Adoption of Mobile Banking by Microentrepreneurs at the Bottom of the Pyramid

Adopción de la Banca Móvil por Microempresarios en la Base de la Pirámide

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Abstract

The use of mobile phones has increased globally, offering developing countries the opportunity to improve financial inclusion through mobile banking. However, mobile banking has been little adopted by microentrepreneurs at the bottom of the pyramid, and studies that explain this phenomenon is incipient. Therefore, this study aims to establish factors that influence mobile banking adoption by microentrepreneurs, from the Theory of Planned Behavior (TPB), extended to the relative advantage and perceived risk. Using a sample of 101 microentrepreneurs at the bottom of the pyramid, our findings confirmed that attitude, subjective norms, behavior control, and relative advantages positively affect the appropriation of mobile banking. Thus, banks and mobile services providers can focus on these critical factors to increase the mobile banking adoption rate.

Keywords: Mobile banking adoption, Theory of Planned Behavior (TPB), Microentrepreneurs, Bottom of the pyramid.

Resumen

El uso de teléfonos móviles ha aumentado en el mundo, ofreciendo a los países en desarrollo la oportunidad de mejorar la inclusión financiera a través de la banca móvil. Sin embargo, en el contexto de los microempresarios en la base de la pirámide, su adopción es baja y los estudios que proporcionan explicaciones para este fenómeno

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son incipientes. Por lo tanto, este estudio tiene como objetivo establecer factores que influyen en la adopción de la banca móvil en microempresarios, desde la Teoría del Comportamiento Planificado (TPB) y el TPB extendido a la ventaja relativa y al riesgo percibido. Utilizando una muestra de 101 microempresarios de la Base de la Pirámide, nuestros hallazgos confirman que la actitud, las normas subjetivas, el control del comportamiento y la ventaja relativa tienen un efecto positivo en la adopción de la banca móvil. Por lo tanto, los bancos y los servicios de telefonía móvil pueden centrarse en estos factores clave para aumentar la tasa de adopción de la banca móvil.

Palabras clave: Adopción de la banca móvil, Teoría del comportamiento planificado, Microempresarios, Base de la pirámide.

1. Introduction

The penetration of mobile services in the world increased up to 97% in 2015. Only four regions in the world have a coverage rate of less than 100%: South Asia (77%), Africa (82%), and Central America (88%), while Central and Eastern Europe concentrate the highest adoption rate at 139%, along with South America and its 121% adoption rate (Rivero, 2015). Despite the increase in mobile phone usage, mobile banking has not grown at the same rate. In Latin America, Colombia has led mobile banking use with a 58% adoption rate (Latinia, 2017).

Concerning digital literacy, mobile phones make it much more comfortable because they allow people to go online at any time and place, thereby reaching unbanked rural areas, and avoiding geographical barriers and installation costs. According to Rivero (2015), by 2020, mobile phones will be responsible for 80% of the world's banking market. Therefore, Latin American economies are challenged to reduce inequality by improving microenterprises' financial inclusion through mobile banking since just 13% have access to financial services compared to 94% in developed countries.

Thus, the need to design and distribute financial services microentrepreneurs at the Bottom of the Pyramid (BOP) can afford, becomes relevant (Pankomera and Van Greunen, 2018). The BOP represents the economically weaker segment of the world's population with a daily per capita income of US$2 or less (Prahalad and Hammond, 2002).

In Colombia, 7.20% of the population lives in extreme poverty (DANE, 2018).

Studies on mobile banking in the context of microenterprises are still rudimentary. Furthermore, no studies have been conducted in Colombia. Moreover, according to Shaikh and Karjaluoto (2015), two of the main variables in the context of mobile banking have not been tested in terms of TPB extended to relative advantage and perceived risk. Hence, this study aims to assess the impact of those factors that affect microentrepreneurs' at the BOP intention to adopt mobile banking.

To that end, we use a sample of microentrepreneurs in the Inclusive and Opportunities Territories (TIOS), which comprise geographical areas characterized by critical indicators concerning poverty, violence, and insecurity. Thus, it becomes essential to identify the factors that affect mobile banking adoption to increase financial inclusion and reduce poverty indexes at the BOP, which represents a new market opportunity for the banking sector (Kansal, 2016). Hence, this study helps extend the knowledge about the factors that influence the intention to adopt mobile banking and thus improve banking strategies.

In this regard, the Theory of Planned Behavior (TPB) is one of the best-suited models on technological adoption to explain individuals' behavior when performing a given action in those contexts where they lack full control and are conditioned by other non-motivational factors associated with the availability of specific requirements, knowledge, skills, and resources (Ajzen, 1991; Venkatesh, Morris, Davis, and Davis, 2003; Santos, Veiga, and Souza, 2011). According to Hasan, Lowe, and Petrovici (2019), given the limitations that BOP consumers face, TPB is a good predictor. Moreover, two other independent variables, namely, relative advantage and perceived risk, explain differences in individuals' behavior in the context of adopting new technologies (Brown, Cajee, Davies, and Stroebel, 2003).

Our findings confirm that attitude, subjective norms, behavior control, and relative advantage have a positive effect on mobile banking adoption, while the perceived risk did not. Consequently, this study helps to

strengthen the literature on the adoption of technology, pointing out managerial aspects to implement successful strategies towards the adoption of mobile banking that increase the financial inclusion of microenterprises at the BOP.

First, this paper presents the literature review, the research model, and the hypotheses. Secondly, we move on to explain the methodology used, the results, and there will be a discussion thereof. Finally, we examine the conclusions, limitations, and future lines of research.

2. Literature review

Mobile banking (M-Banking) is an application of mobile commerce (M-commerce) (Lee and Chung, 2009). According to Shaikh and Karjaluoto (2015), mobile banking dates back to the late 1990s when the German company Paybox launched its first service in collaboration with the Deutsche Bank. Initially, it was tested in Germany, Spain, Sweden, Austria, and the United Kingdom, and Kenya was the first to introduce this M-Pesa text-based service in 2007 regarding developing countries. M-banking also can improve the quality of life of underserved populations (Hassan and Wood, 2020).

Researchers are interested in explaining how users' attitudes and intentions affect mobile banking appropriation. The most widely used and recognized theories on the study of technology adoption are the Technology Acceptance Model (TAM), the Theory of Reasoned Action (TRA), the Theory of Planned Behavior (TPB), and the Unified Theory of Technology Acceptance and Use (UTAUT), which integrates eight models and theories (Venkatesh *et al.,* 2003). Another model used to a lesser extent is the perspective of the Diffusion of Innovation (Rogers, 1995).

TPB extends TRA by adding the perceived behavioral control construct, understood as the ease or difficulty in implementing the behavior (Ajzen, 1991; Mathieson, 1991; Taylor and Todd, 1995). TPB points out that behavior is a direct function of intention and the perception of control over that behavior. The intention is formed by attitude, which

reflects the favorable or unfavorable feeling towards the carrying out thereof. The subjective norms reflect the perception held by individuals' relevant points of reference, which influence the decision of whether or not to implement a behavior. In contrast, the perception of control reflects the internal and external perceptions that constrain such behavior (Taylor and Todd, 1995).

Most studies on technology adoption have focused on TAM (Shaikh and Karjaluoto, 2015). However, in the study of individual behavior, TPB is much broader than the TAM for predicting intention and behavior (Ajzen, 1991; Davis, 1989). TPB's constructs have been tested by different researchers to predict different individuals' adoption of mobile banking, i.e., bank users, university students, young people, bank customers (Priya, Gandhi, and Shaikh, 2018; Elhajjar and Ouaida, 2019; Danyali, 2018; Shankar and Kumari, 2016; Narteh, Mahmoud, and Amoh, 2017; Lu, Tzeng, Cheng, and Hsu, 2015; Verma, and Sinha, 2018; Woodson, Alcantara, and Do Nascimento,2019). According to Baishya and Samalia (2019), studies on technology adoption at the BOP are scarce.

Systematic empirical research on the adoption of innovation at the bottom of the pyramid has begun to develop (Hasan *et al.,* 2019). The studies on mobile banking adoption at the BOP are consumer-oriented and use different models to predict adoption intent. For example, Kansal (2016) applied the TAM model to determine the factors that affect mobile banking adoption by families at the bottom of the Indian pyramid. On the other hand, Hassan and Wood (2020) used TAM, social influence, and cultural variables to determine mobile banking adoption at the BOP in Egypt and the US.

The first study that used TPB to predict mobile banking adoption at the BPO was that by Hasan *et al.* (2019), which determined the factors that affect the adoption of mobile consumer banking at the bottom of the pyramid. Their study employed the Consumer Acceptance Model of Technology (CAT), Diffusion of Innovations (DOI), Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), Theory of reasoned action (TRA), Value-based adoption model (VAM) models. The TPB model explained intent at

27%, and the three predictors had a positive effect on the intention of adopting mobile banking. In contrast, the relative advantage variable did not directly influence intention. Nevertheless, there was no evidence of studies on the adoption of mobile banking among microentrepreneurs' context at the BOP.

2.1. The Theory of Planned Behavior (TPB) in the context of microenterprises

Several research attempts have been made to improve theories on the adoption of technologies that can better explain individuals' behavior. Some of these theories have limitations concerning microenterprises (Venkatesh *et al.,* 2003) because most of them lack a cohesive model that explains the external factors that influence the use of technology. TPB is most appropriate because it seeks answers from a scenario where microentrepreneurs have no control over the external environment that favors or prevents technology adoption (Ajzen, 1985).

After a review of the literature, it was possible to identify that the studies using the TPB model to predict mobile banking adoption by microentrepreneurs on the BOP are incipient (López, Musonda, Sakao, and Kebir,2017). Nevertheless, there are studies on the adoption of other types of technologies, such as that by Mezghani and Almansour (2019). They concluded that TPB and TAM are suitable to study cloud CRM use since all variables were significant in a study conducted in Saudi Arabian SMEs. Nasco, Toledo, and Mykytyn (2008) have found that both attitude and subjective norms are significantly associated with Chilean SMEs' intention to adopt e-commerce. They further determined that control over behavior does not affect adoption intent.

On their part, Riemenschneider, Harrison and Mykytyn (2003), by coupling TAM and TPB, found out that together these models help to predict better small business executives' intent to procure a web page. Their main conclusions reveal that entrepreneurs refrain from adopting a Web page, not because of difficulties or constraints on resources, but because they are not aware of its benefits and feel socially pressured to incorporate this technology into their companies. For Harrison, Mykytyn, and Riemenschneider (1997), TPB's constructs, attitudes, subjective norms, and perceived control over behavior influence the adoption of information technologies. Based on these clarifications on the theoretical background of TPB, the hypotheses were developed.

2.2. Research model and hypotheses

2.2.1. The Effect of Attitude on the Intent of Adopting Mobile Banking. Attitude is a multidimensional construction composed of cognitive, affective, and conative components. The research by Ajzen and Fishbein (1980) describes attitude as an individual's positive or negative feelings (Davis, Bagozzi and Warshaw, 1989; Venkatesh *et al.,* 2003). Attitude is the second positive determinant of a consumer's intention to accept mobile banking, and many authors have found it to be one of the most significant TPB constructs. For instance, for Wu and Chen (2005), attitude helps predict the intention to embrace online payments, and Nasco *et al.* (2008) demonstrated that attitude significantly predicts the intention to use electronic commerce among SMEs. For their part, Püschel, Mazzon, and Hernandez (2010) assert that attitude is a direct determinant of mobile banking usage. Following these arguments, the first hypothesis raised by this research is:

H1: microentrepreneurs' attitude positively influences their intention to adopt mobile banking

2.2.2. *The Effect of Subjective Norms on* the Intent of Adopting Mobile Banking. Subjective norms are a construct promoted by Ajzen and Fishbein (1980) and developed by Mathieson (1991). It is defined as an individual's perception that people are important for their influence or their conduct. According to Baishya and Samalia (2019), subjective norms have a direct and positive impact on "Behavioral Intention" to use a smartphone at the BOP. For Nasco *et al.* (2008), the use of TPB to predict Chilean SMEs' intention to embrace e-commerce shows that subjective norms are significantly linked to the intention of embracing it. In some contexts, subjective norms are an

essential determinant of behavioral intent and may have a relative importance in the stages of technology implementation. Under the assumptions of Riquelme and Ríos (2010), who found that the higher the perception of social pressures towards the use of mobile banking, the higher the intention to adopt it, follows that:

H2: Subjective norms' influence on microentrepreneurs has a positive impact on their intention to adopt mobile banking

2.2.3. *The Effect of Behavioral Control Perception on the Intent of Adopting Mobile Banking.* According to Lu, Tzeng, Cheng, and Hsu (2015), perceived behavioral control is defined as the resources and opportunities available to individuals that foster the conditions necessary to adopt a particular behavior. Taylor and Todd (1995) disaggregated the construct into three dimensions: self-efficacy, resource facilitation, and technological or technical conditions. For this study, control over behavior is reckoned from self-efficacy; in this sense, applied to mobile banking services, self-efficacy describes consumers' judgments of their capabilities. Püschel *et al.* (2010) found that self-efficiency significantly affects the intent of adopting mobile banking; once an individual perceives that he can use it, he will be more likely to adopt mobile banking. Therefore, we state the following hypothesis:

H3: Perceived control over behavior positively influences the intention to adopt mobile banking

2.2.4. *The Effect of Relative Advantage on the Intent of Adopting Mobile Banking.* Relative advantage refers to the degree to which technology provides more benefits than its predecessor does. It also refers to the extent to which an individual considers that innovation offers an advantage over past ways of performing the same task (Taylor and Todd, 1995). Abbas, Abdullah, and Saad (2018) found that relative advantage positively affects Pakistani SMEs' intention to adopt e-commerce technologies. In their study, Al-Jabri and Sohail (2012) demonstrated that the relative advantage affects mobile banking adoption. For these authors, such a variable holds a tight connection with

perceived advantage, implying that those microentrepreneurs who find mobile banking useful and convenient for the efficient and effective management of their finances, will be prone to adopt it. Consequently, the following hypothesis is proposed:

H4: Relative advantage has a positive influence on the intention to adopt mobile banking.

2.2.5. *The Effect of Perceived Risk on the Intent of Adopting Mobile Banking.* Perceived risk can be categorized as microentrepreneurs' perception about their susceptibility to different hazards. Cox (1967) introduced the concept defining it as a combination of uncertainty and the severity of the results involved. In turn, Yadav, Chauhan, and Pathak (2015) showed that perceived risk did not display any significant influence on the intention to adopt mobile banking. Hassan and Wood (2020) found that perceived risk does not play a role in consumers' decisions to use mobile banking. Likewise, Sripalawat, Thongmak, and Ngramyarn (2011) showed that perceived risk could negatively influence customers' intention to use mobile banking in Thailand. Therefore, this study now raises the following hypothesis:

H5: Perceived Risk has a negative influence on the intention to adopt mobile banking.

The empirical model and hypotheses are shown in Figure 1.

3. Research methodology

This research is quantitative and makes part of a project aimed at microentrepreneurs who took part in the TIOS (Territories of Inclusion and Opportunities), an intervention program that advocates for the generation of conditions of equality. The research found that 95% of 180 microentrepreneurs own a mobile phone; however, only 5% of that number had adopted mobile banking. This finding is akin to the study by Brown *et al.* (2003) in South Africa, where 91% of the participants possessed a cellphone, but only 6% had embraced mobile banking. For that study, 95% of microentrepreneurs who had not adopted mobile banking were selected. The participants' age ranged between 35

Figure 1. Research Model
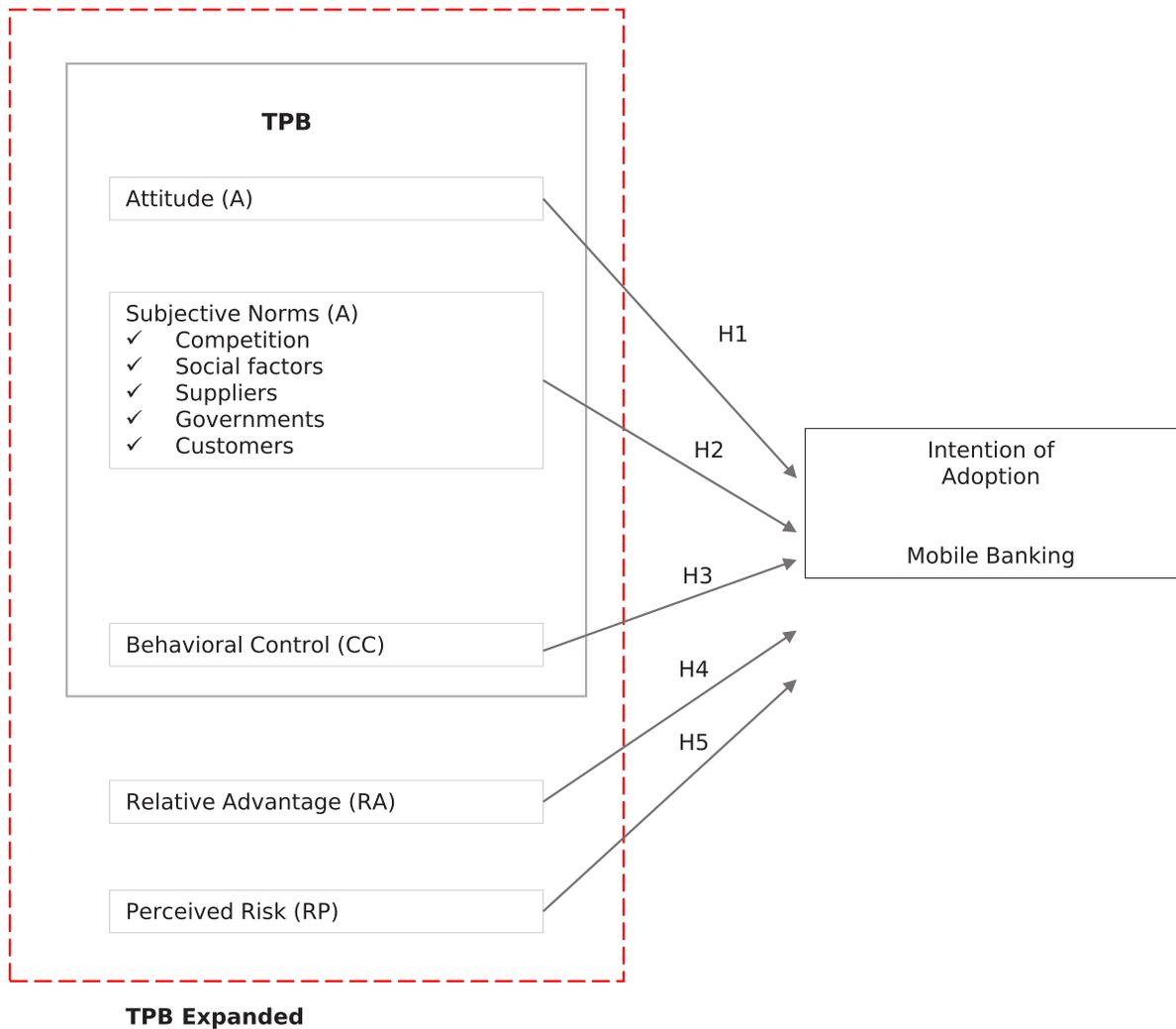
Source: Authors' own elaboration

and 54 years (66%), and 58% were women. Regarding their educational level, 45% had completed high school, and 33% had technical studies.

Concerning microenterprises (i.e., >10 employees), 42% belonged to the commercial sector, 41% to industry, 16% to services, and 1% were in the agricultural sector. In terms of monthly sales, 75% of microentrepreneurs reported sales under 970 dollars a month, and 34% were one-employee companies. It should be noted that banking entities face microentrepreneurs' apathy since 53% do not own banking products. The other 47% held products such as a savings account (28%), a loan (16%), a credit card (11%), or a checking account (7%). Moreover, 39% of microentrepreneurs do not visit banks, given their businesses' lack of formality and their preference for cash.

The measuring instrument was built drawing from different academic papers. We used the Aboelmaged and Gebba (2013) scale to measure intention, while the scale for attitude was drawn from Pattansheti, Kamble, Dhume**,** and Raut (2016). The subjective norms scale was taken from Khasawneh and Irshaidat (2017). For the control over behavior, we employed Luarn and Lin's scale (2005). Finally, to measure relative advantage and perceived risk, the scale used by Al-Jabri and Sohail (2012) was chosen.

We also employed a Likert scale using 1 to express total disagreement and 10 to show total agreement to measure the concepts.

A pre-test was administered upon microentrepreneurs to assess the instrument's validity and adjust wording following the recommendations of Podsakoff, MacKenzie, Lee, and Podsakoff (2003) to prevent common method bias due to the use of one informant. In the next stage, to confirm the questionnaire's reliability, its internal consistency was measured through Cronbach's Alpha. The intention to adopt mobile banking, subjective norms and behavioral control scored above 0.8. As for attitude, relative advantage, and perceived risk, these were above 0.9, thus confirming the scales' converging reliability (Hair, Black, Babin, and Anderson, 2010).

Another method used to assess validity and reliability is factorial analysis, a data reduction multivariate analysis technique that seeks the minimum number of dimensions capable of explaining the maximum amount of information in the data (Hair *et al.,* 2010). The convergent and discriminant validity of the measurement scales were analyzed. Table 1 below shows the results of the factorial analysis performed using LISRELL 8.8.

All concepts' items have a significant standardized factorial load above 0.5 (the lowest t-value is 0.67), which is evidence of convergent validity (Hair *et al.,* 2010). Bagozzi and Yi (2012) point out that the Scale's Composite Reliability (SCR) should be above 0.7. For the proposed model, subjective norms and behavioral control came above 0.8, while for intention, attitude, relative advantage, and perceived risk, their values were above 0.9.

Regarding the factorial loads, as represented by t-values, all items scored above 2.56. The individual standardized coefficients of each concept surpassed 0.5, which is the minimum recommended value by Hair *et al.* (2010), thus proving convergent validity. Another reliability index is the Average Variance Extracted (AVE), which according to Fornell and Larcker (1981) "is a ratio between the variance that is captured by a factor i and the total variance due to that factor's measurement error." AVE values

must be above 0.5. Our lowest AVE value was 0.6 for subjective norms.

The confirmatory factorial analysis results, using the maximum likelihood method, suggest that all of the model's goodness of fit indexes beat their respective typical acceptable levels as recommended by Hair *et al.* (2010) (IFC=0.97; NFI=0.94, NNFI=0.97; SRMR=0.058). RMSEA came at 0.08, which matched the suggested value for a sample smaller than 250 (Hair *et al.,* 2010).

Likewise, this research needed to study the possible relationship or behavior between the model variables, for which we used a correlation matrix. The results show that attitude, subjective norms, control over behavior, and relative advantage, correlate positively and significantly at a level of 0.01. Nevertheless, these values are not met for perceived risk because of its r=0.1, which was not significant.

Notwithstanding the foregoing, as stated by Hernández, Fernández, and Baptista (2014), a cause-and-effect notion can be established theoretically; however, the test did not admit causality. Therefore, the hypotheses should be tested through the multiple regression model, which, according to Hair *et al.* (2010), is used to analyze the relationship between a single dependent variable and several independent variables. A hierarchical method was thence used, giving way to two models: TPB and TPB extended to relative advantage and perceived risk.

Table 2 shows the outcome, displaying the predictability of the TPB model regarding microentrepreneurs' at the bottom of the pyramid intention to adopt mobile banking. The variable that best explains their intention to adopt mobile banking is the attitude (b=0.387, p<0.01). Simultaneously, behavioral control proved to be the second-best explanatory variable (b=0.275, p<0.01). Finally, the least explanatory variable in the TPB model proposed by Ajzen and Fishbein (1980) is the subjective norms (b=0.217, p<0.1).

In general, the TPB model in the context under study had a confidence level of 99% and an error probability of 1%, i.e., it is highly significant (level of 0.01) in explaining

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Table 1. Confirmatory factorial analysis	
Item Description	**Standardized coefficient (t-value)**
Intention (Aboelmaged & Gebba, 2013) SCR: 0.91 AVE: 0.77	
I1: I will adopt mobile banking as soon as possible	0.76 (8.81)
I2: I intend to use mobile banking in the future	0.94 (12.25)
I3: I will regularly use mobile banking in the future	0.92 (11.84)
Attitude (Pattansheti *et al.,* 2016) SCR 0.97 AVE: 0.89	
A1: In my opinion, it is convenient to use mobile banking	0.83 (10.21)
A2: I think it will be good for me to use mobile banking	0.97 (13.37)
A3: I think using mobile banking is a good idea	0.97 (13.23)
A4: My attitude towards mobile banking is favorable	0.96 (13.06)
A5: I like the idea of mobile banking	0.97 (13.20)
Subjective Norms (Joo & Kim, 2004; Khasawneh & Irshaidat, 2017; Riemenschneider & McKinney, 2002) SCR: 0.88 AVE: 0.60	
NS1: Competitors	0.61 (6.49)
NS2: Social factors	0.86 (10.47)
NS3: Providers	0.91 (11.55)
NS4: Customers	0.80 (9.53)
NS5: Government	0.67 (7.40)
Behavioral Control (Luarn & Lin, 2005) SCR: 0.87 AVE: 0.68	
CC1: If I had help built into the system to assist me (audio help like the ATM)	0.86 (10.32)
CC2: If I had seen someone use it before I tried	0.88 (10.63)
CC3: If someone showed me first how to do it	0.74 (8.26)
Relative Advantage (Al-Jabri & Sohail, 2012) SCR:0.96 AVE: 0.82	
VR1: Mobile banking would be a convenient way to manage my company's finances	0.91 (11.84)
VR2: Mobile banking will allow me to manage my company's finances efficiently	0.94 (12.50)
VR3: Mobile banking will allow me to manage my company's finances effectively	0.97 (13.22)
VR4: Mobile banking will give me more control over my company's finances	0.90 (11.67)
VR5: Mobile banking will be useful to manage my company's financial resources	0.80 (9.57)
Perceived Risk (Al-Jabri & Sohail, 2012) SCR: 0.95 AVE: 0.86	
RP1: if I adopt mobile banking, others may manipulate the information about my transactions.	0.85 (10.48)
RP2: I fear that with mobile banking codes or codes will be lost and end up in the wrong hands	0.94 (12.30)
RP3: If I adopt mobile banking my transactions can be known by others	0.95 (12.67)
Source: Authors' own elaboration.	

the intention to adopt mobile banking. In this regard, the hypotheses proposed in the study were tested, showing that attitude as much as subjective norms and behavioral control have a positive influence on the intention to adopt mobile banking.

Concerning the second model, when introducing the relative advantage variable, it became highly significant regarding the intention to adopt mobile banking (b= 0.309, p<0.01), thereby supporting hypothesis 4. Then, attitude follows (b=0.295 p<0.01) and

Table 2. Summary of regression models for the Intention to Adopt Mobile Banking in the context of TPB microenterprise and TPB Extended

Dependent variable	Model I		Model II		
Intention of adoption	Attitude, Behavioral control, Subjective norms, (TPB)		TPB extended, Relative advantage and risk perceived		
	Standardized Coefficients	t-value	Standardized Coefficients	t-value	Sig.
Attitude	0.387	3.758 ***	0.295	2.942 **	0.004 **
Behavioral control	0.275	2.831 ***	0.247	2.440 *	0.017 *
Subjective norms	0.217	1.887 †	0.139	1.253	0.214
Relative advantage			0.309	3.364 ***	0.001 ***
Perceived risk			-0.044	-0.570	0.570
R2 (Adj. R2)	0.713	[0.584]	0.755	[0.634]	
F value		5.539		6.250	
F probability		0,000		0,000	
ΔR2 (Δ adj. R2)	0.390	[0.524]	0.041	[0.049]	
F-value for ΔR2		31.299		5.664	
F-pro. for ΔR2		0,000		0.005	
† p< 0.1; * p < 0.05; ** p < 0.01; *** p < 0.001					
Source: Authors' own elaboration.					

with behavioral control (b=0.247, p<0.05). On the other hand, when perceived risk was introduced in the model, its effect (b=-0.044) was not significant. Consequently, it is not significant to the model despite its validity and reliability; hence, hypothesis 5 goes unsupported. In the second model and context, the subjective norms construct would not explain the intent of adoption. These results suggest that subjective norms do not influence the intention to embrace mobile banking in the presence of relative advantage. According to Püschel *et al.* (2010), for a non-adopter of mobile banking, the relative advantage is an effective factor, while the effect of subjective norms is minimal. Moreover, as Mwangi and Brown (2015) found, microentrepreneurs' decision criteria to adopt mobile banking are endogenous (improved banking processes) instead of exogenous, i.e., they do not stem from other types of influences such as partners, suppliers or customers. This would explain

why subjective norms are not influencing factors in adopting mobile banking in the presence of relative advantage.

The results obtained from the TPB model confirmed that attitude has a positive effect on the adoption of mobile banking. As a favorable attitude towards this technology grows, microentrepreneurs' intention to adopt it also grows. This finding agrees with the prior study by Shaikh and Karjaluoto (2015).

Likewise, subjective norms positively affect the adoption of mobile banking. Five dimensions make up this variable: competitors, social factors, suppliers, customers, and government, of which competitors and government showed less impact on the variable. In contrast, the first three dimensions exerted more substantial influence, especially if any of these three parties, which microentrepreneurs regard as

relevant, recommend using mobile banking; then, their likelihood of adopting it increases. Wu and Chen (2005) and Nasco *et al.* (2008) also produced these results. According to Baishya and Samalia (2019), since the BOP people are less educated, they would be more influenced by social factors than their knowledge of the technology. It should be noted that subjective norms have a more significant effect in the early stages of technological adoption (Nasco *et al.,* 2008).

Behavioral control was found to affect the adoption intention positively, which matches the findings of several other authors (Püschel *et al.,* 2010; Lu *et al.,* 2015). Firstly, this variable defines whether microentrepreneurs perceive mobile banking as easy to use; if so, they would be more likely to adopt it. Similarly, if their confidence in their ability to operate mobile banking increases, so does their intention to adopt it.

For the second model, the relative advantage was found to affect the intention to adopt mobile banking positively. According to Taylor and Todd (1995), when microentrepreneurs perceive that mobile banking offers an advantage and benefits over previous finance-managing methods, their intention to adopt it grows. On the other hand, subjective norms lose their predictive power in the presence of relative advantage because in the context of microentrepreneurs, according to Mwangi and Brown (2015), adopting mobile banking depends more on improved financial processes than it does on exogenous demands.

Finally, perceived risk has been identified at the managerial and academic levels as one of the main barriers to mobile banking (BBVA, 2015). This study rejected such a hypothesis because it did not explain microentrepreneurs' at the BOP intention to adopt it. This finding agrees with Hassan and Wood (2020). They found that adapting to m-banking, as an innovative technology, is driven more by trust in the technology and its provider, than by uncertainty regarding the technology itself. Moreover, Yadav *et al.* (2015) found that perceived risk does not affect online banking adoption. These authors argue that the lack of knowledge about the technology does not show the risk that operating it could unleash.

4. Conclusion

The growth of mobile services worldwide and domestically has been prominent. In this vein, mobile phones offer great opportunities compared to other technologies when providing mobile banking services to the bottom of the pyramid. However, the acceptance of mobile banking has been slow. Worldwide only 8.6% of bank customers use mobile banking services. For this reason, this research's main objective was to determine how the factors in the Theory of Planned Behavior and its extended version, including relative advantage and perceived risk, affect microentrepreneurs' at the bottom of the pyramid intention of adopting mobile banking.

For this purpose, we used a sample of microentrepreneurs characterized by vulnerable conditions. The results obtained confirm that attitude, subjective norms, behavioral control, and relative advantage, affect microentrepreneurs' at the BOP intention of adopting mobile banking. At the same time, the perceived risk has no bearing on the intention of adoption. Thus, BOP microentrepreneurs have a favorable attitude towards mobile banking, and they also believe that it can improve efficiency and effectiveness in the administration of their finances. They are more likely to trust and embrace mobile banking if recommended by customers, suppliers, family, and friends. BOP microentrepreneurs do not perceive risks associated with using mobile banking; therefore, their adoption thereof in the short term is not restricted.

Although mobile phones' penetration rate is high, mobile banking adoption in the context of microentrepreneurs at the BOP is shallow. This study identified the determining factors on which the financial sector must focus to increase financial inclusion and literacy. The perceived risk does not explain the intention of adopting mobile banking since those factors are more oriented to technology knowledge and literacy. Therefore, self-efficacy is the second most significant predictor of mobile banking adoption. Likewise, it was demonstrated that the influence of clients, suppliers, and family or friends has a positive impact on adoption. However, the relative advantage is more critical because microentrepreneurs seek

new technologies to improve their current financial processes.

In this regard, banks and mobile service providers can implement strategies to increase microentrepreneurs' at the BOP mobile banking usage rates by focusing on these key factors. Similarly, developing countries' governments should harness the potential of mobile banking and reduce the costs of financial services for financially excluded people in order to expedite the financial-deepening agenda to reduce income inequality and poverty. Currently, academic studies that include the TPB to analyze mobile banking adoption by microentrepreneurs are embryonic and incipient. Therefore, our findings demonstrate the usefulness of the TPB model to predict the intention of mobile banking adoption in Latin American countries (Sengupta & Slater, 2009).

5. Limitations and future research

This empirical study is not limitation-free. The sample is homogeneous because it concentrates on microentrepreneurs at the bottom of the pyramid regarded as non-adopters of mobile banking. Future studies should extend these studies to other contexts that involve multiple economic sectors, sales volumes, banking penetration rates, level of education, number of employees, and diverse regions. Following the study by Grandon and Mykytyn (2004), it would be interesting to analyze mobile baking's adoption intent by segmented economic sectors. Perhaps socio-demographic variables have a more significant impact on the adoption of mobile banking.

Moreover, future studies should assess the adoption intent from the standpoints of users and non-users of financial products, as has been approached by Riemenschneider and McKinney (2002). Comparative studies could also be conducted to examine differences in the adoption processes between different banking channels such as online banking, telephone banking, and mobile banking to understand why users choose a particular channel over others. Such a study could also reveal the transactions made in each channel (Brown *et al.,* 2003).

Similarly, the TPB model should cover key constructs such as personal innovation (Pattansheti *et al.,* 2016), the cost of financial services (Luarn and Lin, 2005; Mwangi and Brown, 2015), complexity (Narteh *et al.,* 2017; Lu *et al.,* 2015), compatibility (Shaikh and Karjaluoto, 2015; Püschel *et al.,* 2010), and enabling conditions (Lu *et al.,* 2015). This empirical study could be a reference for other contexts and Latin American countries, and help lead microentrepreneurs to adopt mobile banking. However, according to Brown *et al.* (2003), although there are many similarities among microentrepreneurs in these countries, there are many differences based on technological infrastructure, business practices, government, regulatory constraints, and cultural differences, which might need to be accounted for in each study. For this reason, specific scenarios using TPB are needed to contextualize the phenomenon and delve deeper into a growing topic, as is mobile banking**.**

6. Conflict of interest

The authors declare no conflict of interest.

7. Source of Financing

8. References

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