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## Cultural impact on mobile banking use – A multi-method approach

Winnie Ng Picoto <sup>\*</sup>, Inês Pinto <sup>\*</sup>

ISEG, Lisbon School of Economics & Management, Universidade de Lisboa, Portugal

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### ABSTRACT

The literature has extensively studied the adoption and use of mobile banking and has proposed several factors that contribute to the use of such services. Besides these factors, we also use five of Hofstede's well-known cultural dimensions (power distance, uncertainty avoidance, individualism-collectivism, masculinity-femininity, and long/short-term orientation) to investigate their effect on the relation between the intention to use mobile banking and its actual use. The data comprise a sample of mobile banking users from four different countries (Brazil, India, the United Kingdom, and the United States). To test the research hypotheses, we use a multivariate regression and fsQCA to determine alternative solutions to the outcome of interest. The findings from these two methods show that both the power distance and the long-term orientation are important cultural dimensions that influence the relation between the intention to use mobile banking and its actual use in several ways.

### 1. Introduction

The remarkable advances made in telecommunications and information technologies has had an enormous impact on different service industries, in particular the banking sector (Laukkanen & Pasanen, 2007; Oliveira, Faria, Thomas, & Popovičac, 2014; Malaquias & Hwang, 2019). Banks have been investing in electronic channels to provide their clients with flexible ways to meet their needs with more complete and timely information and to increase their satisfaction, while reducing banks' operating costs (Laukkanen & Pasanen, 2007; Baptista & Oliveira, 2015; Malaquias & Hwang, 2019). The increased use of mobile phones and tablets has provided banks with an opportunity to offer customers more flexible and consistent financial services that increase the customers' efficiency (Laukkanen & Pasanen, 2007; Verissimo, 2016).

Mobile banking is a wireless service through which customers interact with the bank by using an application. They can access this application by downloading it from the bank's website or from a virtual store (Google Play, App Store) or through a browser. The app can be installed on a mobile device such as a mobile phone, smartphone, tablet, PDA (personal digital assistant), or wireless media player (Al-Jabri & Sohail, 2012; Laukkanen & Kiviniemi, 2010). Mobile banking services allow customers to perform remote banking operations such as check the movements and details of their personal accounts or make transfers between accounts nationally and internationally. They can also make payments, observe real-time capital market quotes, and place buy or sell

orders (Al-Jabri & Sohail, 2012).

Despite the great potential of this technology, the literature provides evidence that mobile banking is one of the least adopted types of self-service banking as compared to other types like automated teller machines (ATM) (Chakiso, 2019) or e-banking. However, the use of mobile devices to access the internet has increased exponentially in recent years. According to Eurostat (2019), individuals who use mobile devices to access the internet on the move increased from 36% in 2012 to 69% in 2018 in the European Union. Further, new technological innovations from voice-first development to artificial intelligence and advanced biometrics are constantly emerging in this sector (Fintech, 2019). The current studies show that national identity influences users' attitude toward technology acceptance (Chen, Widjaja, & Yen, 2014; Baptista & Oliveira, 2015; Beszta & Kiermas, 2019; Laukkanen & Kiviniemi, 2010; Shaikh & Karjaluo, 2015). Several studies have shown that cultural differences influence the acceptance of technology related products or services (Straub, 1994; Muk & Chung, 2015; Hassan & Wood, 2020). Thus, the study of cross-country differences is important to gain a better understanding of the factors that influence the use of this technology (Malaquias & Hwang, 2016; Zhang, Weng, & Zhu, 2018). Interestingly, the countries with higher penetration rates of mobile banking are developing countries, such as India, Indonesia, South Africa, and Brazil (Marous, 2015), that have not developed their banking systems or fixed telecommunication infrastructures enough, which encourages mobile banking. Sawe (2017) finds that mobile banking is more popular in

<sup>\*</sup> Address: Rua Miguel Lupi, 20, 1249-078 Lisbon, Portugal.

E-mail addresses: [w.picoto@iseg.ulisboa.pt](mailto:w.picoto@iseg.ulisboa.pt) (W.N. Picoto), [inespinto@iseg.ulisboa.pt](mailto:inespinto@iseg.ulisboa.pt) (I. Pinto).

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countries like Botswana, Kenya, and Uganda.

Although some studies have already explored the influence of national culture on electronic banking (Zhang et al., 2018), they only do a comparison of the differences between two countries (Hassan & Wood, 2020; Changchit, Klaus, Lonkani, & Sampet, 2020), or they introduce cultural moderators from Hofstede to a single country to compare the differences between individuals (Baptista & Oliveira, 2015). According to Zhang et al. (2018), most studies do not provide a clear understanding of the influence of national culture on the adoption and use of mobile banking. Therefore, we aim to fill this gap in the literature by analysing several countries simultaneously and using a multi-method approach. We use data from four different countries that are among those with higher levels of penetration in mobile banking (Marous, 2015): the United Kingdom (UK), India, Brazil, and the United States (US). These countries present different cultural characteristics (Hofstede, Hofstede, & Minkov, 2010), are in different parts of the world, and have different levels of economic development (Sachs, Schmidt-Traub, Kroll, Lafor-tune, & Fuller, 2019).

This study intends to answer the following research question: Do cultural dimensions, such as power distance, individualism, masculinity, uncertainty avoidance, and long-term orientation (Hofstede et al., 2010), have a moderating role on the relation between the intention to use mobile banking and its actual use?

Based on the research on adopting mobile banking, we analyse the effect of several commonly identified enablers and restrictors on the relation between the intention to use mobile banking and its actual use. We build on the meta-analysis results from Baptista and Oliveira (2016) and Zhang et al. (2018) to select the variables to explain the intention and use of mobile banking (perceived risk, perceived usefulness, perceived credibility, bank reputation, performance expectancy, and structural assurance). We also use Hofstedés cultural dimensions at the country level to investigate the effect of these dimensions on the relation between the intention to use mobile banking and its actual use.

In order to test the research model, we conducted a questionnaire in four countries with different ICT (Information and Communication Technologies) maturity levels and cultural dimensions, but with a high penetration of mobile banking, to ask bank customers about the factors that influence their use of mobile banking. With this aim in view, we first conduct a multivariate regression to test our research hypotheses. Then, we apply the fuzzy-set qualitative comparative analysis (fsQCA) as a holistic approach to gain a better understanding of the factors that explain the outcome of interest, the use of mobile banking.

This study makes several contributions. First, we determine the different factors that influence the acceptance of mobile banking by bank customers. Second, we analyse if these factors have different effects according to the country. For practitioners, this study is important as it indicates to bank managers what may enable or restrict the use of mobile banking, specifically taking into account the cultural dimension of the country. As we apply a qualitative comparative analysis, we consider all causal factors to explain the use or non-use of mobile banking, rather than treating the influence of each factor separately. As such, the study finds different configurations that lead to higher usage levels of mobile banking.

The remainder of the study is structured as follows: the next section presents the literature review and the hypothesis development. Next, we present the methods and the data analysis results from a multivariate regression and fsQCA. Then we discuss the results and present the implications for research and practice. The final section concludes the study.

## 2. Literature review and hypotheses

### 2.1. Determinants of mobile banking acceptance

Considering the increasing importance of mobile technology and the growing use of mobile banking, a study of the factors that facilitate or

restrict the use of this type of service has gained relevance in the information systems and technologies literature (Baptista & Oliveira, 2016). There are several theoretical models or frameworks that help to understand the determinants of a technological innovation; such as TAM, the Technology Acceptance Model (Davis, 1989; Venkatesh, 2003); ITM, the Initial Trust Model (Kim & Prabhakar, 2004); the Dual Factor Theory (Hsie, 2016); the UTAUT, the Unified Theory of Acceptance and Use of Technology Model (Venkatesh, Morris, Davis, Gordon, & Fred, 2003); the UTAUT 2 (Venkatesh, Thong, & Xu, 2012); and the DOI Diffusion of Innovation theory (Rogers, 2003). However, TAM is one of the most widely applied (Zhang et al., 2018).

Supported by those theories, the literature proposes several research models in order to explain the intention to use or actual usage of mobile banking (e.g., Laukkanen & Pasanen, 2007; Baptista & Oliveira, 2015; Verissimo, 2016; Malaquias & Hwang, 2019). Baptista and Oliveira (2015) propose a conceptual model based on the UTAUT2 theory and add cultural variables measured at the individual level as moderators of the relation between the intention to use mobile banking and its actual use. Similarly, Mahfuz, Khanam, and Hul (2016) build on UTAUT2 and the ITM and add the cultural constructs to explain that relation. Zhang et al. (2018) develop a meta-analysis with mobile banking studies from 27 different countries to understand the effect of cultural dimensions on the intention to use mobile banking. The results show that cultural dimensions do have a moderating effect on the relation between the intention to use mobile banking and its actual use and their antecedents.

Based on the meta-analysis results from Baptista and Oliveira (2016) and from Zhang et al. (2018), the present study considers the following set of antecedents for the intention to use mobile banking: perceived usefulness, perceived risk, perceived credibility, facilitating conditions, performance expectancy, structural assurance, and bank reputation. The factors such as social influence and hedonic motivation are not considered in the present study as they were not significant in a cross-culture context of mobile banking usage (Merhi, Hene, & Tarhini, 2019). As proposed by UTAUT2 (Venkatesh et al., 2012), our endogenous variables are behavioural intention (intention to use mobile banking) and use behaviour (actual use of mobile banking).

### 2.2. The influence of cultural dimensions on mobile banking acceptance

Despite the vast amount of studies on the determinants of mobile banking use, few have addressed the influence of cultural dimensions on why an individual adopts this type of technology. Zhang et al. (2018) find that the literature on this topic is scarce and does not provide clear evidence about which cultural dimensions affect mobile banking use and which affect the direction of such an effect. The majority of studies investigate this topic by comparing the differences in the antecedents of mobile banking use between two countries. However, these studies conclude that a country's cultural dimensions are important factors to consider when studying the adoption of information technologies in general as they can influence the successful implementation and use of these technologies (Leidner & Kayworth, 2006). We aim to contribute to the current debate by analysing the influence of five country-level dimensions from Hofstede et al. (2010) on the behavioural intention to use and the actual use of mobile banking in four different countries (Brazil, India, the UK, and the US).

Culture may be defined in different ways. We adopt the definition suggested by Hofstede (2011, p.3) according to which culture is "the collective programming of the mind that distinguishes the members of one group or category of people from others." Hofstede (1980) empirically developed a typology of cultural dimensions that classified countries along four dimensions: power distance, uncertainty avoidance, individualism-collectivism, and masculinity-femininity. Later on, a fifth dimension was added: the long/short-term orientation (Hofstede, 2001). In this work, we propose that each of these five country-level cultural dimensions influences the use of mobile banking. Based on the literature about the adoption of information technology (IT) in

general and mobile banking in particular, we develop the research hypotheses on the influence of these five dimensions on the relation between the intention to use mobile banking and its actual use.

### 2.2.1. Power distance

Power distance (PD) represents the extent to which the members of a society accept that power is distributed unequally (Hofstede, 2011). In a high PD society, individuals have more respect for authority and thus are more available to be told what to do (Daniels & Greguras, 2014). Regarding the acceptance of information technology, the literature provides mixed results regarding the influence of this cultural dimension. Some authors argue that innovation is more likely to occur in countries with a low PD (Zhao, Shen, & Collier, 2014). They consider that innovation rests in the hands of young people (Bagchi, Hart, & Peterson, 2004). However, Warkentin, Gefen, Pavlou, and Rose (2002) provide evidence that people in countries with a high PD are more likely to adopt e-government as it facilitates the interaction with the hierarchy (government). We predict that in higher PD societies, individuals are more dependent on the views and opinions of their superiors (Tarhini, Hone, Liu, & Tarhini, 2017). Therefore, the direction of the influence of PD on using mobile banking depends on the use and acceptance of this technology by the hierarchy. In this context, we propose the following hypothesis without predicting the direction of the influence of PD on the relation between the intention to use mobile banking and its actual use:

**H1:** Power distance moderates the relation between the intention to use mobile banking and its actual use.

### 2.2.2. Uncertainty avoidance

Uncertainty avoidance (UA) refers to the extent to which individuals feel uncomfortable with novel, unknown, surprising, or different situations (Hofstede, 2011). Therefore, we predict that societies with high levels of UA present lower rates of innovation and acceptance of information technology (Zakour, 2004). As the members of this type of society are more likely to avoid risks, higher UA is negatively related to the use of mobile banking (Bagchi et al., 2004). Our second hypothesis is then formulated in the following way:

**H2:** Uncertainty avoidance negatively moderates the relation between the intention to use mobile banking and its actual use.

### 2.2.3. Individualism-collectivism

Individualism (IND) is the degree to which each member in the society is integrated into a group (Hofstede, 2011). In societies with higher IND, individuals are more worried about taking care of themselves than the group. In contrast, in collectivist societies, people are more concerned about the cohesiveness and opinions of the group (Baptista & Oliveira, 2015). Regarding the adoption of information technology (IT), the literature argues that in collectivist cultures, individuals prefer to communicate in the group, face-to-face, in order to maintain relations as they value the collective. Therefore, we predict a lower rate of IT adoption in this type of society (Zhao et al., 2014) because mobile banking decreases the direct contact between customers and bank representatives. Additionally, individuals from countries that are more individualistic make decisions independently and are more innovative (Zhang et al., 2018). Grounded in this literature, we propose the following hypothesis:

**H3:** Individualism positively moderates the relation between the intention to use mobile banking and its actual use.

### 2.2.4. Masculinity-femininity

In masculine cultures (MASC), members of society are more assertive and are more materialistic as well as valuing achievement (Hofstede, 2011). Considering that the adoption of mobile banking may help banks and financial organizations to be more efficient and competitive, we

predict that adopting mobile banking is higher in masculine societies (Bagchi et al., 2004). Furthermore, Kaba and Osei-Bryson (2013) provide evidence that the role of perceived usefulness on the adoption of new technology is stronger in cultures with greater MASC. Considering these studies, we put forward the following hypothesis:

**H4:** Masculinity positively moderates the relation between the intention to use mobile banking and its actual use.

### 2.2.5. Long/short-term orientation

In a society with a long-term orientation (LT), people are more concerned about the future and being able to easily adapt to circumstances (Hofstede, 2011). In future-oriented societies, we predict that individuals engage in and accept societal advancements, such as technology innovation, in different ways (Zhao et al., 2014). On the other hand, the literature indicates that societies with LTs are more flexible and have a greater propensity to adopt advanced technologies (Kitchell, 1995; Leidner & Kayworth, 2006). In line with the literature, we develop the following hypothesis:

**H5:** Long-term orientation positively moderates the relation between the intention to use mobile banking and its actual use.

## 3. Methods

### 3.1. Data collection and sample

We developed an online survey to collect the data to test the research hypothesis. To measure the antecedents of the intention to use mobile banking and its actual use, we adapted the scales available in the literature. Appendix A presents the measures for each construct and the respective source from which it came. All items are measured with a 5-point Likert scale that ranges from 1-strongly disagree to 5-strongly agree. Mobile banking use is measured with a 5-point frequency scale that ranges from never to every day for each of the most common mobile banking functionalities. The cultural dimensions are defined according to Hofstede et al. (2010) in terms of PD, UA, IND, MASC, and LT on a scale from 1 to 100.

The data came from the UK, India, Brazil, and the US. These countries present different cultural characteristics. In fact, the UK shows a very high level of PD (92) in comparison with the other three countries in our sample (India 77, Brazil 69, and the US 40). The US presents a very high level of individualism (90), while the UK presents the lowest value in our sample (25). The UK also registers a very high level of UA (95) when compared to the other countries in the sample (Brazil has 76, US 46 and India 40). Regarding LT, the UK presents a value of 86, India 51, Brazil 44, and the US 26. Finally, the US is a highly masculine culture (62) when compared to India (56), Brazil (49), and the UK (27). The national cultural dimensions data for each country participating in this study was obtained from Hofstede et al. (2010).

Data were collected between the end of 2019 and the beginning of 2020. A total of 226 responses was gathered. From those, 18 were deleted given the large amount of missing data. The final sample comprises 208 responses, and Table 1 presents the descriptive statistics.

### 3.2. Reliability and validity tests

Prior to the data analysis, we assessed the psychometric proprieties of the instrument and the reliability and validity of latent variables. First, we computed the Cronbach-alpha and composite reliability of the reflective constructs. The results (see Appendix A) show that all variables present values above the 0.7 threshold (Hair, Black, Babin, & Anderson, 2009) after deleting one item for facilitating conditions. The deleted item is marked in the Appendix A. Convergent validity requires that item loadings are above 0.7 so that the items associated with a construct represent the same underlying construct (Hair et al., 2009). All

**Table 1**  
Descriptive Statistics of the Respondents (n = 208).

<b>Gender</b>	Male 71%	<b>Devices used for mobile banking access</b>				
	Female 29%	Smart phone or mobile phone	95%			
<b>Age</b>	<25	25–30	Tablet (example, iPad)	4%		
	12.1%	29%				
	30–35	35–40	Other	1%		
	28.5%	14%				
	>=40					
	15%	<b>Mobile banking access through:</b>				
<b>Education</b>	Undergraduate 25.5%	Bank's app		77.8%		
	Graduate 50.9%	Bank website accessed through a Mobile browser		9.3%		
Master Degree	19.9%	Google Wallet		6.9%		
Doctoral Degree	3.7%	Apple Pay		1.9%		
<b>Country</b>	UK	PayPal		3.7%		
	Brazil					
India	25.5%	<b>Respondents with a mobile broadband</b>		70.8%		
USA	25%					
<b>MB Functionalities Usage</b>	Never	Once a month	Twice a month	Once a week	Everyday	
	Checking account balance	2.29%	10.09%	8.72%	43.58%	35.32%
	Transfers to a bank account	3.23%	18.43%	24.88%	41.01%	12.44%
	Transactions history	3.23%	19.82%	19.35%	41.01%	16.59%
	Contactless payments	16.43%	19.25%	16.43%	23.00%	24.88%
	Reloading a phone-card	34.56%	17.05%	17.51%	20.28%	10.60%
	Transfers to a telephone number	35.94%	15.67%	15.21%	21.20%	11.98%

variables present items with loadings higher than the 0.7 threshold that means they represent the same latent variable. We also tested the discriminant validity of the measurement model by computing the AVE (average variance extracted) and the Fornell and Larcker (1981) test. The AVEs are above the threshold value of 0.5 for all constructs. Additionally, the squared root of AVE is higher than the correlation with each other variable (Table 2), thus the Fornell and Larcker test is satisfied, and the instrument also presents good discriminant validity. We can conclude that the instrument has psychometric proprieties of good quality. The composite scores based on the average of the item scores of each latent variable (Samagaio, Crespo & Rodrigues, 2018) were computed to be used in the multivariate regression and fsQCA.

3.3. Data analysis

We now estimate a model to determine which of the antecedents

**Table 2**  
Fornell and Larcker discriminant validity criterion.

	MBI	BREP	CRED	RISK	PEXP	STASS	USEFUL	MBUSE	FACIL
Behaviour Intention (MBI)	<b>0.86</b>								
Bank Reputation (BREP)	0.70	<b>0.78</b>							
Perceived Credibility (CRED)	0.58	0.64	<b>0.80</b>						
Perceived Risk (RISK)	-0.40	-0.27	-0.27	<b>0.79</b>					
Performance Expectancy (PEXP)	-0.41	-0.38	-0.27	0.71	<b>0.85</b>				
Structural Assurance (STASS)	0.41	0.40	0.59	-0.12	-0.04	<b>0.82</b>			
Perceived Usefulness (USEFUL)	-0.38	-0.30	-0.27	0.69	0.71	-0.01	<b>0.88</b>		
Mobile Banking use (MBUSE)	0.56	0.40	0.36	-0.38	-0.37	0.17	-0.38	n.a.	
Facilitating Conditions (FACIL)	0.44	0.47	0.51	-0.12	-0.10	0.74	-0.08	0.30	<b>0.79</b>

Note: the bold values in diagonal are the AVE square root, and the off-diagonal values are the constructs correlations.

described in the literature are more relevant in explaining the intention to use mobile banking. Therefore, we estimate the following regression:

$$MBI = \alpha_0 + \beta_1 BR + \beta_2 STASS + \beta_3 PEXP + \beta_4 FACIL + \beta_5 CRED + \beta_6 USEFUL + \beta_7 RISK + \epsilon \tag{1}$$

MBI is the intention to use mobile banking and is a behavioural construct (Venkatesh et al., 2012). Studies have used this construct as a predictor of use (Venkatesh et al., 2012). BR is bank reputation that is defined as the extent to which mobile banking users perceive the bank's image, identity, and personality (Chun, 2005). A good reputation means that the bank is perceived as possessing the ability, integrity, and goodwill to deliver mobile banking services (Kim, Shin & Le, 2009). STASS is the structural assurance that is defined as the individual's belief in structures like "guarantees, regulations, promises, legal recourse, or other procedures are in place to promote success" (McKnight, Choudhury, & Kacmar, 2002, p.339). In the case of mobile banking, this belief means that legal and technological resources protect mobile banking users from losing their data or money (McKnight et al., 2002). PEXP is performance expectancy that refers to the extent to which a mobile banking user believes that using the mobile banking system will improve his or her banking related activities (Venkatesh et al., 2012). FACIL is facilitating conditions that is defined as the existence of the perceived necessary infrastructure to support the use of mobile banking (Venkatesh et al., 2012). CRED is perceived credibility that is defined as the extent to which mobile banking is perceived as being a secure and private way to conduct banking activities (Yu, 2012). USEFUL is the perceived usefulness that refers to the extent to which someone thinks that using mobile banking will improve his or her banking related activities (Venkatesh et al., 2012). RISK is the perceived risk that is defined as the degree to which a person believes that issues such as hacking, fraud or faulty usage might occur while using mobile banking (Zhang et al. 2018).

The results in Table 3 show that BR, CRED, and RISK are statistically

**Table 3**  
Antecedents of intention to use mobile banking.

Variables:	Coefficient	Predicted Sign	Coefficient	P-Value
Intercept	$\alpha_0$	?	1.472	0.000
BR	$\beta_1$	+	0.532	0.000
STASS	$\beta_2$	+	0.092	0.194
PEXP	$\beta_3$	-	-0.023	0.628
FACIL	$\beta_4$	+	0.027	0.731
CRED	$\beta_5$	+	0.152	0.055
USEFUL	$\beta_6$	+	-0.051	0.274
RISK	$\beta_7$	-	-0.089	0.058
No of Observations			208	
R-squared			56.86%	

BR is bank reputation; STASS is structural assurance; PEXP is performance expectancy; FACIL is facilitating conditions. CRED is the variable perceived credibility. USEFUL is the variable perceived usefulness, and RISK is the perceived risk.

significant at least at the level of 10%. The signs of the coefficients for these variables are according to the expected signs found in the literature (Zhang et al., 2018).

Next, we use these three variables in conjunction with the cultural dimensions to investigate their roles in mobile banking use, according to the following model:

$$MBUSE = \alpha_0 + \beta_1 BR + \beta_2 CRED + \beta_3 RISK + \beta_4 CULTDIM * BI + \epsilon \quad (2)$$

MBUSE is mobile banking use. CULTDIM indicates each one of the five cultural dimensions: PD, UA, IND, MASC, and LT that are used to test our hypotheses.

In order to develop a better understanding of the role of a country cultural dimensions on the mobile banking use, we complement the multivariate regression analysis with fsQCA to find the configurations of causal conditions that lead to the presence of mobile banking use (Cheng et al., 2016) in a holistic approach. FsQCA 2.5 software was used to conduct this analysis. FsQCA considers the influence of all the causal conditions to the outcome by showing different combinations of those conditions that lead to higher usage levels of mobile banking.

All causal conditions are calibrated into fuzzy variables ranging from 0 (full non-membership) to 1 (full membership). For each condition we apply the same method of calibration as the one used by Ragin (2008) and Fiss (2011). This method considers three qualitative break points: the full membership corresponds to the 95th percentile, the crossover value corresponds to the median, and full non-membership corresponds to the 5th percentile. FsQCA 2.5 software also computes the necessary and sufficient conditions for the presence of the outcome (mobile banking use) (see Table 4).

4. Research results

4.1. Results from multivariate regression

Tables 5 and 6 show the results of the multivariate regression. In line with the literature, the findings of the first model, which does not include the cultural dimensions, indicate that BR and CRED are positively related with mobile banking while RISK negatively influences the use of mobile banking (Zhang et al., 2018). Models 2–6 contain the five cultural dimensions as moderating variables of the intention to use mobile banking and its actual use.

Consistent with a strand of the literature, the results show that the effects of MBI on MBUSE are greater in a culture with a higher PD. This result may be due to the fact that in these societies, individuals are more dependent on or influenced by the views and opinions of their superiors who can encourage the use of mobile banking (Tarhini et al., 2017).

Regarding UA (model 3), the results are contrary to the theory and are not intuitive (Bagchi et al., 2004; Zakour, 2004) as we find a positive moderating effect for this variable on MBUSE. Baptista and Oliveira (2015) also find a positive moderating effect of UA on the intention to

Table 4 Calibration and descriptive statistics of the causal conditions and the outcome.

	UA	PD	LT	BREP	CRED	RISK	USE
<i>Calibration Criteria</i>							
Full membership (95%)	95	92	86	5	5	4.2	4.5
Full non-membership (5%)	40	40	26	2.83	2.6	1	1.83
Crossover (50%)	46	73	47.5	4.17	4	2.6	3.17
<i>Descriptive Statistics</i>							
Mean	63.99	69.43	51.58	4.23	4.02	2.64	3.20
Standard Deviation	22.40	18.91	21.70	0.69	0.76	1.02	0.81
Minimum	40	40	26	1	1	1	1.17
Maximum	95	92	86	5	5	4.8	5

Table 5 Results from multivariate regression analysis.

Variables:	Coef.	Predicted Sign	Coef. (1)	P-Value (1)	Coef. (2)	P-Value (2)	Coef. (3)	P-Value (3)	Coef. (4)	P-Value (4)	Coef. (5)	P-Value (5)	Coef. (6)	P-Value (6)
Intercept	$\alpha_0$	?	1.448	0.000	1.000	0.139	0.908	0.256	1.751	0.002	1.760	0.002	0.619	0.346
BR	$\beta_1$	+	0.575	0.000	-0.023	0.859	0.002	0.983	0.042	0.770	0.03	0.833	-0.016	0.899
CRED	$\beta_2$	+	0.210	0.008	0.037	0.766	0.046	0.705	0.067	0.594	0.064	0.609	0.033	0.786
RISK	$\beta_3$	-	-0.136	0.000	0.233	0.000	0.233	0.000	0.217	0.000	0.215	0.001	0.24	0
PD*BI	$\beta_4$	?	-	-	0.003	0.014	-	-	-	-	-	-	-	-
UA*BI	$\beta_5$	-	-	-	-	-	0.003	0.040	-	-	-	-	-	-
IND*BI	$\beta_6$	+	-	-	-	-	-	-	0.002	0.164	-	-	-	-
MASC*BI	$\beta_7$	+	-	-	-	-	-	-	-	-	0.003	0.219	-	-
LT*BI	$\beta_8$	+	-	-	-	-	-	-	-	-	-	-	0.004	0.002
No of Observations			208		208		208		208		208		208	
R-squared			55.46%		12.62%		12.15%		10.51%		10.51%		13.39%	
Country Dummies			Yes		Yes		Yes		Yes		Yes		Yes	

This table presents the role of country cultural characteristics in mobile banking use (MBUSE). BR is bank reputation; CRED is perceived credibility; RISK is perceived risk. The cultural dimensions from Hofstede et al. (2010) are: PD is the power distance dimension; UA is the uncertainty avoidance; IND is the individualism; MASC represents the level of masculinity of a society; and LT refers to the long-term orientation. BI is the intention to use mobile banking.

**Table 6**  
Results of hypotheses testing.

Hypothesis	Description	Supported	$\beta$	P
Hypothesis 1	PD has a moderating role in the relation between the intention to use mobile banking actual use.	Supported	$\beta_4 > 0$	$P = 0.014$
Hypothesis 2	UA has a negative moderating role in the relation between the intention to use mobile banking and actual use.	Not supported	$\beta_5 < 0$	$P = 0.040$
Hypothesis 3	IND has a positive moderating role in the relation between the intention to use mobile banking and actual use.	Not supported	$\beta_6 > 0$	$P = 0.164$
Hypothesis 4	MASC has a positive moderating role in the relation between the intention to use mobile banking and actual use.	Not supported	$\beta_7 > 0$	$P = 0.219$
Hypothesis 5	LT has a positive moderating role in the relation between the intention to use mobile banking and actual use.	Supported	$\beta_8 > 0$	$P = 0.002$

use mobile banking and its actual use. The authors argue that this result is due to the characteristics of multivariate regression analyses that address the effect of cultural dimensions on mobile banking use separately. We argue that this analysis should be complemented with the holistic fsQCA approach in order to define different causal paths that can justify the use of mobile banking and further understand the role of UA in this specific context.

Models 4 and 5 show that IND and MASC do not have a significant moderating role in the relation between the intention to use mobile banking and its actual use. [Srite and Karahanna \(2006\)](#) argue that IND has a higher influence on the acceptance of collaborative technology than on the acceptance of standalone systems, as is the case with mobile banking. Regarding MASC, our result may be influenced by the fact that this dimension presents the smallest standard deviation, ranging from 27 for the UK to 62 for the US. This finding is in line with the studies of [Sriwindono and Yahya \(2012\)](#) and [Baptista and Oliveira \(2015\)](#) that also conclude that masculinity-femininity is not a significant moderator of mobile banking use.

Model 6 validates our last hypothesis regarding the moderating role of the LT. In fact, this variable presents a strong and positive effect that moderates the relation between the intention to use mobile banking and its actual use.

4.2. Results from fsQCA

FsQCA calculates the necessary and sufficient conditions that lead to an outcome of interest by applying Boolean algebra. If the outcome is a subset of a condition set, then this condition is necessary for that outcome ([Ragin, Drass, & Davey, 2006](#)). The fsQCA software shows that there is no necessary condition for the presence of high levels of mobile banking use.

The sufficient condition analysis determines the different configurations of the causal conditions that lead to the outcome. In this case, we use fsQCA to analyse the presence of the outcome (MBUSE) through the following model:

$$MBUSE = f(UA, PD, LT, BANKREP, CRED, RISK)$$

After calibrating each condition and the outcome, we examine the truth table for the outcome and defined the consistency threshold as 0.88 ([Ragin, 2008](#)). The sufficient condition results are presented as the complex, the parsimonious, and the intermediate solutions in fsQCA. We use the parsimonious and intermediate solutions in our results. [Table 7](#) graphically depicts each solution (according to [Crilly, Zollo, & Hansen, 2012](#); [Misangyi & Acharya, 2014](#)). Core conditions appear both in the parsimonious and the intermediate solutions, while the peripheral conditions are the ones that only appear in the intermediate solution.

[Table 7](#) shows the three configurations that lead to the presence of high levels of mobile banking use. These configurations show an overall

**Table 7**  
Sufficient configurations for high use of mobile banking.

	Solution 1	Solution 2	Solution 3
UA	○	●	
PD	●	○	●
LT	●	○	●
BREP			○
CRED		●	●
RISK		●	●
Consistency	0.82	0.87	0.87
Raw Coverage	0.34	0.27	0.27
Unique Coverage	0.13	0.12	0.05
Overall Solution Consistency	0.81		
Overall Solution Coverage	0.54		

Note: ● = core causal condition present; ● = peripheral causal condition present; ○ = core causal condition absent; ○ = peripheral condition absent.

solution consistency of 0.81 and an overall coverage of 0.54, which are above the thresholds values of 0.75 and 0.25 suggested by [Ragin \(2008\)](#). Therefore, we can conclude that those solutions are informative ([Samagaio et al., 2018](#)).

The first configuration indicates that low levels of UA and high levels of PD and LT lead to the presence of high levels of mobile banking use. This configuration has a consistency of 0.822 and a coverage of 0.34 that means it represents 34% of the cases with high levels of mobile banking use. The second configuration shows that high levels of CRED and high levels of RISK together with the absence of PD, the absence of LT, and the presence of UA are also a possible path to high levels of mobile banking use. This configuration has a coverage of 0.27 and a consistency of 0.88. The last configuration shows that high levels of CRED and high levels of RISK together with the absence of BR and higher levels of PD and LT also lead to higher levels of mobile banking use. This solution presents a coverage of 0.27 and a consistency of 0.87. The raw coverage for each solution represents the percentage of cases that this solution covers. All coverages are above 0.27, so the solutions obtained cover a high percentage of cases. The consistency indicates the degree of agreement between the cases and the solution to achieve the outcome ([Ragin et al., 2006](#)). All consistency values are above 0.82 that give equifinal solutions to explain the presence of the outcome.

5. Discussion

Our results provide evidence that cultural dimensions have an influence on the relation between the intention to use mobile banking and its actual use. In countries with higher power distance, such as the UK, in which individuals tend to have more respect for authority, the relation between the intention to use mobile banking and its actual use is stronger ([Tarhini et al., 2017](#)). On the other hand, in countries with long-term orientation, such as the UK, that show more willingness to innovate, the effect of intention to use is stronger. The solutions of fsQCA reinforce the importance of power distance and long-term orientation for the use of this technology. In fact, in solution 3 (PD\*LT\* ~ BR\*CRED\*RISK), the fsQCA configuration indicates that users from countries with a higher power distance and a greater long-term orientation who have higher levels of perceived credibility and perceived risk use mobile banking more, even with lower levels of bank reputation. The findings indicate that if the society is future-oriented and individuals have more respect for authority and hierarchy, the perceived risk and bank reputation are less important factors in the decision to use mobile banking.

Regarding uncertainty avoidance, our findings from the multivariate regression are contradictory with earlier research and counterintuitive, although researchers have also found this result ([Baptista & Oliveira, 2015](#); [Zhang et al., 2018](#)). In fact, in countries with higher levels of

uncertainty avoidance, the relation between the intention to use mobile banking and its actual use is stronger. Considering that these characteristics may be influenced by the other dimensions or the antecedents of the intention to use mobile banking, we use fsQCA to have a better understating of the relation between cultural dimensions and the use of mobile banking in a holistic way. Solution 2 (UA\* ~ PD\* ~ LT\*CRE-D\*RISK) indicates that in a society with a lower power distance and a short-term orientation, the presence of perceived credibility and risk may lead to a higher use of mobile banking, even in a society where individuals avoid innovation or new situations. This result may occur due to the fact that individuals who frequently use mobile banking are aware of the risks that this type of technology may entail but consider that the existing infrastructure is credible and reliable. Then, even in a society with uncertainty avoidance, they are willing to use mobile banking. Additionally, solution 1 of the fsQCA configurations (~UA\*PD\*LT) shows that in a future-oriented society with lower uncertainty avoidance and higher power distance, there are higher levels of mobile banking use. This result is in line with our hypotheses and the literature. Interestingly, in these two solutions, the three causal conditions that relate to cultural dimensions are involved. In fact, when the UA is present, both the PD and LT are absent, while when UA is absent, PD and LT are present. This evidence shows that countries with higher levels of uncertainty avoidance but with low power distance and less long-term orientation as well as countries with low uncertainty avoidance but higher levels of power distance and long-term orientation are suitable contexts for mobile banking use to grow.

6. Implications for research and practice

Our findings make theoretical contributions to researchers and managerial implications to the banking industry. On the one hand, we provide additional insights by investigating the mediating role of national culture on the relation between the intention to use mobile banking and its actual use that complements technology acceptance models. Our results are based on four different countries with different cultural characteristics that provide evidence that power distance and long-term orientation positively moderates the relation between the intention to use mobile banking and its actual use. Regarding uncertainty avoidance, the fsQCA analysis helps us to explain the counterintuitive result also found by other researchers (Baptista & Oliveira, 2015; Zhang et al., 2018) that in countries with higher levels of uncertainty avoidance, the relation between the intention to use mobile banking and its actual use is stronger. The knowledge of risks and the confidence in

infrastructures can enable individuals to use mobile banking despite their higher uncertainty avoidance. Furthermore, the results show that there are cultural differences that effect the mobile banking use in different countries. Therefore, studies that apply the UTAUT2 should consider this effect.

On the other hand, our findings are also relevant for banking managers as they indicate which cultural factors can drive the use of mobile banking that enable a more adequate supply of services through new technologies.

7. Conclusions, limitations, and further research

This study contributes to a deeper understanding of the moderator role of national cultural dimensions on the relation between the intention to use mobile banking and its actual use. Overall, the results show that the national culture does have a moderator role. Although our findings do not validate the effect of the individualism and masculinity cultural dimensions, we do find that power distance, uncertainty avoidance, and long-term orientation are cultural moderators on the relation between the intention to use mobile banking and its actual use (Zhang et al., 2018).

Despite the contributions of this research, it also has some limitations. The respondents were volunteers who answered a self-reported questionnaire, so the results cannot be generalized. Additionally, a set of four countries is considered in this research that may also influence our findings. Finally, a limited number of antecedents on the relation between the intention to use mobile banking and its actual use were considered in this article. Further research could increase the number of countries under study as well as take into account a different set of antecedents for mobile banking use.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A

Construct	Item	Loadings	Reference
<b>Perceived Risk</b> (α = 0.85, CR = 0.90, AVE = 0.63)	I think my money could be stolen easily if I use mobile banking.	0.85	<a href="#">Chemingui and Ben Lallouna (2013)</a> , <a href="#">Laukkanen (2016)</a> , and <a href="#">Dasgupta, Paul, and Fuloria (2011)</a>
	I do not trust the functionality of banking services using mobile devices.	0.86	
	I am more likely to make mistakes while using mobile banking services for my banking transactions.	0.78	
	While using mobile banking it is likely that I may make mistakes in tapping out the correct pin codes.	0.82	
	While using mobile banking, the connection could be lost and incomplete transactions could occur.	0.63	
<b>Perceived Credibility</b> (α = 0.86, CR = 0.87, AVE = 0.65)	When using MB I believe: my information is kept confidential	0.85	<a href="#">Yu (2012)</a>
	my transactions are secured	0.79	
	my privacy will not be divulged	0.70	
	the banking environment is safe	0.85	
	my pin codes and other personal information will be safe from unauthorized third parties	0.83	
<b>Perceived Usefulness</b> (α = 0.86, CR = 0.86, AVE = 0.78)	I prefer mobile banking to visiting the bank branch and transacting with the bank officials personally.	0.88	<a href="#">Chemingui and Ben Lallouna (2013)</a> , <a href="#">Kim et al. (2009)</a> , and <a href="#">Laukkanen (2016)</a>
		0.89	

(continued on next page)

(continued)

Construct	Item	Loadings	Reference
	I find self-service alternatives more pleasant than personal customer service.		
	I am so used to the means provided by the branch to do my financial transactions that I find it difficult to move to mobile banking.	0.88	
<b>Facilitating Conditions</b> ( $\alpha = 0.80$ , CR = 0.81, AVE = 0.62)	In my opinion, there is enough information available about mobile banking services.	0.85	Chemingui and Ben Lallouna (2013)
	M-banking guidance information is not enough.	Deleted	
	I feel that when needed, I will get enough guidance from the bank related to mobile banking services.	0.74	
	I think that I am aware about the benefits of m-banking.	0.80	
	I think that I have received enough information about m-banking	0.77	
<b>Performance Expectancy</b> ( $\alpha = 0.91$ , CR = 0.93, AVE = 0.73)	I am worried I might lose important information by pressing a wrong key.	0.77	Chen (2013) and Shen, Huang, Chu, and Hsu (2010)
	I am worried I might make irreparable mistakes when using the mobile banking services.	0.81	
	Using m-banking makes me feel uncomfortable.	0.88	
	Using m-banking makes me feel anxiety.	0.89	
	Using m-banking makes me feel nervous.	0.89	
<b>Structural Assurance</b> ( $\alpha = 0.76$ , CR = 0.78, AVE = 0.67)	I feel assured that legal and technological structures adequately protect me from payment problems on the mobile internet.	0.76	Kim et al. (2009)
	Mobile Internet is a robust and safe environment in which to use mobile banking.	0.84	
	I feel confident that encryption and other technological advances on the mobile internet make it safe for me to use mobile banking.	0.85	
<b>Bank Reputation</b> ( $\alpha = 0.85$ , CR = 0.90, AVE = 0.63)	My bank has a good reputation.	0.81	Kim et al. (2009)
	My bank is recognized widely.	0.72	
	I would trust my bank to offer secure mobile banking.	0.73	
	My bank is known for its suitability.	0.81	
	The services my bank provides are of great quality.	0.82	
	My bank is a secure institution.	0.81	
<b>Behaviour Intention</b> ( $\alpha = 0.83$ , CR = 0.90, AVE = 0.75)	I intend to continue using mobile banking in the future.	0.87	Venkatesh et al. (2012)
	I will always try to use mobile banking in my daily life.	0.81	
	I plan to continue to use mobile banking frequently.	0.91	
<b>MB Use</b> (formative construct) Scale: Never, Once a month, Twice a month, Once a week, Everyday	What type of transactions you usually do in mobile banking?	n.a.	Beszta and Kiermas (2019) and Venkatesh et al. (2012)
	Checking account balance		
	Transfers to a bank account		
	Transactions history		
	Contactless payments		
	Reloading a phone-card		
	Transfers to a telephone number		

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**Winnie Ng Picoto** is Associate Professor of Information Systems and Operations Management at ISEG, Lisbon School of Economics & Management, at the University of Lisbon. She holds a BA in industrial engineering and management from the Instituto Superior Técnico, a MIS from ISEG and a PhD in management from the Technical University of Lisbon. She is a member of the Advance Research Center. Her current research interests include the use of innovative IS, IT value, big data and emerging technologies. Her work has been published in journals such as *European Journal of Information Systems*, *Journal of the Association of Information Systems*, *Journal of Business Research*, *Industrial Management and Data Systems*, and *Journal of Organizational Computing and Electronic Commerce*.

**Inês Pinto** completed is PhD in management at ISEG - Technical University of Lisbon, where she is Assistant Professor, teaching Accounting, Corporate Finance and Real Estate Finance. She has a master in finance from ISCTE-Instituto Superior de Ciências do Trabalho e da Empresa in Lisbon. She started her professional career as credit analyst in Deutsche Bank and Barclays Bank and worked as consultant in CB Richard Ellis. Simultaneously, she taught accounting in *Universidade Católica Portuguesa* until 2000. Her main interests are earnings quality, financial reporting and real estate finance.