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Development and evaluation of the model for analysis of student' behavioral intentions towards the use of mobile banking: Evidence from an emerging economy

Damir Becirovic[1+]
Sejfudin Zahirovic[2]
Emira Kozarevic[3]
Jasmina Okicic[4]

[1]*International Business Information Academy Kulina Bana 2, 75000 Tuzla, Bosnia and Herzegovina.*
[1]*Email: direktor@ipi-akademija.ba*
[2,3,4]*Faculty of Economics, University of Tuzla Univerzitetska 8, 75000 Tuzla, Bosnia and Herzegovina.*
[2]*Email: sejfudin.zahirovic@untz.ba*
[3]*Email: emira.kozarevic@untz.ba*
[4]*Email: jasmina.okicic@untz.ba*


(+ Corresponding author)

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ABSTRACT

The purpose of this work is to show the development and evaluation of behavioural intentions of students by using mobile banking. The research goal is to explain determinants of students' intentions towards the use of mobile banking. PLS SEM (partial least squares structural equation modeling) analysis was used for the model evaluation. The sample consists of 83 students from four higher education institutions operating in Bosnia and Herzegovina (B&H). Research results confirmed that subjective norm and attitude are significant predictors of the user's attitude towards mobile banking acceptance, while the influence of self-efficacy was not determined. Attitudes related to mobile banking acceptance are primarily determined by perception of usefulness and self-efficacy, and to a lower degree by perception of privacy and security risk. Perception of mobile banking usefulness appeared to be the most significant predictor of attitudes, while simultaneously it influenced positively on acceptance of behavioral intention, including intervening effect of attitude variable. Digital literacy was proved to be a significant predictor for self-efficacy. From the perspective of banks, it is very important to see how a generation that a high potential for the use of modern technologies has perceives mobile banking, and what affects it to accept mobile banking. The results of this research are useful for banks to attract new younger users of mobile banking and increase their own benefits.

Contribution/ Originality: This paper represents pioneering research related to the acceptance of mobile technology in Bosnia and Herzegovina. In contrast to the basic models (TPB and TAM), our model of acceptance intent was expanded by the Digital literacy, financial knowledge, and Privacy and security risk dimensions.

1. INTRODUCTION

The current crisis caused by the Covid-19 virus pandemic led to rapid digitalization in all spheres of business. Customers dramatically tuned towards online channels. The average share of customer interactions that are digital is 58% at global level, which is an increase compared to the trends before the pandemic (LaBerge, O'Toole, Schneider, & Smaje, 2020). Electronic and mobile banking appeared to be the key condition for e-commerce participation, namely as a support for engagement with different e-commerce applications, such as online shopping, online auctions, stock exchanges, etc (Lee, 2009). An advantage of mobile banking is the ability to use the service wherever necessary, immediate access to the service, and time savings (Laukkanen, 2007). With the development of

4G and 5G networks, the potential for applying mobile technologies has expanded significantly. Mobile technology is the fastest-growing technology platform in human history. It has altered many aspects of social, economic, and political life. New products and services related to mobile technology are changing education, health care, and governance (West, 2014). Mobile technologies provide many benefits for consumers and companies and can be a driver of economic growth (Aker & Mbiti, 2010). Banks are required to monitor the development of technologies, such as data transfer and the evolution of mobile devices, as the development of technology is more quickly and easily accepted by clients in relation to the development of basic financial instruments (Cleveland, 2016). In 2020, there was an 8.64% increase in the number of electronic banking users in Bosnia and Herzegovina (BiH) compared to 2019. Structurally, 61% of electronic banking users engage in mobile banking and 39% in Internet banking, where individuals prevail in use of mobile banking with 66%, while only 5% of legal entities use it (Central Bank of B&H, 2021). In B&H, 92.9% of households own a mobile phone, which is significantly higher than the percentage of households that own a computer or laptop (Agency for Statistics of B&H, 2021). This indicates the potential that banks have in terms of promoting and offering mobile banking.

For explanation of aspects of behavior related to intentions and continuance intention, the following base models were used - theory of planned behavior (TPB) (Ajzen, 1991) and technology acceptance model (TAM) (Davis, 1986; Davis, 1989). Besides TPB and TAM, it is also important to mention theory of reasoned action (TRA) (Fishbein & Ajzen, 1975) model of adoption of technology in households (MATH) (Fillion & Le Dinh, 2008) and motivational model (MM) (Samaradiwakara & Gunawardena, 2014).

Mathieson (1991) conducted a comparative analysis of TAM and TPB models. In relation to the ability to predict the intention to use the system, both models explain intention properly. Although TAM explained more variance than TPB, the difference is not significant enough to conclude that one model is better than the other. Since these two models are complementary, in a significant number of studies related to Internet acceptance, i.e., mobile banking, authors use integrated TAM and TPB models. The key dimensions of the integrated model arise from the following basic models: attitude, subjective norm, perceived behavioral control, perceived usefulness, and perceived ease of use. These dimensions are empirically operationalized by using predominantly similar indicators (Aboelmaged & Gebba, 2013; Lee, 2009; Sanayei & Bahmani, 2012; Takele & Sira, 2013).

In addition to these dimensions, authors often expand the model of accepting mobile or Internet banking with additional dimensions, such as perceived privacy and/or security (Akturan & Tezcan, 2012; Alalwan, Dwivedi, Rana, Nripendra, & Williams, 2016; Baabdullah, Alalwan, Rana, Patil, & Dwivedi, 2019; Mortimer, Neale, Fazal, Hasan, & Dunphy, 2015; Singh & Srivastava, 2018) trust (Govender & Sihlali, 2014; Gu, Lee, & Suh, 2009; Koksal, 2016; Marakarkandy, Yajnik, & Dasgupta, 2017; Singh & Srivastava, 2018) government support (Marakarkandy et al., 2017) social influence (Govender & Sihlali, 2014; Gu et al., 2009) etc.

To the best of our knowledge, previous research has not recognized the use of digital literacy and financial knowledge for explaining the intention to use mobile banking. However, digital literacy has proven to be an important dimension in the context of accepting and perceiving the ease of use of modern technologies in general (MacCallum, Jeffrey, & Kinshuk, 2014) while financial knowledge helps individuals comparing financial products and services make better financial decisions (Morgan & Trinh, 2019).

Special interest in research is related to the student population in the context of mobile and Internet banking acceptance (Akturan & Tezcan, 2012; Amin, 2007). The student population included in this paper belongs to the generation that was born and raised in the digital age (i.e., millennials). Prensky (2001) labeled them as "digital natives". Accordingly, from the perspective of banks, it is very important to see how a generation that has a high potential for the use of modern technologies perceives mobile banking, and what affects it to accept mobile banking. Therefore, the key objectives of this research are as follows:

1. Examine and validate the determinants of the intention to accept mobile banking while taking into account the key dimensions of TPB and TAM models, including the dimensions of digital literacy, financial knowledge, and privacy and security risk.
2. Assess whether the developed model offers a solid theoretical basis for explaining the intention to accept mobile banking.
3. Explain the influence of digital literacy and financial knowledge on the perception of self-efficacy, i.e., the belief of individuals that they will not have difficulties in using mobile banking.
4. Verify the influence of perceived usefulness and privacy and security risk on students' attitudes on the use of mobile banking.

The paper is structured as follows. After introduction comes theoretical background with discussion on TBP and TAM models. What follows is an explanation of our research model and the corresponding hypotheses developed. Next, the research methodology is explained, followed by the analysis of the research results and discussion. At the end of the paper, the corresponding conclusions are presented, alongside the limitations of the given research and recommendations for the future research.

2. THEORETICAL BASIS OF THE RESEARCH

Table 1 shows an overview of selected articles on adoption of mobile banking, as well as intentions towards acceptance of mobile banking. Theoretical models and constructs most frequently used in these articles are provided. Based on that, in this research TPB and TAM and their constructs represent the baseline for development of the authors' model regarding intentions towards the acceptance of mobile banking.

2.1. Theory of Planned Behavior (TPB)

TPB is extended theory of reasoned action (TRA) (Ajzen & Fishbein, 1980). As within TRA in TPB the main factor is an individual's intention to perform a specific behavior. In relation to TRA model, Ajzen improved TPB by introducing perceived behavioral control as the third factor, which directly affects intentions. The following three independent determinants of behavior represent the starting point of TPB (Ajzen, 1991):

- Attitude towards the behavior means a determinant related to what degree an individual has positive or negative evaluation towards a specific behavior.
- Subjective norm means a determinant related to social pressure on an individual's perception to perform, or not to perform, a specific behavior.
- Perceived behavioral control means perceived easiness or difficulty to perform a specific behavior. In other words, resources and possibilities available to an individual determine, to a certain extent, a possibility of achieving that behavior.

As a theory, TPB has found its application even within the research of intentions of new technology acceptance (Ekow, Hammond, & Kweku, 2020; Shih & Fang, 2004; Teo & Lee, 2010; Wang, Fan, Zhao, Yang, & Fu, 2016).

2.2. Technology Acceptance Model (TAM)

Davis (1986) suggested TAM as a model for the empirical testing of acceptance of information systems by new users. According to this model, the use of a new system is explained through user's motivation which is determined by attitude towards the use of systems, perceived ease of use, and perceived usefulness. The overall attitude of a potential user towards usefulness of a specific system is the main determinant of potential use of new systems. In further model development, Davis (1989) included the behavioral intention variable assuming that intentions determine the use of the system. Moreover, attitudes and perceived usefulness directly influences intentions towards the adoption of new systems.

Table 1. Overview of selected articles on acceptance of mobile banking.

Authors	Theories adopted	Context	Constructs
Singh and Srivastava (2018)	TAM	Intention to use mobile banking	Perceived ease of use Computer self-efficacy Social influence Perceived financial cost Security Trust
Aboelmaged and Gebba (2013)	TAM, TPB	Mobile banking adoption	Perceived ease of use Attitude Perceived usefulness Behavioral control Subjective norm
Gu et al. (2009)	Extended TAM, trust-based TAM	Behavioral intention to mobile banking	Perceived ease of use Trust Perceived usefulness Social influence System quality Self-efficacy Facilitating condition Familiarity with bank Situational normality Structural assurances Calculative-based trust
Mortimer et al. (2015)	Extended TAM	Intention to use mobile banking	Need for interaction Social influence Perceived risk Perceived ease of use Perceived usefulness
Alalwan et al. (2016)	Extended TAM	Adoption of mobile banking	Behavioral intention Self-efficacy Perceived risk Perceived ease of use Perceived usefulness
Luarn and Lin (2005)	Extended TAM	Behavioral intention to use mobile banking	Perceived financial cost Perceived self-efficacy Perceived credibility Perceived ease of use Perceived usefulness
Govender and Sihlali (2014)	Extended TAM	Actual use of mobile banking	Perceived value Social influence Perceived ease of use Trust Intention to use Perceived ease of adoption
Baabdullah et al. (2019)	TAM	Continued intention towards adoption of mobile banking	Task characteristics Task-technology fit Technology characteristics Perceived ease of use Perceived usefulness Perceived security Perceived privacy
Akturan and Tezcan (2012)	Extended TAM	Intention to use mobile banking	Perceived ease of use Attitude to use mobile banking Perceived usefulness Perceived benefit Perceived performance risk Perceived financial risk Perceived social risk Perceived time risk Perceived privacy risk Perceived security risk
Sakala and Phiri (2019)	TAM	Adoption and use of mobile banking	Perceived ease of use User's attitude Perceived usefulness External factors User's intention

Attitudes towards the use of a specific technology function on two basic beliefs – perceived usefulness and ease of use (Davis, 1986). Perceived usefulness can be defined as a degree of belief that the use of a specific system will improve individual work performance, while perceived ease of use is defined as a degree of individual's belief to use that system without any effort required (Davis, 1989). TAM became, both as an individual model and as integrated into another model, a widely used theoretical model for research related to adoption of new information systems. In relation to this research, it should be noted that TAM is also a dominant theoretical model in this research used for testing the adoption of new banking technologies, including acceptance of different e-banking models (Amin, 2007; Chong, Ooi, Lin, & Tan, 2010; Marakarkandy et al., 2017; Pikkarainen, Pikkarainen, Karjaluoto, & Pahnila, 2004; Safeena, Date, Hundewale, & Kammani, 2013; Vuković, Pivac, & Kundid, 2019) i.e., mobile banking (Akturan & Tezcan, 2012; Alalwan et al., 2016; Govender & Sihlali, 2014; Gu et al., 2009; Rammile & Nel, 2012).

3. RESEARCH MODEL AND HYPOTHESES

3.1. Research Model

As noted earlier, our proposed theoretical model uses TPB and TAM as a starting point. It includes attitudes and subjective norms from TPB, and perceived usefulness and perceived ease of use from TAM. Both, perceived ease to use construct from TAM and PBC (perceived behavioral control) from TPB are integrated into self-efficacy construct. The concept of perceived behavioral control is close to self-efficacy. Ajzen (1991) reported that the construct of perceived behavioral control is mostly compatible to the perceived self-efficacy construct. Starting from the fact that perceived self-efficacy refers to judgments about how well procedures necessary to solve situations in the future can be performed (Bandura, 1982) perceived self-efficacy is similar to the construct of perceived ease of use (Davis, 1989). Ajzen (1985) distinguished internal control factors from external factors. Internal factors relate to skills while external factors include time, opportunities, and cooperation with others. Based on Ajzen's distinction between internal and external control factors, Mathieson (1991) stated that some people may perceive they have the necessary skills to use a system, but that they do not have the resources to use it. Namely, external factors deny them the possibility to use the system. External control issues are obviously not quite considered in TAM, and the perceived ease of use corresponds to the internal skill factor. Since in our research the indicators of perceived behavioral control refer exclusively to the internal control factor, we find it reasonable to integrate these two constructs in the proposed model. In their research on the importance of behavioral theory for the development of communications aimed at promoting healthy behavior, Fishbein and Cappella (2006) used self-efficacy as the equivalent of perceived behavioral control in the model.

In addition, in relation to TPB and TAM baseline models, our integrated model has been expanded with the following constructs: privacy and security perception, digital literacy, and financial knowledge. The inclusion of digital literacy and financial knowledge constructs into the model represents an innovation in relation to constructs traditionally used in mobile banking acceptance research (see Table 1).

Therefore, the model we developed includes endogenous variables (self-efficacy, subjective norm, and attitude) and exogenous variables (digital literacy, financial knowledge, perceived usefulness, and privacy and security risk), as shown in Figure 1.

3.2. Hypotheses Development

3.2.1. Hypotheses about TPB and TAM

Based on the theoretical development of the model described in the previous section, including defined constructs of TAM and TPB models, it is possible to formulate the following hypotheses:

H1: Attitudes positively influence behavioral intention to use mobile banking.

H2: Subjective norms positively influence behavioral intention to use mobile banking.

H3: Perceived usefulness positively influences attitudes towards the use of mobile banking.

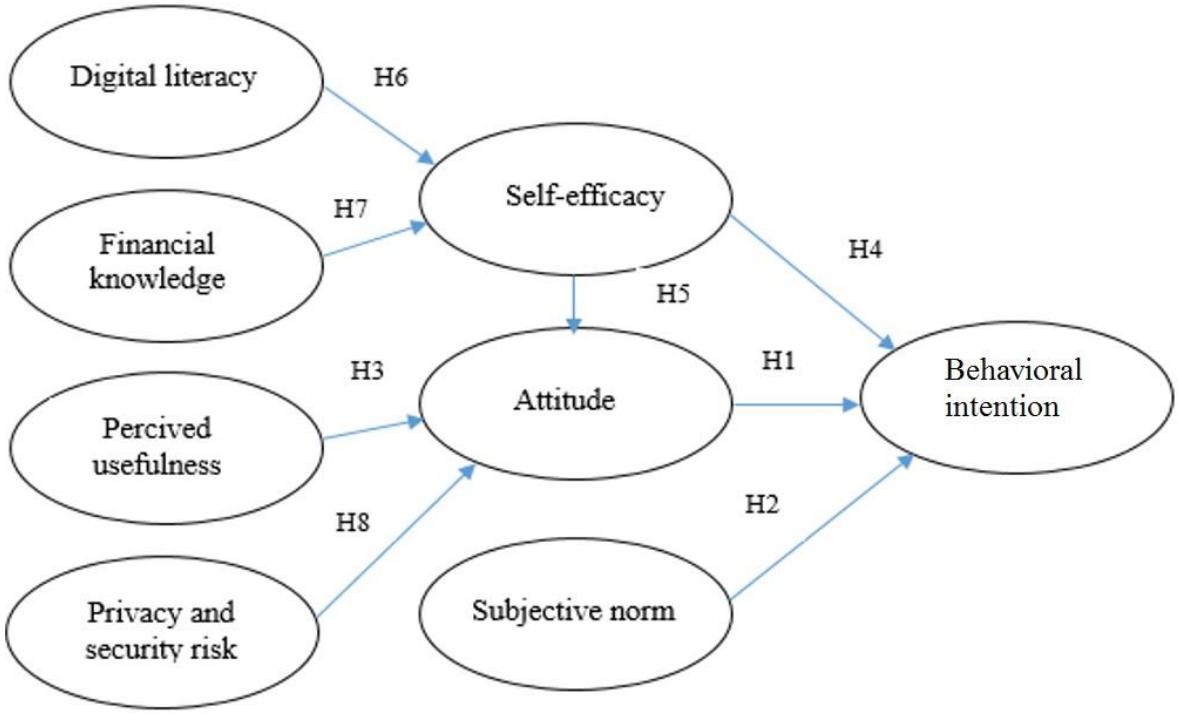

Figure 1. Research model.

3.2.2. Hypotheses about Self-Efficacy

Perceived self-efficacy is the belief that one is capable to execute behaviors necessary to produce specific outcomes (Bandura, 1977). Moreover, self-efficacy influences how much effort people will make, i.e., whether they will be persistent, when faced with challenges and obstacles (Bandura, 1982). In terms of information technologies, self-efficacy represents an individual's belief in their capacity to perform specific behavior related to IT (information technology) (Compeau & Higgins, 1995). With regard to the use of mobile banking, perceived self-efficacy is seen as individual's perception on to what extent they are capable of using the mobile banking platform. In our proposed model, self-efficacy construct includes perceived ease of use from TAM and perceived behavioral control from TPB model. Takele and Sira (2013) analyzed influence of perceived behavioral control and ease of use on the attitude towards behavior and behavioral intention related to e-banking acceptance. Sentosa and Mat (2012) examined the influence of perceived behavioral control and ease of use on intentions towards the use of Internet shopping. Therefore, the following hypotheses are proposed:

H4: Perceived self-efficacy influences psychological intentions towards the use of mobile banking.

H5: Perceived self-efficacy influences attitudes towards the use of mobile banking.

3.2.3. Hypothesis about Digital Literacy

In a nutshell, the term "literacy" means the ability to read and write. However, it has various interpretations in relation to the forms of information and communications technology (ICT) imposed by the level of technological and civilization development of society. Nowadays, there are different sorts of functional literacy required for individual's efficacy in regards to business and social life. In relation to the accelerated digital transformation of society, digital literacy is imposed as one of the key forms of functional literacy. Digital literacy is a broader concept than ICT literacy, as it includes elements of information literacy, media literacy, and visual literacy. The concept of digital literacy refers to the awareness, attitude, and ability of individuals to appropriately use digital tools and opportunities to access, manage, analyze, and synthesize digital resources, gain new knowledge and communicate in regards to specific life situations, in order to achieve their constructive social action (Martin, 2006). Digital literacy is an important dimension in the context of acceptance and perception of ease of use of modern technologies.

MacCallum et al. (2014) found a positive impact of digital literacy on the perception of ease of use and acceptance of mobile learning by teachers. Prior, Mazanov, Meacheam, Heaslip, and Hanson (2016) also showed that digital literacy significantly affects students' self-efficacy in online learning. Therefore, we propose the following hypothesis:

H6: Digital literacy positively influences perceived self- efficacy.

3.2.4. Hypothesis about Financial Knowledge

Financial literacy is multidimensional because it represents the combination of knowledge, attitudes, skills, and behaviors necessary for making healthy financial decisions that lead to achieving individual financial well-being (OECD INFE, 2011). A very important segment of overall financial literacy is financial knowledge. Financial knowledge helps individuals compare financial products and services and make better financial decisions (Morgan & Trinh, 2019). The development of new FinTech services probably further complicates the process of comparing financial products and selecting those that are most favorable for an individual. Jünger and Mietzner (2020) and Yoshino, Morgan, and Long (2020) revealed that financial knowledge has a positive impact on the reception of FinTech services in Germany and Japan, respectively. A positive link between financial literacy and FinTech awareness has also been determined for developing countries. The survey was conducted in the Lao People's Democratic Republic (Morgan & Trinh, 2019). Thus, the following hypothesis is proposed:

H7: Financial knowledge positively influences perceived self-efficacy.

3.2.5. Hypothesis about Privacy and Security Risk

The perception of privacy and security risks refers to trust in the use of mobile banking in terms of believing that the bank is capable of protecting users' personal data and that the use of mobile banking is safe in relation to financial and other aspects of security. Privacy risk refers to a possible loss of control over the use of personal data (Lee, 2009). Chong et al. (2010) and Govender and Sihlali (2014) use extended TAM in their research on acceptance online (mobile) banking, in which the trust variable is included. Thereby, trust is defined as a measure in which an individual believes that the use of online banking is safe and that there are no threats to privacy. Privacy and security risk is a construct that is often included in mobile and/or Internet banking reception models (Albort-Morant, Sanchís-Pedregosa, & Paredes, 2022; Baabdullah et al., 2019; Koksal, 2016; Luarn & Lin, 2005; Marakarkandy et al., 2017; Pikkarainen et al., 2004; Takele & Sira, 2013). Lee (2009) and Akturan and Tezcan (2012) include six risk dimensions in TAM model, including security risk and privacy risk by examining the relationship between risk and attitudes. Therefore, the following hypothesis is proposed:

H8: Perceived privacy and risk influence the use of mobile banking.

4. RESEARCH METHOD

The partial least squares (PLS) method was used for evaluating the measurement models and the structural model. Moreover, software package SmartPLS 3.0 has been used. The statistical significance of the PLS SEM analysis results is estimated with bootstrapping procedure including 5,000 subsamples. Test Q2 value was performed by using blindfolding procedure. The sample size of 83 respondents is an appropriate component of structural modeling – the sample is 10 times larger than maximum number of arrowheads pointing at a construct anywhere in the PLS path model (Hair, Hult, Ringle, & Sarsted, 2014).

4.1. Data Collection

The survey included respondents – members of the student population at four private and public higher education institutions in BiH. The survey was conducted online, using Google Forms. The respondents voluntarily participated in the survey with their privacy being protected. The survey was conducted over the period March 13 –

March 31, 2020. Our online questionnaires were completely answered by 83 respondents. The respondents' average age was 21.2 years. According to the gender structure, 77% of the respondents were female and 23% were male. In relation to study programs, 12% of the respondents study technical sciences, 84% social, and 4% other sciences.

4.2. Measurement Development

The data was collected through a questionnaire divided into two parts. The first part relates to socio-demographic characteristics of the respondents including gender, age, and their study program while the other part of the questionnaire includes multi-item measures per each construct from the proposed theoretical model. All items were translated into the Bosnian language and adapted in regards to mobile banking. The scale of items was measured on a five-point Likert scale, ranging from strongly disagree (1) to strongly agree (5). Table 2 contains the constructs used, as well as their sources.

Table 2. Constructs and their sources.

Constructs	Number of items	Sources
Perceived usefulness (PU)	4	Adapted from Davis (1989)
Attitude (AT)	3	Adapted from Liñán and Chen (2009)
Self-efficacy (SE)	6	Adapted from Liñán and Chen (2009) and Davis (1989)
Subjective norm (SN)	3	Adapted from Liñán and Chen (2009)
Privacy and security risk (PSR)	5	Adapted from Akturan and Tezcan (2012)
Digital literacy (DL)	9	Adapted from Van Deursen, Helsper, and Eynon (2014)
Financial knowledge (FK)	8	Adapted from OECD INFE (2011)
Behavioral intention (BI)	3	Adapted from Liñán and Chen (2009)

Financial knowledge is an exemption due to the use of eight-item questionnaire. The total number of correct answers was used in analysis with zero to eight values. Each question had the same specific difficulty.

5. DATA ANALYSIS AND RESEARCH RESULTS

5.1. Test Results of Measurement Models and Collinearity Assessment of Constructs

Evaluation of measurement models was conducted by verification of internal consistency reliability along with convergent and discriminant validity items within measuring scales.

Table 3. Construct reliability and validity.

Latent variable	Internal consistency reliability		Convergent validity
	Cronbach's alpha	Composite reliability	AVE
DL	0.89	0.92	0.55
PU	0.89	0.92	0.74
PSR	0.92	0.94	0.75
SN	0.90	0.94	0.83
SE	0.85	0.89	0.58
AT	0.86	0.91	0.78
BI	0.89	0.93	0.82

Internal consistency reliability construct was evaluated on the basis of Cronabach's alpha and composite reliability. Table 3 clearly shows that Cronbach's alpha values were within 0.85 to 0.92 interval and higher than limit value of 0.70, which indicates a high level of reliability of measuring latent variables (Pallant, 2007). Moreover, composite reliability Table 3 for all constructs was above 0.7 limit value, indicating a very good internal consistency and reliability of scales used for this sample (Nunally & Bernstein, 1994).

Convergent validity of measuring scales was tested on the basis of average variance extracted (AVE) and the outer loadings of the indicators. AVE values (see Table 3) for all latent variables were higher than the critical 0.5 value (Fornell & Larcker, 1981). The outer loadings of the indicators on the construct are provided in Table 4. It can be determined that all outer loadings ratings were statistically significant at level 0.001. Most outer loadings of individual indicators were higher than the threshold of 0.70. Seven outer loading ratings were between 0.40 and 0.70 and they were retained in the model because they were statistically significant and because their elimination did not increase composite reliability and AVE above the critical threshold value (Hair et al., 2014). In this way, the convergent validity of individual indicators on the construct was confirmed.

Table 4. Outer loadings and cross loadings of the indicator significance testing results.

Constructs	Indicators	Convergent validity		Discriminant validity							
				Cross loadings of the indicator							
		Outer loadings	p value	DL	FL	PU	PASR	SN	PBC	AT	BI
DL	DL1	0.83	0.00		0.01	0.31	0.10	0.01	0.47	0.25	0.18
	DL2	0.77	0.00		0.06	0.17	-0.01	-0.05	0.40	0.24	0.18
	DL3	0.85	0.00		0.06	0.33	0.01	0.00	0.34	0.25	0.18
	DL4	0.79	0.00		0.06	0.38	0.03	0.04	0.36	0.31	0.14
	DL5	0.75	0.00		-0.02	0.16	0.00	0.02	0.37	0.33	0.03
	DL6	0.61	0.00		-0.01	0.01	0.01	0.02	0.20	0.04	0.16
	DL7	0.50	0.00		-0.00	-0.06	0.10	0.07	0.29	0.09	0.03
	DL8	0.68	0.00		-0.12	0.08	0.10	0.11	0.35	0.18	0.13
	DL9	0.83	0.00		-0.05	0.20	-0.05	0.14	0.31	0.25	0.25
FK	FK1	1	0.00	0.00		0.07	-0.05	0.13	-0.13	-0.10	0.22
PU	PU1	0.83	0.00	0.23	0.03		0.33	0.40	0.33	0.49	0.38
	PU2	0.86	0.00	0.28	0.02		0.16	0.25	0.39	0.53	0.30
	PU3	0.88	0.00	0.17	0.04		0.49	0.36	0.46	0.66	0.39
	PU4	0.88	0.00	0.23	0.14		0.45	0.38	0.50	0.68	0.43
PSR	PSR1	0.86	0.00	0.04	-0.08	0.35		0.34	0.26	0.36	0.39
	PSR2	0.86	0.00	-0.02	0.07	0.34		0.37	0.17	0.30	0.43
	PSR3	0.86	0.00	0.09	-0.05	0.44		0.28	0.22	0.36	0.36
	PSR4	0.88	0.00	0,02	-0.02	0.35		0.31	0.26	0.32	0.35
	PSR5	0.86	0.00	0.06	-0.10	0.37		0.38	0.19	0.44	0.27
SN	SN1	0.87	0.00	0.01	0.04	0.44	0.46		0.18	0.26	0.51
	SN2	0.95	0.00	-0.00	0.14	0.37	0.33		0.11	0.23	0.53
	SN3	0.91	0.00	0.12	0.17	0.31	0.30		0.06	0.18	0.58
SE	SE1	0.82	0.00	0.38	-0.07	0.48	0.12	0.08		0.59	0.17
	SE2	0.68	0.00	0.33	-0.11	0.17	0.14	0.05		0.31	0.16
	SE3	0.69	0.00	0.35	-0.16	0.24	0.28	0.19		0.45	0.23
	SE4	0.82	0.00	0.44	-0.03	0.47	0.25	0.14		0.54	0.27
	SE5	0.68	0.00	0.27	-0.21	0.39	0.08	0.00		0.48	0.20
	SE6	0.69	0.00	0.39	-0.03	0.42	0. 27	0.11		0.48	0.26
AT	AT1	0.91	0.00	0.32	-0.08	0.62	0.35	0.19	0.57		0.40
	AT2	0.89	0.00	0.20	-0.03	0.62	0.46	0.27	0.56		0.46
	AT3	0.84	0.00	0.30	-0.16	0.59	0.28	0.20	0.55		0.33
BI	BI1	0.91	0.00	0.16	0.22	0.44	0.36	0.55	0.25	0.45	
	BI2	0.92	0.00	0.14	0.13	0.36	0.38	0.60	0.22	0.36	
	BI3	0.88	0.00	0.23	0.26	0.40	0.37	0.44	0.31	0.41	

For examination of discriminant validity measuring scales, the following was used: (a) examining the cross loadings of the indicator, (b) Fornell-Larcker criterion, and (c) heterotrait-monotrait (HTMT) ratio (Hair, Hult, Ringle, & Sarsted, 2017). In accordance to the results provided in Table 4, and by comparing the values of the outer loadings of specific indicators that were related to one construct with the values of cross loadings with the other

constructs, it can be concluded that the values of outer loadings of all indicators with associated construct were higher than the cross loadings with the other constructs (Hair et al., 2014).

In accordance to the Fornell-Larcker criterion, the test results for discriminant validity are shown in Table 5. On the main diagonal of the table, square roots of the AVE value were provided for each latent variable (written in cursive), while the elements below the main diagonal represented correlation coefficients between latent variables. By checking the ratio between the square root of the AVE value of individual constructs and the correlation with all other constructs, it can be concluded that the values on the diagonal for each construct were higher than the correlation coefficients of that construct and all other constructs (Fornell & Larcker, 1981).

Table 5. Discriminant validity in accordance to the Fornell-Larcker criterion.

Construct	Coefficients of correlation / Square root AVE							
	DL	FK	PU	PSR	SN	SE	AT	BI
DL	0.74							
FK	0.00	1.00						
PU	0.26	0.07	0.86					
PSR	0.05	-0.05	0.43	0.86				
SN	0.05	0.13	0.40	0.39	0.91			
SE	0.48	-0.13	0.50	0.26	0.13	0.76		
AT	0.31	-0.10	0.69	0.42	0.25	0.64	0.88	
BI	0.19	0.22	0.44	0.41	0.59	0.28	0.45	0.90

Note: FL refers to single-item construct validity according to HTMT ratio.

Moreover, discriminant validity of construct was determined in accordance to HTMT ratio (Table 6), because all the values of the ratio were under the critical value of 0.9 (Henseler, Ringle, & Sarstedt, 2015). In this way, the presence of discriminant values of measuring scales tested by all three criteria was determined, thus confirming that the included constructs measured characteristics of different phenomena.

Table 6. Discriminant TMT criterion.

Construct	Construct							
	DL	FK	PU	PSR	SN	SE	AT	BI
DL								
FK	0.06							
PU	0.30	0.07						
PSR	0.09	0.08	0.46					
SN	0.11	0.13	0.45	0.44				
SE	0.53	0.15	0.54	0.29	0.15			
AT	0.34	0.12	0.78	0.46	0.28	0.74		
BI	0.23	0.24	0.49	0.46	0.66	0.33	0.52	

Testing collinearity of a set of predictor constructs for each endogenous construct starts from the already formulated structural model, based on the value of variance inflation factor (VIF) (Table 7). Since all VIF values were less than the critical value of five, there was no multicollinearity in the model between predictor constructs of all three endogenous constructs (Hair, Ringle, & Sarstedt, 2011).

Table 7. Collinearity assessment.

First set - PBC		Second set - AT		Third set - BI	
Construct	VIF	Construct	VIF	Construct	VIF
DL	1	PU	1.52	SN	1.07
FK	1	PSR	1.23	SE	1.68
		SE	1.33	AT	1.76

5.2. Evaluation of Research Structural Model and Testing of Hypotheses

The testing of explanatory and predictive power of integrated model of intentions towards mobile banking acceptance was performed by using PLS SEM.

For testing hypothetical relations in the structural model, i.e., for identifying the key constructs with the greatest importance for the explanation of endogenous latent variables, the most significant was the estimation of path coefficients, total effects, and f^2 effect size (Hair et al., 2014; Zahirović & Okičić, 2021).

Based on individual path coefficients provided in Table 8, it can be concluded that four out of eight were statistically significant at the 0.001 level, one at 0.05 and one at 0.10 level, while two of them were not statistically significant. BI was positively predictably the most significant from SN (ρ=0.52; p<0.001), and then from AT (ρ=0.31; p<0.05) providing empirical support for H_2 and H_1 hypotheses. PU (ρ=0.45; p<0.001) and SE (ρ=0.38; p<0.001) had a positive effect on AT, thus they supported H_3 an H_5 hypotheses. If this research is treated as explanatory, then PSR positively affects AT (ρ=0.12; p<0.10), which can be explained as a bit weaker empirical support of H_8 hypothesis. DL had a positive effect on SE (ρ=0.48; p<0.001) thus it supported H_6 hypothesis. The total effects of exogenous variables which included direct and indirect effects on the target variable BI were statistically significant only for exogenous variable PU (TE=0.14; p=0.03<0.05). Therefore, it can be concluded that PU positively affects BI including the intervening effect of the AT variable. Since SN had only direct path with BI, the total effect was equal to path coefficient and was statistically significant. A statistically significant total effect of DL on AT was also confirmed (TE=0.18; p=0.001<0.01).

The analysis of f^2 effect size (critical values 0.02 – small; 0.15 – medium; 0.35 – large (Cohen, 1992) confirmed there was no relevance of construct FK for the explanation of variance of SE construct, and that the effect of SE on BI was insignificant, which provided the results identical to the results of path coefficient analysis Table 8. Medium effect size of DL on SE was present, but as statistically significant (f^2=0.30; p<0.05), therefore supporting H_6 hypothesis. AT was under medium effects of constructs PU (f^2=0.34; p<0.05) and SE (f^2=0.28; p<0.05), empirically supporting H3 and H_5 hypotheses, respectively. A small but statistically insignificant effect of PSR on AT (f^2=0.03; p>0.05) was determined. A large size effect of SN (f^2=0.45; p<0.01) on BI construct was determined, which confirms H_2 hypothesis. Interestingly, there was a small effect size of construct AT (f^2=0.10; p>0.05) on BI, which was not statistically significant.

Table 8. Significance testing result of the structural model path coefficients (summary of the results).

Hypotheses/ Constructs relations	Path coefficients		f^2 effect size	
	Bond strength	P values	Value	P values
H_1: AT → BI	0.31	0.01	0.10	0.23
H_2: SN → BI	0.52	0.00	0.45	0.009
H_3: PU → AT	0.45	0.00	0.34	0.047
H_4: SE → BI	0.02	0.42	0.00	0.49
H_5: SE → AT	0.38	0.00	0.28	0.04
H_6: DL → SE	0.48	0.00	0.30	0.01
H_7: FK → SE	-0.13	0.14	0.02	0.33
H_8: PSR → AT	0.12	0.10	0.03	0.32

In this model, the explained part of variable SE was 25%, AT 61%, and BI 45% Table 9. When taking into consideration that the research relates to the user's behavior (e.g., technology acceptance), all values of coefficients of determination were above 0.20 and can be considered as high values (Hair et al., 2017). If more rigorous criterion is used, with thresholds 0.25 - weak, 0.50 – medium, and 0.75 - substantial, all three values of R^2 for endogenous constructs were acceptable: for SE extremely weak, for AT medium, and for BI closer to medium than weak (Hair et al., 2014). In this way, prediction purposes model is confirmed. Furthermore, based on Q^2 value a very good predictive relevance was determined of the path model because all Q^2 values were higher than zero.

Table 9. Results of R^2 and Q^2 values.

Endogenous latent variable	Coefficients of determination		Q^2 value
	R^2 value	P value	
SE	0.25	0.00	0.13
AT	0.61	0.00	0.45
BI	0.45	0.00	0.35

6. DISCUSSION OF THE RESULTS

This research focused on determining how much perceptions of Self-efficacy, Attitude and Subjective norm determined the intention towards acceptance of mobile banking. Moreover, the research sought to determine the existence of influences of Digital literacy and financial knowledge on Self-efficacy, as well as Perceived usefulness, Privacy and security risk, and Self-efficacy on Attitude. In order to achieve these goals, TPB and TAM models were used as a theoretical basis. In contrast to the basic models, in our model the Perceived behavioral control and Perceived ease of use constructs were integrated into Self-efficacy construct. In addition, the original theoretical model of acceptance intent was expanded by the Digital literacy, financial knowledge, and Privacy and security risk dimensions. Thus, a new model was designed to explain the key influential factors of user behavior in the process of deciding on the acceptance of mobile banking. The research also tried to verify how much the selected measurement models contribute to verification of the relationship between the dimensions of the integrated model.

The evaluation of measurement models revealed the presence of reliability of internal consent, convergent validity, and discriminant validity of the measurement scales of the covered constructs. The reliability of the internal consonance of measurement models was confirmed, since for all latent variables the values of Cronbach's alpha were within the range from 0.85 to 0.92 (threshold 0.7), and composite reliability had values higher than the threshold of 0.70 (from 0.89 to 0.94). The presence of convergent validity of indicators in measurement scales was determined according to the criteria of statistical significance of external loadings and AVE values. The external loads of all individual indicators on the corresponding construct were statistically significant at 0.001 level. AVE values for all latent variables of the model exceed the minimum criterion value of 0.50. The presence of discriminant validity of construct measurement scales was confirmed in the cross-load comparison process, Fornell-Larcker criterion, and HTMT correlation ratio. The load values of all indicators (34 of them) for the corresponding construct were greater than the load value for other constructs, thus meeting this criterion. The Fornell-Larcker criterion confirmed the discriminant validity since the values of the square root of AVE for each construct were higher than the correlation coefficients of this construct and all other constructs. The HTMT correlation ratio confirmed the presence of discriminant validity, because HTMT correlation ratios between the constructs in question were lower than threshold 0.90. Since all VIF values were significantly below threshold 5, it was concluded that the structural model characterizes the absence of collinearity between predictor constructs of all three endogenous constructs.

The used model explained 45% of variance Behavioral intention. The results of the research confirmed that Subjective norm and Attitude are significant predictors of the user's intention to accept mobile banking. The influence of Attitude and Subjective norm on the intention to accept new technologies was confirmed by the results of other studies (Lee, 2009; Sanayei & Bahmani, 2012). This paper shows that Subjective norm is a stronger predictor than Attitude when it comes to the intention to accept mobile banking, which is consistent with the findings of the Sentosa and Mat (2012) survey, in which the influence of Attitude was insignificant, while the impact of Subjective norm was significant. On the other hand, in the research by Sanayei and Bahmani (2012) and Lee (2009) Attitude was a stronger predictor of Behavioral intention compared to Subjective norm. The predictive influence of Attitude on Behavioral intention, without confirming the impact of Subjective norm, was shown in the studies by Marakarkandy et al. (2017) and Takele and Sira (2013). Confirmation of the influence of Attitude on the intention to accept technologies can be found in Akturan and Tezcan (2012). Singh and Srivastava (2018) did not

support the significant social impact on the intention to accept mobile banking in India. In their research, Mortimer et al. (2015) did not prove that social influence affects the intention to accept mobile banking in Thailand, while on the other hand, social influence in the case of Australia was confirmed. Also, Govender and Sihlali (2014) showed a significant social impact on the intention to use mobile banking.

Subjective norms are often related to culture, i.e. to the fact that societies are collectivist or individualistic. In our case, the strong influence of Subjective norm on Behavioral intention can also be explained through the increasing presence of mobile banking in banking practice and the behavioral follow-up effect.

It was also found that Perceived usefulness positively affects acceptance of Behavioral intention including the intervening effect of the Attitude variable. The indirect and direct effect of Perceived usefulness on the intention to accept mobile and Internet banking was confirmed by Lee (2009) and Sanayei and Bahmani (2012) research. The significant influence of Perceived usefulness on the intention to accept mobile and Internet technologies can also be found in Mortimer et al. (2015); Govender and Sihlali (2014); Marakarkandy et al. (2017); Sentosa and Mat (2012); Chong et al. (2010); Gu et al. (2009); Baabdullah et al. (2019) and Alalwan et al. (2016). On the contrary, Akturan and Tezcan (2012) did not confirm the significant influence of Perceived usefulness on Behavioral intention in case of acceptance of mobile banking.

This research did not find a direct influence of Self-efficacy on the intention to accept mobile banking. Although these results stood out from the assumptions of the starting models, their confirmation can be found in other studies. Sentosa and Mat (2012) could also not confirm the impact of Perceived behavioral control and Perceived ease of use on Behavioral intention in their research on Internet shopping acceptance. Govender and Sihlali (2014) and Baabdullah et al. (2019) did not confirm that Perceived ease of use affects the intention to use mobile banking. In the case of Australia, Mortimer et al. (2015) did not confirm the significant influence of Perceived ease of use on the intention to accept mobile banking, while in Thailand's example this influence was significant. Chong et al. (2010) also show that the influence of Perceived ease of use on the intention to use Internet banking is insignificant. On the other hand, Marakarkandy et al. (2017) showed that Internet banking Self-efficacy positively influences the behavioral intention to use Internet banking. Lee (2009) showed that Perceived behavioral control has a direct, and Perceived ease of use indirect effect on the intent to use Internet banking. Gu et al. (2009); Luarn and Lin (2005) and Alalwan et al. (2016) showed that Perceived ease of use significantly influences the intention to accept mobile banking, as well as Singh and Srivastava (2018) who confirmed the influence of computer Self-efficacy. Takele and Sira (2013) showed that Perceived behavioral control and Perceived ease of use influence the intention to accept Internet banking. Sanayei and Bahmani (2012) revealed that Perceived behavioral control influences the intention to embrace Internet banking.

Our model explained 61% of the variance of the Attitude variable. Perceived usefulness and Self-efficacy had a significant positive impact on Attitude. Confirmation of this result can be found in Lee (2009); Sanayei and Bahmani (2012) and Takele and Sira (2013). Perceived usefulness was proven to be a more significant predictor of attitudes than Self-efficacy. Sanayei and Bahmani (2012) also showed that influence of Perceived usefulness on attitudes when accepting Internet banking was more significant than Perceived ease of use. Akturan and Tezcan (2012) and Aboelmaged and Gebba (2013) confirmed influence of Perceived usefulness on Attitude in a survey on the intention to use mobile banking, while the influence of Perceived ease of use on Attitude was not confirmed. On the contrary, in the Takele and Sira (2013) survey, the influence of Perceived behavioral control and Perceived ease of use on the attitudes was more significant than Perceived usefulness. Lee (2009) also revealed that the impact of Perceived ease of use on Attitude is more significant than the influence of Perceived usefulness. Marakarkandy et al. (2017) showed that Perceived ease of use influences attitudes regarding the acceptance of Internet banking.

Perceived usefulness was crucial for explaining the intention to accept mobile banking, it had the strongest influence on the formation of attitudes about the acceptance of mobile banking. Generally speaking, Perceived usefulness shows the level of understanding of the advantages of using mobile over traditional banking, which in

fact directly shapes the positive attitude in relation to mobile banking. Banks are, above all, responsible for improving the use of mobile technologies. As part of the promotion, banks should inform potential customers about the usefulness of mobile banking and its benefits over the Internet, in particular traditional banking.

The impact of Privacy and security risk on Attitude was confirmed with a level of significance $p<0.10$. Akturan and Tezcan (2012) did not confirm the influence of security and privacy risk on attitudes towards accepting mobile banking. In contrast, Lee (2009) and Sanayei and Bahmani (2012) confirmed the influence of security risk on attitudes, but also on the intention to use Internet banking. Moreover, Takele and Sira (2013) confirmed the influence of risk perception on attitudes related to the acceptance of Internet banking. The lack of impact of Privacy and security risk on Attitude can also be observed in the context of the Covid-19 pandemic, during which this research was carried out.

The necessity of using digital channels in the times of the pandemic has potentially influenced the overcoming of earlier fears related to security and privacy protection, when it comes to the use of mobile and Internet technologies. Although it was not fully confirmed that Privacy and security risk affects Attitude, yet it seems to us that ignoring it by embracing mobile technologies could have detrimental consequences for the development of the mobile banking market.

Digital literacy and financial knowledge are features of users that are predominantly related to understanding a phenomenon with the potential ability to implement it for specific purposes. Their relationship is associated with potential Self-efficacy or ability to use mobile technology. The model explained 25% of the variance of Self-efficacy. Digital literacy was proven to be a significant predictor of Self-efficacy. Prior et al. (2016) confirmed the positive impact of digital literacy on students' self-efficacy in online learning. MacCallum and Jeffrey (2013) showed in their research that ICT skills, as a segment of digital literacy, influence students' perceptions regarding mobile technology. Those with better skills are more likely to perceive mobile learning as easy. MacCallum and Jeffrey (2014) also examined the impact of digital literacy on teacher acceptance of mobile learning. The results showed that basic ICT literacy and advanced mobile literacy influence the perception of ease of use and the intention to adopt mobile learning. The fact that Digital literacy is a predictor of Self-efficacy can be explained by the fact that the respondents are increasingly embracing and using different digital technologies, thus they can very easily master mobile banking technologies. Considering that the results of this study did not confirm the influence of perceived Self-efficacy on Behavioral intention, contrary to the assumptions of TAM and TPB models, this finding that may be explained by the following. The respondents probably believe that they can easily learn to use the mobile banking and, therefore, their perception of Self-efficacy in terms of using mobile banking technology does not represent a significant factor related to the intention to use it.

Financial knowledge was not proven to be a significant determinant of self-efficacy of mobile banking use. It seems to us that this is mostly because mobile banking processes do not require some special financial knowledge, except for those that can be gained through experience and using other forms of business with banks. Also, the indirect influence of financial knowledge, Digital literacy, and Privacy and security risk including intervening variables on Behavioral intention was not confirmed. The fact that financial knowledge did not affect Self-efficacy, but also Behavioral intention, can be interpreted as the fact that knowledge of digital technologies is much more important for the use of mobile banking than financial knowledge. It is likely that simpler products are still offered in the banking market in B&H in the framework of mobile banking, and it is likely that the respondents, since they come from a younger age group, do not use more complex banking products or have experience in that regard. On the other hand, using more complex FinTech services would probably require advanced financial knowledge, as confirmed by Jünger and Mietzner (2020) research, which revealed that German households with good Financial knowledge are more likely to accept FinTech services. Individuals with greater Financial knowledge use more complex financial products. Yoshino et al. (2020) found that financial knowledge has a positive impact on the use of mobile payment applications, electronic money, or the use of at least one FinTech service.

The user's attitude before acceptance is based on cognitive beliefs, which may be influenced by sources that are biased. Thus, the user's attitude can be subjective, unrealistic, and unreliable.

7. CONCLUDING REMARKS

In this paper we developed a model based on the constructs of TPB and TAM models, in order to explain and anticipate the intention to accept mobile banking in the student population. Previous research offered different variables and their operationalization. Our integrated model included key constructs of starting models and their operationalization. The Self-efficacy construct compiled Perceived behavioral control construct indicators from TPB model and Perceived ease of use construct from TAM model. In addition to these constructs, the model was expanded with constructs Digital literacy, financial knowledge, and Privacy and security risk. Innovation in relation to previous research is in the introduction of digital literacy and financial knowledge in the model. The results showed that the proposed model has good explanatory power and confirmed its robustness in predicting customer intentions regarding the acceptance of mobile banking.

The intention to accept mobile banking was directly influenced by subjective norms and attitudes, while the perception of Self-efficacy was not proven to be significant for intentions. Considering that the respondents came from a younger age population, accustomed to the use of mobile technologies, we assume that the use of mobile banking does not present difficulty for them in terms of learning. Therefore, the perception of Self-efficacy was not perceived as significant for the intention to accept mobile banking. Perceived usefulness of mobile banking was proven to be the most important predictor of attitudes, while at the same time affecting positively the acceptance of Behavioral intention including the intervening effect of the Attitude variable. Attitudes regarding the acceptance of mobile banking were primarily determined by Perceived usefulness and perception of Self-efficacy, and to a lesser extent by Privacy and security risk. Financial knowledge was not proven to be important in terms of perception of Self-efficacy, while on the other hand Digital literacy was proven to be a significant predictor of perceived Self-efficacy. Environmental support was proven crucial in the intention of using mobile banking. This may come from the fact that mobile banking is used more and more in the environment, whereby one kind of social impact is made through supporting individuals to use mobile banking. This could be implemented by banks in terms of exploiting herd bias, in order to attract new mobile banking users, while maximizing the benefits associated with the use of mobile banking, without neglecting issues related to Privacy and security risk.

The limitation of this study refers primarily to the generalizability of the results obtained, for two reasons. Firstly, it is a relatively small sample of subjects, coming from a narrow segment of the population. Secondly, the survey was conducted in a narrow context of four higher education institutions from one country characterized by the low level of development of the digital environment. The narrow spatial coverage of higher education institutions, with different features and with different levels of development of digital environments, represents a limitation of the complete generalizability of the results for the behavior of young people with different characteristics of the digital environment.

In future research, it is necessary to explore the link between the intentions of acceptance and the actual actions of users in terms of the use of mobile banking, as well as its long-term effects, especially in the case of the introduction of more complex banking products available within the framework of mobile banking. Also, in the context of today's accelerated digitization of society, it would be useful to explore the intentions of accepting mobile banking in relation to different socio-demographic characteristics of populations such as gender, age, level of education, etc. Moreover, future research can investigate whether the characteristics of the services created by banks, or the design of mobile devices and applications through which these services are provided, are more significant to accept mobile banking.

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