

Key Factors Influencing Mobile Banking Adoption in Saudi Arabia

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Abstract—The introduction of mobile banking has revolutionized traditional financial practices, enhancing efficiency, customer experiences, and business models globally. Despite the global advancements in mobile banking, adoption rates remain low in Saudi Arabia. This paper seeks to identify key factors affecting adoption, using a mixed-methods approach. We propose a novel model integrating factors from the DeLone and McLean (D&M) model and the Unified Theory of Acceptance and Use of Technology (UTAUT2) model, complemented by additional factors. Data was gathered through online surveys and customer interviews. Findings revealed that net benefits, compatibility, facilitating conditions, and trust positively influence adoption, while literacy levels and digital skills pose barriers. Our study offers a significant theoretical contribution by synthesizing multiple models and enriches understanding of mobile banking adoption, aiding future research and industry decisions.

I. INTRODUCTION

THE banking sector has evolved significantly due to technological advancements, introducing various electronic channels. These innovations have transformed how banking services are accessed and utilized, reducing reliance on traditional methods and reshaping the industry's operational landscape. Among these innovations, mobile banking has emerged as a groundbreaking technology, offering customers unparalleled convenience and flexibility. Users prioritize mobility and 24/7 accessibility as the defining features of mobile banking, leading to increased adoption rates [1]. However, mobile banking usage remains lower than expected in Saudi Arabia, with only 59% of bank customers using mobile banking [2], compared to 84% in Kuwait [3], and 76% in Bahrain [4], highlighting the need to examine the factors influencing its adoption.

In Saudi Arabia, mobile systems have gained significant popularity, with the government emphasizing the importance of technology in enhancing the quality of life for Saudi citizens through Vision 2030. Despite these efforts, research indicates that Saudi mobile banking users are less satisfied compared to their UK counterparts [5]. Furthermore, half of Saudi banking customers have indicated they would consider switching to other banks due to insufficient mobile banking

features [6], raising concerns about the capability of these services to meet customer expectations.

Our study builds on [6] by focusing on specific inhibitors and facilitators of mobile banking adoption in Saudi Arabia, such as perceived trust, privacy, and compatibility. Using a mixed-method approach, we provide a detailed understanding of user behaviours with the latest data reflecting current trends. Our research also highlights unique inhibitors like literacy levels and digital skills, and facilitators such as the need for better educational resources, which were not covered previously.

This paper delves into the factors shaping mobile banking adoption in Saudi Arabia, crucial for enhancing customer satisfaction, fostering financial inclusion, and ensuring the success of mobile banking technologies. Guided by the research question, "What are the key factors influencing the adoption and usage of mobile banking in Saudi Arabia?", it identifies motivators and barriers by exploring technological, social, and individual factors. The study offers a tailored model for the Saudi context, providing insights to inform banks and policymakers on improving mobile banking services and encouraging broader adoption. This investigation aims to enrich the understanding of mobile banking and provide actionable recommendations for its advancement in Saudi Arabia.

II. LITERATURE REVIEW

This section reviews prior studies on mobile banking adoption to identify factors influencing its implementation in Saudi Arabia. It provides a comprehensive understanding of existing theories and empirical findings, informing the research model and hypotheses. Covering studies from the early 2000s to 2024, the literature review focuses on Saudi Arabia and includes relevant research from other Middle Eastern countries.

A. Research Framework

We utilize a theoretical framework that integrates factors from the DeLone and McLean information system success (D&M) model, proposed by [7], the Unified Theory of Acceptance and Use of Technology (UTAUT2), developed by [8], and additional factors, as depicted in Fig 1. This

integration aims to encompass a wide range of factors affecting mobile banking adoption and usage in Saudi Arabia, providing a holistic understanding of human, technological, and organizational influences on attitudes and behaviours towards mobile banking.

B. Methodology

We conducted a literature review using Google Scholar, PubMed, IEEE Xplore, ScienceDirect, and ProQuest, with keywords such as "mobile banking adoption," "UTAUT2," "D&M model," "customer satisfaction," "trust," and "privacy." Emphasizing relevance, recentness, and peer-reviewed publications, we screened abstracts and titles, followed by a full-text review, assessing quality based on research design, sample size, validity, reliability, and analysis robustness. This ensured the inclusion of high-quality studies, enhancing our understanding of mobile banking adoption in Saudi Arabia. Key factors influencing adoption are reported in our position paper [9], and repeated in section C.

C. Key Factors that influence adoption of mobile banking in Saudi Arabia

Performance Expectancy (PE) refers to the anticipated benefits from using a technology to improve performance [8]. Mobile banking offers convenient, flexible access to services anytime, anywhere, significantly impacting its adoption [6], [10]. Therefore, we expect customers to perceive mobile banking as enhancing overall performance.

Effort Expectancy (EE) refers to the perceived ease of using a new system [8]. Customers are more likely to adopt technology that is user-friendly [11]. Given the specific requirements of mobile banking and the need for certain levels of skills and knowledge, this factor can significantly influence customer intention to utilize it [10], supported by previous research [12]. Therefore, we expect customers to recognize the ease of use associated with mobile banking.

Social Influence (SI) refers to the impact of others' opinions on an individual's decision to adopt new technology [8]. The influence of social circles can significantly drive technology adoption [10], consistently highlighted in previous research [13]. Therefore, we expect customers to be motivated by others' preferences and views in using mobile banking.

Facilitating Conditions (FC) refer to the belief in adequate technical and organizational support for technology [8]. In mobile banking, customers are more likely to engage if there is sufficient support, skills, resources, and infrastructure [10], as highlighted by multiple studies [6], [12]. Therefore, we expect customers to recognize the presence of necessary infrastructure and resources for mobile banking usage.

Hedonic Motivation (HM) reflects the enjoyment and pleasure derived from using a technology [8]. It significantly impacts the adoption of new systems [13], with studies showing its strong influence on mobile banking use [6], [10].

Therefore, we expect customers to appreciate the pleasure and joy derived from using mobile banking.

System Quality (SQ) measures the effectiveness of technical services [7]. Research shows that a visually appealing and user-friendly mobile banking app enhances customer satisfaction [6], [14], [15]. Therefore, we expect customers to perceive mobile banking's ease of use, flexibility, functionality, and integration.

Service Quality (SVQ) measures the reliability, responsiveness, and timeliness of services [15]. Research shows that high service quality is crucial for mobile banking adoption [6], [16]. Therefore, we expect customers to perceive mobile banking reliability, availability, and competence.

Information Quality (IQ) refers to the relevance, accuracy, and adequacy of information provided by the system [15]. Mobile banking may face challenges due to limited screen sizes or app restrictions, impacting information access. Research shows that high information quality is crucial for user satisfaction [16]. Therefore, we expect customers to perceive the sufficiency, relevancy, and accuracy of information in mobile banking.

Perceived Privacy (PP) reflects confidence in data security during mobile banking usage, crucial for transaction privacy and risk mitigation [17]. Privacy concerns are recognized as a significant barrier to mobile banking adoption [18], reducing technology adoption and usage. Therefore, we expect customers to be assured that their information remains confidential and protected.

Perceived Trust (PT) reflects the belief in the alignment of actions with positive assumptions [19]. Establishing trust requires honesty, integrity, and benevolence within a system [20]. It significantly influences technology adoption by inversely relating to perceived risk [21]. Prior research robustly demonstrates the significant impact of this factor on mobile banking adoption [22], [23], [24]. Therefore, we expect customers to perceive the honesty and integrity of mobile banking.

Perceived Compatibility (PC) indicates how well an innovation aligns with user values, beliefs, and habits [25]. It holds significance as it notably impacts the acceptance of new technology [26]. It strongly influences technology adoption, as customers prefer innovations that fit their cultural beliefs [27]. Therefore, we expect mobile banking to be seen as compatible with customers' cultural values and beliefs.

Use of Mobile Banking involves evaluating customer actions and satisfaction with the system [7]. Understanding overall customer experiences is key to measuring satisfaction and usage rates [28]. Positive service experiences notably enhance user satisfaction [29], thereby increasing usage rates [30]. Therefore, we expect customers to perceive the advantages and benefits of mobile banking.

Satisfaction (SAT) measures customers' commitment and resistance to switching services, reflecting their loyalty [31]. Improving service quality is a key strategy for retaining customers and enhancing satisfaction [32]. Prior research

highlights the strong link between technology use and increased user satisfaction [6], [14]. Therefore, we expect customers to recognize the value and utility of mobile banking.

Loyalty (LOY) reflects a consistent use of the same service over time, showing commitment to it [33]. It is enhanced by improving service, information, and system quality [34]. Research underscores that user satisfaction significantly boosts loyalty to mobile banking [6]. Therefore, we expect customers to appreciate the value and utility of the service.

Net Benefits (BEN) evaluates the impact of technology on users or organizations, crucial for assessing effectiveness [35]. Positive net benefits increase the likelihood of adoption. Research shows that net benefits significantly affect mobile banking usage [27], and satisfaction [36]. Therefore, we expect customers to recognize and appreciate the advantages of mobile banking.

D. Research Model

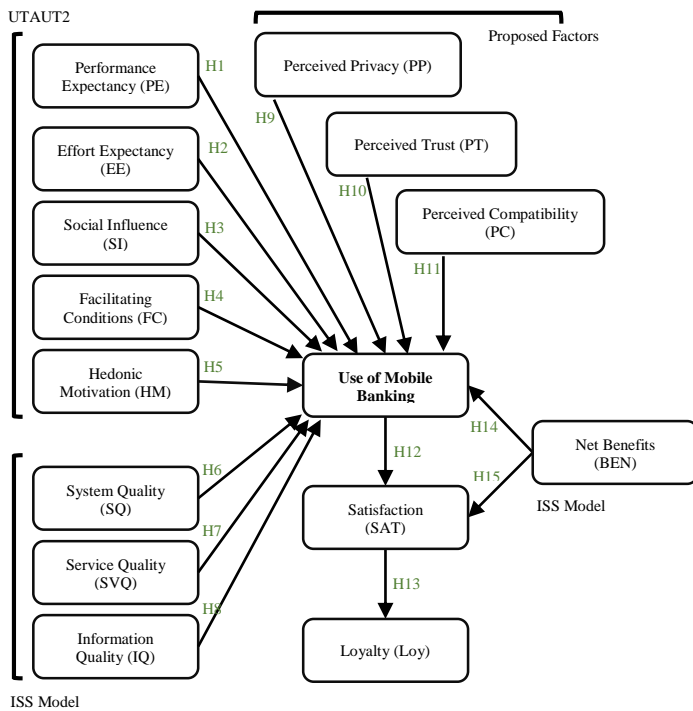


Fig 1. Research Model (adapted from UTAUT2 and D&M)

The theoretical framework combines established theories into a cohesive model to explore mobile banking adoption in Saudi Arabia. By analysing and empirically testing the relationships between key factors, the research enhances understanding of customer satisfaction and loyalty in mobile banking.

III. METHOD

This study employs a mixed-method approach to explore mobile banking adoption in Saudi Arabia. Data from 385 bank customers was collected via online surveys between January and April 2021. The survey, distributed through

email and WhatsApp, covered demographic details and mobile banking usage. Table I summarizes the participants' demographic characteristics.

TABLE I. DEMOGRAPHIC AND USAGE CHARACTERISTICS OF RESPONDENTS

		Frequency	Percent
Gender	Male	156	40.5
	Female	229	59.5
Age	18 - 24 years	134	34.8
	25 - 34 years	161	41.8
	35 - 44 years	68	17.7
	45 - 54 years	17	4.4
	55 or older	5	1.3
Marital Status	Married	150	39.0
	Single	224	58.2
	Divorced	11	2.9
Employment Status	Employed	133	34.5
	Self employed	54	14.0
	Unemployed	46	11.9
	Student	133	34.5
	Retired	3	0.8
Qualifications	Housewife/husband	16	4.2
	No schooling completed	1	0.3
	High school	37	9.6
	Diploma	7	1.8
	Bachelor	205	53.2
	Master or above	135	35.1

A. Quantitative Study

Analysis was conducted using Structural Equation Modeling SEM and Statistical Package for the Social Sciences (SPSS) software to infer relationships between variables. These tools are widely utilized in social sciences for such analyses.

• Convergent Validity and Model Fit

Convergent validity assesses the alignment among measurements of a specific construct [37], providing evidence of reliability and accuracy. One method to assess convergent validity is through calculating the Average Variance Extracted (AVE) for each construct. An acceptable AVE value, typically 0.5 or higher, signifies that the construct explains at least 50% of the variance in its items. Model fit refers to how well a statistical model fits the observed data. It is evaluated using multiple indices: the chi-square value should be less than 3 (<3), the standardized root mean square residual (SRMR) should be equal to or less than 0.10 (SRMR ≤ 0.10), the CMIN/DF value should be less than or equal to 5 (≤ 5), the comparative fit index (CFI) should be greater than or equal to 0.90 (CFI ≥ 0.90), and the root mean square error of approximation (RMSEA) should be equal to or less than 0.08 (RMSEA ≤ 0.08) [38], [39]. Tables II and III present the values of CMIN/DF, CFI, IFI, SRMR, RMSEA, and AVE, for evaluating model fit and convergent validity.

TABLE II. MODEL FIT INDICES

	Threshold	Value	Interpretation
CMIN/DF	≤ 5	2.1	Good fit
CFI	≥ 0.90	0.902	Good fit
IFI	≥ 0.90	0.903	Good fit
SRMR	≤ 0.10	0.043	Good fit
RMSEA	≤ 0.08	0.056	Good fit

TABLE III.
AVERAGE VARIANCE EXTRACTED VALUES

	No of Items	AVE
PE	2	0.60
EE	3	0.59
SI	2	0.75
HM	2	0.80
FC	2	0.54
SQ	6	0.51
IQ	5	0.53
PT	4	0.67
SQ	3	0.81
PP	4	0.57
PC	4	0.56
USE	3	0.62
SAT	3	0.68
LOY	3	0.55
BEN	3	0.55

The analysis revealed a chi-square value of 2237.823 with 1019 degrees of freedom and a probability value of < 0.001. The CMIN/DF value was 2.1, indicating satisfactory fit. Fit measures, including CFI = 0.902, IFI = 0.903, SRMR = 0.043, and RMSEA = 0.056, all demonstrated satisfactory levels, with AVE values meeting the required standard for good model fit. Despite the chi-square value not indicating model fit, the study achieved five to six indices meeting the criteria, ensuring the model's overall fit.

• Reliability

Reliability measures the consistency of variable measurements [37]. It is assessed using Composite Reliability (CR) and Cronbach's alpha. In this study, Cronbach's alpha needed to be greater than 0.60. Values between 0.60 and 0.70 are satisfactory, while values of 0.80 or higher are very good [40]. The evaluation outcomes for reliability are presented in Table IV below.

TABLE IV.
RELIABILITY AND CONSTRUCT VALIDITY

	Cronbach's α	CR	Reliability and Construct Validity
PT	0.88	0.89	Yes
PP	0.85	0.84	Yes
PC	0.82	0.83	Yes
PE	0.74	0.75	Yes
EE	0.81	0.81	Yes
SI	0.85	0.85	Yes
FC	0.69	0.70	Yes
HM	0.88	0.89	Yes
SQ	0.86	0.86	Yes
IQ	0.85	0.85	Yes
SVQ	0.92	0.92	Yes
SAT	0.86	0.86	Yes
LOY	0.72	0.77	Yes
BEN	0.77	0.78	Yes
USE	0.83	0.83	Yes

As shown in the table, all items in the proposed model meet the minimum reliability requirement and exhibit satisfactory measurement properties.

• Discriminant Validity

We utilized the HTMT method, which is believed to be more appropriate method, to evaluate discriminant validity. It was argued that the HTMT value ought to be less than 0.90, as values exceeding this threshold indicate a lack of discriminant validity [41]. The findings of the discriminant validity analysis are shown in Table V below.

TABLE V.
DISCRIMINANT VALIDITY

	USE	BEN	LOY	SAT	SVQ	IQ	SQ	HM	FC	SI	EE	PE	PC	PP	PT
USE	-														
BEN	0.81	-													
LOY	0.77	0.84	-												
SAT	0.66	0.75	0.84	-											
SVQ	0.25	0.33	0.33	0.42	-										
IQ	0.52	0.63	0.56	0.65	0.56	-									
SQ	0.49	0.65	0.60	0.70	0.52	0.73	-								
HM	0.20	0.33	0.33	0.45	0.35	0.48	0.61	-							
FC	0.69	0.66	0.54	0.47	0.28	0.60	0.68	0.38	-						
SI	0.20	0.32	0.26	0.29	0.25	0.44	0.46	0.39	0.35	-					
EE	0.39	0.55	0.50	0.54	0.37	0.48	0.59	0.41	0.64	0.31	-				
PE	0.28	0.42	0.37	0.41	0.21	0.36	0.42	0.41	0.35	0.43	0.39	-			
PC	0.63	0.74	0.77	0.83	0.35	0.77	0.72	0.49	0.56	0.32	0.49	0.35	-		
PP	0.51	0.57	0.47	0.51	0.48	0.68	0.55	0.32	0.49	0.30	0.39	0.16	0.64	-	
PT	0.56	0.62	0.65	0.69	0.52	0.70	0.57	0.43	0.50	0.23	0.45	0.44	0.73	0.82	-

The table reveals that all constructs have HTMT values below 0.90, indicating that this study achieved sufficient levels of discriminant validity.

• Structural Model and Hypotheses Testing

The path coefficient evaluates hypotheses and indicates relationships between variables. A value close to 1 shows a strong positive correlation, while a value near -1 indicates a strong negative correlation [42]. Coefficients near zero are usually insignificant. Table VI summarizes the path coefficient analysis, showing the relationships between dependent and independent variables.

TABLE VI.
RESEARCH MODEL EVALUATION

	Path	Beta	t	p
H1	PE → Use	0.212	4.256	0.000
H2	EE → Use	0.322	6.651	0.000
H3	SI → Use	0.172	3.420	0.001
H4	FC → Use	0.518	11.837	0.000
H5	HM → Use	0.173	3.434	0.001
H6	SQ → Use	0.426	9.219	0.000
H7	SVQ → Use	0.229	4.600	0.000
H8	IQ → Use	0.449	9.834	0.000
H9	PP → Use	0.463	10.210	0.000
H10	PT → Use	0.488	10.941	0.000
H11	PC → Use	0.532	12.305	0.000
H12	Use → Sat	0.569	13.524	0.000
H13	Sat → Loy	0.707	19.566	0.000
H14	Ben → Use	0.644	19.543	0.000
H15	Ben → Sat	0.618	15.384	0.000

As shown above, there are significant relationships among all path coefficients. Ben and Use had the highest significant positive path relationship. The relationship between PC and Use was shown to be the second most significant positive relationship, followed by the relationship between PT and Use. Among significant positive relationships, the least but significant positive relationship was between SI and Use. In summary, all paths showed significant relationships explaining approximately 62% of the variance in the use of mobile banking.

IV. DISCUSSION

The study investigated factors influencing mobile banking adoption in Saudi Arabia and confirmed all hypotheses as significant. Performance Expectancy was shown to significantly impact usage, indicating that customers are more likely to adopt mobile banking when they perceive its benefits in enhancing their performance. Effort Expectancy was also significant, with customers preferring technology that is convenient and user-friendly. Social Influence had the least positive impact, possibly due to Saudi Arabia's cultural norms emphasizing privacy and conservatism, which reduce the influence of social networks on adoption. Facilitating Conditions showed a significant positive impact, as users are more likely to adopt technology when it provides support, training, and guidance. Hedonic Motivation was confirmed to impact usage, though practical benefits like convenience and efficiency are the primary drivers in Saudi Arabia.

System Quality was significant, highlighting the need for reliable, functional, and user-friendly apps compatible with various devices, especially for older users. Service Quality also had a significant impact, boosting customer trust and satisfaction, with improved educational resources and training enhancing the user experience. Information Quality was crucial, with effective usage influenced by the accuracy, timeliness, and format of information, and impacted by literacy and language barriers. Perceived Privacy and Perceived Trust significantly influenced adoption, as users are more likely to engage with mobile banking when they trust that their data is secure and the service reliable. Perceived Compatibility eased adoption by aligning with existing practices and reducing resistance.

The relationship between mobile banking usage and user satisfaction was confirmed, with users valuing the efficiency, immediacy, and accessibility of mobile banking. User satisfaction and loyalty were also positively correlated, with positive experiences fostering trust and loyalty. Net Benefits had the strongest impact on adoption, suggesting individuals are inclined to adopt technology when the perceived benefits outweigh the costs and risks.

This paper extends previous research [6], by exploring deeper into factors such as perceived trust, privacy, and compatibility, using a mixed-method approach and recent data to offer a nuanced understanding of mobile banking adoption, incorporating new inhibitors and facilitators not previously addressed.

V. CONCLUSION AND IMPLICATIONS

This paper developed a framework to study mobile banking adoption in Saudi Arabia using a mixed-methods approach. Findings reveal that net benefits and perceived compatibility drive adoption, while literacy levels and digital skills act as barriers. The study fills a gap in understanding mobile banking adoption, offering insights that help banks refine strategies and contribute to academic and practical knowledge. It provides new quantitative data for future research and policy, and offers practical guidance for banks, service providers, and app developers to enhance user experience and satisfaction.

VI. RECOMMENDATION AND FUTURE WORK

The survey, based on convenience sampling, mostly involved young and educated respondents, limiting its generalizability. Efforts to include a more diverse age range were constrained, particularly by online data collection challenges during COVID-19. Future research should aim for a more representative sample across all demographics and regions to improve generalizability and insights for mobile banking providers.

Future research should compare regions to explore cultural impacts on mobile banking. Collaborative international studies could provide deeper insights into cross-cultural dynamics.

Given the evolving nature of mobile banking, a longitudinal approach could track changes in customer attitudes over time. Future research should explore technological, cultural, and contextual factors affecting mobile banking in Saudi Arabia and consider alternative models or theories to enhance understanding. Expanding the study to other technological services could further validate the model and offer broader insights.

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