Factors Influencing Mobile Banking Adoption in Pakistan: An extension of UTAUT Model

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Abstract
This study examines the behavioural factors influencing mobile banking acceptance in Pakistan, emphasizing the mediating roles of perceived benefits, perceived learning, and mobile self-efficacy, by extending the Unified Theory of Acceptance and Use of Technology model. The study explores how these elements impact behavioural intention i.e .Performance Expectancy, Effort Expectancy, Social Influence and Facilitating conditions to use mobile banking services, exploring the cognitive processes involved in adoption decisions. 654 valid responses were used to compute direct and mediation effects using SPSS version 27 and the partial least squares using Smart PLS 4.0 software. Significant direct effect was observed on all behavioural factors except social influence. However, mediation was observed in performance expectancy and facilitating condition. These findings emphasise the critical role of perceived benefits, perceived learning, and mobile self-efficacy in influencing mobile banking adoption in Pakistan, providing practical insights for stakeholders aiming to enhance digital financial services. The insights gained are valuable for Pakistani fintech companies and financial institutions to promote mobile banking usage, for policymakers to devise strategies for digital financial inclusion, and for contributing to the broader research on technology acceptance in emerging markets.
Keywords: *Mobile banking, behavioural intension, fintech, PB, PL, MSE*

INTRODUCTION

The rapid proliferation of mobile technologies and the increasing penetration of smartphones have revolutionized the financial services landscape worldwide. Mobile banking, in particular, has emerged as a transformative force, offering unprecedented convenience and accessibility to consumers (Shaikh & Karjaluoto, 2015; Quader, 2024). This digital shift in financial services has been especially pronounced in emerging markets like Pakistan, where traditional banking infrastructure may be limited, particularly in rural and remote areas (Kemal, 2019; Iqbal & Abbas, 2024).

Representing a digital substitute for cash, mobile money also known as electronic money or e-money allows consumers to store, send, and receive funds using mobile devices (Donovan, 2012). Particularly in developing countries where conventional banking infrastructure may be limited, this creative financial technology has become rather popular recently (Mas & Morawczynski, 2009; Wadud, 2022; Asif et al., 2023). Usually running on a network of agents who enable cash-in and cash-out transactions, mobile money systems let users translate actual money into electronic value and vice versa (Jack & Suri, 2014; Hasan & Sadat, 2023). Early in the 2000s, the idea of mobile money first surfaced with M-Pesa in Kenya acting as a trailblazing, quite successful model (Hughes & Lonie, 2007; Hussain, 2018; Asim et al., 2021; Audi et al., 2021). Since then, mobile money services have exploded all around providing a variety of financial services including peer-to--peer transfers, bill payments, even credit and savings products (Demombynes & Thegeya, 2012; Omri, 2022; Sulehri et al., 2023; Sulehri & Ali, 2024). Mobile money's ability to solve financial inclusion issues and provide access to official financial services for once unbanked populations has been mainly responsible for its quick acceptance (Suri & Jack, 2016; Wali, 2018; Elahi et al., 2021). Often blurring the lines between traditionally separate sectors, mobile money functions at the nexus of telecommunications and financial services (Maurer, 2012; Audi et al., 2024). As legislators try to strike a mix between innovation and consumer protection and financial stability concerns, this convergence has resulted in both fresh regulatory challenges and opportunities (Klein & Mayer, 2011; Shahbaz, 2018). Mobile money is progressively seen as a possible driver of more general economic growth and a main component of the digital economy in many developing countries as it develops (Aron, 2018; Khan et al., 2020; Audi et al., 2022; Hun et al., 2024).

Mobile money and e-money services have seen significant expansion in Pakistan recently, and they are quite important in increasing financial inclusion all around the national. With branchless banking rules in 2008 and e-money institution rules in 2019, the State Bank of Pakistan has been aggressive in establishing a favourable

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regulatory environment for these services (State Bank of Pakistan, 2019). With transaction values exceeding PKR 2.4 trillion per quarter, Pakistan's over 88 million mobile wallet accounts as of 2023 reflect Offering a range of services from peer-to--peer transfers to bill payments and merchant transactions, major market players JazzCash, EasyPaisa, and UPaisa are (Yen, 2018; Kemal, 2019; Ali et al., 2020). The COVID-19 epidemic hastened the acceptance of mobile money services even more since the government uses them to distribute social welfare payments (Malik et al., 2020). Notwithstanding this development, problems still exist including low digital literacy rates in rural areas and the necessity of more interoperability between many mobile money platforms (Shaikh et al., 2021; Yasir et al., 2021). Still, the explosive expansion of mobile money in Pakistan shows how capable it is to change the financial scene and propel more economic inclusion.

Pakistan, with its population of over 245 million (Worldometer, 2024) and a mobile phone penetration rate exceeding 79.48%, presents a significant opportunity for mobile banking services (Pakistan Telecommunication Authority, 2024). Despite this potential, the adoption of mobile banking in Pakistan has not reached its full capacity, only 16 million mobile banking users and 11% internet banking users with only a fraction of the population actively using these services (Tribune, 2024). This gap between potential and actual adoption underscores the need for a deeper understanding of the factors influencing mobile banking acceptance among Pakistani consumers.

There are many behavioural, social, and technological aspects that play a role in the process of technology adoption, which includes mobile banking. Research on technology adoption in developed economies is abundant, but studies examining emerging markets, such as Pakistan, with their unique cultural, economic, and technological contexts are relatively scarce (Majeed & Rasheed, 2024).

Emphasizing the mediating roles of perceived benefits (PB), perceived learning (PL), and mobile self-efficacy (MSE) this study explores the behavioural factors influencing mobile banking acceptance in Pakistan. This study intends to extend the Unified Theory of Acceptance and Use of Technology (UTAUT) model (Venkatesh et al., 2003), so improving knowledge of the adoption process in Pakistan. Research is conducted to find how these elements influence behavioural intention to use mobile banking services. This study aims to clarify the cognitive processes influencing adoption decisions by investigating the mediating mechanisms linking several ideas.

Understanding these components is essential for a number of reasons. First of all, it can enable Pakistani fintech companies and financial institutions to coordinate how to raise mobile banking usage in Pakistan. Second, it can assist in the definition of strategies meant to support digital financial inclusion among policy makers. Last but not least, it contributes to the mounting corpus of research on the acceptance of emerging market technologies, which might offer helpful insights for other, similar circumstances.

LITERATURE REVIEW

By allowing consumers all around the world more accessible and convenient services, mobile banking has transformed the financial services sector (Shaikh & Karjaluoto, 2015). Thanks to the ubiquitous smartphones and better internet connectivity, both developed and developing countries have seen fast increase in the acceptance of mobile banking services (Tran & Corner, 2015). Online banking has been more evident in developing nations such as Pakistan's, where physical bank branches may be rare (Kemal, 2019; Rafique et al., 2020). All those engaged including policy makers, financial institutions and researchers have to be well-versed in the behavioural factors influencing mobile banking acceptance. These results can direct initiatives aiming at increasing financial inclusion, user acceptance, and service design (Venkatesh et al., 2012). Although technology is always improving mobile banking systems, the success of these developments relies on users' consistent acceptance and application of them (Alalwan et al., 2017; Abid et al., 2021).

Emphasizing the Pakistani background, this review of the literature aims to examine the important behavioural factors influencing mobile banking acceptance. Combining past research and theoretical models will help us to clarify the complex interaction among variables including Social Influence (SI), Facilitating Condition (FC), performance expectancy (PE), and Effort Expectancy (EE). We will also look at the possible mediating roles in the adoption process for MSE, PL, and apparent advantage.

THEORETICAL FRAMEWORK

Studies of intention to use mobile banking have mostly depended on theories of technology acceptance of these, Venkatesh et al.'s (2003) Unified Theory of Acceptance and Use of Technology (UTAUT) stands out as a strong and extensively used framework. Drawing from eight models of technology, Theory of Reasoned Action (Fishbein & Ajzen, 1975), Social Cognitive Theory (Bandura, 1986), TAM (Davis, 1989), Model of

PC Utilisation (Thompson et al., 1991), Motivational Model (Davis et al., 1992), C-TAM-TPB (Taylor & Todd, 1995), Diffusion of Innovation Theory (Rogers, 1995) and Theory of Planned Behaviour (Ajzen, 1985). Facilitating FC, SI, PE and EE and other elements like age, gender and experience are regarded to moderate the influence of these constructs on behavioural intention and use behaviour (Venkatesh et al., 2003; Asif et al., 2017).

Researchers had modified and extended the UTAUT model (Bude et al., 2021; Kahenya et al., 2014; Kundu et al., 2021; Lin et al., 2013; Trahini et al., 2016; Zafar et al., 2022) to better grasp the quirks of mobile banking. Oliveira et al. (2016) put forward an integrated model combining UTAUT and the Task-Technology Fit (TTF) model to show the acceptance of mobile banking. Their studies show that elements including performance expectations, technological features, and task-technology fit greatly affect the probability of using mobile banking. Alalwan et al. (2017) similarly investigated Jordan's mobile banking adoption using UTAUT2 expanded by including trust and perceived risk as extra constructs an updated version of UTAUT. Their findings underlined the need of trust, hedonic motivation, and physical education in influencing consumers' intention to use mobile banking services. Raza et al. (2019) investigated Islamic bank consumers in Pakistan use mobile banking using a modified UTAUT model. Their study underlined the importance of SI, PE, and EE in guiding adoption intentions.

Although UTAUT provides a strong basis for understanding mobile banking adoption, researchers have explored MSE (Chao, 2019; Dahri et al., 2023) PL (Al Share & Lane, 2011; Singh et al., 2023) and PB (Al Aufa et al., 2020; Murani & Gupta, 2020) as possible factors that influence or mediate adoption intentions. Researchers have acknowledged the need to add additional constructs to UTAUT in order to capture the whole complexity of user behaviour.

Based on these theoretical results, the present study suggests an enlarged model of mobile banking adoption that takes into account the core UTAUT constructs and investigates the mediating functions of PB, PL and MSE with a goal to explore the complex set of behavioural factors impacting the intention to adopt of mobile banking in Pakistan.

HYPOTHESIS DEVELOPMENT
Performance Expectancy
Venkatesh et al. (2003) define PE as the degree of confidence a person has in a system's capacity to enhance their job performance; in the context of mobile banking, however, refers to the degree to which consumers believe the service will help them achieve their goals. Studies have indicated that those who use mobile banking do so mostly for physical education. Alalwan et al. (2017) found, for instance, in Jordan that physical education was the most important determinant of behavioural intention to use mobile banking services. In keeping with this, Oliveira et al. (2016) discovered that PE greatly raised the intention to use mobile banking independent of cultural setting. Raza et al. (2019) claimed that PE had a major influence on how often Islamic bank clients in Pakistan adopted mobile banking. This demonstrates how more likely people are to use mobile banking if they believe it will enhance their financial transactions.

H1a: Performance expectancy is positively associated with behavioural intention for M-payment/M-banking services adoption.

Studies on the acceptance of mobile banking have repeatedly found a relationship between PE and PB. Research by Alalwan et al. (2018) indicates that consumers who believed mobile banking would help them better manage their money were more likely to find it useful. Likewise, Shareef et al. (2018) found that PE strongly correlates with the construct of perceived usefulness, which is rather closely related to PB. PE had a significant impact on users' opinions of the advantages of mobile payment systems similar to mobile banking in a 2016 Oliveira et al. study. These findings indicate that those who expect mobile banking will improve their performance on financial tasks will be more likely to see its wider picture benefits.

H1b: Performance expectancy is positively associated with Perceived benefits.

Effort Expectancy
Venkatesh et al. (2003) contend that EE explains the simplicity of a system. Relevant to mobile banking is EE of a mobile banking app or service. Studies of how EE influences mobile banking intention to adopt have produced conflicting results. While some studies have indicated no such link between EE and adoption intent (Baptista & Oliveira, 2015; Hydari et al., 2019), others have shown a positive one. In the Pakistani context, Raza et al. (2019) found that EE significantly changed consumers' intention to use mobile banking services. This supports the view of mobile banking apps as simple to use as a main influence on Pakistani adoption decisions.

H2a: Effort expectancy is positively associated with behavioural intention for M-payment/M-banking services adoption.

Prior studies have looked at the settings of technology adoption including mobile banking as well as the relationships between EE and PB. Research by Baab Abdullah et al. (2019) found that Saudi Arabia's mobile banking users had a favourable correlation between EE and perceived value. This implies that user impressions of the advantages of the technology depend on their level of simplicity of usage. Research on mobile payment adoption by Koenig-Lewis et al. (2015) shows that users' opinions of the benefits of mobile financial services are raised by their simplicity of use, which in turn influences their intention to adopt these services. Alalwan et al. (2016) presented more proof linking usability to perceived value since they found that EE improved perceived usefulness in the Jordanian mobile banking environment.

H2b: Effort expectancy is positively associated with Perceived benefits.

Social Influence

SI is the person's perception of the extent to which influential others think they should utilize the new system (Venkatesh et al., 2003). When discussing mobile banking SI describes the impact of one's social circle on the customer's choice to use the service. According to research by Slade et al. (2015), SI significantly increased the likelihood that people would use mobile payment services in their daily lives. Kemal (2019) found that among younger users in Pakistan, SI was the most important factor in determining their attitudes towards mobile banking adoption. The study conducted by Reza et al. (2019) in Pakistan focused on Islamic banking and found that SI had no significant impact on the intention to adopt M Banking.

H3a: Social influence (SI) is positively associated with behavioural intention for M-payment/M-banking services adoption.

On the other hand, other UTAUT constructs have gotten more attention than the one involving SI and PB in mobile banking adoption. Nevertheless, this association has been illuminated by a number of studies. Users' views of the advantages of mobile banking might be influenced by social factors, according to Tam and Oliveira (2016). This is especially true in collectivist cultures. According to research on mobile payment adoption by Yang et al. (2012), social norms can improve people's views of the benefits of technology, which in turn affects their intention to adopt the technology. A similar positive association between SI and PB was found by Al-Saedi et al. (2020) in the context of mobile government services; this finding could be generalized to other mobile-based technologies, such as banking.

H3b: Social influence is positively associated with Perceived benefits.

Facilitating Conditions

According to Venkatesh et al. (2003), FC is the level of confidence an individual has in the system's organizational and technical support. Access to cellphones, internet, and technical support are all components of mobile banking's FC. Among Chinese consumers, Zhou et al. (2010) discovered that FC had a substantial impact on whether or not they used mobile banking. Mobile banking adoption is likely to be greatly influenced by FC in Pakistan, a country where technological infrastructure can differ greatly between rural and urban areas (Shaikh & Karjaluoto, 2015).

H4a: Facilitating conditions is positively associated with behavioural intention for M-payment/M-banking services adoption.

Several studies explored the relationship between FC and the PB of mobile banking. Zhou et al. (2010) found that users' perceptions of mobile banking benefits in China were positively impacted by technical support and infrastructure. Oliveira et al. (2016) discovered that enabling conditions indirectly affected adoption intention through PE, indicating a connection to PB, in a study of mobile payment adoption. Supporting the association between available resources and PB, Alalwan et al. (2017) reported that in the Jordanian mobile banking context, FC positively impacted perceived usefulness. The results indicate that people are more inclined to see the value in mobile banking when they feel that there is sufficient infrastructure and support for it.

H4b: Facilitating conditions is positively associated with Perceived benefits.

Mediating Mechanisms

The proposed mediating mechanisms suggest that the relationships between the key behavioural factors (PE, EE, SI, FC) and behavioural intention are not always direct, but can be mediated by other factors.

Perceived Benefits

According to Kim et al. (2009), mobile banking services are expected to provide users with various advantages, which are collectively referred to as PB. Financial, time-saving, and convenience benefits are just a few of the many that this construct extends to beyond PE. According to research by Akturan and Tezcan (2012), young consumers' attitudes toward mobile banking adoption were greatly affected by the PB. To better understand

adoption behaviour in Pakistan, it would be helpful to understand the specific benefits that users perceive. According to research by Gu et al. (2009), PB is an indirect mechanism through which perceived usefulness (PE) affects behavioural intention. Accordingly, it appears that users' expectations of performance may boost their overall view of benefits, which impacts their intention to adopt.

H5: Perceived benefits are positively associated with perceived learning.

Perceived Learning

Chong (2013) defines PL as users' belief on their capacity to acquire fresh knowledge or skills by means of mobile banking solutions. This idea really comes through at the junction of financial literacy with technology adoption. According to a 2009 study by Wang et al., users' impression of the learning value clearly influences their intention to keep using mobile banking services. Given Pakistan's very different degrees of financial literacy, PL could be quite important in helping mobile banking to be adopted there. Though studies conducted in the framework of online education have shown that PL can mediate the relationship between system features and user happiness, studies looking especially at PL's role as a mediator in mobile banking adoption may not be plentiful (Liaw, 2008). Regarding mobile banking, PL can help to mediate the relationship between effort expectation and behavioural intention.

H6: Perceived learning is positively associated with mobile self-efficacy.

Mobile Self-Efficacy

MSE is Confidence in one's own competence in making good use of mobile devices (Luarn & Lin, 2005). Customers' trust in their own mobile banking abilities is known as mobile self-efficacy. Alalwan et al. (2016) discovered that people's belief in their own ability to use mobile banking services significantly influenced their intention to actually use these services. There is a wide disparity in digital literacy in Pakistan (Her, 2023), despite the country's fast expanding smartphone penetration, suggesting that MSE may be an important factor in adoption choices. Researchers Kumar et al. (2018) discovered that when it came to adopting government mobile services, self-efficacy was the mediating factor between EE and behavioural intention. The effects of effort expectation and facilitating circumstances on adoption intention in mobile banking could be moderated by MSE.

H7: Mobile self-efficacy is positively associated with behavioural intention for M-payment/M-banking services adoption.

Mediation Role

H8a: The performance expectancy affects behavioural intention for M-payment/M-banking services adoption by the mediation of perceived benefits, learning and mobile self-efficacy.

H8b: The effort expectancy affects behavioural intention for M-payment/M-banking services adoption by the mediation of perceived benefits, learning and mobile self-efficacy.

H8c: The social influence affects behavioural intention for M-payment/M-banking services adoption by the mediation of perceived benefits, learning and mobile self-efficacy.

H8d: The facilitating conditions affects behavioural intention for M-payment/M-banking services adoption by the mediation of perceived benefits, learning and mobile self-efficacy.
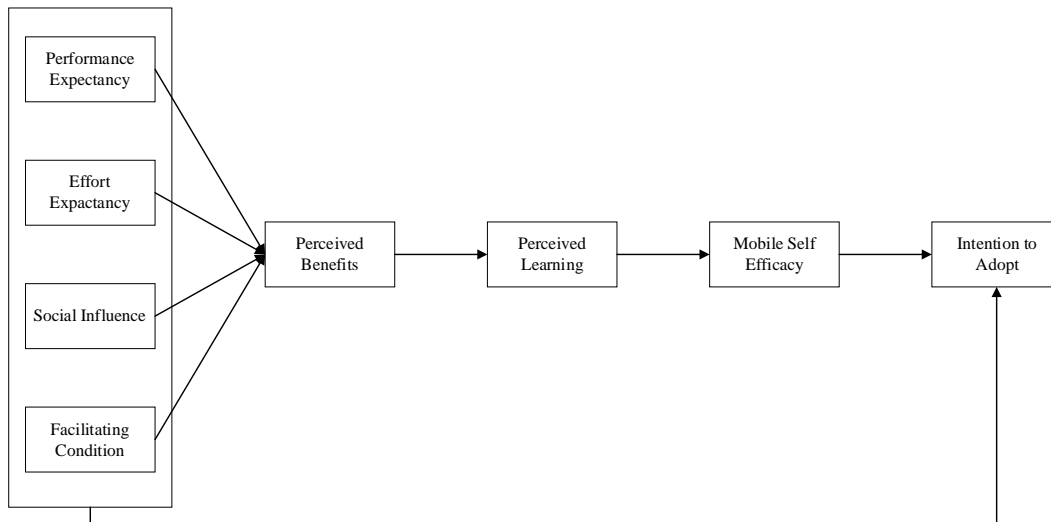
Conceptual Model

Figure 1: Conceptual Model of the Study

METHODS

Participants

For this study, people using mobile banking (M-banking) and mobile payment (M-payment) technologies within Pakistan constituted the target population. Using cluster sampling, the data was gathered with from the larger population by concentrating on major metropolitan cities Islamabad, Lahore, and Karachi. Inclusion criteria for the study specified that Participants must have used M-payment services at least once in the past month, be able to read and understand English, and be of legal adult age more especially, above 18 years old. For structural equation modeling, the sample size was computed with Daniel Soper's online priori sample size calculator (Soper, 2024). The necessary sample size was found to be 641 persons considering an expected effect size of 0.20, a desired statistical power of 0.95, and a probability level of 0.05 (Cohen, 1988; Wastland, 2010). Participants were gathered using convenience sampling, therefore guaranteeing accessibility and feasibility in obtaining the required sample size.

Measures

To assess different constructs, the study used a standardized questionnaire with a five-point Likert scale spanning "strongly disagree" to "strongly agree". Four items tailored from Venkatesh et al. (2003, 2011) measured EE. Four items taken from Abd Ghani et al. (2017) and Venkatesh et al. (2003) helped to measure PE. Four Venkatesh et al. 2003 items were used to assess SI. Four items from Abd Ghani et al. (2017) and Venkatesh et al. (2003) measuring FC Three Venkatesh et al. (2003) items helped to estimate the intention to use M-payment services. Three items from Yiu et al. (2007) measured perceived benefit; five items from Moore and Benbasat (1991) rated PL. Finally, six items from Mahat et al. (2012) allowed one to assess MSE. The questionnaire comprised four demographic questions covering age, occupation, gender, and educational level in addition to thirty-three items on other categories.

Procedure

The data collection was conducted through Google Survey, where the questionnaire was distributed to potential respondents. A total of 1,000 questionnaires were shared, and 734 completed surveys were received. Upon data cleaning, 80 responses were identified as biased due to similar patterns across the survey and were subsequently excluded from further analysis leaving 654 responses adequate for further analysis (Curran, 2016). The data cleaning process was performed using Microsoft Excel. Frequencies were calculated using SPSS version 27. The partial least squares (PLS) model was employed to determine both direct and mediation effects, utilizing SmartPLS version 4.0 software.

DATA ANALYSIS AND RESULTS

Analysing demographic percentages and frequencies enhances clarity and significance in presenting factual information. Table 1 provides a comprehensive overview of the demographic characteristics of the respondents (n = 654).

The demographic profile of the respondents was diverse and representative of the target population. The sample included 364 females (55.7%), 285 males (43.6%), and 5 individuals (0.8%) who preferred not to disclose their gender. In terms of age distribution, the majority of respondents were between 18-25 years old, accounting for 510 individuals (78.00%). Other age groups included 59 respondents (9.00%) aged 26-30, 37 respondents (5.70%) aged 31-35, 27 respondents (4.10%) aged 36-40, 15 respondents (2.30%) aged 41-45, and 6 respondents (0.90%) above 45 years old. Regarding educational status, 136 respondents (20.8%) had postgraduate qualifications, 363 respondents (55.5%) were graduates, 57 respondents (8.7%) were undergraduates, and 98 respondents (15.0%) had an education level of intermediate or less. The occupation distribution showed a varied mix: 2 respondents (0.3%) were businesswomen, 16 respondents (2.4%) were businessmen, 3 respondents (0.5%) were house husbands, and 8 respondents (1.2%) were housewives. Additionally, there were 13 IT sector employees (2.0%), 1 manufacturing sector employee (0.2%), 65 service employees (9.9%), 515 students (78.7%), and 31 respondents (4.7%) categorized as 'other.'

Measurement Model Assessment

In Partial Least Squares (PLS) analysis, item and concept reliability is determined by examining item loadings on latent variables, as described by Hulland (1999). Since the model used is reflective, outer loading values for each construct were evaluated, with Sarstedt et al. (2016) recommending a minimum acceptable value of 0.50. In this study, all outer loadings exceeded this threshold, indicating satisfactory reliability. Hair et al. (2010) proposed a threshold of 0.70 for composite reliability (CR) was evaluated to assure internal consistency. The study's structure showed a good consistency with CR values above 0.70. Moreover, Cronbach's Alpha values which measure construct reliability were all greater than 0.70, so attesting to appropriate internal

consistency levels (Taber, 2018). Convergent validity was evaluated using the average variance extracted (AVE); Cheung et al., (2023) claim that a value above 0.50 is reasonable. Given all AVE values exceeded the 0.50 limit, this study revealed a good degree of convergent validity for the constructs.

Table 1: Demographics of the Participants

Gender	N	%
Female	364	55.7%
Male	285	43.6%
Prefer not to say	5	0.8%
Age		
18 – 25	510	78.00%
26 – 30	59	9.00%
31 – 35	37	5.70%
36 – 40	27	4.10%
41 – 45	15	2.30%
Above 45	6	0.90%
Education Status		
Postgraduate	136	20.8%
Graduate	363	55.5%
Undergraduate	57	8.7%
Intermediate or less	98	15.0%
Occupation		
Business Woman	2	0.3%
Business Man	16	2.4%
House Husband	3	0.5%
House Wife	8	1.2%
IT Sector Employee	13	2.0%
Manufacture Sector Employee	1	0.2%
Service employee	65	9.9%
Student	515	78.7%
Other	31	4.7%

The Heterotrait-Monotrait ratio (HTMT) criterion was used to evaluate the latent construct's discriminant validity by means of which the ratio of between-trait correlations to within-trait correlations were measured. Henseler et al. (2015) advise that HTMT values should be below 0.90 for constructs having sufficient discriminant validity. In this study results Table 3, the HTMT values for the constructs for FC (0.633), Intention to Adopt (0.542, 0.643), MSE (0.458, 0.667, 0.534), PB (0.603, 0.683, 0.529, 0.702), PL (0.511, 0.69, 0.578, 0.74, 0.789), PE (0.807, 0.723, 0.634, 0.577, 0.686, 0.695), and SI (0.665, 0.716, 0.552, 0.572, 0.607, 0.577, 0.79). Since all HTMT values are below the threshold of 0.90, the constructs demonstrate satisfactory discriminant validity (Henseler et al., 2015).

Every construct in a study measures unique traits free from overlapping with others can be determined by the Fornell-Larcker criterion (Fornell & Larcker, 1981). It compares the relationship of the square root of the average variance extracted (AVE) for every construct with respect to other constructs. Results from Table 4 shows that the AVE values on the diagonal EE (0.794), Facilitating Condition (0.741), Intention to Adopt (0.8834), Mobile Self Efficacy (0.708), PB (0.8837), PL (0.814), PE (0.780), SI (0.763) exceed the correlations between constructs. This indicates that every construct has enough discriminant validity, hence verifying that our measuring model effectively separates among the several constructs applied in the research (Fornell & Larcker, 1981).

Table 2: Constructs Validity and Reliability

Latent Construct	Observed Variable	Outer Loadings	Alpha	Rho_a	Rho_c	AVE
Effort Expectancy	EE1	0.746	0.803	0.808	0.872	0.63
	EE2	0.855				
	EE3	0.785				
	EE4	0.785				
Facilitating Condition	FC1	0.614	0.724	0.744	0.827	0.547
	FC2	0.796				
	FC3	0.780				
	FC4	0.754				
Intention to Adopt	INT1	0.824	0.782	0.787	0.873	0.696
	INT2	0.857				
	INT3	0.822				
Mobile Self Efficacy	MSE1	0.672	0.802	0.804	0.858	0.502
	MSE2	0.689				
	MSE3	0.753				
	MSE4	0.689				
	MSE5	0.712				
	MSE6	0.733				
Perceived Benefits	PB1	0.832	0.786	0.788	0.875	0.701
	PB2	0.869				
	PB3	0.809				
Performance Expectancy	PE1	0.769	0.786	0.786	0.861	0.608
	PE2	0.802				
	PE3	0.785				
	PE4	0.764				
Perceived Learning	PL1	0.774	0.872	0.872	0.907	0.662
	PL2	0.823				
	PL3	0.828				
	PL4	0.838				
	PL5	0.803				
Social Influence	SI1	0.770	0.761	0.761	0.848	0.582
	SI2	0.771				
	SI3	0.737				
	SI4	0.773				

Structural Model Assessment

Variance in inflation factor (VIF) measurements to identify any structural model collinearity problems. VIF values in this study varied from 1.251 to 2.227, suggesting no notable collinearity issues (Hair et al, 2019). Path coefficients then are calculated to ascertain the strength and importance of the structural model's relationships. With values between -1 and +1, path coefficients show the strength and direction of these interactions. A coefficient nearer +1 denotes a strong positive link; a coefficient nearer -1 shows a strong negative link (Hair et al., 2012). P-values and t-values help one assess the significance of every path coefficient.

Applying a significance level of 1.96 (5%) to the t-value and 0.05 (5%) to the p-value, results T-values below 1.96 are thus regarded as nonsignificant; p-values above 0.05 are also nonsignificant. Table 5 shows for every suggested relationship in the study the significance of path coefficients.

Table 3: Discriminant Validity HTMT-Ratio

Latent Constructs	EE	FC	INT	MSE	PB	PL	PE
Facilitating Condition	0.633						
Intention to Adopt	0.542	0.643					
Mobile Self Efficacy	0.458	0.667	0.534				
Perceived Benefits	0.603	0.683	0.529	0.702			
Perceived Learning	0.511	0.69	0.578	0.74	0.789		
Performance Expectancy	0.807	0.723	0.634	0.577	0.686	0.695	
Social Influence	0.665	0.716	0.552	0.572	0.607	0.577	0.79

Table 4: Discriminant Validity Fronell-Larkcer Criterion

Latent Construct	EE	FC	INT	MSE	PB	PL	PE	SI
Effort Expectancy	0.794							
Facilitating Condition	0.486	0.74						
Intention to Adopt	0.433	0.497	0.834					
Mobile Self Efficacy	0.372	0.512	0.431	0.708				
Perceived Benefits	0.481	0.522	0.416	0.559	0.837			
Perceived Learning	0.428	0.547	0.479	0.624	0.655	0.814		
Performance Expectancy	0.642	0.544	0.503	0.464	0.54	0.575	0.78	
Social Influence	0.52	0.531	0.43	0.454	0.471	0.47	0.612	0.763

Table 5: Significance of Path Coefficients

Hypothesis	Direct Path	Beta	T	P	Results
H1a	PE -> PB	0.236	4.173	0.000	Supported
H1b	PE -> INT	0.206	3.711	0.000	Supported
H2a	EE -> PB	0.142	2.908	0.004	Supported
H2b	EE -> INT	0.103	2.085	0.037	Supported
H3a	SI -> PB	0.111	2.17	0.030	Supported
H3b	SI -> INT	0.062	1.181	0.238	Not Supported
H4a	FC -> PB	0.265	5.237	0.000	Supported
H4b	FC -> INT	0.223	4.165	0.000	Supported
H5	PB -> PL	0.655	18.555	0.000	Supported
H6	PL -> MSE	0.624	16.418	0.000	Supported
H7	MSE -> INT	0.155	2.899	0.004	Supported

The findings of structural model hypothesis testing are shown in table five. With associated beta coefficients, t-values, and p-values reflecting the relevance of relationships, each hypothesis investigates the direct path

between constructs. Significant correlations (p < 0.05) abound in hypotheses H1a, H1b, H2a, H2b, H3a, H4a, H4b, H5, H6, and H7. More specifically, H1a and H1b show that Intention to Adopt and PB are much influenced by PE. In same vein, EE greatly affects PB and INT (H2a and H2b). PB (H3a) is much influenced by SI, but not INT (H3b). Promoting Condition (FC) improves INT (H4a) and PB alike. Furthermore, highly predicted by PB is PL, which in turn has a major impact on MSE, (H6). Finally, MSE increases INT (H7). These results illustrate the relevance of the constructs in the structural model and support the expected links among them in the research.
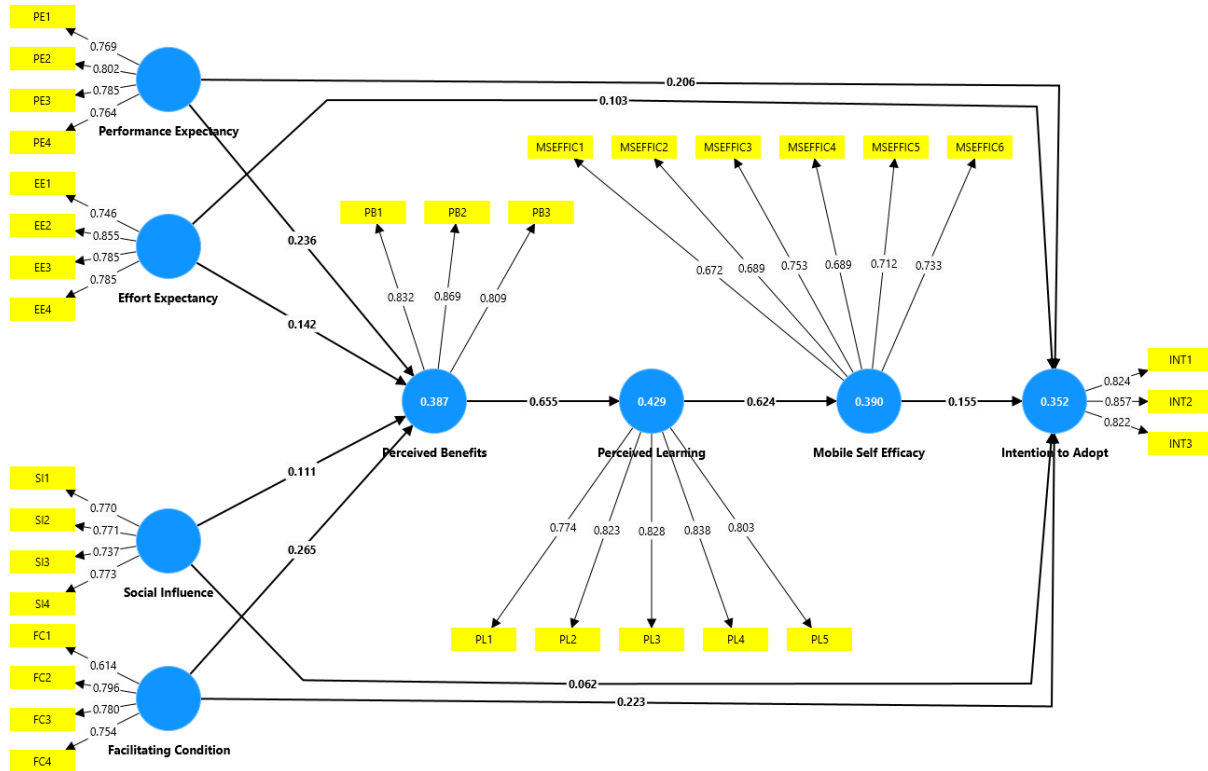

Figure 2: Structural Equation Model of the Study

In evaluating structural models, the coefficient of determination (R^2) is an important aspect. Ranging from 0 to 1, R^2 quantifies the variance in the endogenous variable explained by the exogenous variable. Values of 0.75, 0.50, and 0.25 typically indicate strong, moderate, and weak effects, respectively (Tabachnick et al., 2013). The structural model analysis reveals moderate explanatory power across the endogenous constructs. PL demonstrates the highest coefficient of determination ($R^2 = 0.429$, adjusted $R^2 = 0.428$), followed by Mobile Self Efficacy ($R^2 = 0.390$, adjusted $R^2 = 0.389$), PB ($R^2 = 0.387$, adjusted $R^2 = 0.383$), and Intention to Adopt ($R^2 = 0.352$, adjusted $R^2 = 0.347$). All relationships are statistically significant ($p < 0.001$). The close alignment between R^2 and adjusted R^2 values suggests model stability. While the model explains a substantial portion of variance for each construct, ranging from 35.2% to 42.9%. Table 6 shows the R^2 values of the study.

Table 6: Coefficient of Determination

Endogenous Construct	R Square	R Square Adjusted	P values
Intention to Adopt	0.352	0.347	0.000
Mobile Self Efficacy	0.390	0.389	0.000
Perceived Benefits	0.387	0.383	0.000
Perceived Learning	0.429	0.428	0.000

Mediation Analysis

There are four of total indirect effects under consideration in this study. Two of the four hypothesized mediation pathways demonstrated statistical significance as seen in the results from the Table 7. The indirect

effect of PE on Intention to Adopt, mediated through PB, PL, and Mobile Self Efficacy (H8a), was supported (β = 0.015, t = 2.111, p = 0.035), indicating partial mediation. Similarly, the pathway from FCs to Intention to Adopt via the same mediators (H8d) exhibited significance (β = 0.017, t = 2.172, p = 0.030), also suggesting partial mediation. Conversely, the proposed indirect effects stemming from EE (H8b: β = 0.009, t = 1.79, p = 0.074) and SI (H8c: β = 0.007, t = 1.584, p = 0.113) failed to achieve statistical significance at the conventional threshold ($p < 0.05$). The mediation results are provided in table 7 of the study.

Table 7: Mediation Model Results

Hypothesis	Mediation Model	Beta	T	P	Results	Mediation
H8a	PE -> PB -> PL -> MSE -> INT	0.015	2.111	0.035	Supported	Partial
H8b	EE -> PB -> PL -> MSE -> INT	0.009	1.79	0.074	Not Supported	No Mediation
H8c	SI -> PB -> PL -> MSE -> INT	0.007	1.584	0.113	Not Supported	No Mediation
H8d	FC -> PB -> PL -> MSE -> INT	0.017	2.172	0.030	Supported	Partial

DISCUSSION

This study's investigation into the factors influencing mobile banking adoption in Pakistan, through an extension of the UTAUT model, offers valuable insights into the complex interplay of elements affecting user acceptance in this rapidly evolving digital landscape. The findings underscore the significance of PE and EE in shaping behavioural intentions to adopt mobile banking services, aligning with previous research by Alalwan et al. (2017) and Raza et al. (2019), suggesting that Pakistani consumers are more inclined to embrace these technologies when they perceive them as beneficial to their financial management and straightforward to use. The strong influence of PE, in particular, echoes the findings of Oliveira et al. (2016) in a cross-cultural context, highlighting the critical importance of emphasizing the practical advantages of mobile banking in marketing strategies and user education initiatives, potentially serving as a key driver in accelerating adoption rates across the country.

FC showed a notable positive relationship with behavioural intention, in line with Zhou et al.'s (2010) findings in the Chinese setting, SI failed to show a similar impact, unlike Kemal's (2019) results among younger Pakistani users but in line with Reza et al.'s (2019) findings in Islamic banking. The significant impact of FC emphasises the vital need of infrastructure and support in promoting mobile banking adoption, a consideration of particular relevance in a country marked by different technological environments spanning urban and rural areas, as noted by Shaikh and Karjaluoto (2015). On the other hand, the non-significant impact of SI could point to a change in Pakistani consumers' decision-making towards more individualistic approaches of technology adoption, so deviating from the collectivist cultural expectations underlined in past research (Tam & Oliveira, 2016).

The fresh contribution of the study is in its examination of the mediating roles of PB, PL, and MSE, so providing an expanded view of the adoption process. While extending this knowledge to the larger UTAUT framework, the identification of important mediating pathways from PE and FC to behavioural intention aligns with Gu et al.'s (2009) results on the indirect effects of perceived usefulness. Though the non-significant mediation paths for EE and SI through PB, PL, and MSE contrast with Kumar et al.'s (2018) findings on self-efficacy as a mediator in mobile service adoption, suggesting that the effects of ease of use and social influence on adoption intentions in the Pakistani context may operate via different mechanisms.

Building on the work of Venkatesh et al. (2012), this study theoretically expands the UTAUT model by including PB, PL, and MSE as mediating variables, so offering a more complete framework for understanding mobile banking adoption in emerging markets. Echoing advice from Baab Abdullah et al. (2019) and Koenig-Lewis et al. (2015), these results suggest several strategic directions for financial institutions and fintech companies operating in Pakistan: the need of stressing performance benefits and ease of use in marketing and user interface design.

CONCLUSION

Through validation and extension of the UTAUT model, this study improves regarding knowledge of the elements affecting mobile banking adoption in Pakistan. Results show that perceived benefits, learning, and mobile self-efficacy which in turn shape adoption intentions are much influenced by performance expectancy, effort expectancy, social influence, and facilitating conditions. While some paths line up with earlier studies,

others expose original cultural and contextual influences. These findings imply that increasing mobile banking acceptance calls for a multifarious strategy including better user impressions of performance and benefits, strong support systems, and educational interventions promoting self-efficacy. For financial institutions and legislators hoping to encourage mobile banking in Pakistan, this thorough awareness provides insightful direction.

LIMITATIONS

This study has several limitations that should be acknowledged. Firstly, the cross-sectional design limit's ability to infer causality between the constructs, therefore, longitudinal studies may provide evidence of causal relationships. Further, the sample was predominantly composed of young, educated individuals, which may not fully represent the broader population of mobile banking users in Pakistan. This demographic bias could affect the generalizability of the findings. Self-reported data may introduce response biases, such as social desirability bias, potentially influencing the results. Additionally, while the study extends the UTAUT model, other relevant factors influencing mobile banking adoption, such as security concerns and trust, were not included, therefore, further research could explore these aspects to provide a more comprehensive understanding. Moreover, cultural factors unique to Pakistan might limit the applicability of the findings to other contexts. Comparative studies across different countries or regions could provide understandings into the generalizability of the model.

FUTURE PROSPECTIVES

Diverse Pakistani population as highlighted by Her (2023) in discussions of digital literacy disparities, the future researches could explore adoption factors among older and less tech-savvy populations, conduct longitudinal studies to provide insights into how adoption factors evolve over time as mobile banking becomes more prevalent, and investigate the non-significant effect of SI through qualitative studies to understand the cultural nuances affecting mobile banking adoption in Pakistan, building on the work of Yang et al. (2012) and Al-Saedi et al. (2020) in related mobile technology contexts.

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