ISLAMIC BANK CUSTOMERS' ADOPTION OF DIGITAL BANKING SERVICES: EXTENDING DIFFUSION THEORY OF INNOVATION

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ABSTRACT

This paper examines the factors that drive non-users of digital banking services rendered by Pakistani Islamic banks to adopt digital banking using the Diffusion theory of Innovation (DOI). We gather data from 208 Islamic bank customers who do not use digital banking services. Findings of the study reveal that adoption of digital services offered by Islamic banks are largely decided by relative advantage, technology self-efficacy and complexity. All the factors above are influential in determining the digital banking adoption by non-users. The finding serves as an essential input to banks and policy makers in expanding the adoption of digital banking services of Islamic banks.

I. INTRODUCTION

1.1. Background

The word "digital" signifies the usage of digital infrastructure (Sveriges Riksbank, 2019). Globally, there are various digital banking channels, which play an important role and act as a backbone in the growth of the banking industry, making it simple to perform transactions at one's ease. Particularly interesting is the fact that numerous digital payment methods (DPMs) have steadily supplanted cash, resulting in both benefits and drawbacks for bank customers (Dimitrova, Öhman, & Yazdanfar, 2022). Many strategies are used in the banking business that is based on evolutionary developments reported by Organisation for Economic Co-operation and development, OECD (OECD, 2020). Similarly, changing consumer preferences, legal restrictions, social and demographic trends, competition and technological developments enable bank clients to employ novel methods as technology advances (Carranza, Díaz, Sánchez-Camacho, & Martín-Consuegra, 2021). The advancement of innovation and recent developments in the Islamic banking service industry have altered the commercial landscape. On that note, it is also true that customer satisfaction is required not just to keep present customers but also to attract and retain future customers (Amin et al., 2013).

1.2. Digital Banking in Pakistan

Islamic banks in Pakistan use a digital-based system in order to render the best client service, a substantial structure, and to raise usage knowledge (Shaikh et al., 2022). Dimitrova, Öhman, & Yazdanfar (2022) in their study on barriers to the adoption of digital payment mention that there are dual sides of the "digital coin", which are digitalization facilitates and smoothes payments, but it also introduces hazards that must be controlled (Sveriges Riksbank, 2019, p.4).

The current challenge faced by the banking system in developing countries is related to cashless, digital banking, which operates in the opposite direction, which is in contrast to the traditional banking environment, and digital banking has much more to offer (Carranza et al., 2021). Innovation and development in terms of contactless banking such as using automated teller machines (ATM), with the assistance of applications installed on smartphones or other gadgets. Other forms of advanced digital banking operations come in form of biometric cash withdrawals not requiring debit cards or other personal identities and or other services that fulfil an individual's daily personal or business needs (Dimitrova et al., 2022). This study is carried out with the aim to assess digital banking as a product or service such as contactless fund transfers and other non-financial transaction facilities rendered by Islamic banks in Pakistan. Digital banking has now become quite appealing throughout the world, but as per the report on digitalization by the State bank of Pakistan (SBP) many people in Pakistan are unaware of this facility (SBP, 2019; Shaikh et al., 2020). In a similar vein, Islamic banks want to enhance their current customer base but due to a lack of certain factors, some customers may not fully utilize its digital services. Considering the current banking business in Pakistan, it is obvious that dynamics such as the shifting payments landscape, the arrival of mobile money services and competition from Fintech firms push Islamic banks to accelerate digital transition (SBP, 2020).

In the context of a developing country, the current study attempts to better understand the adoption intention of non-users of digital banking services. On a same note, current work is centred on the adoption of digital banking by non-users in Pakistan and the authors provide a theoretical backdrop in order to fill the research gap. The preceding facets will be investigated in order to identify the factors responsible for digital banking usage in Pakistan.

In terms of research gaps, at least there are two gaps identified from the literature. Concerned with theory used, earlier works on user behavior in Pakistan apply the theories of planned behavior (TPB) and reasoned action (TRA), but to the best of the authors' knowledge, the diffusion of innovation (DOI) theory has yet to be confirmed and evaluated in the context of Islamic banks digital services adoption (e.g. Shaikh et al., 2022; Shaikh et al., 2020). In terms of empirical findings, limited works have documented the results of perceived compatibility, perceived relative advantage, perceived complexity and technology self-efficacy when examining digital banking adoption in the context of Pakistan (e.g. Shaikh et al., 2020; Shih and Fang, 2004). Hence, this study closes the research gap by providing fresh findings pertinent to the effects of these independent variables on the adoption, extending new empirical findings for generalization and application.

Concerned with originality, this study presents a thorough understanding on model of adoption of online banking in Pakistan and the significant outcomes that the DOI's variables brought sourced from the developed framework.

The rest of the paper is organized as follows. Section 2 reviews the literature, covering background theory, conceptual framework and hypotheses development. In Section 3, details of the methodology that covers data, measures and method are presented. Section 4 provides detail results on the measurement model, structural model and analysis followed by discussion in Section 5. Section 6 concludes the study.

II. LITERATURE REVIEW
2.1. Background Theory
2.1.1. Diffusion of Innovation Theory
The theory of diffusion of innovation was first introduced by Gabriel Tarde (Rogers & Shoemaker, 1983). The diffusion curve originally was plotted by him in an S- shaped diffusion curve. The theory of diffusion of innovation is an important change model for guiding innovative technological advancement where the innovation is modified and best presented to meet all the levels of adoption taking into view the significant importance of peer networking and communication in the adoption process (Rogers, 2003). The diffusion of innovation theory refers to the process an individual goes through in order to adapt to a new product, process, idea, and philosophy. Rogers (2003) in his study further maps out this process. He measures amount of people who are open to a new idea and are willing to adopt its use. Now, these early adopters like the snowball effect spread the word to more and more people in order to make them become more open to the new idea, which eventually leads to the development of a critical mass until the innovative idea or a product is diffused enough to achieve the saturation point. Rogers divides adopters into five distinct categories: innovators, early adopters, early majority,

late majority and laggards (Rogers, 2003). Innovators are technology enthusiasts. They are early to adopt and are risk-takers. They understand the complex technical knowledge and apply it with uncertainty about outcomes. They are motivated and ready to transform into new technology. Early adopters are visionaries. They are the opinion leaders. They have the urge to be the trendsetters looking forward to revolutionizing competitive rules in their respective industry. Moreover, they serve as role models within their social system. The early majority serve as pragmatists. They deliberately interact with their peers. They are more inclined towards proven applications and reliable services. Late majority serve as conservatives. They tend to respond to peer pressure and economic necessity to adopt new technology, and they are motivated only by the need to keep up with competitors. Last but not least are the laggards, who serve as sceptics. They are isolated from opinion leaders; they tend to think of technology as an obstacle to operations because they are suspicious of innovations, and the innovative decision process and consider it to be of a limited resource.

Furthermore, Rogers & Shoemaker (1983) classifies usage and adoption of innovation into two stages namely implantation and initiations. The recognition of the problem triggers the process of adoption and diffusion as it is perceived as necessity for an innovative product or idea. This, in turn, leads to the seek for innovation that could really address the issue. Thus every individual experiences five phases of the innovation-based choice system as defined by Rogers (2003) as:

(1) Stage of Knowledge: In this stage, a person is exposed towards innovation and learns information about the innovation. "How?", "When?" and "What?" are questions in the knowledge phase. In this stage an individual learns about the innovation when it is introduced, how it works and what that innovation is.

(2) Persuasion stage: This stage is about the attitude of an individual towards technology, which can be either positive or negative. However, whatever the attitude might be it doesn't necessarily lead to the adoption of technology or rejection of technology. An individual develops his or her attitude after learning about the technology.

(3) The decision stage: In this stage, an individual makes a decision about whether to adopt or reject the technology. Adoption refers to "usage of innovation" while rejection means" refusal to adopt innovation". Most individuals want to try the innovation and use it under their own circumstances and later come to the decision to adopt it while the probability of rejection is still there.

(4) The implementation stage: In this stage, innovation is implanted. In its usage, innovation brings in newness but at the same time, there is still uncertainty involved in diffusion.

(5) The confirmation stage: In this stage, the decision of innovation is already made, but still individual searches for support for his or her decision. If there are conflicting messages the individual is prone to reject the innovation. Likewise, affirmative messages that assure support make an individual adopt the innovation.

In this research work, the authors investigate factors driving the adoption of digital banking by non-users who are Islamic bank customers. Diffusion of innovation theory is the best fit for the investigation of the adoption of technology (Amin et al., 2014; Shaikh et al., 2020). Much of the research on diffusion has

technological innovations involved in it. Thus, technology and innovation have been used as synonyms by Rogers. To achieve the desired outcome technology plays a significant role in reducing the uncertainty in cause-effect relationships (Rogers, 2003).

2.2. Conceptual Framework

This research is rooted in a model based on the diffusion theory of innovation (DOI). This method is comparable to the model of DOI adapted by Amin et al. (2016). We utilise innovation related perception facets, which include complexity, relative advantage, compatibility, and integrated technology self-efficacy as added constructs in the study.

The studies mentioned in the previous section contribute to the existing literature in terms of theoretically and empirically. The present work will empirically add to the literature by examining the determinants of digital banking adoption in Pakistan. Figure 1 depicts the research framework for this research.
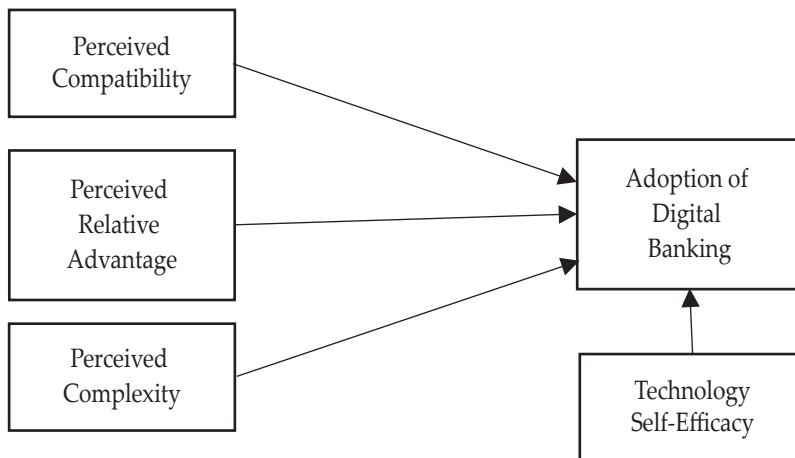

Figure 1.
Conceptual Framework

2.3. Hypotheses Development

2.3.1. Perceived Compatibility and Digital Banking Adoption

Compatibility refers to the level to which users perceive new or innovation to be consistently taking into consideration existing values, habits and beliefs based on previous experiences (Moore & Benbasat, 1991). Compatibility is an important feature of innovation through which a user's lifestyle can lead it to an enhanced rate of adoption (Rogers, 2003). Furthermore, Moore and Benbasat (1991) in their study define perceived compatibility as a system which is consistent with massive open standards, experiences and requirements of users. Thus, in this study compatibility is defined as the level to which Islamic bank customers view digital banking system that will enhance their banking needs.

H1: Perceived Compatibility will have a positive effect on digital banking adoption.

2.3.2. Perceived Relative Advantage and Digital Banking Adoption

Relative advantage refers to the level at which people perceive innovation to be more beneficial than the traditional. Relative advantage increases economic benefits, enhanced status and efficiency (Moore and Benbasat, 1991). Moreover, relative advantages refer to the level at which consumers perceive that digital banking services will enhance their daily banking needs. Previous researches suggest that when the users of innovation perceive the new technology as more beneficial than the previous one they tend to adopt it (Shih & Fang, 2004). Therefore, it is assumed that relative advantage will have a positive effect on the adoption of new technology.

H2: Perceived relative Advantage will have a positive effect on digital banking adoption.

2.3.3. Technology Self-efficacy and Digital Banking Adoption

Self-efficacy is a person's inner belief that he/she possesses the ability to perform tasks. An individual believes he has the capability to perform up to the mark with the current skill set that he possesses (bandura, 1986). As the demand for individuals to be more tech-oriented grows, it is of significant importance to investigate the experiences of bank customers' interaction with technology and what perceptions they develop associated with self-efficacy towards technology. On the other hand, Mathieu (2007) defines technology self-efficacy as "Individuals' perceptions of their capability to successfully use information technology tools." The term technology self-efficacy is a belief in one's own ability towards performing a new technological task (Compeau & Higgins, 1995). Technology self-efficacy is used to explore the responses toward technology integration. In this study, it is expected from an individual that he or she is more likely to adopt digital banking and navigate his way to gain the most out of it. Mathieu (2007) conducts a study using a longitudinal cross-level model of leaser and salesperson influences on technology and discovers that one of the significant factors that drive an individual's intention is technology self-efficacy. Furthermore, other various studies in the domain of IT find that one of the major predictors of behavior control is technology self-efficacy.

H3: Technology Self-efficacy will have positive effect on digital banking adoption.

2.3.4. Perceived Complexity and Digital Banking Adoption

Complexity is defined as the magnitude to which an innovation is considered difficult to use and understand (Hernandez and Mazzon, 2007). Hernandez and Mazzon (2007) discover that complexity has a negative impact on the adoption of internet usage. Complexity is the opposite of ease of use. Many pieces of research have shown that ease of use has a significant impact on the adoption of new technology (Gu, Lee, & Suh, 2009). There are numerous digital services available with user-friendly interfaces. Moreover, users perceive them as easy to operate and this, in turn, develops a positive attitude of non-users towards the adoption of technology (Liu & Li, 2010). In this research, complexity refers to the extent to which non-users experience difficulties in performing online transactions that affect their digital banking experience with Islamic banks. If digital banking is

complicated or difficult, the chances are that its adoption tends to decrease (Liu & Li, 2010). Moreover, many researchers suggest that complexity has a negative impact on the attitude of concerned users towards the adoption of digital banking services when the system is complicated for an individual to understand.

H4: Perceived complexity will have a negative effect on digital banking adoption.

III. METHODOLOGY

3.1. Data

The data for the current study are collected from the consumers of Islamic banks, who are non-users of digital banking residing in Karachi. The online survey was conducted accepting responses from October 2020 till mid of July 2021. Furthermore, in order to ascertain that the respondent is non-user of digital banking services offered by Islamic banks, there is a filter question at the start of survey, which asks respondents if they are users or non-users of digital banking services. Only non-users proceed to the survey.

All completed responses from non-users are considered, where there are 208 responses. This meets Hair et al. (2006) recommendation (computed as 10 x battery items to get the sample size of 180). The sample size is adequate to provide precision and constancy for the results obtained. The sampling technique applied is purposive sampling to better represent the population. For this reason, before proceeding to the main questions, the questionnaire asks first the respondents if they were Islamic bank customers. Secondly, if they are users of digital banking or not.

Table 1.
Frequency Statistics

Demographic information	Detail	Frequency	Percentage
Gender	Male	113	54.0
	Female	95	46.0
Age	21-30	76	37.0
	31-40	89	43.0
	41 and over	43	20.0
	Self-employed	62	30.0
Occupation	Full-time job	95	46.0
	Part-time job	51	24.0

Source: Primary data

3.2. Measurements

All factors are adopted and used in the mobile banking context from confirmed and modified instruments. The measures for technology self-efficacy are operationalized by Mathieu (2007). All the items of perceived compatibility are adapted from Moore and Benbasat (1991). Perceived relative advantage items are adapted from Moore and Benbasat (1991), Shih and Fang (2004) and Liu and Li (2010). The items of perceived complexity are adapted from Mauro et al. (2007) and Liu and Li (2010). Questionnaires are sorted on a 1-5 scale, with 5 representing

"strongly agree" and 1 representing "strongly disagree." Moreover, part one of the questionnaire comprises demographic profiles of the respondents. All the constructs' items used in this study are adapted after modification so as to reflect the digital banking adoption context. Four subject experts have been requested to validate the constructs' items used in the context of this research. All of the suggestions have been considered and incorporated into the questionnaire. Following that, a pilot research is done utilizing the questionnaire among non-users of digital banking drawn from several Islamic banks. Furthermore, this study postulates four hypotheses as stated in the preceding section.

3.3. Method

For analysis of data, the partial least - square (PLS) technique is used with Smart PLS 3.2 professional version software. It is a method to investigate the validity of interactions among factors (Shi et al., 2008). PLS has been shown as mentioned by Lowry and Gaskin (2014) to yield precise and reliable outcome. Furthermore, given its capacity to deal with both large and small size of the sample, it serves as a powerful measurement software (Marcoulides and Saunders, 2006; Chin et al., 2003). Besides that, PLS technique has few constraints on normality test, resulting in greater adaptability in examining the proposed model of research framework (Gefen et al., 2000; Chin et al., 2003).

IV. RESULTS AND ANALYSIS
4.1. Results
4.1.1. Measurement Model

Discriminant and convergent validity are investigated while performing analysis of the model at level of measurement. The validity test related to convergence assesses the degree to which factors are ideally linked. As a result, the Cronbach's alpha, composite reliability (CR), and extracted average variance (AVE) are all taken into account. Internal consistency is crucial for determining the composite validity of every component, whilst the AVE reflects the level of variance in combining items together into a factor (Hair et al., 2010). As presented in Table II, all factors have CR values in the range from 0.901 to 0.953. The range is greater than the lower limit, 0.7, demonstrating the data's substantial consistency internally (Chin et al., 2003). Moreover, the AVE surpasses 0.5, implying that the variables would have enough variance (Fornell and Larcker, 1981). Cronbach alpha evaluates the dependability or precision of every stated variable. Most Cronbach alpha values are greater than 0.7, indicating also that the factors are reliable and precise in the present study framework (Nunnaly, 1978).

Table 2.
Convergent Validity

Composite reliability		Average variance	
Constructs	**CR**	**extracted AVE**	**Cronbach's alpha**
Perceived Compatibility	0.880	0.660	0.804
Perceived Relative Advantage	0.941	0.841	0.905
Perceived Complexity	0.856	0.556	0.788
Technology Self Efficacy	0.945	0.852	0.913
Adoption of Digital banking	0.934	0.825	0.894

Note: AVE, average variance extracted, CR, composite reliability

Validity assures that each factor in a predictive method is readily distinguishable enough to detect situations which are not reflected through other factors (Campbell and Fiske, 1959). The heterotrait-monotrait of correlation (HTMT) has been observed in this setting (Henseler et al., 2015). It compares the average correlations' ratio for scale items throughout different factors to average correlations' mean for items in the scale in the same factors (Voorhees et al., 2016). It is worth noting that HTMT has been shown to have sensitivity scores; thereby, misrepresentative results regarding construct validity should be avoided.
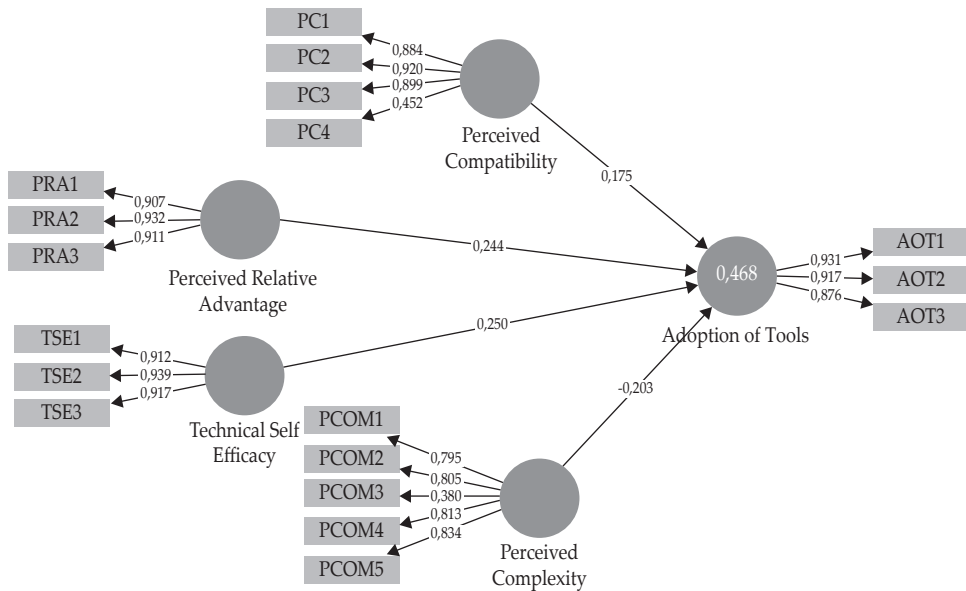

Figure 2.
Analysed Research Model

Figure 2 and Table 3, present the outcomes of the interactions among factors, which are complexity, relative advantage, compatibility, technology self-efficacy and the adoption of digital banking. It can be seen that compatibility directly impacts Islamic banks' digital services adoption ($\beta = 0.175$, t-value = 2.116, p<0.05).

Table 3.
Hypothesis Testing Results

Hypothesis	Pathway	Estimate (β)	SD	t-statistics	Supported
H1	PC → AOT	0.175	0.083	2.116	Yes
H2	PRA → AOT	0.244	0.099	2.476	Yes
H3	TSE → AOT	0.250	0.114	2.203	Yes
H4	PCOM → AOT	-0.203	0.101	2.006	Yes

Note: PC, perceived compatibility; PRA, perceived relative advantage; PCOM, perceived complexity; TSE, Technology Self-Efficacy; AOT, Adoption of Digital banking tools.

Hence, H1 is supported. Furthermore, relative advantage has a direct impact on Islamic banks' digital services adoption (β = 0.244, t-statistics = 2.476, p < .05). As a result, H2 is supported. On other note, technology self-efficacy is proved to be the most impactful factor for Islamic banks' digital services adoption (β = 0.250, t-statistics = 2.203, p <0 .05) therefore, H3 is supported. However, it is found that perceived complexity has a negative but significant impact on Islamic banks' digital services adoption (β = -0.203, t-value = 2.006, p < 0.05). So, H4 is also supported.

The results obtained as reported in Table 3 suggest that technology self-efficacy has the highest influence on the adoption (b = 0.250 and t = 2.203) followed by perceived relative advantage (b = 0.244 and t = 2.476). This is out of the fact that the individual aptitude has a direct impact on consumers' capability in terms of their capacity to perform the adoption without less assistance by third parties. Besides, the use of digital banking is somewhat beneficial in terms of improved financial benefits offered and competitive financial cost saving, at best. Beyond, perceived complexity and perceived compatibility are ranked three and four in importance, shaping the adoption of digital banking.

4.2. Discussion

This research covers the gap by introducing additional perceptions as factors that promote digital banking adoption from the perspective of Pakistan. The research would be useful for the managers of the banking industry to capture the local banking market by the virtue of gripping these factors from a strategic standpoint. Furthermore, such factors are vital for managers to consider as significant inputs in enhancing the effectiveness of Islamic banks' services. In the long-term, increased market penetration will result in improved, impactful, and profitable outcomes. In the digital era, leveraging on digital banking, the managers of Islamic banks may strive for financial inclusion and branchless banking using the FinTech services by offering digital banking (Shaikh et al., 2020), which will lead to reduced cost and include those who are deprived of banking services in far rural regions of Pakistan. This may apply to other South Asian regions where the poor are nonbankable and banking services usage is a dream for a poor population that resides in villages or remote areas. In the present research, authors consider that Islamic banks may step forward and use digital means to reach out to those in need of banking services with the help of technology.

With regards to implications, the main goal of current research is to investigate whether complexity, compatibility, perceived relative advantage, and technology self-efficacy influence digital banking adoption in Pakistan using Roger's Innovation Diffusion Theory. According to the developed framework, all the preceding mentioned factors are to influence Islamic bank customers in Pakistan to adopt digital banking. The findings of the study reveal that all four constituents, namely perceived compatibility, perceived relative advantage, perceived complexity and technology self-efficacy are driving factors of digital banking adoption. And technology self-efficacy is one of the influential constituents as a potential driving factor.

V. CONCLUSION

The current study investigates non-users' adoption of digital banking services provided by Islamic banks in Pakistan, as well as the variables that motivate non-users to use digital banking. The technology self-efficacy variable is incorporated into the diffusion of innovation theory, DOI, in order to devise an advanced theoretical framework. Furthermore, the existing framework can be used in behavioral research to determine an individual's adoption of digital-based products.

The research contributes to the development of a new relationship between technology self-efficacy and Islamic bank consumers' adoption of digital banking services. From a theoretical aspect, this study provides a model based on DOI and includes a new variable, technical self-efficacy, which adds to the literature on the adoption of digital banking services. The research framework is based on DOI, and it is a pioneering effort to use the aforementioned theory in the context of Islamic banks' adoption of digital banking services in Pakistan. As a result, this study attempts to contribute to the limited empirical literature on digital banking services by employing a DOI modified framework in the context of the Islamic banking sector in Pakistan in order to increase the predictability of adoption determinants. Studies related to the determinants of digital banking services in an Islamic banking setting are mainly limited. According to the literature, there have been few studies on the adoption of digital banking services by non-user in Pakistan. As a result, the current work is an attempt to propose determinants responsible for non-users adoption of digital banking. All of the variables employed in this study, such as perceived complexity, technical self-efficacy, perceived compatibility, and perceived relative advantage, may be able to better explain non-users' adoption. According to the findings, technology self-efficacy is the most influential determinant of digital banking adoption. DOI theory is helpful in predicting digital banking adoption by Islamic bank customers. Extending the specific determinants that affect Islamic banking digital services, such as perceived complexity, technology self-efficacy, perceived compatibility, and perceived relative advantage, offers a vibrant knowledge of the interaction among variables and the effects these variables have on implementation. As a consequence, the findings of this research are relevant to bankers.

This research demonstrates extensive implications in order to bridge an existing research gap particularly regarding how regulators such as central

banks may embrace novel technology channels that clients might want to use. It is also critical for central banks, such as Bank Indonesia, to relate the research findings concerning barriers which may well prevent non-users from accepting digital banking services offered to bank customers. In addition, the model could be replicated in the context of Indonesia to validate the results. Moreover, a comparative analysis in two different regions or countries may be conducted to assess the similarities and differences that might also prevail (Shaikh et al., 2022). Likewise, bankers might be required to understand their clients' willingness to use innovative services and products so as to gauge markets for technology-based products. In the current study, perceived complexity (PCOMP) has a substantial influence on digital banking adoption. Likewise, perceived relative advantage and perceived compatibility have a substantial impact on digital banking adoption. Given the findings of this study, policymakers and Islamic bank management are urged to investigate aspects that significantly influence Islamic bank digital services, such as technology self-efficacy, perceived relative advantage, perceived complexity, and perceived relative advantage. These criteria, which indicate a 47 per cent variance, may be considered the primary reason for an individual to use digital banking services. As a result, there could be additional variables driving digital banking uptake.

Note that the present study is confined only to the capital city of Sindh province, Karachi. Further research needs to be conducted in other areas with large populations. Adding further, this study is limited in terms of usage of repetitive model and use of crosstab analysis in order for sample mapping. Furthermore, other reasons may be responsible for Islamic banks' digital banking adoption, and hence the application of theories other than the DOI. As a result, future studies may employ different analysis techniques as well as other related theories, such as the technology acceptance model (Venkatesh & Davis, 2000), the unified theory of acceptance and use of technology (UTAUT), and the theory of interpersonal behavior (TIB).

Despite the fact that digital banking has a foothold in Pakistan and that numerous Islamic banks have effectively integrated digital banking services, policymakers may be required to make some modifications in terms of digital policymaking in order to gain the support of non-users of Islamic banks for digital banking services. Central bankers might also want to take into account the findings of this research in order to persuade their clients to use available digital services.

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