the COVID-19 pandemic has added volatility and social strain to people's everyday transactions. Users who trust M-payment platforms are more likely to use them to make contactless M-payments rather than conventional payments. According to Zhu et al. (2017), confidence has the most important impact on behavioral intention to use M-payment.

The perceived risk associated with M-payment can be perceived as an extra variable of UTAUT, is a critical guarantee for establishing users' interest in using M-payment in the event of a pandemic. According to Shao et al. (2018), security is the most important antecedent of customers' confidence in influencing M-payment use in both male and female classes.

III. Methodology

4.1 Data Collection and sampling procedure

The online questionnaire survey was designed and used to collect data in order to test the proposed conceptual model. The survey included demographic dimensions; age, gender, employment status, marital status, educational level, and income, in its first part. The second part assesses access to mobile money products, and the third section investigates barriers and motivations for mobile money products adoption. The final part assesses competition and network issues. The survey includes number of questions to evaluate ease of use, security and trust, perceived usefulness, cost of use, and compatibility. The sample is composed of 1606 respondents (See Annex 1). A scale from 1 to 5, representing “strongly disagree” to “strongly agree” was used to represent the objects of the questions.

The primary survey participants in this study were smartphone users who used or planned to use M-payment services in China during the COVID-19 pandemic. To prevent the effects of cultural and linguistic differences, the questionnaire was professionally translated into Arabic.

4.2 Data Demographic Characteristics

According to Jackson's (2003) N: q law, an ideal sample size-to-parameters ratio would be greater than 20:1, so the sample size for this analysis should be greater than 140. This study distributed a total of 1606 online questionnaires, with 1400 data collected on April 1st. Following the removal of answers with missing values, a total of 1143 correct questionnaires were approved, yielding a final response rate of 71.1 percent. The Kolmogorov–Smirnov test was used to check the sample's nonresponse bias by comparing the groups of males and females, as recommended by Ryans (1974). It appears that more than half of the study population (53.24%) adopted mobile money. Considering the income of individuals in the study population, it appears that 67.24% have a monthly income below \$ 500, 32.76 % have an income above \$ 500. As a result, the impact of income as a determinant of mobile money adoption may be negligible. Based on these stylized facts, mobile money has been widely

adopted by individuals with low income. This confirms its role in financial inclusion.

Table 2 . Characteristics of the survey respondents

Variables	Category	%
Gender	Male	52.42
	Female	47.58
Age	18-35	39.84
	35-60	59.66
	60+	0.5
Education	High School	3.36
	Bachelor	69.62
	Post Graduate	27.02
Employment	Yes	66.01
	No	33.99
Marital Status	Single	63.14
	Married	27.60
	Divorced	9.26
Location	Greater Cairo	93.10
	Other	6.90

Source: Authors' survey.

Another remarkable fact is that 75.10% of individuals in the study population say they know or have heard of mobile money. Among them, 68.44% reported that they have heard of mobile money through SMS, 26.16% through television, 2.66% through radio, and 2.40% through the press.

However, although a large segment of the population has heard of mobile money and adopted it, the level of transactions carried out through this service remains relatively weak. Researchandmarkets (2019) estimates mobile payment industry in Egypt to record a CAGR of 19.3% to reach US\$ 22,485.9 million by 2025. In this case, the adoption rate, can be justified by environmental or product-specific factors. These factors include sufficient information on the product, adequate communication, Safety (like the risk hacking), and fear of system failure, especially its ability to extinguish debts.

Figures show that 84.55% of individuals who have used mobile money were to transfer money, 62.15% to buy credit or communication units, 18.70% to pay for bills, 12.93% to buy airline tickets 4.43% for other purposes. However, when trying to find out the motivations to the adoption of mobile money, it appears that people have recourse to it for the following: it saves time (87.90%); low transaction costs (57.24%); Proximity to the point of sale (53.17%); the possibility to make distance purchases (48.14%) with the development of e-commerce; ease of use (46.60%). Other reasons for less importance are mentioned, such as Safety (28.86%) and Perceived benefits by operators (21.80%).

4.3 Estimation technique and data

Beyond its mobile banking dimension, mobile money is analyzed here as a mean of payment. That is why, in this study, individuals with or without a mobile phone should say whether they adopt or not this service, namely: payment of invoices, transferring money, depositing or withdrawing cash, etc. From this perspective, the use of mobile money allows economic agents to reduce their transaction costs and, to a certain extent, contributes reducing financial exclusion.

Our purpose is to distinguish households that have adopted mobile money from those not having done so, the dependent variable describing the household's decision is dichotomous. It takes the value 1 when the household adopts mobile money and the value 0 otherwise. That is why the binomial logit is used to estimate the household's probability of adoption. Let p be the household's decision to adopt mobile money, $p_i = 1$ if there is adoption and $p_i = 0$ otherwise. The prediction made through this model makes it possible to quantify the intensity of the link between the explanatory variables characterizing mobile money and explained variables representing the adoption decision (Desjardins, 2005).

The adopted technique does not impose any restrictions on the conditions of normality of the explanatory variables, nor does it impose any on the discrete nature or not of these variables (Tabachnick & Fidell, 2005). Therefore, we can admit that the explanatory variables' diversified nature, the assumption of non-linearity of the relationship between mobile money's adoption decision and the

explanatory variables characterizing it, and the recognized flexibility of logistics models justify the option taken here for this technique in data analysis.

We assume that the decision to adopt mobile money by an individual is a function of the likely utility he experiences using this financial instrument. Let p^* be the latent variable representing the household's adopt varies from $-\infty$ to $+\infty$. This variable is determined by explanatory variables describing the specificities of mobile money so that we have the following structural equation:

$$p_i^* = X_i b + e_i \quad (1)$$

where i indicates the observation, b is the vector of the parameters to be estimated, X the matrix of independent variables, and e the error term, which follows asymptotically a normal distribution. Suppose the probable adoption utility is $U_A(p^*)$ and the probable utility of non-adoption is $U_N(p^*)$; since the latent variable is p^* , we have:

$$p_i = \begin{cases} 1 & \text{if } p^* > 0 \quad U_A(p^*) > U_N(p^*) \\ 0 & \text{if } p^* < 0 \quad U_A(p^*) < U_N(p^*) \end{cases}$$

We assume that individuals are risk-neutral. Cases with positive values of p^* are observed as $p = 1$, whereas cases with negative or zero values of p^* like $p = 0$. The idea of the variable p^* is an underlying propensity to adopt mobile money because of the observed condition. Moreover, although we cannot directly observe this propensity, a change of p^* entails, at a given moment, a change in what we observe, that is, households may or may not adopt mobile money. In our case, the adoption utility $U(p^*)$ is supposed to be related to the mobile money service's set specific characteristics, such as defined in equation (1). These specific factors are likely, for the potential user, to influence his decision to adopt mobile money. These are the Perceived benefits or gratuities following the completion of a mobile money transaction, information available on the operation of mobile money, proximity to points of sale, network effect. Therefore, the probability that a household adopts mobile money, for a given value of x can be expressed as follows:

$$\Pr(p = 1/x) = \Pr(p^* > 0/x) \quad (2)$$

By integrating the structural model obtained in (1) in equation (2) and in rearranging the terms, the probability of adopting mobile money by a household becomes:

$$\Pr (1/x) = \Pr (e > - (a + bx)) \quad (3)$$

The following assumptions were made to test this model:

- the Perceived benefits of the service may affect its adoption;
- the ease of use of mobile money can increase the adoption probability;
- the longer it takes to complete a transaction; the user is less motivated to adopt mobile money;
- proximity to mobile money point of sale can increase the adoption probability;
- reliability or Safety linked to mobile money can increase the adoption probability;
- the existence of a large number of mobile money users can increase the likelihood of adoption.

These different hypotheses implicitly give the expected signs of explanatory variables of the model. Data analysis was done directly by simultaneously entering all the explanatory variables because no assumption has been made on the order of explanatory variables in our analysis. Moreover, given the size of the sample, the central limit theorem solves the problem of normality. However, to reassure us in choosing a regression logistics, we carried out a collinearity test of our explanatory variables, particularly the tolerance test. It turns out that none of the values response for each of the independent variables is not less than or equal to 0.01, as shown in Table 2 below: therefore, there is no multicollinearity in our model. Besides, the estimate of the coefficient of variance inflation factor (VIF) for each independent variable validates the tolerance value conclusions. Indeed, according to Bressoux (2008), we speak of multicollinearity when the coefficient VIF is greater than 5. The results presented in Table 2 show that there is no multicollinearity since the VIF coefficient is close to 3.

Table 3: Collinearity calculations

Variables	Tolerance	VIF
Preceived benefits	0.448551	2.31
Ease of use	0.413256	2.54
Completion time	0.621425	1.42
Proximity of point of sale	0.932151	1.23
Safety	0.757854	1.36
Network effect	0.972155	1.12

IV. Study results

Since our objective is to examine the role of product-specific factors in the adoption of mobile money based on socioeconomic characteristics, the analysis of the results will be done as follow: first by examining the general model, that is, the one that analyzes the determinants specific in the whole sample, then a series models which, while discriminating the population according to the characteristics socioeconomic, analyze their adoption behavior in relation to product-specific factors.

Table 4. General Model Results

Variables	General Model	
	Coef.	Marginal effect
Preceived benefits	-0.814*** (0.250)	-0.154*** (0.049)
Ease of use	0.731** (0.212)	0.0132** (0.431)
Completion time	-0.234 (0.171)	-0.045 (0.037)
Proximity of point of sale	0.355* (0.131)	0.080* (0.031)
Safety	0.344 (0.255)	0.081 (0.062)
Network effect	0.189 (0.232)	0.031 (0.471)
Constant	-1.345 (1.059)	

Observations	1143
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*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

a. An analysis of the product- specific factors

From Table 3, it appears that the perceived advantages, the information available on the operation of mobile money, and proximity of point of sale are the significant variables in the adoption of this service. In other words, information relating to mobile money's functioning, which aims to reveal the product's benefits to the consumer, plays a fundamental role in its Adoption in Egypt. In this regard, mobile phone companies would do well not only on a communication structure that reveals the existence of a varied offer of services but also on informing the consumer about the opportunity associated with mobile money adoption. In this regard, it should be noted, as per Kuisma, Laukkanen and Hiltunen (2007), that poor communication can inhibit the service adoption. Moreover, the geographical proximity of mobile money point of sale has a positive and significant effect on adopting this service. This significance can be explained by the fact that the proximity to point of sale is a factor in reducing transaction costs for consumers, who, in this case, do not have to go long distances when requesting this service. In this regard, we can refer to the works of Baumol (1952) and Tobin (1956), which have been taken up by many authors such as Alvarez and Lippi (2009) or Dunne and Kasekende (2018).

Regarding bill payments, money transfers, consultation of the mobile money account, payment of tuition fees, the costs are almost null since they are electronically administered. That is why the increase of sales points as a business strategy implemented by telephone companies impacts adoption, given the marginal effect linked to this variable (0.080). On the other hand, the Perceived benefits negatively and significantly affect the adoption of mobile money. Yet, according to results, they play a significant role in adopting mobile money, because their contribution to the decrease in the probability of adoption is 15.4%. Therefore, the telephone companies would benefit from bonuses of any other kind if they want to boost mobile money. However, assuming that not all individuals have the same level of understanding of specific factors. In that case, their understanding will depend on several socioeconomic factors, such as gender, education, level of income, and age.

b. The impact of socioeconomic factors

This second stage of the analysis aims to see how certain socioeconomic variables assumed to be relevant may better understand specific factors in adopting mobile money in Egypt. We will analyze, in turn, gender, educational level, age, and income.

Table 5: Perception of specific factors according to gender

Variables	Coefficients	
	Female	Male
Preceived benefits	-1.052*** (0.432)	-0.750** (0.388)
Ease of use	0.921** (0.314)	0.582* (0.271)
Completion time	0.0933 (0.277)	-0.431* (0.237)
Proximity of point of sale	0.177 (0.222)	0.521** (0.188)
Safety	0.589 (0.389)	0.314 (0.341)
Network effect	0.0822 (0.314)	0.188 (0.312)
Constant	-2.565 (1.622)	-1.001 (1.433)
Observations	547	596

** p<0.05, * p<0.1

In the adoption of new technologies, the empirical literature highlights the role of gender (Laforêt & Li, 2005; Riquelme & Rios, 2010; Fall et al., (2015). Therefore, the apprehension of specific factors will necessarily depend on gender. Through Table 4 above, we note that, for both genders, the Preceived benefits and the Ease of use has significant importance on adoption, even if the benefits offered negatively influence the adoption probability. However, the probability of men's adoption is negatively related to the time taken to complete a transaction and positively related to the point of sale's proximity.

Table 6: Perception of specific factors according to educational level

Variables	Coefficients
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	High school	Bachelor degree	Postgraduate
Preceived benefits	0.932 (1.514)	-1.532*** (0.455)	-0.438 (0.348)
Ease of use	-0.0549 (1.023)	1.248** (0.366)	0.428 (0.299)
Completion time	0.723 (0.966)	-0.478 (0.344)	-0.249 (0.221)
Proximity of point of sale	-1.988* (0.971)	0.321 (0.277)	0.471*** (0.169)
Safety	1.514 (1.632)	0.182 (0.529)	0.531* (0.279)
Network effect	-0.245 (1.900)	0.309 (0.324)	0.0377 (0.321)
Constant	1.241 (5.78)	-0.746 (2.220)	-1.780 (1.219)
Observations	38	378	727

Although education is not a factor specific to a product or service, many studies recognize it as very important in the understanding and adopting new technology (Bocquet & Brossard, 2008; Galliano & Roux, 2006). In this case, it appears a clear difference in perception of the role of specific factors according to the level of study. For the population with high school education, the proximity to the mobile money point of sale negatively influences the probability adoption. For the population having completed a bachelor's degree, there are positive influences of Preceived benefits and ease of use on the probability of mobile money adoption. For the population having a postgraduate degree, the proximity to the mobile money point of sale and Safety positively influences the probability adoption.

Table 7: Perception of specific factors according to income

Variables	Coefficients	
	Income (less than 1000 \$)	Income (Higher than 1000 \$)
Preceived benefits	-0.921*** (0.322)	-0.547 (0.388)

Ease of use	0.789** (0.287)	0.392 (0.309)
Completion time	-0.212 (0.189)	-0.101 (0.178)
Proximity of point of sale	0.179 (0.169)	0.539*** (0.222)
Safety	0.219 (0.401)	0.699** (0.412)
Network effect	0.222 (0.215)	-0.177 (0.388)
Constant	-1.009 (1.474)	-2.312 (1.522)
Observations	619	524

The empirical literature highlight that income largely influences the adoption of new technologies (Doss & Morris, 2001; Egyir, Owusu- Bennoah, Anno-Nyako & Banful, 2011). Taking this parameter into account, our study retained two income levels: a bracket of less than \$ 1000 and another more than \$ 1000. For the first category, information on the functioning positively affects the probability adoption, while for the second, Proximity and Safety positively affect the probability of adoption. This result is quite understandable since the greater the wealth increases, the more users are concerned about Safety, due to the importance of their financial transactions.

Table 8: Perception of specific factors according to age

Variables	Coefficients	
	Less than 30 years	30+
Preceived benefits	-0.822** (0.299)	-0.01200 (0.512)
Ease of use	0.712*** (0.277)	0.512 (0.488)
Completion time	-0.388* (0.222)	0.222 (0.309)
Proximity of point of sale	0.287** (0.112)	0.455** (0.222)

Safety	0.409 (0.322)	0.389 (0.340)
Network effect	0.125 (0.251)	0.107 (0.529)
Constant	-0.821 (1.312)	-4.612** (2.106)
Observations	880	263

Research has identified age as a determining factor in adopting new technology (Morris, 2000). But opinions differ on this subject. While some believe that young people adopt new technology more quickly, others think the opposite is true (Fall, 2015). In this case, for all users, regardless of age, proximity plays an essential role in the adoption of mobile money. However, those under 30 also place importance on the operation's information and the completion time of a financial transaction. For them, the offers and completion time negatively influences the probability adoption

V. Conclusion

Our econometric estimation results show that, in general, the Perceived benefits, the information available on the operation of mobile money, and proximity of point of sale are the variables significant to the adoption of this service.

Given the social and demographic characteristics of Egypt, there is a discrimination in the use of mobile money. In this regard, the results of this study show that when considering gender, women highlight the benefits offered and ease of use, while men add the time taken for a transaction and proximity to points of sale. For individuals with lower income, ease of use is the primary determinant, while for those with higher income, it is the proximity point of sale and the Safety that are the significant variables to adopting this service. Finally, for individuals under the age of 30, benefits offered and ease of use, the point of sale's proximity are the significant variables to adopting this service.

Altogether, these findings indicate that operators seeking to succeed in the mobile money marketplace must meet changing customer needs convenient, relevant, and cost-effective through a planned expansion of mobile payments

and related services in the respectful country's socioeconomic context. Besides, mobile phone companies would benefit from dwelling on a communication structure that reveals a varied range of services, but on the one that informs the consumer on the advisability for him to adopt the mobile money service. It could also be useful to include communication information on how to resolve problems such as possible payment incidents, network bugs, reset bugs accounts in data loss (password, PIN code, etc.), and problems of recipient confusion.

Finally, to improve the impact of proximity to points of sale, we recommend allowing the consumer to realize the maximum of its financial operation within the regulations' limits, knowing that some point of sale are facing a liquidity constraint.

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VII. Annex I

Good morning/afternoon/evening. I am Hoda Mansour, and I am researching mobile phones and other services people use for academic purposes. The online questionnaire will take about 20 minutes, and I hope you agree to share your views. There are no correct or incorrect responses, and your response will be kept strictly confidential.

SECTION I: DEMOGRAPHICS

Age

- 18-35
- 35-60
- 60+

Gender

- male
- female

City

- Greater Cairo
- Other

Marital status

- Single
- married
- Divorced

Level of education

- High school
- University Graduate
- Post Graduate

Employment status

- Yes
- No

Income range

- Less than 5000 LE
- 5000-10000 LE
- More than 10000 LE

SECTION II: ACCESS TO mobile money product

Do you personally have a mobile phone?

- Yes
- No

Do you personally have a bank account that is registered in your name?

- Yes
- No

Have you heard of the Mobile Money service?

- Yes
- No

How did you hear of the Mobile Money service?

- (SMS) of the telecommunications operators
- Television
- Radio
- Press
- Other

Have you registered for Mobile Money?

- Yes
- No

How often do you use Mobile Money?

- Very often
- Quiet often
- Rarely
- Never

Apart from today, when was the last time you conducted any financial activity using these registered accounts?

- Yesterday
- Last week
- A month ago
- More than a month
- Never

How do you usually access this mobile money service?

- by using your own account
- by using an account of a family member
- by using a friend or a neighbor account
- by using a workmate or a business partner account
- Other

- Never

Does offer matters for you in adopting Mobile Money?

- Yes
- No

Does Ease of use matters for you in adopting Mobile Money?

- Yes
- No

Does completion time matters for you in adopting Mobile Money?

- Yes
- No

Does the proximity of point of sale matters for you in adopting Mobile Money?

- Yes
- No

Does the security matters for you in adopting Mobile Money?

- Yes
- No

Does the operator brand matters for you in adopting Mobile Money?

- Yes
- No

Overall, are you satisfied with your experience using our new product, dissatisfied with it, or neither satisfied or dissatisfied with it?

- Satisfied
- Dissatisfied
- Neutral

SECTION III: barriers and motivations for adoption

What is the main reason you started using mobile money?

- I had to send money to another person
- I had to receive money from another person
- Somebody/a person requested I opened an account

- I had to pay a bill
- I saw posters/billboards/radio/TV advertising that convinced me
- A person I know, who uses mobile money, recommended I use mobile money because it is better than other financial instruments I use
- I saw other people using it and wanted to try by myself
- I wanted to start saving money with an m-money account
- I wanted a safe place to store my money

Have you ever used a mobile money account to do transfer money?

- Yes
- No

Have you ever used a mobile money account to buy credit?

- Yes
- No

Have you ever used a mobile money account to pay bills?

- Yes
- No

Have you ever used a mobile money account to buy airline tickets?

- Yes
- No

Have you ever used a mobile money account for other purposes?

- Yes
- No

Do you use a mobile money account to Pay employees?

- Yes
- No
- N/A

Do you use a mobile money account to Pay suppliers

- Yes
- No

- N/A

Do you use a mobile money account to Receive payments from customers

- Yes
- No
- N/A

Do you use a mobile money account to Pay remotely for goods and services

- Yes
- No
- N/A

What is the main reason you have never used mobile money services?

- I do not know how to open an account
- I prefer to use another type of institution
- I do not make any transactions
- The registration fee is too high
- Using mobile money is difficult
- Fees for using mobile money are too high
- No one among my friends or family is using it
- I do not understand the purpose of mobile money, I do not know what I can use it for
- Other
- N/A

Section IV: the network effect

Do you tend to use the same mobile money agent all or most of the time?

- Yes
- No
- N/A

Are you happy with the customer support you are receiving when you face challenges on Mobile Money?

- Yes
- No
- N/A

How far is the closest mobile money agent (of any provider) from the place where you live? Is he/she _____ away?

- 0.5 Km or less
- More than 0.5 and less than 1km
- More than 1 Km to 5 km
- More than 5 km

Which of the following mobile money agent/agents is/are the closest to where you live? Regardless of what service you use.

- Vodaphone
- Orange
- Etisalat
- Other

Have you ever experienced any of the following issues with any mobile money agent?

Agent did not have enough cash and could not perform the transaction

- Yes
- No
- N/A

Agent gave me enough information about the services

- Yes
- No
- N/A

Agent did not know how to perform the transaction

- Yes

- No
- N/A

Agent overcharged for the transaction or asked me to pay a deposit before they make the transaction I want

- Yes
- No
- N/A

Agent did not give all the cash that was owed It was very time consuming/agent was slow I did not get a receipt, including SMS receipt

- Yes
- No
- N/A

Agent charged me for depositing money Agent asked for my PIN number

- Yes
- No
- N/A

Agent's place was not secure/there were suspicious people at agent's place

- Yes
- No
- N/A

Agent shared my personal/account information with other people without my knowledge/permission

- Yes
- No
- N/A

Agent defrauded me of money or assisted other people in scamming me I had money stolen from me on the way to/from the agent

- Yes
- No

- N/A

Agent's place was inconvenient, e.g., very noisy, dirty, too close to the road, etc.

- Yes
- No
- N/A