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## **Factors driving the adoption of mobile banking app: An empirical assessment in the less digitalized economy**

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### **Abstract**

Financial institutions remain one of the key industries making use of information and communication technologies to transform their products and services and their business in general. As the internet becomes pervasive, most banks, in addition to their traditional mobile banking, have introduced mobile banking apps, which ride on smart devices and the internet to offer banking services remotely to customers. However, given some contextual factors such as unstable internet, adoption of this innovation may be a challenge in an emerging economy. Thus, the study sought to find out the factors, which could affect the adoption of mobile banking app in a less digitalized environment. To this end, data was sourced via the intercept approach on a sample of the entire population in Ghana for the analysis. By using the partial least square structural equation modelling (PLS-SEM) technique, the study found that performance expectancy and hedonic motivation were the key factors that influence mobile banking app adoption. Contrary to our expectation, effort expectancy, perceived transaction cost, and privacy and information concerns were found to have no effect on consumers' intention to adopt mobile banking app. Implications for further research and practice are presented and discussed.

**Keywords:** mobile banking app, mobile banking, privacy concern, transaction cost

### **1. Introduction**

Financial institutions remain one of the key industries making use of information and communication technologies, like the internet and wireless technologies to transform their products and services and their business in general. With and through mobile technologies, banks can meet customers' expectations by offering them different services (Singh & Srivastava, 2018). The banks started with the introduction of mobile banking, which according to Barnes and Corbitt (2003) can be defined as the channel allowing customers to use their digital devices to interact with the bank. As the internet becomes more pervasive, the banks have now developed their applications to augment the mobile banking service. Unlike mobile banking which can be done without smartphone and internet, services offered by the bank on mobile banking app can only be accessed by smartphones with the internet. To this end, the mobile banking app is less useful in developing economies where the internet is a challenge. For instance, research shows that in rural India where there is less access to the internet, mobile banking is easily accessed, and remains the preferred channel of banking services (Singh & Srivastava, 2018). Whilst studies on mobile banking abound (see

Chhonker et al, 2018; Grover & Kar,2020; Singh et al, 2017) research on mobile banking apps remain scant. Moreover, the few studies we have on mobile banking apps have also been conducted in internet-endowed economies (e.g. Munoz-Leiva *et al.*, 2017; Wijland *et al.*, 2016; with few in developing economies like Ghana (e.g. Ansong *et al.*,2015).

In studying the adoption of the predecessor of mobile banking apps, Owusu *et al.* (2020) note that although there is a high rate of mobile device penetration in Africa (ITU, 2007), the diffusion of mobile banking technologies is far below expectation. We thus argue that there are myriad of factors in developing economies, which make direct applications of the previous findings contextually irrelevant in those economies. For instance, in a less digitized environment like Ghana where consistent pervasive stable internet is a dream and even in the capital city, Accra, where one expects to have a stable internet in place, is also not the case. Thus, we argue that an introduction of a mobile banking app to attract a massive adoption may be a mirage. We also contend beyond downloading of the mobile banking app, customers in such growing economies would have other issues like privacy/cybersecurity or perceived transaction cost, as the modalities and how the internet of things work are not popular in these environments. In other words, the study argues that the issues on mobile banking apps are not well researched and empirically tested. As these apps are at their infancy stage, there is the need to examine thoroughly to know which issues could influence customers' adoption behaviour. Following these arguments, the key objective of the present study is to address the factors or issues, which could affect customers' adoption of mobile banking app in Ghana. To achieve this objective, the study uses the modified version of the unified theory of acceptance and use of technology (UTAUT2) (Venkatesh *et al.*, 2012). Specifically, we examine the relationships between performance expectancy, effort expectancy, and hedonic motivation (UTAUT2), and intention to use mobile banking apps. Further, the study also adds perceived transaction cost and privacy and information concern to the constructs of the said theories in examining the relationships. We make significant contributions to literature with this paper. First, we extend UTAUT2 with two additional constructs to help understand the issues customers may have in adopting mobile banking apps. Second, contextually, we add to the scanty of research output on mobile banking app adoption in a less internet-penetrated territory. These, we believe, would offer insights to managers and policymakers in organizations especially those in the financial sector as a guide in the development and introduction of their banking apps on the markets.

We organize the rest of the paper as follows: While the next section 2 presents the theoretical background and hypotheses development, section 3 explains our empirical study. This is followed by sections 4, which presents the discussion and conclusion of the study.

## **2. Theory and hypotheses development**

### **2.1 Unified theory of acceptance and use of technology**

The theory from which our study takes inspiration is the modified version of the unified theory of acceptance and use of technology (UTAUT2) by Venkatesh (2012). As the name suggests, UTAUT is an integration of eight information system theories and models. The first four of these theories and models include the theory of reasoned action-TRA (Fishbein & Ajzen,1975), social cognitive theory-SCT (Bandura, 1986),

technology acceptance model-TAM (Davis, 1989), and theory of planned behaviour-TPB (Ajzen, 1991). The other four theories/models include the model of PC utilization (MPCU-[Thomspson *et al.*, 1991]), the motivational model-MM (Davis *et al.*, 1992), the decomposed theory of planned behaviour-DTPB (Taylor & Todd, 1995) and the innovation diffusion theory-IDT (Rogers, 1995). Thus, the first UTAUT (Venkatesh, *et al.*, 2003) posits that for factors such as performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC) are the key determinants of a person's intention to adopt a technology. This means for a person to use a certain technology, the technology should meet performance expectations, and should not require excessive effort to use. The theory also acknowledges that social norms or influence from other people the individual value and also certain conditions like technical and human support can affect the person's intention to use the technology. Thus, PE, EE, SI, and FC were the key four constructs of UTAUT. In his study, Venkatesh moderated these variables with age, experience, gender, and voluntariness of use.

However, in 2012, Venkatesh and his colleagues modified the UTAUT to UTAUT2 by including new constructs: price value, habit, and hedonic motivation, and dropped the voluntariness of use as a moderator and concluded that UTAUT2 better explain consumer intention. We also design our present study in line with the UTAUT2 but specifically adopt only the performance expectation (PE), effort expectancy (EE), and hedonic motivation (HM). We also extend the UTAUT2 with perceived transaction cost (PTC), and privacy and information concern (PIC). We argue that in an environment like Ghana, as mobile banking apps use the internet, customers may have problem internet and transaction costs. We further contend that in such an environment where technology acceptance is at infancy, customers could be more sceptical over cybersecurity issues regarding personal information if they should use the mobile banking app, which uses the internet. To this end, we explain performance expectation, effort expectancy, hedonic motivation, perceived transaction cost, and privacy and information concern, as well as our dependent variable, intention to adopt mobile banking app in details as follows: We summarize previous works on our study's constructs in Table 1 below:

*Table 1: Definitions & summary of previous works using UTAUT2 /PTC & PIC*

<b>Construct</b>	<b>Definition</b>	<b>Some findings</b>
Performance expectancy (PE)	PE measures the extent to which a new technology assists users to get what they need in a more useful and convenient manner (Venkatesh <i>et al.</i> , 2003).	Extant studies have found that PE affects users behavioural intention to adopt new technology (see Alalwan, 2019; Shareef <i>et al.</i> , 2018; Alalwan <i>et al.</i> , 2017; Venkatesh <i>et al.</i> , 2003). For instance, Alalwan (2019) found that performance expectancy has a positive impact on customers behaviour intention to mobile food ordering apps in Jordan.

Effort expectancy (EE)	EE is the degree to which users of a technology perceive it to be easy to use. Thus, in this study, we define effort expectancy as the extent to which consumers perceive mobile banking apps to be easy to use (Venkatesh <i>et al.</i> , 2012).	Several studies have confirmed the relationship between EE and customers' intention to adopt new technology (Thusi & Maduku, 2020; Albashrawi <i>et al.</i> , 2017; Alalwan <i>et al.</i> , 2017). For example, Albashrawi <i>et al.</i> , 2017 noted that EE influence customers intention in using mobile banking app in US banks
Hedonic motivation (HM)	HM refers to the pleasure gained from using an innovation (Ven-katesh <i>et al.</i> , 2012).	HM has been found as a good predictor of behavioural intention to use innovation (Thusi & Maduku, 2020; Okumus <i>et al.</i> , 2018; Yeo <i>et al.</i> , 2017). For instance, Okumus <i>et al.</i> (2018) found that HM positively affects customers' intention to adopt smartphone diet apps to order food at restaurants.
Perceived transaction cost (PTC)	Perceived transaction cost refers to the perception that customers hold that using innovation or new technology will attract financial charges. Mobile banking app costs may include initial purchase price, transaction cost, subscription charges (Singh & Srivastava, 2018).	Overall, PTC is a major obstacle to the adoption of mobile technology (Lubua & Pretorius 2018; Hanafizadeh <i>et al.</i> , 2014).
Privacy and information concern (PIC)	PIC denotes the extent to which a user of technology feels sceptical about personal data.	Prior studies have found that PIC negatively affects technology adoption (Hayikader, <i>et al.</i> , 2016; Tang & Liu, 2015; Alkhater <i>et al.</i> , 2014; Gupta <i>et al.</i> , 2013).
Intention to use a mobile banking app	An intention is defined as the plan of action to engage in a certain behaviour (Armitage & Christian, 2003). In this study, the intention to use is conceptualized as a dependent variable and is influenced by PE, EE, HN, PTC, and PIC.	

Following the theoretical review and the previous empirical works summarized in table 1 above, we argue that the three constructs of UTAUT2 (performance expectancy, effort expectancy, hedonic motivation) plus perceived transaction cost, and privacy and information concern will directly influence usage intention to use the mobile app (our dependent variable) and are therefore conceptualized as independent variables. Accordingly, we derive the following hypotheses:

*H1: Performance expectancy positively affects the adoption of Mobile Banking App*

*H2: Effort expectancy positively affects the adoption of Mobile Banking App*

*H3: Hedonic motivation positively affects the adoption of Mobile Banking App*  
*H4: Perceived transaction cost negatively affects the adoption of Mobile Banking App*  
*H5: Privacy and information concern negatively affect the adoption of Mobile Banking App*

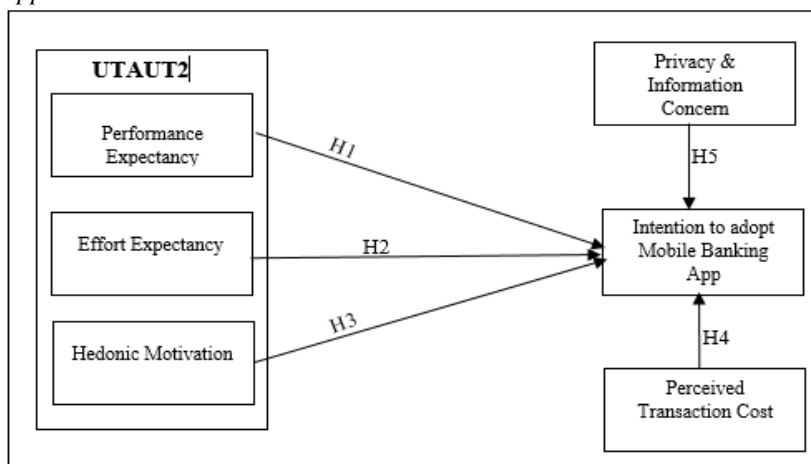


Figure 1. Empirical model

The methodology used to test the proposed model is outlined in the following section.

### 3. Empirical study

#### 3.1 Survey data and method

The study made use of both probability and non-probability sampling techniques for data collection. In effect, the non-probability sampling technique was adopted to select the target banks (unit of our analysis) comprising universal, rural, investment management firms/banks. On the other hand, the probability sampling technique (random sampling- which we consider to be most practical in this case) was then adopted via the intercept approach to gathering data for our analysis. Initially, we aimed to recruit 600 participants for the study. However, the influx of the COVID-19 pandemic did not allow us, therefore we ended up getting 327 respondents of which 291 was used for our analysis, after cleaning the data. We must emphasize that the first author was on the ground for data collection and recruited research assistants from his previous University to help gather the entire data (A token of reward from the funds of our research project was given to these research assistants). Data collection was undertaken in the months between November 2019 and January 2020. On average, the questionnaire took seven minutes to fill.

The mainstream of sampled respondents was male (65%), aged between 21-35 (39.6%), and a bachelor's degree (63.2%). In this study, statistical analyses were performed using both IBM SPSS and ADANCO 2.0 version (Henseler *et al.*, 2014). Lastly, the research constructs – except for demographic variables - were measured using a five-point scale (ranging from completely disagree to completely agree). Besides, our work is consistent with most of the views expressed in Podskaoff *et al.*, (2003) regarding the minimization of common method bias.

### 3.2 Measurement model analysis

By way of improving the face and construct validity, we curled the study's constructs from the existing literature. Specifically, the measures for Performance Expectancy (PE), Effort Expectancy (EE), Hedonic Motivation (HM) and Intention to adopt mobile banking app (INT) were adapted from Farah *et al.* (2018), while the measures, Perceived transaction cost (PTC) and Privacy/information concern (PIC) were modified from Hanafizadeh *et al.* (2014) and Albashrawi and Motiwalla (2019) respectively. Moreover, the research hypotheses were tested by using the PLS-path modelling technique and precisely using mode A algorithm for path analysis while mode B was used to measure control variables on the dependent variable. The inspected composite reliability scores pertaining to the reflective measurement model were recorded as follows: 0.85 (EE), 0.84 (PE), 0.80 (HM), 0.71 (INT), 0.85(PTC), 0.68(PIC). Moreover, the lower bound estimate of the reliability of sum scores of the reflective model (Cronbach's alpha-although not recorded here exceeded the minimum threshold of 0.6). Furthermore, all indicator loadings and weights were statistically significant at  $p < 0.05$ . Besides all the indicator loadings exceeded the 0.6 scores required for this kind of exploratory work. Likewise, in terms of convergent validity, average variance extracted (AVE) scores range from 0.843 (EE), 0.849 (PE), 0.880 (HM), 0.923 (INT), 0.676 (PTC.), 0.791 (PC). While not reported here, following Fornell and Larcker (1981), discriminant validity was documented for the constructs.

### 3.3 Model fit analysis

Model fit and quality criteria were assessed based on Standardized Root Mean Squared Residual (SRMR). We obtained 0.0562 (SRMR value and thus acceptable since it is less than 0.1) (Henseler *et al.*, 2014). The SRMR is calculated as the square root of the sum of the squared differences between the model-implied correlation matrix and the empirical correlation matrix, i.e. the Euclidean distance between the two matrices. Hence, the lower the SRMR, the better the theoretical model's fit. As a rule of thumb, a value of 0 for the SRMR indicates a perfect fit, and, mostly, an SRMR value less than 0.05 indicates an acceptable fit (Byrne, 2013). However, a recent replication study shows that even totally correctly specified models can yield SRMR values of 0.06 and higher (Henseler *et al.*, 2014). Therefore, a baseline value of 0.0562, as proposed by Hu and Bentler (1999), appears to be better for variance-based SEM in our case depicting a model fit.

Table 2: Structural Model statistics

Hypothesis	$\beta$ (t-ratios)	<i>p-values</i>	Remarks
H1: PERFORM-EXPT -> INTENT-ADOPT	0.2422	0.0012	Significant
H2: EFFORT-EXPT -> INTENT-ADOPT	0.0720	0.1855	Not significant
H3: HEDONIC-MOTIV -> INTENT	0.5112	0.0000	Significant
H4: PRIV-INFO-CONCERN -> INTENT-ADOPT	-0.0308	0.6758	Not significant
H5: TRANS-COST -> INTENT-ADOPT	0.1322	0.2981	Not significant
<b>Control Variables</b>			
Gender	-0.1419	0.0091	Significant
Age	0.1246	0.0411	Significant

Past Experience	0.0385	0.3552	Not significant
<i>Coefficient of determination (R<sup>2</sup>)</i>	<i>R<sup>2</sup></i>	<i>Adjusted R<sup>2</sup></i>	
INTENT-ADOPT	0.5939	0.5810	Acceptable

NB: *Model/path is significant at P<0.05*

### 3.5 Structural model evaluation

Table 2 shows an empirical analysis of the proposed model of this study. We performed a structural path analysis using a statistical software: ADANCO 2.0 version as earlier disclosed. Reflecting on the recommendation of pioneer scholars (F. Hair Jr, Sarstedt, Hopkins, & G. Kuppelwieser, 2014; Henseler, Hubona, & Ray, 2016), the summary of our PLS-SEM (see table 2) indicates direct path analysis with control variables as well as the estimated coefficient of determination ( $R^2$ ). Concerning the hypothesis testing, we found that hypotheses: (H1 and H3) proved significant at p-value  $< 0.05$  whilst the remaining direct hypotheses; (H2, H4, H5) were insignificant. Again, in testing the control variables: gender, age, and experience of the study's respondents, it was found that 'Gender' and 'Age' of respondents played a significant control variable regarding the use of the e-banking app. Further, the value of the coefficient of determination ( $R^2$ ) (see table 2) indicates that our endogenous variables (e.g. Performance expectancy, hedonic motivation etc) explain significant variance in the exogenous variable (intent to adopt banking app). This suggests that the model satisfied beyond the appreciable threshold of 50% (see table 2 and figure 1)

### 4. Short discussion and conclusion

We took inspiration from the modified version of the unified theory of acceptance and use of technology (UTAUT2) by Venkatesh (2012) to investigate thoroughly and to know which issues could influence customers' adoption behaviour of the use of mobile banking app in a less digitized country as earlier unveiled. Hence, the key objective of the present study was to address the factors or issues, which could affect the customer's adoption of the mobile banking app in Ghana. The research model based on the UTAUT2 was tested with a sample of the population in Ghana using an intercept approach via a cross-sectional study. The measurement and structural models recorded good model fit metrics, and the study measures possessed sufficient validity and reliability.

**RQ1** investigated which issues could influence customers' adoption of mobile banking app in Ghana. For this research question, it is worth noting that the research results revealed that potential users (or users) of the mobile banking app within the preview of the less digital economy are much more passionate about the performance expectancy (PE) and the hedonic motivation (HM) attached to the use of the mobile banking app. This assertion further corroborates with the recent works of Abdul-Hamid *et al.* (2019) and Boateng *et al.* (2016) who examined the adoption of mobile money apps, and internet banking adoption in a developing country respectively. Similarly, it is important to note that the current empirical findings revealed 'age and gender' variations as key control variables, which significantly predict the user's intention to adopt the banking app.



*RQ2* examined the relationship between UTAUT2 factors and the intentions to continue using the mobile banking app in Ghana. In answering this question, the current analysis confirmed PE and HM but not EE as the two major UTAUT2 factors that have a positive influence towards the intention to adopt the said app amongst potential users in the less digitalized economy (Alalwan *et al.*, 2017). Again, in evaluating the impact of Privacy/information concern (PIC) on the intent to adopt the banking app, the former showed an inverse relation towards the latter (Jibril *et al.*, 2020; Owusu *et al.*, 2020). Perceived transaction cost (PTC) has no significant impact per the responses evaluated. This further suggests that any additional charges that may arise in an attempt to use the said app would not deter the potential users from using the service (i.e mobile banking app). Hence the result is consistent with the research of (Oliveira *et al.*, 2014; Ali, 2016; Owusu *et al.*, 2020).

**Theoretically**, the study's findings advance the literature on UTUAT in two ways: First, we utilized an abreast version of the technology adoption model to examine the influence of UTUAT2 on the intentions to adopt mobile banking app, while introducing additional two constructs to measure the intention and adoption of the app. This enabled a valued contribution to the evolving literature on the relationship between adoption/intentions, which has remained underexplored thus far. This is in line with the consistent recommendation of recent literature that has called for urgent steps to be taken to recognize the factors driving the adoption of online banking transactions in the developing world (Jibril *et al.*, 2020; Nwaiwu *et al.*, 2020). Second, this research further informs scholars on the need to re-consider an extensive exploration of technology studies geared toward technology adoption/resistance in the less digitalized economies so far as digital divide continues to perpetuate between developed and developing worlds.

**Practically**, this study has two significant implications for stakeholders and shareholders in the financial sector in the developing country. First, the study findings could be of particular relevance to those emerging banks or lesser banks, which are yet to transition to the online banking system. Second, the study offers relevant information and knowledge to bank customers on the need to make use of banking technologies (apps) since the latter performs several functions to the user including enhancing service delivery, quick bank transaction, ability to use the app at the comfort of your home, and among others.

The present study has some limitations, which need to be kept in mind. First, the study participants were selected from a single country, namely Ghana. Therefore, the study could not have been generalised to reflect the entire economies that are described as less digitalized economies. However, despite these limitations, the study makes notable contributions to the existing literature. Hence, we recommend the following possible future directions for future studies. First, scholars could use our model to study customer behaviour in other contexts because the mobile banking app has come to stay. Lastly, scholars should explore the causal relationships of different theory as explained earlier with the adoption or resistance intention through longitudinal investigations.

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## References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50(2), 179-211.
- Alalwan, A. A., Dwivedi, Y. K., & Rana, N. P. (2017). Factors influencing adoption of mobile banking by Jordanian bank customers: Extending UTAUT2 with trust. *International Journal of Information Management*, 3(37), 99–110.
- Alam, S. S., Omar, N. A., Mohd Ariffin, A. A., & Nik Hashim, N.M. H. (2018). Integrating TPB, TAM and DOI Theories: An Empirical Evidence for the Adoption of Mobile Banking among Customers in Klang Valley, Malaysia. *International Journal of Business & Management Science*, 8(2).
- Alavi, S., & Ahuja, V. (2016). An empirical segmentation of users of mobile banking apps. *Journal of Internet Commerce*, 15(4), 390-407.
- Albashrawi, M., & Motiwalla, L. (2019). Privacy and personalization in continued usage intention of mobile banking: An integrative perspective. *Information Systems Frontiers*, 21(5), 1031-1043.
- Albashrawi, M., Kartal, H., Oztekin, A., & Motiwalla, L. (2017, January). The impact of subjective and objective experience on mobile banking usage: An analytical approach. In *Proceedings of the 50th Hawaii International Conference on System Sciences*.
- Alkhatier, N., Wills, G. & Walters, R. (2014) 'Factors influencing an organisation's intention to adopt Cloud computing in Saudi Arabia', *IEEE 6th International Conference on Cloud Computing Technology and Science (CloudCom)*, 15-18 Dec 2014, 1040-1044
- Ansong , E. D., & Synaepa-Addision, T. Q. (2019, May). A Comparative Study of User Data Security and Privacy in Native and Cross Platform Android Mobile Banking Applications. In *2019 International Conference on Cyber Security and Internet of Things (ICSIoT)* (pp. 5-10). IEEE.
- Armitage, C. J., & Christian, J. (2003). From attitudes to behaviour: Basic and applied research on the theory of planned behaviour. *Current Psychology*, 22(3), 187-195.
- Bandura, A. (1986). Social foundations of thought and action. *Englewood Cliffs, NJ, 1986*, 23-28.
- Barnes, S. J., & Corbitt, B. (2003). Mobile banking: concept and potential. *International journal of mobile communications*, 1(3), 273-288.
- Boateng, H., Adam, D. R., Okoe, A. F., & Anning-Dorson, T. (2016). Assessing the determinants of internet banking adoption intentions: A social cognitive theory perspective. *Computers in Human Behavior*, 65, 468-478.
- Byrne, B. M. (2013). Structural equation modeling with LISREL, PRELIS, and SIMPLIS: Basic concepts, applications, and programming. *Psychology Press*.
- Chandran, R. (2014). Pros and cons of mobile banking. *International journal of scientific and research publications*, 4(10), 1-5.

Chhonker, M. S., Verma, D., Kar, A. K., & Grover, P. (2018). m-commerce technology adoption. *The Bottom Line*.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and intrinsic motivation to use computers in the workplace 1. *Journal of applied social psychology*, 22(14), 1111-1132.

F. Hair Jr, J., Sarstedt, M., Hopkins, L., & G. Kuppelwieser, V. (2014). Partial least squares structural equation modeling (PLS-SEM) An emerging tool in business research. *European Business Review*, 26(2), 106–121.

Farah, M. F., Hasni, M. J. S., & Abbas, A. K. (2018). Mobile-banking adoption: empirical evidence from the banking sector in Pakistan. *International Journal of Bank Marketing*.

Fenu, G., & Pau, P. I. E. R. (2015). An analysis of features and tendencies in mobile banking apps. In *The 12th International Conference on Mobile Systems and Pervasive Computing (MobiSPC 2015) Affiliated Workshops* (Vol. 56, No. 1, pp. 26-33). Elsevier BV.

Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention, and behavior Reading, MA: Addison-Wesley, 913-927.

Fishbein, M., & Ajzen, I. (2011). *Predicting and changing behavior: The reasoned action approach*. Taylor & Francis.

Grover, P., & Kar, A. K. (2020). User engagement for mobile payment service providers—introducing the social media engagement model. *Journal of Retailing and Consumer Services*, 53.

Gupta, P., Seetharaman, A. & Raj, J.R. (2013) 'The usage and adoption of cloud computing by small and medium businesses', *International Journal of Information Management*, 33(5): 861-74.

Haldar, P., & Goel, P. (2019). Willingness to use carsharing apps: an integrated TPB and TAM. *International Journal of Indian Culture and Business Management*, 19(2), 129-146.

Hanafizadeh, P., Behboudi, M., Koshksaray, A. A., & Tabar, M. J. S. (2014). Mobile-banking adoption by Iranian bank clients. *Telematics and Informatics*, 31(1), 62-78.

Hayikader, S., Hadi, F. N., & Ibrahim, J. (2016). Issues and security measures of mobile banking Apps. *International Journal of Scientific and Research Publications*, 6(1), 36-41.

Henseler, J., Hubona, G., & Ray, P. A. (2016). Using PLS path modeling in new technology research: updated guidelines. *Industrial Management & Data Systems*, 116(1), 2–20.

Henseler, J., Hubona, G., & Ray, P. A. (2016). Using PLS path modeling in new technology research: updated guidelines. *Industrial Management & Data Systems*, 116(1), 2–20.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the academy of marketing science*, 43(1), 115-135.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal*, 6(1), 1-55.

Inman, J. J., & Nikolova, H. (2017). Shopper-facing retail technology: A retailer adoption decision framework incorporating shopper attitudes and privacy concerns. *Journal of Retailing*, 93(1), 7-28.

ITU. (2007). Telecommunication/ICT market trends in Africa 2007. Retrieved from [http://www.itu.int/ITU-D/ict/statistics/material/af\\_report07.pdf](http://www.itu.int/ITU-D/ict/statistics/material/af_report07.pdf)

Li, T. (2014). *Applying the IS success model to mobile banking apps* (Doctoral dissertation, Lethbridge, Alta.: University of Lethbridge, Faculty of Management.).

Liu, Z. Y. (2014). An Analysis of Technology Acceptance Model-Exploring user acceptance and intension of taxi-hailing app in Shanghai.

Lubua Dr, E. W., & Pretorius, P. (2018). The role of the transaction assurance, perceived cost and the perceived innovation in the decision to continue using mobile money services among small business owners. *The African Journal of Information Systems*, 10(2), 3.

Munoz-Leiva, F., Climent-Climent, S., & Liébana-Cabanillas, F. (2017). Determinants of intention to use the mobile banking apps: An extension of the classic TAM model. *Spanish Journal of Marketing-ESIC*, 21(1), 25-38.

Okumus, B., Ali, F., Bilgihan, A., & Ozturk, A. B. (2018). Psychological factors influencing customers' acceptance of smartphone diet apps when ordering food at restaurants. *International Journal of Hospitality Management*, 72, 67-77.

Owusu, G. M. Y., Bekoe, R. A., Addo-Yobo, A. A., & Otioku, J. (2020). Mobile Banking Adoption among the Ghanaian Youth. *Journal of African Business*, 1-22.

Owusu, G. M. Y., Bekoe, R. A., Addo-Yobo, A. A., & Otioku, J. (2020). Mobile Banking Adoption among the Ghanaian Youth. *Journal of African Business*, 1-22

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of applied psychology*, 88(5), 879.

Rogers, E.M. (1995). *Diffusion of innovations*. 4<sup>th</sup> ed. New York. Free Press.

Sampaio, C. H., Ladeira, W. J., & Santini, F. D. O. (2017). Apps for mobile banking and customer satisfaction: a cross-cultural study. *International Journal of Bank Marketing*.

Shareef, M. A., Baabdullah, A., Dutta, S., Kumar, V., & Dwivedi, Y. K. (2018). Consumer adoption of mobile banking services: An empirical examination of factors according to adoption stages. *Journal of Retailing and Consumer Services*, 43, 54-67.

Sharma, S. K., Al-Badi, A., Rana, N. P., & Al-Azizi, L. (2018). Mobile applications in government services (mG-App) from user's perspectives: A predictive modelling approach. *Government Information Quarterly*, 35(4), 557-568.

Singh, B. P., Grover, P., & Kar, A. K. (2017, November). Quality in mobile payment service in India. In Conference on e-Business, e-Services and e-Society (pp. 183-193). Springer, Cham.

Singh, S., & Srivastava, R. K. (2018). Predicting the intention to use mobile banking in India. *International Journal of Bank Marketing*.

Tang, C. & Liu, J. (2015) 'Selecting a Trusted Cloud Service Provider for Your SaaS Program', *Computers & Security*, 50(1): 60-73.

Teo, T., & Lee, C. B. (2010). Explaining the intention to use technology among student teachers. *Campus-Wide Information Systems*.

Thompson, R. L., Higgins, C. A., & Howell, J. M. (1991). Personal computing: toward a conceptual model of utilization. *MIS quarterly*, 125-143.

Thusi, P., & Maduku, D. K. (2020). South African millennials' acceptance and use of retail mobile banking apps: An integrated perspective. *Computers in Human Behavior*, 106405.

Thusi, P., & Maduku, D. K. (2020). South African millennials' acceptance and use of retail mobile banking apps: An integrated perspective. *Computers in Human Behavior*, 106405.

Tobbin, P. (2012). Towards a model of adoption in mobile banking by the unbanked: a qualitative study. *info*.

Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. *MIS quarterly*, 157-178.

Wijland, R., Hansen, P., & Gardezi, F. (2016). Mobile nudging: Youth engagement with banking apps. *Journal of Financial Services Marketing*, 21(1), 51-63.

Wijland, R., Hansen, P., & Gardezi, F. (2016). Mobile nudging: Youth engagement with banking apps. *Journal of Financial Services Marketing*, 21(1), 51-63.

Zhang, T., Lu, C., & Kizildag, M. (2018). Banking “on-the-go”: examining consumers' adoption of mobile banking services. *International Journal of Quality and Service Sciences*.

**Appendix**

