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A cross-cultural study of the intention to use mobile banking between Lebanese and British consumers: Extending UTAUT2 with security, privacy and trust

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ABSTRACT

This study aims to examine the key factors that may hinder or facilitate the adoption of mobile banking services in a cross-cultural context. A conceptual framework was developed through extending the Unified Theory of Acceptance and Use of Technology UTAUT2 by incorporating three additional constructs, namely trust (TR), security (PS) and privacy (PP). Data were collected using an online survey and a self-administrated questionnaire from 901 mobile banking users who were either Lebanese or English. These were analysed using structural equation modelling based on AMOS 23.0. The results of this analysis indicated that behavioural intention towards adoption of mobile banking services was influenced by habit (HB), perceived security (PS), perceived privacy (PP) and trust (TR) for both the Lebanese and English consumers. In addition, performance expectancy (PE) was a significant predictor in Lebanon but not in England; whereas price value (PV) was significant in England but not in Lebanon. Contrary to our expectation, Social Influence (SI) and Hedonic Motivations (HM) were insignificant for both the Lebanese and English consumers. Overall, the proposed model achieved acceptable fit and explained 78% of the variance for the Lebanese sample and 83% for the English sample – both of which are higher than that of the original UTAUT2. These findings are expected to help policy makers and bank directors understand the issues facing mobile banking adoption in different cultural settings. Subsequently, they will help guide them in formulating appropriate strategies to improve the uptake of mobile banking activities. As the low mobile banking adoption rate in Lebanon can be attributed to the novelty of this technology, the Lebanese banking sector stands to greatly benefit from this study.

1. Introduction

The evolution of internet services and technologies has affected the operation and management of most commercial and non-commercial systems, including banking services [1,2]. While traditional banking services were restricted to physical channels such as bank branches, telephones banking and automated teller machines (ATMs), Mobile Banking has removed the physical limitations from daily banking activities. Customers can now complete their banking at a time and place of their choosing [3,4]. Moreover, banking activities such as fund transfers, investments, payments as well as regular account information check-ups were possible purely through bank websites [5,6], thereby providing a fast and efficient alternative for branch visiting banking services. Mobile Banking was similarly advantageous to banks, providing a cost effective and profitable banking platform which offers customers higher quality banking services [7].

Despite the benefits to customers and banks alike, customers were found to regard Mobile Banking services with caution and reluctance [8,9]. Frequent deterrents to Mobile Banking adoption by consumers were related to the technology's perceived ease of use and effectiveness, the skills necessary for its use, as well as security risks associated with this novel technology [7,10–14]. This was illustrated by a survey by the Federal Reserve Bank of America, which showed that around 65% of respondents in the US with a mobile phone were concerned about the security of mobile payments, or could simply see no benefit in their use.

Furthermore, when examined in different populations, the adoption of Mobile Banking exhibited noteworthy variations, which were attributed to cultural as well as social factors [15,16]. Lebanon was not exempt from the influence of these, as evidenced by the poor adoption of Mobile Banking. This persisted despite the significant increase in the Lebanese population's internet use from 13.3% in 2005 to 75.9% in 2016 and extensive investment in internet banking field [17]. In fact, a

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survey conducted in the Middle East and North Africa (MENA) region found that Lebanese respondents were among the least likely to use digital banking, which includes both online and mobile banking. As a result, only 38% of Lebanese consumers were found to use both mobile and online banking, with just 6% using mobile banking alone. These rates were very low compared to other Middle Eastern countries such as KSA, where digital banking was found to be used by 60% of survey respondents [18].

The differential effect of factors such as social norm and cultural influences on the adoption of e-services in dissimilar cultural settings, such as Lebanon and England, were demonstrated [19]. The critical effect of social and organisational factors in the Lebanese sample, which was not reflected in its English counterpart, emphasizes the importance of adapting a Western (developed country) technological model to a developing country setting. Thus, the potential benefits of Mobile Banking, coupled with the problematic adoption rates in developing countries, demand further cross-cultural studies to improve its prospects in such countries. Determining the factors affecting Mobile Banking adoption in Lebanon is crucial in improving Mobile Banking penetration and hence preventing potential financial losses [20]. Recent studies advocate that innovation is a key influence on a company's performance and competitiveness. Chen and Huang [21], suggest that innovation orientation is a critical facilitator of company performance in service industries. This was supported by Uzkurt et al. [22], who found that innovation was critical for Turkish banks to stay competitive and ensure continued good performance.

According to Hofstede, Individualism/Collectivism reflects the nature of the relationships existing between members of society, be they restricted to direct family members as is the case of individualist societies or extended to encompass extended family and work relations in collectivist ones such a Lebanon. Additionally, Power distance represents the extent to which individuals expect and accept equal distribution of power in their society. Those who score higher on power distance accept power inequalities and expect orders to be willingly followed. As for Uncertainty Avoidance, it embodies the adaptation and response of a society facing ambiguous situations, with the clear aim of circumventing them. A society's Long-Term Orientation determines whether it is normative in its thinking and adherent to its traditions or rather pragmatic in its approach towards past and future events. A society's Restraint or indulgence of desires and impulses is also indicative of its culture and reflects optimism and positivity in indulgent societies or alternatively cynicism and pessimism in those showing Restraint. The Hofstede model's cultural dimensions scores for Lebanon and England showed the striking difference between these two countries and this was reflected in their differing adoption of e-services and m-services. While Lebanon was found to be a collectivist, hierarchical, normative, cynical and pessimistic society, England was contrarily a non-hierarchical, highly individualist and private society, comfortable in ambiguous situations [23], see Appendix A. Additionally, Lebanon had relatively modest human and financial resources along with immature technology investment and adoption rates as compared to western countries [19,24–26].

Accordingly, this study aims to examine the key factors that may hinder or facilitate the adoption of mobile banking in a cross-cultural context. This is studied by examining mobile banking adoption by extending the unified theory of acceptance and use of technology UTAUT2. The research model contributes to the current literature by integrating the roles of the three constructs; trust (TR), security (PS) and privacy (PP) into technology acceptance in a cross-cultural context. From a theoretical perspective, this paper contributes to extant technology adoption literature as recommended by researchers (e.g. Ref. [16] through the expansion of technology adoption and acceptance models and theories beyond the initial context for which they were conceived. So far, no research has been found to examine these three constructs collectively in a cross-cultural context.

As such, the present study aims to determine the generalisability and applicability of the UTAUT in an understudied context, namely that of mobile banking among users in two different cultural settings (Lebanon, England). The latter was recognized as a critical step for the advancement of a theory [27] and allows the exploration of where differences may lie between the cultures involved.

Based on the above discussion, this study aims to examine the key factors that may hinder or facilitate the adoption of mobile banking in a cross-cultural context through the extension of the unified theory of acceptance and use of technology UTAUT2 with three additional constructs namely, trust (TR), security (PS) and privacy (PP). The UTAUT2 was an adaptation of the original UTAUT model to a voluntary individual consumer context, which significantly differs from its organisational counterpart. Moreover, the UTAUT2 incorporated three key constructs hedonic motivation, price value, and habit, which were suggested as significant antecedents of individual usage intention. in this regard, the UTAUT2 was especially suited for the examination of behavioural intention towards the adoption of mobile banking among Lebanese and British consumers. The extension of the UTAUT conferred it with superior explanatory power of the variance in consumer usage intention [16], which however did not eliminate the need to adapt it to the characteristics of the studied technology. the latter was advocated by many researchers including Venkatesh et al. as a fundamental approach for the advancement of the understanding of the studied phenomenon. Unlike mobile internet technology for which the UTAUT2 was formulated, the mobile banking field was fraught with security risks and sensitive financial dealings. the extension of the UTAUT2 with TR, PS, and PP was thus justified and was expected to further improve the model's explanatory power, which was not independent of the technology itself [28].

From a theoretical perspective, this paper also contributes to extant technology adoption literature as recommended by researchers (e.g. Ref. [16] through the expansion of technology adoption and acceptance models and theories beyond the initial context for which they were conceived. As such, the present study aims to determine the generalisability and applicability of the UTAUT in context that has not been examined extensively, namely that of mobile banking among users in two different cultural settings (Lebanon, England). The latter was recognized as a critical step for the advancement of a theory [27] and provides a mechanism to explore differences in the cultures involved. From a practical perspective, this research will be helpful for bank directors and policy makers in Lebanon and England in formulating strategies to improve the uptake of mobile banking activities by Lebanese and English consumers.

The structure of the paper is as follows. The next section proposes the conceptual framework, and this is followed by the research methodology that guided our research. Section four presents the results of the statistical data analysis. Before concluding the paper in section six, section five discusses the results, including their implications for theory and practice.

2. Conceptual framework

2.1. Background

Technology acceptance has attracted the focus of researchers for decades, a fact reflected in the various studies and technology acceptance models available in this field (2007). Mobile banking was not an exception and its acceptance was predominantly studied using five models; the innovation diffusion theory (IDT) [29], theory of reasoned action (TRA) [30], theory of planned behaviour (TPB) [31], technology acceptance model (TAM) [32], and theory of perceived risk (TPR) [33]. However, these models were not without limitations. Hence [34], attempted to overcome these limitations by proposing the UTAUT model. UTAUT model is the consolidation of the eight models and previous research pertaining to them. These models include four of the five already mentioned (with the exception of TPR), in addition to the

motivational model (MM) [35], the PC utilization model (MPCU) [36], the social cognitive theory (SCT) [37], and an integrated model of technology acceptance and planned behaviour (TAM-TPB) [38]. The UTAUT model's four constructs (performance expectancy, effort expectancy, social influence, and facilitating conditions) succeeded in accurately predicting system usage and acceptance while accounting for additional influences such as moderators [39] and conferring this model with superiority over its counterparts [34,40]. Moreover, the model was validated in different countries and contexts such as Internet Technology [41,42], Internet Banking [19,43,44], E-government and Mobile Banking [45,46] among others, albeit oftentimes incompletely by dropping certain of its factors (i.e. Hedonic Motivations, Price value [16].

Nevertheless, the UTAUT model's own limitations soon emerged [47], embodied by its conception for an organisational context as opposed to a consumer one. As a result, the necessity of adapting this model to better represent consumer acceptance and intentions was suggested, especially in the context of e-business [48]. Additionally, this model failed to account for task-technology fit and technology performance as well as user satisfaction, factors that are considered imperative for the measurement of technology usage and success [49].

The UTAUT model was consequently modified and extended by adding three constructs. These are the hedonic motivation, price value, and habit, aiming to integrate its consumer context and address its limitations. Accordingly, UTAUT2 emerged to allow the analysis of consumer technology use in a voluntary setting with the integration of age, gender and experience as moderators of the model's proposed relationships all the while assuring a markedly higher explanation of the variance in use and intention [16]. Moreover, UTAUT2 has since been applied, validated and extended in multiple fields such as e-services [50], Mobile banking [9,51], Online shopping [52,53] Internet banking [15], smartphone [54,55] and e-learning [56], further establishing it as a comprehensive model for the study of technology acceptance both in organisational and consumer contexts.

The proposed research model is adopted from the summarised version of the UTAUT2 model. Fig. 1 presents the proposed conceptual framework and a detailed explanation of each factor is presented in the next subsections.

2.2. Performance expectancy (PE)

Performance expectancy (PE) is the extent of benefit to be had in particular activities due to the use of a technology [16]. Throughout multiple studies, PE was consistently found to have a significant effect on users' behavioural intention (BI) to use a technology and was proven to be its strongest indicator [13,34,40,57]. A study conducted in Lebanon confirmed these results and found that PE was a positive indicator of Lebanese internet banking consumers' intention to use this service [19]. In this study, PE will indicate the user's perceived benefit of mobile banking use, more specifically, accelerating routine banking transactions such as account checks and payments. Thus, PE will reflect the impact of the convenience ensured by mobile banking on the adoption of this technology. The perceived convenience was proposed to be due to the remote 24/7 availability of financial services through mobile banking. Therefore, the following hypothesis is proposed:

H1a,b: PE will significantly and positively influence the consumers' behavioural intention towards adopting mobile banking services in the English and Lebanese context.

2.3. Effort expectancy (EE)

Perceived ease of use was initially introduced by Davis [32] in the Technology Acceptance Model (TAM) as a fundamental determinant of user acceptance and has since been validated in multiple UTAUT2 studies as a significant precursor [9,16,34] and precise predictive factor [58] of behavioural intention. UTAUT2 defines effort expectancy as "*the degree of ease associated with consumers' use of technology*" [16], with a positive effect on intentional behaviour to use this technology [34]. As might be expected, consumers were more likely to adopt a technology requiring little effort to be effectively used.

Studies have shown a positive association between mobile banking's perceived usefulness and the incidence of the initial willingness to use it [9,13,59,60]. In fact, service usefulness was found to be the main reason consumers adopted mobile service systems to complete banking transactions [61].

Studies have demonstrated that the Lebanese consumer market was receptive to new technology in the event that it was easy to use [62,63]. This was validated when perceived ease of use of an e-learning system was found to be a significant predictor of students' intention to adopt the system [19]. Thus, the author assumed that users were more likely to access and adapt Mobile Banking services provided it was believed to be easy to use.

Subsequently, the following hypotheses are proposed:

H2a,b: EE will significantly and positively influence the consumers'

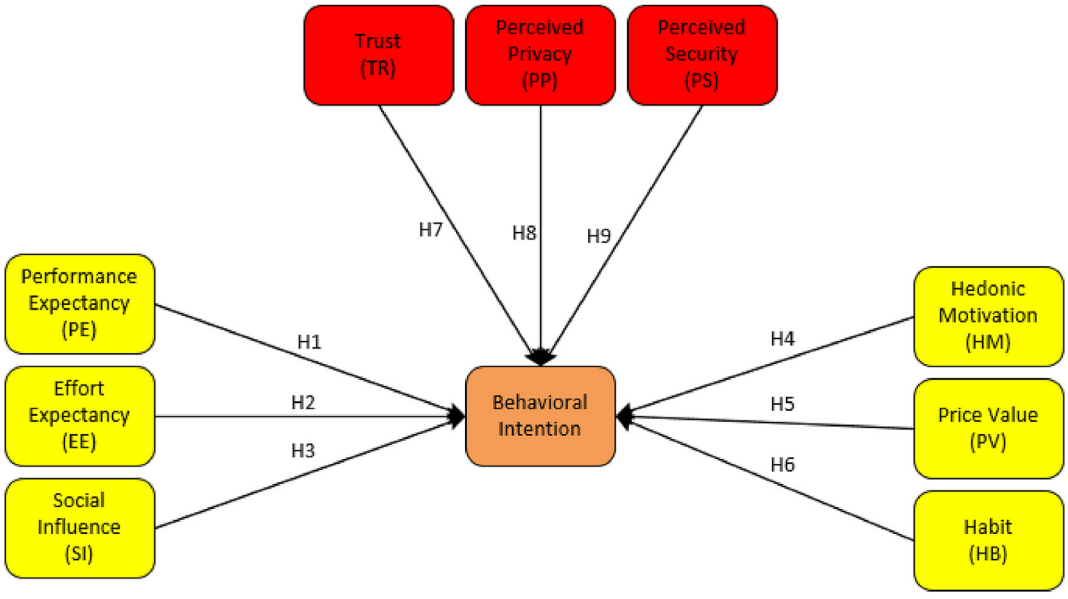


Fig. 1. The proposed conceptual framework.

behavioural intention towards adopting mobile banking services in the English and Lebanese context.

2.4. Social influence (SI)

Social influence is defined as "*the extent to which consumers perceive that important others believe they should use a particular technology*" [16]. This includes family, friends, co-workers, media and social media and significantly influences user perceptions and behaviour. Social influence was shown to have a significant impact on behavioural intention in mobile banking adoption (Sharma K and Govindaluri M, 2014; [60,64–68].

According to Lebanon's cultural index as proposed by Hofstede [69]; power distance in this country is high which indicates a tendency of the Lebanese people to follow orders as well as expect and accept hierarchy. Moreover, individualism is low in Lebanon and consequently its people considered families and even extended relationships of the utmost importance, overshadowing societal rules. Oppositely, power distance is low while individualism is high in England, which explains the difference between these two populations as well as suggests that Lebanese individuals would be more likely to be influenced by others, namely family and co-workers, even in matters such as mobile banking usage. This effect was expected to be less in the English population where familial and societal influence was of a lesser extent.

Based on the difference between those two countries and the significant impact of social influence on behavioural intention as observed in the previous studies, the following hypothesis is proposed:

H3a,b. Social influence positively influences the behavioural intention to adopt mobile banking in Lebanon and England.

2.5. Hedonic motivation (HM)

Hedonic motivation, or perceived enjoyment, is defined as the amusement, cheerfulness or pleasure acquired from the use of a technology [16]. It was suggested that enjoyment was important in mobile banking use seeing as mobile phones were mostly regarded as entertainment gadgets [70]. Hedonic outcome is an intrinsic value that cognitively absorb consumers to the online platform. Salimon, Yusoff, Sanuri and Mokhtar [71] assert that the enjoyable experience and fun attach and motivate users to continually use technological-based service.

Hedonic motivation was also associated with a stronger mobile services adoption intention [9,16,51,72], which explains the increasing integration of hedonic motivation in recent mobile commerce adoption models. A study by Sharif and Raza [73] found that client's trust in internet banking was intensely predicted by the hedonic motivation factor in Pakistan. Their results supported the findings of Hwang and Kim [74] and Akhlaq and Ahmed [75] that found that client's feelings and emotion is a key prerequisite of trust views in inventive system. Hanudin [70] highlighted HM use in mobile banking "*mobile phone is viewed as an entertainment gadget to some individuals; therefore, enjoyment can play an essential role in expounding mobile banking use*."

Therefore, the following hypotheses are proposed:

H4a,b. Hedonic motivation positively influences the behavioural intention to adopt mobile banking in Lebanon and England.

2.6. Price value (PV)

Dodds et al. [76], define price value as "*consumers' cognitive trade-off between the perceived benefits of the applications and the monetary cost of using it*". Empirical evidences affirmed that consumers were more likely to adopt a service with good price value [77,78]. Additionally, a pivotal relationship was evidenced between price and novel technology adoption [16].

The cost associated with mobile banking is generally due to the need of a smart mobile phone, an internet connection and any additional cost necessary for mobile banking application use. However, as previously mentioned, Lebanese consumers have already adopted smartphones and mobile broadband. Thus, cost of access to mobile banking services in Lebanon will be effectively reduced to the cost of the application itself if applicable as well as any possible auxiliary connection cost.

This study anticipates higher probability of mobile banking adoption by Lebanese consumers with a better presumed service price value. Thus, the following is proposed:

H5a,b. Price value positively influences the behavioural intention to adopt mobile banking in Lebanon and England.

2.7. Habit (HB)

Habit is the degree of observed automatic behaviour following accumulated learning after use of a technology [79]. In other words, habit is a learned behaviour in response to an unconscious stimulus leading to pleasing outcomes. Thus, once customers use a technology more frequently, a habit will be created. Customer behavioural intention to use a technology was predicted in many studies using habit as one of the determinant factors [16,80,80,81,81–83]. Additionally, mobile devices were shown to be habit forming through providing quick access to dynamic content and inducing brief repetitive usage sessions of "checking behaviours" [84]. Studies have found that habit was also a significant moderator of technology adoption in England, with consumers more likely to use e-learning services when habituated to their use [19].

Therefore, with the aforementioned increased penetration of smartphones in the Lebanese population, mobile usage will be presumed to increase all applications and the following hypotheses are proposed:

H6a,b: Habit will have a positive influence on behavioural intention to adopt mobile banking in Lebanon and England.

2.8. Trust (TR)

Trust is a subjective disposition to believe in the occurrence of an action consistent with positive assumptions [85]. Thus, trust is ensured when enough level of ability, benevolence and integrity is found in a specific system [86]. Trust was found to be a crucial influencer of behavioural intention to adopt a technology [5,15,87–90] due to its inverse association with risk. Thus, higher trust in a technology would lower its perceived risk and consequently positively affect behavioural intention.

Two types of trust were distinguished in association with mobile banking adoption, namely institutional trust and trust in the technology or the channel [85]. The former covers the trust existing between users and financial service providers which could be due to prior experience or good reputation [91]. However, this concept is not applicable in the case of the introduction of novel financial technology. Therefore, certain perceptions and emotional or irrational forces would then influence the users' trust in the technology [92]. Additionally, prior trust was found to have a significant positive impact on the adoption of mobile banking [9,56,89,92].

Hence, the following hypothesis is proposed:

H7a,b: Trust will have high positive impact on users' intention to adopt mobile banking in Lebanon and England.

2.9. Perceived privacy (PP)

Privacy refers to an individual's right to control the collection and use of personal digital and non-digital information. It was also defined as the right to prevent the unapproved disclosure of personal information [93]. However, privacy concerns have skyrocketed with the recent quasi-complete reliance on electronic information, turning privacy into a major ethical concern. This is due to the sensitivity, value and potential risk of personal information present in electronic form.

Additionally, three perceived needs for privacy were identified, namely degree of privacy concerns, information management concerns, and interaction management concerns [94].

Privacy was associated with technology adoption, with privacy concerns found to hinder e-commerce use in 65% of study participants [95]. Statistics Canada (2006) reported that more than half of consumers (57%) were apprehensive of using credit cards online. It was also established through a public opinion study that 64% of Americans have encountered a major data breach and 49% believed their personal information to be less secure than it was 5 years prior to the study.

Consequently, data protection laws were adopted in most countries, such as England's data protection act, as well as the General Data Protection Regulation (GDPR) (Regulation (EU) 2016/679) which was adopted in England in May 2018. The Data Protection Act is updated yearly since its implementation in 1998 and ensures the privacy and fair use of personal information by companies and organizations (General Data Protection Regulation - GOV.UK, 2018). However, according to the 23rd session of the Universal Periodic Review Stakeholder Report, no laws for the regulation and protection of personal data were present in Lebanon [96]. Nevertheless, Lebanon shares with Switzerland, Singapore and Luxembourg the bank secrecy law which is a legal requirement that disallows banks to shares any client personal data or account information.

Therefore, taking into account the effect of privacy on technology adoption was important, especially considering that around 65% of a US survey respondents were concerned about the security of mobile payments and consequently the breach of their private information by hackers for example a fact that was reflected in multiple studies [7,11–14].

Hence, the following hypothesis assumption:

H8a,b: Perceived Privacy will have a positive influence on consumer's behavioural intention to adopt mobile banking in Lebanon and England.

2.10. Perceived security (PS)

Perceived security is defined as the degree of belief and trust in a web channel to transmit sensitive information [97]. In fact, security breaches were considered to significantly prevent consumers from accessing sensitive information online. Additionally, security breaches were applicable to the mobile channel, remarkably influencing mobile adoption rates [98].

Understandably, security remains the biggest concern facing internet banking adoption due to the possibility of data leakage or theft by hackers for example. This has been reflected in many studies, listing security as one of the most critical barriers facing mobile and e-banking acceptance and growth [12,61,99–101]. This was reflected in Lebanon where consumers were found to be among the most concerned about digital banking's security [18] which explains the significant impact of a technology's perceived credibility and therefore security on their intention to use it in both Lebanon and England [19].

Therefore, the following hypothesis is assumed:

H9a,b. Perceived Security negatively influences the behavioural intention to adopt mobile banking in the Lebanon.

3. Research methodology

3.1. Data collection

The proposed hypotheses were tested using a quantitative research approach. An online survey consisting of 45 questions was used for the empirical collection of data and was divided into two parts. The first comprised nine close-ended questions for the determination of demographic variables using a nominal scale (Gender, Age, education, occupation, income, mobile banking usage frequency, mobile banking experience, mobile banking features usage). The second part included the UTAUT2 model items and were adopted from Venkatesh et al. [16], and related studies e.g. Alalwan et al., [9]; Sharma et al., [1,6]. These factors were measured using four items each. Moreover, four items were used to measure perceived Privacy (PP), Perceived Security (PS) and were adopted from the work of Featherman, and Pavlou [33]; Daniel and Jonathan [102] and Amin [103]. Finally, Trust (TR) was measured using five items and adopted from the work of Sharma et al. [104], and Riffai et al., [105]. A 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree) was used to measure the items used in the questionnaire.

The present cross-sectional study aimed at examining mobile banking adoption in Lebanon and England. The questionnaire was initially formulated in English and was subsequently translated into Arabic by a professional translator. The Arabic version was then re-translated into English by a separate translator in order to ensure translation quality and consistency [106].

This study employed a non-probabilistic and self-selection sampling method (i.e., convenience sampling) as it enables the researcher to collect data from the potential participants based on their availability. Specifically, an online survey was disseminated through social media platforms in Lebanon and England between May and December 2017 in Lebanon and England was used. Additionally, a self-administrated questionnaire was distributed. Initially, the questionnaire was pre-tested with three information systems experts from England to ensure content validity. A pilot study with 45 potential participants from both countries was conducted in order to ensure the readability and clarity of the questionnaire items and to check if the collected data answered the investigated questions and provided face validity [107,108]. Following the pilot study results, two questions were eliminated, and one was modified.

Participants taking part in the study were all volunteers. In face-to-face contact, participants were made aware of their right to participate or withdraw from the survey at any point during the study verbally and by reading and understanding the research ethic and main aim of the study. The online survey comprised of a cover letter explaining the aim of the study and participants rights in participating. No financial incentive or rewards in kind was offered.

3.2. Data analysis

Structural Equation Modelling (SEM) is a statistical technique allowing researchers to simultaneously test and estimate the hypothesized relationships in a given conceptual model thereby determining the possible correlations between multiple dependent and independent variables [109]. In other words, it is a second-generation multivariate technique convenient for the concurrent estimation of multiple relationships through a hybrid method deriving from multiple regression and factor analysis [110]. SEM, also referred to as path analysis, covariance structure analysis as well as simultaneous equation models, is therefore suited for the elaboration of concepts and theories [111] and the systematic elucidation of the ensuing research questions without resorting to the use of multiple statistical methods [109]. Moreover, SEM's ability to determine the construct validity of the proposed model's variables was remarked in the context of social science research, most likely contributing to its wide acceptance in this field as well as that of IS and behavioural science [109,112].

In addition to its aforementioned characteristics, SEM was deemed most appropriate for the purposes of this research due to its applicability in situations where a transition between a dependent (exogenous) and independent (endogenous) variable occurs [111] as is the case of BI. The latter constitutes both an independent and dependent variable through its effect on mobile banking adoption and its dependence on the main determinants of the proposed model, respectively. SEM use would therefore circumvent the need of multiple first-generation analyses as well as allow the study and testing of the relationships within a complex model such as the one proposed in this study as

Table 1
Descriptive statistics of the constructs for the two samples.

Construct	Lebanon					England				
	Mean	Std. Deviation	Skewness	Kurtosis	α	Mean	Std. Deviation	Skewness	Kurtosis	α
PE	5.50	1.377	−1.36	1.535	.891	5.23	1.049	−2.285	2.288	.789
EE	5.22	1.241	−1.045	1.360	.892	5.75	1.068	−1.588	2.307	.786
SI	4.78	1.204	-.393	.166	.897	4.70	1.412	-.389	-.307	.795
HM	4.87	1.398	-.603	.118	.896	4.25	1.563	-.443	-.326	.807
TR	4.56	1.420	-.463	-.312	.897	5.07	1.290	-.683	.444	.803
PV	4.73	1.285	-.365	.231	.894	5.35	1.414	-.734	.127	.798
HB	4.46	1.495	-.232	-.614	.893	4.70	1.456	-.434	-.356	.786
PP	4.98	1.352	-.636	.053	.921	4.20	1.551	-.257	-.735	.849
PS	4.76	1.143	-.116	-.142	.916	4.83	1.306	.516	-.284	.829

a result of its aptitude in complex mathematical models [109] and its use of confirmatory modelling strategy [111].

This study employs a covariance-based SEM approach, Analysis of Moment Structures (AMOS version 23.0) in order to analyze the proposed model's data, owing to aptness of this particular approach in regard to theory testing and confirmation.

4. Results

4.1. Descriptive analysis

After screening for missing data and duplicated responses, we retained 901 answers for final data analysis. These included 486 Lebanese participants and 415 English participants. As shown in Table 1, the mean for all constructs was above 3.5 and ranged between 4.48 and 5.5 in the Lebanese sample, whereas it ranged between 4.2 and 5.75 for the English sample. This suggests that the majority of participants express generally positive responses to the factors being measured in this research. Moreover, Cronbach's alpha value for all factors was above the cut-off 0.7 which indicates that the constructs have a strong internal reliability as suggested by Nunnally [113]. Furthermore, the normal range for skewness-kurtosis value is ± 2.58 as suggested by Tabachnick and Fidell [111]. Hence, all the items in the dataset for both samples were found to be normally distributed (i.e., < ± 2.58). Specifically, the skewness and kurtosis indices ranged from −1.36 to - 0.116 and - 0.614 to 1.535 respectively in the Lebanese sample, and ranged from −2.285 to 0.516 and - 0.735 to 2.307 respectively in the English sample.

As displayed in Table 2, approximately equal gender distribution was observed in both samples. moreover, Lebanese and English participants were predominantly young, which could possibly account for the high levels of mobile experience reported by the vast majority (> 90% of respondents). While older individuals are invaluable for the formulation of a broader understanding in any population-based study, the sizeable inclusion of young respondents, often presenting with a higher affinity towards technology, allowed a better understanding of the intentions of Lebanese and English users towards mobile banking. It is also worth mentioning that the greater part of participants (approximately 70% or more) possessed more than two years of experience in mobile banking, an observation applicable to both samples.

4.2. Analysis of measurement model

This study followed the recommendation of Anderson and Gerbing [114] by employing a two-step approach to investigate the relationship in the proposed conceptual framework. It first employed confirmatory factor analysis (CFA) to test model fitness, validity and reliability. Then the structural model was employed to test the proposed relationship between the exogenous (PE, EE, SI, HM, TR, PV, HB, PP, PS) and endogenous factor (BI) in the proposed model.

This study adopted the maximum likelihood method to estimate the

Table 2
Demographic characteristics for the two samples.

Category	Lebanon		England	
	Frequency	%	Frequency	%
Gender				
Female	236	48.6	210	50.6
Male	250	51.4	205	49.4
Age				
18 -25	224	46.1	88	21.2
26–35	161	33.1	170	41.0
36–45	59	12.1	89	21.4
46–55	20	4.1	52	12.5
56 Years and older	22	4.5	16	3.9
Experience in using Mobile Banking				
1–2 years	40	8.2	40	9.6
More than 2 Years	337	69.3	347	83.6
up to 1 year	109	22.4	28	6.7
Mobile experience				
Beginner	32	6.6	12	2.9
Experienced	221	45.5	266	64.1
Intermediate	233	47.9	137	33.0
Educational level				
Bachelor's degree	253	52.1	155	37.3
High School	51	10.5	69	16.6
Master's degree	127	26.1	73	17.6
Others	22	4.5	49	11.8
PhD	27	5.6	32	7.7
Secondary	6	1.2	37	8.9
Occupation				
Academic/Teacher	57	11.7	25	6.0
Clerical/Administrative	35	7.2	16	3.9
Computer Technical/Engineering	50	10.3	36	8.7
Executive/Manager	29	6.0	61	14.7
Homemaker	18	3.7	6	1.4
Other	34	7.0	19	4.6
Professional	29	6.0	60	14.5
Retired	7	1.4	8	1.9
Sales/Marketing	20	4.1	25	6.0
Self-employed/Own Company	28	5.8	32	7.7
Service/Customer Support	2	.4	22	5.3
Student (College/University)	160	32.9	99	23.9
Unemployed, looking for work	17	3.5	6	1.4
Monthly Income				
4000$ and above	37	7.6	66	15.9
Between 1001$ to 2000$	92	18.9	107	25.8
Between 2001 and 3000$	54	11.1	89	21.4
Between 3001 and 4000$	14	2.9	53	12.8
Between 501$ to 1000$	110	22.6	49	11.8
Less than 500$	179	36.8	51	12.3
Mobile Banking Usage				
Daily	72	14.8	185	44.6
Less than once a month	67	13.8	17	4.1
Never	121	24.9	8	1.9
Once a month	123	25.3	46	11.1
Once a week	103	21.2	159	38.3

model's parameters where all analyses were conducted on variance–covariance matrices [110]. The following indices were used as recommended by Hair et al. [110], "*Goodness of Fit Index (GFI); Normed Fit Index (NFI); Parsimony Normed Fit Index (PNFI); Root Mean Square Residuals (RMSR); Comparative Fit Index (CFI); Adjusted Goodness-of-Fit Index (AGFI); the Root Mean Square Error of Approximation (RMSEA).*". The $\chi 2$ test alone was not considered due to its incompatibility with the study's sample size [115]. As for exploratory sample formation, Jöreskog and Sörbom [116] model generating (MG) method was used in order to determine exemplary items essential for the arrangement of a shortened instrument that retained the original sample's theoretical structure. This was achieved by the systematic deletion of single items until an acceptable fitting model was achieved. Scale items were appropriately balanced in order to retain a minimum of three items per scale, a consideration critical for the circumvention of possible identification and convergence problems [117]. Both the exploratory sample and the retained items were tested with the generation and the validation sample methods respectively in order to ascertain suitable item selection. A shorter instrument version was obtained as a result of the MG method, with the deletion of SI4, HM4, TR4, PV2, HB2 and PP1 from the initial measurement model in the case of the Lebanese sample, and PE4, SI2, PV4, PP4, PS4 and TR3 from the initial measurement model of the English sample. Table 3 displays the summary of the model fit with the final measurements and structural model of the Lebanese and English samples.

Having achieved a good measurement model fit for both samples (see Table 3), the next step is to evaluate the reliability and the validity of the constructs in the proposed model. Convergent validity confirms whether each construct can be reflected by its own indicators [109] in order to ensure the unidimensional of the multiple-item factors and to eliminate unreliable indicators [117]. Discriminant validity assesses the extent to whether the measures of different concepts are statistically different [109]. According to Hair et al. Hair et al., [110]; composite reliability (CR) and average variance extracted (AVE) can be employed to examine the reliability, convergent validity and discriminant validity. They recommended that CR should be greater than 0.7 to achieve good reliability. To ensure convergent validity, the CR should be above 0.5 and also the AVE should be smaller than CR, whereas discriminant validity can be achieved by comparing the square roots of AVE vs. correlations between constructs whereby when the former (square roots of AVE) is higher than correlations between constructs indicating there is discriminant validity. As shown in Tables 4 and 5, the AVEs for all the constructs for the both samples were all above the 0.5 and above 0.7 for CR which suggest that the factors had adequate reliability and convergent validity. Additionally, the square root of AVE is higher than their correlation values which suggest that all the constructs illustrated sufficient discriminant validity (see Table 6).

Table 3
Fit indices summary for the final measurement and structural model for the Lebanese and English sample.

Fit Index	Recommended Values	Lebanon		England	
		MM	SM	MM	SM
df	n/a	332		389	
χ^2/df	< 5 preferable < 3	2.694	2.5	2.929	2.929
GFI	> .90	.902	.920	.905	.902
AGFI	> .80	.859	.891	.816	.832
CFI	> .90	.944	.958	.911	.920
RMSR	< .08	.091	.080	.098	.085
RMSEA	< .08	.059	0.055	.068	.070
NFI	> .90	.915	.933	.902	.916
PNFI	> .60	.748	.754	.729	.708

Note: MM: Measurement Model; SM: Structural Model; Fit Index Degrees of Freedom (DF); Goodness-Of-Fit Index (GFI), Adjusted Goodness-Of-Fit Index (AGFI), Comparative Fit Index (CFI), Root Mean Square Residuals (RMSR), Root Mean Square Error of Approximation (RMSEA), Normed Fit Index (NFI), Parsimony Normed Fit Index (PNFI), Recommended Values as recommended by Hair et al. [110], and Hu et al.(1999).

4.3. Structural model

Having established adequate reliability and validity of the factors in the proposed model, the next step is to assess the structural model in order to test the relationship among the factors in the proposed model.

In terms of the Lebanese sample, the results of the standardised path coefficients indicate that behavioural intention towards adopting mobile banking services was influenced by HB, PE, PS, PP and TR in their order of influencing power and explained 78% of its variance. These results suggest that H1a, H6a, H7a, H8a and H9a were supported in this study, whereas H2a, H3a, H4a and H5a were not. In terms of the English sample, the results show that BI was impacted by PS, PP, TR, HB, EE and PV in their order of influencing power and explained 83% of the variance of BI. These results suggest that H2b, H5b, H6b, H7b, H8b and H9b were supported, whereas H1b, H3b and H4b were not supported in this study.

5. Discussion and conclusions

The main aim of this study was to examine the key factors that may hinder or facilitate the adoption of mobile banking services in a cross-cultural context through the extension of the unified theory of acceptance and use of technology UTAUT2 with Trust, Perceived Security and Perceived Privacy.

From a theoretical point of view, the obtained results differed from the UTAUT2 model in that few factors were not supported in this study, while the rest were found to be more critical than the others compared to the original UTAUT2 study. Additionally, the results suggest that the majority of participants generally expressed positive responses to this research's measured factors. This finding contradicted the findings of other studies which showed less favourable responses from Lebanese respondents [62].

As evidenced by the obtained path coefficient, the behavioural intention to adopt mobile banking of both Lebanese and English consumers was influenced by Habit, Perceived Security, Perceived Privacy and Trust. Moreover, the findings indicated that Performance Expectancy and Price Value were inversely significant uniquely in Lebanon and England respectively, while Social Influence and Hedonic Motivation, unexpectedly, did not reach significance in either country. Altogether, the proposed model achieved acceptable fit and accounted for 78% and 83% of the Lebanese and English samples' variance respectively, which was markedly superior to the original UTAUT2 study. Many researchers such as Venkatesh et al. [16], stressed the importance of broadening the UTAUT's generalisability as well as applicability in contexts and groups dissimilar to the original study. This paper effectively achieved this by supporting the application of this theory in the context of mobile banking consumers across two cultural settings, namely England and Lebanon, and thereby contributed to the literature pertaining to technology adoption and acceptance models and theories.

The importance of UTAUT2, PP, TR, and PS factors when attempting to elucidate consumers' BI of mobile banking was clearly supported by this study's findings. Therefore, all individual factors pertaining to the mobile banking technology must then be approached simultaneously in order to obtain an accurate representation of the technology's nature. Moreover, the cross-cultural validation of the proposed model was recommended and necessary for the feasibility of comparisons between different samples, especially if the studied samples belong to contrasting cultural environments [118]. In fact, technologies that were developed and adapted in western countries could not be successfully applied in non-western countries, where cultural factors significantly differed and effectively shaped consumers' perception and consequently adoption of this technology [119]. Therefore,

Table 4
Construct reliability, convergent validity and discriminant validity for England sample.

	CR	AVE	PS	PE	EE	SI	HM	TR	PV	HB	BI	PP
PS	.862	.675	**.822**									
PE	.893	.736	.115	**.858**								
EE	.898	.690	.172	.779	**.831**							
SI	.802	.584	.140	.461	.486	**.764**						
HM	.896	.743	.102	.298	.262	.457	**.862**					
TR	.783	.548	.245	.542	.641	.429	.338	**.740**				
PV	.881	.714	.150	.426	.513	.345	.252	.520	**.845**			
HB	.795	.564	.175	.400	.356	.557	.539	.331	.343	**.751**		
BI	.831	.622	.181	.668	.710	.464	.430	.616	.570	.668	**.789**	
PP	.820	.606	.824	.052	.112	.083	.050	.423	.161	.061	.032	**.878**

Note:Factor correlation matrix with√AVE on the diagonal, AVE, average variance extracted; CR; composite reliability.

Table 5
Construct reliability, convergent validity and discriminant validity for the Lebanese sample.

	CR	AVE	PS	PE	EE	SI	HM	TR	PV	HB	PP
PS	.726	.519	**.747**								
PE	.804	.566	.098	**.853**							
EE	.772	.508	.035	.500	**.813**						
SI	.777	.534	.028	.595	.652	**.731**					
HM	.780	.556	.081	.645	.552	.576	**.746**				
TR	.767	.597	.177	.585	.519	.563	.571	**.705**			
PV	.714	.559	.028	.617	.671	.590	.575	.502	**.878**		
HB	.841	.572	.090	.648	.683	.602	.633	.548	.506	**.756**	
PP	.773	.504	.774	.058	.081	.049	.005	.192	.016	.019	**.810**

Note: Factor correlation matrix with √AVE on the diagonal, AVE, average variance extracted; CR; composite reliability.

it is suggested that policy makers ensure the personalization and adaptation of each technology, from its content to its design and framework, in addition to a custom marketing plan and documentation, in order to complement individual countries' or even specific communities' characteristics.

Habit was found to be one of the most significant factor on behavioural intention to use mobile banking services in both countries, securing the highest significance in Lebanon compared to other factors, which supports the findings of El-Masri and Tarhini [56]; Venkatesh et al., [16]; Lewis et al., [120]; Wang et al., [82]; Yen and Wu, [80]; Limayem et al. [81], and Arenas Gaitán and Peral, [83]. The former had observed similar results regarding the influence of habit on e-learning adoption in Qatari population, which further substantiated previous remarks on the direct and powerful impact of habitual preferences on the continued use of a specific IS.

The recommendation for policy makers is to continue supporting and encouraging the consumers to increasingly use mobile banking services by extending available offerings. Mobile banking activities must be frequent to build a habit and therefore establish the foundation of continuous use. Additionally, Perceived Security was highly significant in both Lebanon and England and was found to be the most significant factor in the latter thus supporting the findings of other studies such as Patel and Patel [121]; Shah et al., [122]; Kim and Forsythe, [123]. Understandably, and as expected in the study, security remains a big concern and barrier to mobile banking adoption due to the distinct possibility of data breaches and leakage. Therefore, the reinforcement of IT infrastructures and mobile banking applications remains critical in order to ensure the highest degree of safety and security in mobile banking.

Managing customer fears are suggested to banks through clear communication and education regarding mobile banking risks, in addition to ensuring the security of the mobile application and by extension, financial transactions offered through it as well as instigate contingency plans to be deployed in the event of complications. Such measures could be achieved through the development of a secure mobile banking application with clear compliance to ISO and PCI requirements. Moreover, the implementation of preventative measures such as the conduction of a penetration test as well as the stipulation of an antivirus software as a basic application requirement would ensure the mitigation and avoidance of mobile banking impediments and should be carried out in a manner that does not affect mobile banking users' behaviour.

Furthermore, Perceived Trust was found to be majorly significant in both Lebanon and England. These results are similar to previous findings [5,15,88–90,124] where trust was found to be a key influencer of behavioural intention to adopt a technology. Therefore, this construct supports the need for adequate security and management of customer security concerns seeing as these two factors decidedly affected their use of mobile banking. It is then suggested that guarantees as well as advertising campaigns be provided by banks in order to ensure full compensation for any mobile banking-related loss. Furthermore, effective dissemination of this service's security procedures and the implemented improvements (two factor authentication, for example) could be achieved through the release of detailed user-friendly reports.

Table 6
Path coefficient and their significance.

Number	Relationship	Lebanon		England	
		Path Coefficient	Results	Path Coefficient	Results
H1	PE — > BI	.346***	Supported	.068	Not Supported
H2	EE — > BI	.023	Not Supported	.197*	Supported
H3	SI — > BI	.063	Not Supported	-.088	Not Supported
H4	HM— > BI	-.057	Not Supported	-.020	Not Supported
H5	PV — > BI	.061	Not Supported	.117*	Supported
H6	HB — > BI	.479***	Supported	.500***	Supported
H7	TR — > BI	.131*	Supported	.525***	Supported
H8	PP — > BI	.223**	Supported	.611***	Supported
H9	PS — > BI	-.268***	Supported	-.651***	Supported

Note: *p < 0.05; **p < 0.01, ***p < 0.001.

Consequently, trust emerges as a clear and impactful motivator for mobile banking use as well as customer predispositions towards this novel technology and was corroborated by multiple studies [5,89,90,105]. Furthermore, researchers suggested that the undeniable effect of trust on mobile banking use and adopting could be the result of the delicate nature of electronic financial transactions [11,105].

Privacy was similarly highly significant in both countries with a major significance observed in the English sample. Privacy concerns could impact behavioural intention to use a certain technology and were embodied in the occasional abuse of customers' personal information by service providers, such as spamming messages or disclosing private information [125,126]. Nonetheless, general privacy concerns which were shown to be reflected in particular systems, could be effectively managed with system security guarantees. This could be undertaken through statements or graphic representations of the provider's willingness to protect the customers' privacy [33]. In May 2018, the GDPR come into force across the EU including England, whereby software services-provided privacy was further controlled and restricted and businesses which fail to comply face the prospect of heavy fines. This was achieved through following the adopted regulations as well as sharing the process with which data was used and protected by the providers, effectively mitigating consumers' mobile banking privacy concerns. The implementation of similar initiatives and policies is recommended in Lebanon on a national as well as individual bank level.

Contrary to our hypothesis, Effort Expectancy was not a significant predictor in the Lebanese sample, but was slightly significant in the English sample. Our findings were therefore inconsistent with previous studies [13,34,40,57] possibly due to the increasing familiarity of the general population with technology especially with the recent expansion of the internet and its users [34,40]. This familiarity restricts the influence of effort expectancy to users that are less acquainted with a particular system. Therefore, policy makers are recommended to ensure user friendly services that have a very simple interface, are responsive as well as adaptive to different mobile device sizes and brands. Moreover, the negative effect of non-familiarity with a particular system on users' intention to use it could be managed through the organization of training sessions or online modules.

Furthermore, the results showed that Performance Expectancy emerged as an influential predictor of consumers' behavioural intention to use mobile banking services in Lebanon, while PE wasn't an influential predictor in England as proposed in the hypothesis. Moreover, the study's findings in Lebanon support the majority of previous findings [13,34,40,57]. Decision makers in Lebanon are therefore recommended to provide additional mobile banking features as well as ensure higher visibility and awareness of this service's attributes and values which mainly reside in its ability to complete banking transactions without any physical or time restraints.

Price Value was not observed to be a significant predictor in the Lebanese sample, as opposed to the English sample where it was slightly significant. The results in the former sample do not support previous findings [16,77,78]. The results might be due to consumers associating access to mobile services with limited cost or free use, which results in no direct high cost to the usage. The previous finding might link to the technology that requires additional hardware or cost to use (m-commerce, m-ticketing). As for the results of the English sample, the slight significance of PV could be attributed to the general consensus on the low or absence of cost necessary for the use of mobile banking services, contrary to others. Many approaches are available for banks with which they could boost their services' price value, namely establishing mobile banking's importance and pivotal role in ensuring a time, money and cost-effective alternative for users. Moreover, mobile banking's price value could be further promoted through the reduction or complete annulment of its cost, thereby effectively positively affecting customers' behavioural intention [16,127] and consequently encouraging potential users to adopt this technology [128].

Conversely, two factors (SI and HM) unexpectedly emerged as non-significant predictors of behavioural intention which was especially surprising in Lebanon, where social influence was presumed to significantly affect the Lebanon's collectivist society. This result was reflected in other papers where social influence was found to have no effect on customers' decision to adopt a specific technology, as evidenced in different contexts (online shopping in Spain, telebanking and mobile banking respectively in Jordan) by Escobar-Rodriguez, Carvajal-Trujillo [72] and Alalwan et al. [3,9], respectively. However, other researchers such as Kim et al., [92]; Izquierdo-Yusta and Calderon-Monge [129]; Ingham et al. [130], and Pascual-Miguel et al. [131], have successfully established the role of SI as a significant predictor of BI, which directly opposes our findings. Our findings could be explained by the fact that financial information is considered private to the individual, thus there is there is limited communication about it which limit the influence of the social network.

HM was similarly contrary to existing studies (i.e. [16,51,72,9,73], but was similar to the findings of [77,132]. The reasons in Lebanon could be due to consumers' perception of mobile banking services as a beneficial service as opposed to bringing joy and enjoyment, a suggestion supported by the observed PE which was a significant factor in Lebanon. On the other hand, HM's insignificance in England could be attributed to its established role in this country which rendered it as more of a habit rather than an enjoyable or fun technology.

5.1. Practical implications

Mobile banking has greatly contributed to the remodelling of the banking industry, albeit with occasional disheartening adoption rates. This holds especially true in developed countries which thus require alternative or tailored approaches for optimal technology usage. The results presented herein allow policy makers and mobile banking organizations to formulate targeted strategies for the implementation of mobile banking in Lebanon and the UK specifically, as well as in similar cultural settings. The guarantee of security, privacy and trust should be of paramount importance in future strategies targeting mobile banking adoption regardless of cultural setting, in addition to the promotion of continuous technology use. On the other hand, English bank managers stand to particularly benefit from the improvement of privacy and price value, while their Lebanese counterparts must explore non-traditional approaches to mobile banking adoption considering the insignificant effect of social influence and hedonic motivations.

5.2. Main contribution and advancement of research

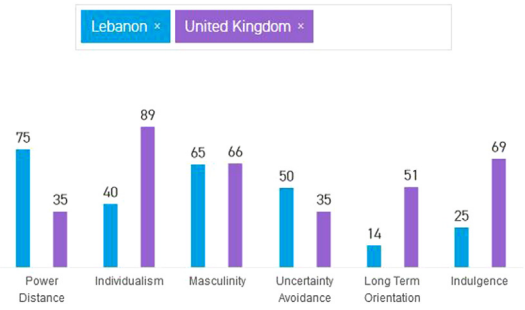
The present study addressed a noteworthy gap in extant mobile banking literature through its extension of the UTAUT2 with security, privacy and trust. The latter remain critical variables in financial dealings and their addition notably improved the UTAUT2's explanatory power in a cross-cultural setting, while achieving good model fit. Moreover, the study allowed the clear distinction between the factors influencing technology adoption in a developed and developing setting consistently with regional reports of the independence of mobile banking usage in an Arab setting from social influence and effort expectancy [133]. The importance of accounting for cultural factors when examining mobile banking adoption thus emerges as integral to the advancement of technology adoption studies.

5.3. Limitations and future research

As with any research, this study has some limitations that must be acknowledged. Firstly, the data were collected using a convenience sampling technique and thus the findings of this research cannot be generalised to the whole population. Secondly, this study didn't examine the moderating effects of demographic characteristics (gender, age, educational level and experience) due to the complexity of the proposed model. Therefore, sub analysis of the present data as well as

future research might resolve this issue and provide a clearer and more comprehensive understanding of user intentions by integrating demographic variables omitted in this study. Additionally, future research might integrate Hofstede cultural dimensions and therefore arrive to a better understanding of the investigated phenomena. This modification would be interesting considering some of the unexpected results of the present study, which did not integrate cultural dimensions into its proposed framework, especially in regard to the effect of social influence and other parameters on technology adoption in different cultural settings. Finally, this study did not account for the possible effect of external factors such as the differences in mobile adoption rates and mobile banking maturity in the two investigated cultural settings, which could act as confounding variables. The proposed model could be further validated through its application for the investigation of mobile banking adoption in different cultural settings, be it in the context of a developed or developing country. As such, the intentions of different populations could be compared, providing useful insights both into population-specific as well as general determinants of mobile banking users' behaviour.

Appendix



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