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TECHNOLOGY USAGE & FINANCIAL BEHAVIOR IN DIGITAL BANKING: INFLUENCE OF PERCEIVED RISK IN AN EMERGING ECONOMY

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ABSTRACT

The current study explores how digital financial consumer behavior (DFCB) in the fast-growing digital banking ecosystem in Pakistan is affected by technology adoption and it also explores whether perceived risk moderates' relationship between technology adoption and digital financial consumer behavior. Its conceptual foundation is Diffusion of Innovation (DOI) theory where three dimensions (technological relative advantage, technological compatibility & technological complexity), used to measure technological usage. A well-designed questionnaire was administered to 360 participants of the digital banking in Punjab province of Pakistan, and hypotheses were tested using PLS-SEM. This empirical study showed that technology use has a positive effect on the digital financial consumer behavior, but perceived risk has a strong negative effect. In addition, positive influence of enabling factors on digital financial engagement is moderated and weakened by perceived risk. In the future, the research will add value to field by jointing DOI theory and perceived-risk literature in establishing financial conduct in the novel setting. The empirical analysis findings provide the practical advice to banks and fintech companies willing to encourage more digital use and interaction.

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INTRODUCTION

The digitalization process has transformed the financial sphere in its core, and one of the drivers of the transformation is the rapid introduction of financial technology (fintech) products, including mobile banking applications, digital wallets, and peer-to-peer (P2P) lending platforms (Jameaba & Ssenyonga, 2022). In emerging economies, such as Pakistan, these innovations have emerged as

invaluable tools of financial inclusion, reduction of transaction costs as well as the increase of access to the financial system (Bello, 2024). However, despite the execution of flagship initiatives, the use of digital financial services remains disproportionate (Shaikh, Amin, Noordin & Shaikh, 2023; Yan, Siddik, Akter & Dong, 2021), including Raast and the Roshan Digital Account, the two most effective initiatives. The difference implied that there is mismatch amid technological availability and actual consumer involvement, and, thus, thorough study of factors that drive digital financial behavior is required.

Literature reviews on the use of technology and its effects on digital financial consumer behavior (DFCB) have shown that level of influence depends on the perceived risk–a psychological concept that has a strong influence on decision making in the digital environment (Grima, Hamarat, Özen, Girlando & Gonzi, 2021). The perceived risk includes the fear of fraud in money transactions, the information theft, failure to make transactions, as well as unauthorized access, which is of specific relevance in the developing world with less regulatory and cybersecurity systems (Atiqa, 2023; Xia, Wu & Zhang, 2022). The empirical studies show perceived risk (security, privacy, financial & performance risk) is consistently a negative predictor of e-banking adoption. Thus, the empirical evidence indicates that despite the benefits that consumers might see in the context of using digital platforms, the perceived risk might reduce adoption tendency may not directly relate to attitude (Jaradat, Moustafa & Mashaqba, 2018; Al-Jabri & Sohail, 2012). The risk perception can therefore act as moderating factor that can strengthen or dull the positive impact of the required perceived technological advantages.

The existence of perceived risk in Pakistani context of digital banking takes on special significance due to the lack of consumer awareness of their privacy protection, the existence of documented cases of cyber fraud, and the general distrust in institutional protection, historically (Gharaibeh & Gharaibeh, 2023; Sudarsono, Kholid, Trisanty & Maisaroh, 2022). It is therefore important to infer not only the short-term impacts of technological innovation on the consumer behavior but also the circumstances surrounding the impacts that can strengthen or weaken impacts driven by financial inclusion goals, infrastructure development, and fintech expansion. Thus, affordability concerns, accessibility, and cultural trust factors shape risk perceptions and adoption patterns. Protection Motivation Theory (PMT) supports this view, which states that the salient perception of threat can significantly block the way of behavioral intention, even in case of technological capability as well as awareness (Rogers, 1983; Hoque, Susanto, Shah, Khatimah & Mamun, 2023). Thus, a thorough investigation into digital banking behavior has to combine both of two determinants of capability and perceived risk.

LITERATURE REVIEW

The current digitalization of the financial services sector has completely changed the way people interact with financial institutions and banks. The introduction of mobile banking applications, fintech platforms, and digital wallets, which have become popular in last few years, has reorganized consumer financial behavior in terms of providing speed, convenience, and accessibility (Ali, Raza, Puah & Amin, 2023; Shaikh et al., 2022). Such innovations are essential in emerging economies like Pakistan where they are needed to achieve financial inclusion and reduce dependence on cash

payment. Still, to realize the potential of these digital financial instruments, it is important to know the technological and psychological drivers that lead to adoption and sustained use (Rana, Slade, Dwivedi & Piercy, 2023). Thus, further studies are necessary to define the exact factors of digital financial interaction.

Use of technology forms a key determinant to the digital financial consumer behavior. Based on the DOI theory (Rogers, 2003), the study will be conducted on three main dimensions of technology usage, including technological relative advantage, technological compatibility, and technological complexity. The relative advantage addresses how good or bad an online service is compared to a traditional alternative (Yuen, Wong, Ma & Wang, 2022), compatibility refers to extent to which technology is compatible with personal values and experiences (Shahadat, Nekmahmud, Ebrahimi & Farkas, 2023), and complexity refers to how easy or difficult it is to comprehend and navigate a digital platform, and it impedes adoption of the technologies (Jamshidi & Kazemi, 2022). These dimensions contribute differently to user's willingness and capability of being involved in digital banking services.

Technological Usage → Digital Financial Consumer Behavior

Technological relative advantage refers to how a new technological system is evaluated as better than the former (Moore & Benbasat, 1991). In the world of digital banking, this benefit often has the form of the reduced transaction length, mobile capabilities, and increased cost-effectiveness. Riza (2019) showed that perceived benefit played a significant role in fastening the adoption of digital Islamic banking in Pakistan due to increased reliability and convenience. Similarly, Shih and Fang (2004) discovered that the evaluation of digital platforms added value by consumers is precursor to adoption. Yuen et al. (2021) ensure that relative advantage increases the perceived usefulness and, thus, the adoption rates are higher in fintech settings. Chan et al. (2020) also confirmed this statement, determining a strong relationship between technological advantage and involvement with customers in e-banking. Simultaneously, Japutra et al. (2022) reported that the adoption of digital tools grows when users find them not only entertaining but also more productive compared to the traditional ones. Similar results are provided by Sunardi et al. (2022), who demonstrate that benefits, including speed, security in unified payment interfaces and peer-to-peer lending services, increase the usage.

All these findings show that it is essential to focus on technological benefits to regulate behavior. Technological compatibility may be defined as measure to which an innovation may be congruent with established routines and values of users (Rogers et al., 2019). Compatibility has always been found as a critical factor of technology adoption especially in the financial services sector, through empirical studies. Oliveira et al. (2016) and Choudrie et al. (2014) noted that the adoption of digital banking services is higher when they are fitted to daily habits of its users. Riza (2019) pointed out that professional applicability of fintech tools is reason why they are used frequently. As evidence, Rahmayati (2021) and Mehra et al. (2022) revealed that user lifestyle and device preferences are in line with frequent use and good experiences. Such studies as Zhang et al. (2023) demonstrated that smooth integration process of digital banking increased consumer satisfaction and loyalty in digital banking. Compatibility was found as a factor that enhances trust and adoption as Dinh et

al. (2023) and Dehnert and Schumann (2022) also confirmed that consumers are aware of the compatibility between new tools and their financial needs that can be achieved over compatible technological solutions.

Technological complexity can be described as perceived difficulty of users using digital platforms. The available literature evidenced that services that are considered difficult have less adoption. Sbarcea (2019) makes argument that less complexity enhances chances of acceptance; Chauhan et al. (2019) point out that BoP populations, especially, need simple and intuitive solutions; Villiers et al. (2020) come to same conclusion that simplicity is paramount to the adoption of mobile banking. Lee and Shin (2020) also stated that complexity undermined technology-related attitudes, mainly in the case of people who are not well versed in digital platforms. Salloum et al. (2023) support these data, indicating that ease of use and mobile app usage are closely related. Kaur et al. (2020) confirmed that a simple design is associated with greater satisfaction and continuous involvement as digital literacy programs help demystify risks and increase perceived usefulness. In the wider literature, Koskelainen et al. (2023) and Baliga and Goveas (2023) stated that decision-making and financial literacy suffer because of complex systems. So, based on above literature, following hypothesis is formulated in study that "technology usage has significant impact on digital financial consumer behavior".

Perceived Risk → Technology Usage → Digital Financial Behavior

Convenience and wide area of reach have been identified as relatively beneficial traits that have stimulated the use of digital banking in the past. However, this can be reduced by perceived risk. In their study, Jabri and Sohail (2012) found out that mobile banking users are still reluctant to use the service despite the advantages that this technology has brought. This was supported by Jaradat et al. (2018) who showed that risk perception mediates the judgment of individuals on usefulness of innovations. Xia et al. (2022) also demonstrated the fact that the perceptions of social and economic risk hinder the decision-making process concerning the use of better technologies. As Atiqa (2023) showed, security concerns still keep people away from using digital wallets. In combination, these findings support the need to create trust in order to raise perceived value. Hoque et al. (2023) and Riahi and Garrouch (2023) reported that perceived risk acts as a psychological block that destroys the visible advantage of digital tools. Despite the fact that compatibility tends to promote use, it is possible that increased perceived risk can put off users in adoption of the new tools. Sudarsono et al. (2021) have established in sphere of mobile banking that perceived risk weakens positive effect of compatibility on usage.

Although digital platforms have been able to align with the lifestyles of users, fears of fraud and loss of data prompt many people to act cautiously. Findings of Sudarsono et al. (2022) and Xia et al. (2022) also revealed that behavior is skewed in a favorable context by risk perceptions. Customers wonder whether their information would be secure, regardless of the degree of the service fit with their habits. This result is supported by AlQudah et al. (2024) who demonstrated that risk undermined the trust in compatible fintech services. Complexity is an adopted barrier that is well documented. In circumstances where the users feel there is more risk, the outcomes are worsened.

Villiers et al. (2020) showed that, in the fintech sphere, systems with a high level of complexity and low trust level significantly reduced the use of them. At the same time, Rahman et al. (2023) marked late adopters as those that are especially vulnerable to both risk and complexity. According to Sudarsono et al. (2022), the use of digital platforms that are hard to use and which are perceived to be unsafe causes the users to abandon them altogether. The above literature confirmed the hypothesis that Perceived Risk significantly moderates the relationship between Technology Usage and Digital Financial Consumer Behavior.

RESEARCH METHODOLOGY

The research design used in current study is quantitative and cross-sectional in design to establish how adoption of technology can affect the digital consumer behavior within the financial sector, and same time examine moderating role of perceived risk. A well-structured survey questionnaire was administered to gather data among the consumers using digital banking services in different districts of the Punjab province in Pakistan. The target population was those individuals who have a regular interaction with digital banking services such as mobile banking, internet banking, and e-wallets in the institutional scope of study. A population-based formula developed by Yamane (1967) was used to determine a principled sample size, which was obtained as 360 respondents. In order to protect data quality and reduce possibility of response bias, purposive sampling approach was chosen to identify 410 respondents based on at least one year of experience with using digital banking platforms.

Data collection tool was a structured questionnaire that included closed-ended questions based on validated instruments in past. The constructs along with the sources are as follows, Technological Relative Advantage (4 items) – Adapted from the Kaur, Dhir, Bodhi, Singh and Almotairi (2020), Technological Compatibility (4 items) – Adapted from the Singh and Sinha (2020), Technological Complexity (5 items) – Adapted from Yuen et al. (2021), Perceived Risk (6 items) – Adapted from Nguyen and Huynh (2018), Digital Financial Consumer Behavior (6 items) – Based on the Alalwan and Rana (2017). The current research utilized Partial Least Squares Structural Equation Modeling (PLS-SEM) through Smart PLS 4.0 to test a complicated model which included moderating factors and latent variables.

RESULTS OF STUDY

The reliability and validity analysis demonstrates that constructs are of the satisfactory internal consistency. The Cronbach alpha coefficients are between 0.7168 and 0.8189 and the composite reliability (CR) exceeds the 0.70 mark, which also proves the reliability of the measurement scales. Internal consistency values of the constructs are also supported by RHO_A values. Meanwhile, the values of average variance extracted (AVE) are lower than the recommended 0.50, with the range of 0.2827 (Technological Compatibility) to 0.4151 (Technology Usage), which implies that the indicators fail to explain the variance of the corresponding constructs sufficiently. Technological Relative Advantage as a whole has the best reliability values among all variables, as the values of Cronbach alpha, rho alpha, and composite reliability were 0.8189, 0.8711, and 0.8371, respectively. Comparatively, the AVE of Technology Usage has the highest of 0.4151. In this linking, these results

demonstrate that the technological relative advantage is the construct that was thus measured most consistently.

Table 1 Reliability Analysis

	CA	RHO_A	CR	AVE
Digital Financial Consumer Behavior	0.7379	0.7406	0.8067	0.3198
Technological Complexity	0.7957	0.8871	0.838	0.3807
Perceived Risk	0.7168	0.7115	0.8041	0.3711
Technological Compatibility	0.7696	0.8038	0.8213	0.2827
Technological Relative Advantage	0.8189	0.8711	0.8371	0.3033
Technology Usage	0.751	0.8451	0.8041	0.4151

The Heterotrait-Monotrait (HTMT) ratio table suggests the risk of discriminant validity, since many inter-construct correlations are above standard value of 0.85. The high values of HTMT related to digital financial consumer behavior with perceived risk and technological relative Advantage are of special concern: 0.7674 and 0.8078 respectively. These results indicate conceptual overlap of the measures. A similar trend is seen in perceived risk that has high correlation with technological compatibility (0.7539) and Technology Usage (0.6735). Even though it is clear that none of these correlations exceeds a Critical Value of 0.90 (rather the more conservative of 0.85), the fact that the inter-construct relationships are relatively high (particularly in DFCB & TRA) requires that greater attention be paid to ensure that constructs are measuring independent dimensions and not the same underlying concepts.

Table 2 Validity Analysis (HTMT)

	DFCB	TCOMPLEX	PR	TCOMPAT	TRA
Digital Financial Consumer Behavior					
Technological Complexity	0.6795				
Perceived Risk	0.7674	0.739			
Technological Compatibility	0.665	0.4477	0.7539		
Technological Relative Advantage	0.8078	0.6518	0.7109	0.5485	
Technology Usage	0.508	0.574	0.6735	0.4588	0.6462

Direct & Moderating Effect

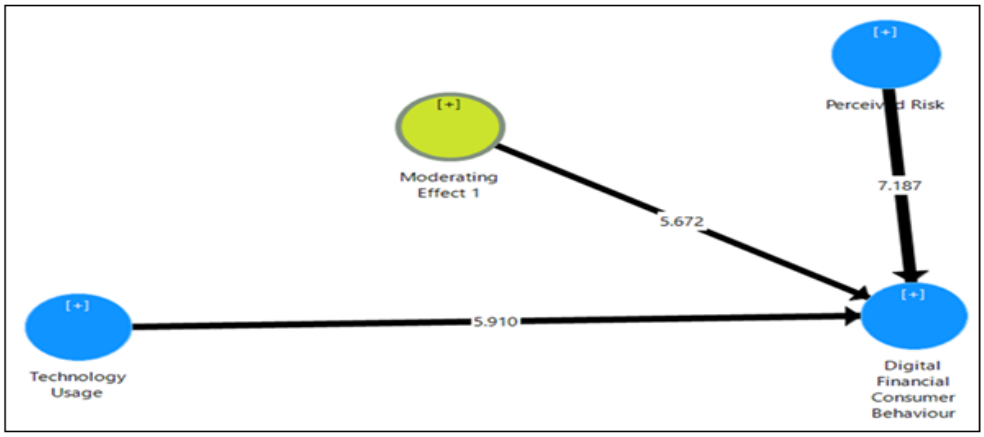
The analytical framework used in the current study distinguishes direct and moderating effects in order to investigate determinants of Digital Financial Consumer Behavior (DFCB). Particularly, those who are more active in the use of digital financial technologies show more desirable digital financial behaviors meaning that long-term interaction with technology leads to trust, confidence, and efficiency in the use of digital space. On the other hand, Perceived Risk has a strong, negative direct impact on DFCB ($b = -0.3155$, $p < 0.001$), means that consumers with a higher perception of risks (data breach, fraud, losing money) have low engagement with digital financial services. There is one more moderated path, which shows that Perceived Risk decreases the positive relationship amid TU and DFCB (beta=-0.0727, p=0.0002). Thus, those who regularly use digital technologies

are vulnerable to reduced DFCB when subjected to high ratios of perceived risk, and it is therefore of extreme importance that strong digital security and protection of users be upheld to maintain consumer activity.

Table 3 Direct and Moderating Effect

	OS	SM	SD	TS	PV
Technology Usage -> Digital Financial Consumer Behavior	0.2529	0.2765	0.0428	5.9103	0.0001
Perceived Risk -> Digital Financial Consumer Behavior	-0.3155	-0.3216	0.0439	7.1868	0
Moderating Effect 1 -> Digital Financial Consumer Behavior	-0.0727	-0.0664	0.0128	5.6723	0.0002

Figure 1 PLS SEM Results



DISCUSSIONS

The results presented in this study provide a set of implications to be considered when exploring the digital financial consumer behavior (DFCB) in the Pakistani banking environment. The technology Usage has a statistically significant positive impact on DFCB (0.2529, $p < 0.001$), which proved that frequent practice of digital financial tools increases the level of trust and dependence of customers on fintech services. As is in line with existing literature, the findings highlighted fact that perceived technological usage, which are convenience, accessibility, and efficiency, have always impacted the digital banking adoption (Riza, 2019; Yuen et al., 2021). With practical use of fintech, consumers feel more comfortable and confident, and it allowed them to complete digital financial tasks; this fact proposed that use itself shapes digital competence and predetermines behavioral intention. Perceived Risk has a prominent negative effect on DFCB (beta = -0.3155, $p < 0.001$) which confirmed theory that fear of fraud, data leaks, or even financial loss might suppress digital financial activity. This conclusion is along with earlier studies highlighting risk perception as active psychological obstacle to use of fintech, even in the technologically competent consumers (Jaradat et al., 2018; Hoque et al., 2023).

Conclusions, therefore, showed that fintech service providers should not only improve functionality and performance of their platforms but eliminate uncertainty by communicating openly, executing strong cybersecurity, and user education. This result is consistent with previous research that has described risk perceptions as a notable psychological obstacle against fintech adoption, especially in developing markets. This analysis also shows that the perceived risk by the individuals produced a strong negative moderating effect between technology usage and DFCB ($b = -0.0727$, $p < 0.001$), implying even active users, high perceptions of risk can diminish the positive effect of technology use. Such moderation effect confirms the inferences that are supported by Protection Motivation Theory according to which perceived threats may override behavioral suppression, even when there are enabling conditions. Following the reasoning of Atiqa (2023) and Telo (2023), it means that risk-reduction measures must be proactive, namely, offering stronger data protection, more simplified user interfaces, and easily identifiable customer support in case behavioral advantages of technological familiarity are to be achieved. Consequently, the promotion of digital financial behavior demands the measured one that balances the advancement in the technology as well as psychological guarantees.

CONCLUSION

The current study determined the impact of the use of technology, which could be influenced by the technological relative advantage, compatibility, and complexity, on digital financial behavior in the banking sector in Pakistan, as well as evaluated the moderating role of perceived risk. All the suggested hypotheses were proved by empirical evidences. Thus, empirical evidence indicated a prominent positive relationship between the use of technology frequency in the cyber-financial environments and the emergence of positive financial behaviors. It is suggested that people who deal with the digital financial instruments repeatedly become more likely to develop the positive attitudes toward the personal finance. This can be explained by the gradual process of acquiring familiarity, trust, and confidence in digital financial systems, which, in the sum, contribute to the further sustained and responsible involvement in online financial practices. Considering the above findings, it can be asserted that DOI is useful in explaining behaviors of adopting digital technology in emerging markets.

The results of the empirical research indicated that the perceived risk is an important moderating factor in the relationship between technology use and digital financial consumer behaviour. The increased use of technology facilitated by developed apps and products resulted in more beneficial consumer outcomes, but the effect diminished when users perceived digital financial products and services as risky, i.e., considering existence of data breaches, fraud, and violating privacy. Therefore, technological engagement levels even at great levels did not always provide the best behavioral responses among the consumers who were insecure. These findings highlight the crucial importance of perceived risk to decision-making, and showcasing that technologically inclined solutions are not enough unless they are accompanied by the attention to the security concerns of the consumers. On this basis, the digital adoption strategies in developing economies cannot only be based on functionality but should be able to cover emotional and psychological issues, particularly safety, trust, and security.

Implications

The current research contributes to modern academic literature by combining the concept of perceived risk and the Diffusion of Innovation Theory to the situation of digital banking adoption. This method of analytical integration provides a more extensive explanatory model of digital consumer behavior, which at the same time takes into account technological specifics of financial platforms and the psychological barriers they face. The confirmed model shows that user behavior could be influenced by not only intrinsic characteristics of digital settings, but also the way people evaluate threats. The use of this multidimensional approach will provide a deeper understanding of the mechanism of acceptance or rejection of financial technologies. Practically, empirical results have a major bearing on banks, tech-based companies, and policymakers who want to increase the use of digital finance.

First, developers should optimize digital banking interfaces and match them with daily needs of users. Technological devices must be user friendly, compatible with the systems that are in place, and without any doubt they must be highly advanced in comparison to the previous forms. At the same time, risk mitigation should also be the basis of any digital banking strategy. Banks and other institutions are encouraged to strengthen the cyber-security measures, establish clear grievance redressal systems and consistently inform the customer of the protection. User-education programs are also suggested to build the trust and reduce the fears surrounding the digital transactions especially among the rural population or first-time users. All these interventions have the potential of significantly increasing the adoption and long-term usage of the digital financial platforms in emerging economies.

Future Research Directions

The current research is an important contribution to the knowledge of links that existed between technological utilization, perceived risk, and digital financial consumer behavior. However, at the same time it also outlines a number of directions to be explored in the future. The research is also cross-sectional and thus it does not allow to capture the behavioral trends over time; longitudinal designs would thus allow to better understand how consumer trust as well as risk perceptions are changing with repeated exposure to a digital environment. The second, external validity could be increased through increasing geographic extent, such as rural and other Pakistani provinces. Third, mediating variables, e.g., digital trust, financial self-efficacy, and technology anxiety, would also shed more light on the processes by which technological utilization affects behavioral outcomes. Fourth, the comparative studies of emerging economies and developed economies may provide cross-cultural information on the reception of fintech innovations and risk factors by the specific consumer environment.

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