

Behavioral Intention to Adopt FinTech Services: A Comparative Study Between Digital Immigrants and Digital Natives in Pakistan

Muhammad Saleem^{1,2*}, Haliyana Khalid¹, Haneen Mohammad Shoaib³
Faisal Mohammed Almaslukh¹, Ayesh Wijenayake⁴, Asim Nasar¹

¹ Azman Hashim International Business School, Universiti Teknologi Malaysia, Kuala Lumpur, Malaysia

² ALFA University College, Kuala Lumpur, Malaysia

³ College of Business Administration, University of Business and Technology, Jeddah, Kingdom of Saudi Arabia

⁴ Faculty of Management, Law and Social Sciences, University of Bradford, United Kingdom

*Corresponding author: smuhammad@utm.my

Article History

Received: 13 Apr 2025 Revised: 29 June 2025 Accepted: 30 June 2025 Published: 30 June 2025

Abstract

This study aims to investigate the key factors influencing the adoption of financial technology among digital immigrants and natives by extending the diffusion of innovation theory. A convenience sampling technique was employed to collect data from 160 digital immigrants and 193 digital natives, resulting in a total of 353 responses. A structural equation modelling approach was employed to conduct a multigroup analysis comparing the responses of digital immigrants and digital natives using SmartPLS software. This study reveals significant relationships between relative advantage, complexity, compatibility, trust, data security, and intention to adopt FinTech services. Moreover, this study emphasizes the importance of addressing data security concerns and ensuring compatibility with existing financial systems to foster trust and facilitate the adoption of FinTech. Notably, the present research holds important implications for stakeholders, including academia, the financial industry, and policymakers, informing modern strategies to promote financial inclusion by targeting all age groups of users in this digital financial landscape.

Keywords: FinTech, digital immigrants, digital native, intention, diffusion of innovation (DOI) theory, intention to adopt fintech, trust, data security.

1. Introduction

In this current revolution of the digital economy, the Financial Technology (FinTech) industry is considered a fundamental enabler of economic development aligning with the Sustainable Development Goal (SDG) 8, “Decent Work and Economic Growth” and SDG 9, “Industry, Innovation, and Infrastructure” of United Nations (Pauliukevičienė and Stankevičienė, 2022). Notably, recent empirical studies on financial services have considered FinTech services as technology-driven innovations, fostering economic development (Abbas et al., 2024), job creation (Ayimah et al., 2024), and enhancing the effectiveness of a country's fiscal and monetary policies (Khan et al., 2023). By leveraging digital technology-driven applications within the FinTech industry, including mobile banking, blockchain, Apple Pay, and Google Pay, trustworthy and secure financial services are being offered to individuals and organizations (Rabaa'I, 2023; Alalwan et al., 2024). In this regard, Aloulou et al. (2024) highlighted that the adoption of FinTech services worldwide has led to extensive economic growth across various regions and demographics. Recently, Statista reported that the global FinTech industry generated USD 340.10 billion in 2024 (Statista, 2024). Likewise, the number of FinTech service users worldwide has been steadily increasing compared to traditional banking systems (Esawe, 2022).

However, considering the current rise in cybercrimes, phishing attacks, and debit/credit card hacking, among other threats, the momentum behind implementing FinTech services among users is undeniable. Thus, understanding the different imperative implication patterns between various age groups, i.e., digital immigrants and digital natives, is crucial for FinTech companies to formulate strategies for inclusive and sustainable ecosystems, especially in developing nations. Digital natives are individuals born and raised during the digital era, often characterized by their familiarity and ease with technology (Hoffmann et al., 2014). Thus, digital immigrants are individuals who were introduced to digital technology later in life (Autry Jr & Berge, 2011). On the other hand, understanding the imperative adoption patterns of digital immigrants and digital natives is crucial for FinTech companies to formulate strategies for inclusive and sustainable ecosystems, especially in developing nations like Pakistan. In this view, Zhang et al. (2023) noted that there is a lack of empirical studies examining the behavioral intention of individuals to adopt FinTech services in Pakistan. To make FinTech services familiar and easy to use in Pakistan, the State Bank of Pakistan (SBP) established Facilitation Desk Services (FDS) for FinTech companies, which aim to understand and expand FinTech services in rural and urban areas of the country. Despite this revolutionary technological progress, the adoption of FinTech services remains complex and insecure, particularly for digital natives (those born into the digital era) and digital immigrants (those who adopted technology later in life). Despite the growing popularity of FinTech services worldwide, significant practical and theoretical gaps remain in our understanding of the critical factors influencing the adoption of FinTech services among digital natives and digital immigrants. On the other hand, Appiah and Agblewornu (2025) noted that “even in advanced economies, lack of proper regulation has been identified as a major barrier to Fintech adoption” (p.2).

Theoretically, previous empirical studies (e.g., Chan et al. (2022); Laksamana et al. (2023); Zhang et al. (2023)) applied and examined the individuals' behavioral intention to adopt FinTech services employing the Technology Acceptance Model (TAM). Limited existing studies have extended and applied the Diffusion of Innovations (DOI) theory to investigate the influence of trust and data security on the intention to adopt FinTech services. In contrast with previous empirical research, this study seeks to address the abovementioned gaps by shedding light on the determinants of FinTech adoption among digital natives and digital immigrants by aligning with the dimensions of the DOI theory (i.e., relative advantages, complexity, and computability) by extending with the two external variables (i.e., trust and data security). Despite the widespread presence of FinTech services worldwide, there is a notable lack of empirical studies examining the relationship between the adoption of FinTech services and trust and data security. Notably, Jena (2025) stated that "issues such as insufficient digital literacy, lack of faith in digital platforms, and inadequate infrastructure frequently obstruct the implementation of these technologies" (p.6). The above-mentioned gap in the literature leaves numerous mediating relationships between actual DOI theory dimensions and intention to adopt FinTech services unexplored. By incorporating trust and data security as mediating variables, the extended DOI theory provides a robust theoretical foundation for the adoption of FinTech services among both digital immigrants and digital natives. Therefore, a lack of security measures and trust among digital natives and immigrants can rigorously damage users' intentions, ultimately deterring their adoption of FinTech services.

Therefore, the present study contributes to the literature by adding new knowledge and establishing actionable insights for the financial services industry, public and private financial policy-making bodies, and stakeholders across academia. Ultimately, by unravelling the complexities of FinTech adoption, this study advances our knowledge and promotes inclusive and sustainable FinTech ecosystems.

This paper is structured into five sections. The theoretical underpinnings and hypotheses development are outlined in Section 2. The third section demonstrates the research method, demographic characteristics, and reliability and validity of the measurement of items. The fourth and fifth sections provide the hypotheses testing, discussion, conclusion, limitations, and future research agenda.

2. Literature Review and Theoretical Foundation

2.1 A Comprehensive Review of FinTech Services in Pakistan

The first FinTech service in Pakistan, Easypaisa, was introduced in 2009 by Telenor, a telecom company. Initially, the company offered only money transfer and collection services (Mustafa, 2015). Currently, the company provides a wide range of services, including cash deposits and withdrawals, transfers, online shopping, utility bill payments, and insurance plans (Mithe, 2015). However, FinTech companies have revolutionized

Pakistan's digital financial landscape, offering innovative and secure solutions that enhance the consumers' accessibility, affordability, and efficiency of a comprehensive range of financial services (Ali et al., 2021). In Pakistan, several FinTech companies, including NayaPay, SadaPay, Mobilink Microfinance Bank, and TAG, offer virtual bank account services that enable users to transfer money and receive bills digitally. However, due to the trust and lack of technological awareness among users, over 80% of financial services are still performed using traditional banking systems (Kapronasia, 2024), a notably low percentage compared to other developing countries. According to a survey by Forbes, only 23% of the total population in Pakistan possesses basic financial literacy (Forbes, 2023). Underscoring the financial literacy scale in Pakistan, a World Bank report (2016) identified that 100 million adults in Pakistan are still unaware of regulated digital financial services, representing 5% of the global unbanked population. Government agencies like the SBP and "The Securities and Exchange Commission of Pakistan" (SECP) have been instrumental in fostering a conducive regulatory environment for financial companies, which has contributed to a surge in digital payments, with transactions growing over 30% annually and mobile wallet users exceeding 50 million in a population of 245 million (Karandaaz, 2021). In addition, a recent report by Karandaaz stated that the market share of the FinTech industry in Pakistan is estimated to reach USD36 billion by the end of 2024, which will generate four million new jobs and contribute 7% to the country's overall GDP, stepping towards the achievement of SDG8 and SDG 9 (Karandaaz, 2021). Additionally, Digitt's report forecasts that by the end of 2024, more than 45% of Pakistan's population will have adopted digital banking services (Digitt, 2024). More recently, Daraz's 'DigiPay' introduced the 'Buy Now, Pay Later' (BNPL) interest-free instalment model, which has rapidly become popular among Pakistani consumers. Additionally, SBP facilitates local FinTech companies in collaborating with international digital payment gateways, such as PayPal, Payoneer, and Wise, which have experienced a 47% increase in digital transactions (Digitt, 2024).

2.2 FinTech Services

FinTech is defined as the digitalization or technology-enabled process of finance solutions. According to Laksamana et al. (2023), FinTech has undergone three distinct stages of evolution, transforming the financial services industry. In the first stage (1866-1967), telegraphs and transatlantic cables facilitated the rapid transfer of financial and payment information. In the second phase (1967-2008), the utilization of Information Technology (IT) enabled conventional financial institutions to expand their services and products through online banking, Automated Teller Machines (ATMs), electronic payments, and clearing systems. In the third stage (2008-present), advanced technology has enabled new entrants to provide direct, non-intermediated financial services to customers, intensifying competition for financial institutions. Notably, several prior empirical studies have highlighted that FinTech is a fast-growing industry offering a wide range of applications, including marketplace financing, mobile payment systems, and cryptocurrencies (Hu et al., 2019; Chaudhry et al., 2022; Qi et al., 2024). Relatively advanced applications of FinTech

services are successfully building trust among users of all ages through reliable services, apparent communication, and adherence to data protection regulations (Koloseni and Mandari, 2024). Such factors underpin solid trust among FinTech service users, addressing concerns about potential cyber threats and data breaches. Accordingly, Stewart and Jürjens (2018) highlight that FinTech providers must implement robust security measures, such as encryption and regular audits, to reassure users and mitigate risks. Moreover, relative advantages, such as cost-effectiveness, convenience, and enhanced functionality, make FinTech more appealing to users in terms of trust (Aloulou et al., 2024). Therefore, the findings on FinTech services from recent empirical studies are presented in Table 1.

Table 1: Recent Empirical Studies on Fintech

| Author (s)/Study | Objectives, Method, and Region | Findings |
|----------------------------|--|---|
| Stewart and Jürjens (2018) | Using the Technology Acceptance Model, an empirical analysis technique was employed to examine the influence of trust, data security, and user interface design on the adoption of FinTech in Germany. | Findings reveal that customer trust, data security, and user interface design have a significant impact on FinTech adoption, despite the low adoption rate among mobile users. |
| Hu et al. (2019) | An extended technology acceptance model was employed to investigate the impact of user innovativeness, government support, brand image, and perceived risk on trust and subsequent user attitudes toward adopting Fintech services in China. | The findings highlight the critical role of trust in shaping users' attitudes toward adopting Fintech services, underscoring trust as a key determinant in the extended TAM. Notably, the study reveals that perceived ease of use and perceived risk do not significantly influence attitudes toward adoption, challenging conventional assumptions in the original TAM. |
| Zhang et al. (2023) | The study aims to empirically examine the impact of perceived ease of use, data security, and perceived usefulness on the | Perceived ease of use, data security, usefulness, and trust drive FinTech adoption, while FinTech promotion has a |

| Author (s)/Study | Objectives, Method, and Region | Findings |
|----------------------------|---|--|
| | adoption intention of Fintech services through customer trust and Fintech promotion in commercial banks of Pakistan using the TAM | minimal impact on trust and usefulness. |
| Saadah and Setiawan (2024) | A convenience sampling technique was employed in this quantitative research to explore the factors influencing small and medium-sized enterprises' trust and intention to continue using FinTech in Indonesia. | Convenience and economic benefits significantly influence perceived benefits. Additionally, the perceived benefits have a significant positive impact, while the perceived risks indicate a significant negative impact on trust. Likewise, the individuals' intention to continue using fintech is revealed by trust. |
| Qi et al. (2024) | Employed a quantitative research approach to examine the impact of the extended post-acceptance model factors, such as financial capability, perceived security, usefulness, fintech proficiency, and investment risk tolerance, on FinTech use in the USA. | Financial capability, technological proficiency, investment risk tolerance, and usefulness drive FinTech adoption, with financial literacy boosting safety and trust. |
| Aloulou et al. (2024) | Quantitative research was employed to explore consumers' favourable attitudes and adoption of FinTech technology, as well as its impact on the performance of the banking sector in the UAE. | The results highlight that the adoption of FinTech substantially influenced the banking industry's performance during the COVID-19 pandemic. |

2.3 Diffusion of Innovation (DOI) Theory

The DOI theory explains how exciting services and/or technologies are distributed within a social system (Koloseni and Mandari, 2024). This theory involves key variables such as relative advantages, complexity, and compatibility, which significantly predetermine individuals' adoption behavior towards new services and/or technologies (MacVaugh and Schiavone, 2010; Ali et al., 2019). However, DOI theory emphasizes the significance of specific technology adoption practices (Sobti, 2019). However, prior studies have elaborated on perceived compatibility as the most significant variable in DOI theory, defined as the degree to which consumers rely on new technologies (Koloseni and Mandari, 2024), particularly when the technology is unpredictable in relation to existing user needs, experiences, and values (Saleem et al., 2025). The DOI theory could be extended using several technology-specific constructs (i.e., consumer awareness and religiosity) that play essential roles in developing a strong adoption intention among individuals (Ali et al., 2019). Therefore, the present study extends the DOI theory by incorporating trust and data security variables, which have not been previously applied to investigate the intention to adopt FinTech services among digital immigrants and digital natives. Trust is crucial in shaping individuals' willingness to embrace new and existing services or technologies, influencing their perceptions of reliability (Saadah and Setiawan, 2024). On the other hand, data security proved essential in safeguarding consumers' personal information while using new and/or existing services or technologies (Carlos Roca et al., 2009). Trust and data security of extended DOI theory account for consumers' sensitivity to cybersecurity threats while using FinTech services. An empirical study by Sun et al. (2024) highlighted how new and existing technologies contribute to building trustworthiness among individuals, encouraging them to adopt FinTech services to meet their financial needs. Therefore, based on the above critical discussions and arguments, this study formulated a conceptual framework, presented in Figure 1, to define the intention of digital immigrants and digital natives to adopt FinTech services using the extended DOI theory.

3. Hypothesis Development

3.1 Relative Advantage

“A relative advantage is the level to which people assume that the new innovation is better than the old traditional one” (Al-Rahmi et al., 2019, p. 26799). Numerous empirical studies investigated the impact of relative advantages on trust and data security. For example, Koloseni and Mandari (2024) found that relative advantages have a significant and positive impact on trust and intention to adopt digital payment services. This finding aligns with a previous study by Wong et al. (2024), which found that the relative advantages significantly influence consumers' trust in online shopping. Another survey by Aloulou et al. (2024) examined the relative advantages as an essential factor of the DOI theory, which supports predicting users' trust in FinTech services. This means that individuals who believe FinTech services may trustworthy and secure are more likely to adopt them.

Therefore, limited studies have explored the direct link between relative advantages, trust, and data security concerns of digital immigrants and digital natives. To bridge the aforementioned research gap, this study formulated the following hypotheses.

- H1: Relative advantage has a significant positive impact on trust.
- H2: Relative advantage has a significant positive impact on data security.

3.2 Complexity

Complexity defines the individual's perceived effort needed to learn and use the technology (Tan and Teo, 2000). If efforts to use technology are excessively challenging, it may have an insignificant impact on building user inattention (Lopez and Tucker, 2017). Existing empirical studies exhibited that the complexity of using FinTech services may pose hurdles to establishing solid trust and data security among users. For instance, a recent empirical study by Qi et al. (2024) suggested that the complexity of FinTech services has an insignificant impact on users' trust and data security concerns. Similarly, Chaudhry et al. (2022) emphasized that the high complexity of new and/or existing technologies may make users feel less confident in their ability to perform personal tasks, ultimately maximizing risk factors. In this view, Laksamana et al. (2023) found that user-friendly FinTech applications have a significant impact on users' trust and perceptions of data security. Minimizing complexity in the use of FinTech applications may enhance users' perceptions of trust and data security. Users are more likely to adopt FinTech services if they trust the application and believe their personal and financial data is secure (Stewart and Jürjens, 2018). Therefore, to bridge this empirical gap, we formulated the following hypotheses.

- H3: Complexity has a significant positive impact on trust.
- H4: Complexity has a significant positive impact on data security.

3.3 Compatibility

“Perceived compatibility refers to the degree to which an innovation is perceived as consistent with the values, needs, and past experiences of potential users” (Rabaa'I, 2023, p.13). Individuals who perceive a high level of compatibility are more likely to trust digital payment applications and feel that their personal and financial data is secure while performing financial transactions using FinTech services (Chan et al., 2022). For example, Nguyen et al. (2022) examined the users' behavioral intention to adopt online payment services in Vietnam and confirmed that trust and data security risks are the fundamental determinants of consumers' intention to adopt FinTech services. Accordingly, another empirical study by Carlos Roca et al., (2009) found that effort expectancy mitigates perceived risk and trust in Australia, Singh et al. (2020) noted that consumers who perceive online banking as compatible with their financial values and needs are likely to trust and perceive it as a secure financial service, ultimately impacting their adoption intention in India. Thus, this study formulated the following hypotheses to bridge the above-mentioned empirical gaps.

- H5: Compatibility has a significant positive impact on trust.
- H6: Compatibility has a significant positive impact on data security.

3.4 Trust

Trust is crucial for users to adopt new or exciting technology (Widyanto et al., 2022). Trust is a psychological state of witnessing users' faith in a system (Aldboush and Ferdous, 2023). Empirically, several exciting studies investigated and concluded that consumers' trust in adopting FinTech services. For example, a survey by Saadah and Setiawan (2024) found that trust has a positive effect on users' intentions to continue using FinTech services in Indonesia. Accordingly, another study by Stewart and Jürjens (2018) revealed that user trust is crucial in the adoption of FinTech in Germany. Additionally, prior studies have emphasized that trust mediates the relationship between perceived compatibility and the intention to adopt FinTech services. The abovementioned studies outlined that building and maintaining trust through transparent communication, robust security measures, and user-friendly designs are vital for successfully adopting and retaining FinTech services. Additionally, prior studies have emphasized that trust mediates the relationship between perceived compatibility and the intention to adopt FinTech services. For example, a survey on mobile financial services in Bangladesh confirmed that trust mediates the relationship between perceived usefulness, ease of use, and the intention to adopt mobile payment services (Himel et al., 2021). Overall, the findings suggest that trust plays a critical role in directly influencing and mediating the factors that drive the adoption of FinTech services. Therefore, this study formulated the following direct and mediating hypotheses.

- H7: Trust has a significant positive impact on the intention to adopt Fintech.
- H9: Trust mediates the relationship between relative advantage and intention to adopt Fintech.
- H10: Trust mediates the relationship between compatibility and intention to adopt Fintech.
- H11: Trust mediates the relationship between complexity and intention to adopt Fintech.

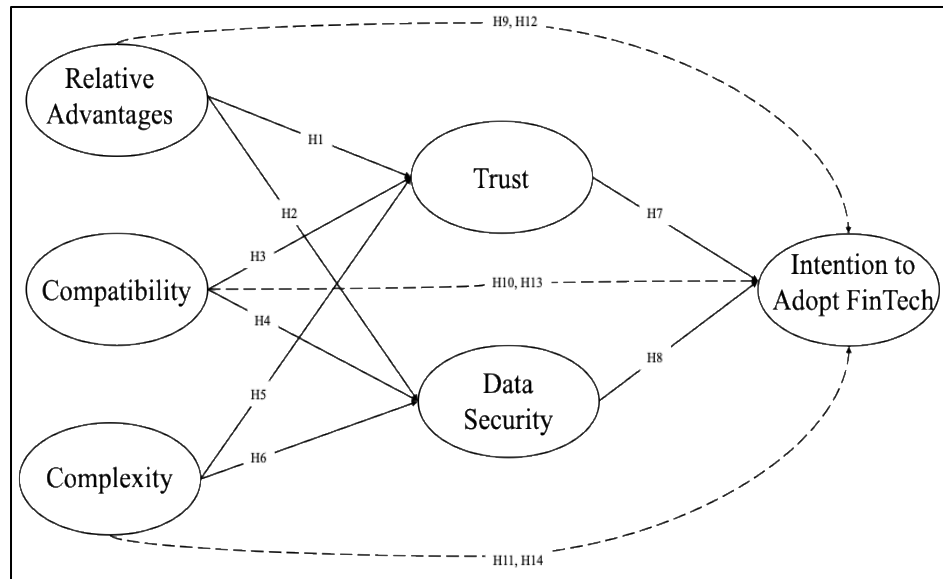
3.5 Data Security

“Data security is the insurance of data and its crucial assets, e.g., the equipment used for data gathering, data storage, and the transmission process” (Stewart and Jürjens, 2018, p.3). Data security encompasses (i.e., accessibility, privacy, and confidentiality) the protection of personal data (Hussain et al., 2021). However, the impact of data security on individuals' intention to adopt has been widely studied. For example, Ali et al. (2021) emphasized that data security is a critical determinant that predicts individuals' intention to adopt FinTech services. Consumers are likely to adopt FinTech services if they are confident that their

personal and financial data are secure (Das and Das, 2023). Similarly, another study by Nayak et al. (2019) demonstrated that perceived data security influences consumers' positive intentions while adopting FinTech services. However, in the present study, we also investigated the mediating role of data security; thus, several previous studies have confirmed the mediating role of data security in the adoption of FinTech services. Therefore, we formulated the following hypotheses to bridge the abovementioned empirical gaps.

- H8: Data security has a significant positive impact on the intention to adopt Fintech.
- H12: Data security mediates the relationship between relative advantage and intention to adopt Fintech.
- H13: Data security mediates the relationship between compatibility and intention to adopt Fintech.
- H14: Data security mediates the relationship between complexity and intention to adopt Fintech.

Conceptual framework of the study is presented in Figure 1.



Note: the solid black arrows (→) present direct hypotheses (H1-H8), and dotted arrows (-->) present mediating hypotheses (H9-H14).

Figure 1: Conceptual Framework

4. Method

A convenience sampling technique was employed to collect data from 160 digital immigrants and 193 digital natives, resulting in a total of 353 responses. The older group, aged 45 and above, represents digital immigrants (Hoffmann et al., 2014). These individuals, likely accustomed to traditional financial methods, may have transitioned to digital ones later in life. The younger group, aged below 45, likely represents digital natives (Hoffmann et al., 2014). The decision to focus on respondents (digital immigrants and digital natives) from Pakistan was deliberate, aiming to provide insights into FinTech adoption intentions within a specific cultural and socio-economic context. By narrowing the scope to a particular geographic region, the study could capture trends unique to Pakistan's FinTech ecosystem, contributing to a more comprehensive understanding of the subject matter (Zhang et al., 2023).

However, “structural equation modelling” (SEM), a well-known data analysis technique, was employed through SmartPLS to test and validate the direct and indirect hypotheses proposed in the current study. The first reason for utilizing SEM approach to validate the theories, hence the backbone of this study is built on the DOI theory, where this study intends to extend the theory by introducing new variables (data security and trust). Secondly, the present study has six formative and mediating variables, which add complexity to the proposed model. Consequently, “PLS-SEM” is the best fit to select when validating the formative constructs in a complex model. This exhaustive approach to data analysis enables a holistic investigation of the complex underlying FinTech adoption among digital natives and digital immigrants, aligning with the present study's objectives. Notably, a multigroup analysis was performed to compare the responses of two distinct demographic groups (i.e., digital immigrants and digital natives). In addition, to ensure the reliability and validity of the data collected, a 5-point Likert scale was utilized to measure participants' agreement with various items related to FinTech adoption. In the present study, we used a range of measurement items adapted from previous studies, as outlined in Table 2.

4. Results

5.1 Demographic Characteristics

The demographic characteristics of the 353 participants reveal a diverse group with a notable distribution across various categories, as shown in Table 2. The sample is predominantly male (59%), with females comprising 41%. Most participants were digital natives (55%), while the rest were digital immigrants (45%). The age distribution shows a relatively balanced spread, with 32% of participants below 25 years, another 32% between 31 and 40 years, 25% aged 26 to 30 years, and a smaller portion (11%) above 40 years. In terms of education, the majority hold a bachelor's degree (73%), followed by those with a high school diploma (16%), a master's degree (8%), and a PhD (3%). Experience-wise, a

Behavioral Intention to Adopt FinTech Services

significant portion of participants have less than 3 years of experience (35%), 29% have 3 to 5 years, 10% have 6 to 10 years, and 26% possess over 10 years of experience.

Table 2: Demographic Profile of Participants (n=353)

| Items | Frequency | Percent |
|---|-----------|---------|
| Gender | | |
| Male | 209 | 59 |
| Female | 144 | 41 |
| Digital Affinity (Generation Classification) | | |
| Digital Native (grew up with digital technology) | 160 | 45 |
| Digital Immigrants (adopted digital technology later in life) | 193 | 55 |
| Age | | |
| Below 25 years | 112 | 32 |
| 26 to 30 | 89 | 25 |
| 31 to 40 | 113 | 32 |
| Above 40 years | 39 | 11 |
| Education Level | | |
| High School Diploma | 58 | 16 |
| Bachelor | 256 | 73 |
| Master | 30 | 8 |
| PhD | 9 | 3 |
| Have you used FinTech services before? | | |
| Yes, frequently | 145 | 41 |
| Yes, occasionally | 98 | 28 |
| No, but I am familiar with them | 110 | 30 |
| How often do you use your smartphone for online transactions? | | |
| Daily | 180 | 50 |
| Weekly | 90 | 25 |
| Monthly | 50 | 14 |
| Rarely | 33 | 9 |
| What type of internet access do you primarily use? | | |
| Mobile data | 175 | 48 |
| Home broadband/Wi-Fi | 80 | 22 |
| Public Wi-Fi | 35 | 10 |
| Limited access | 12 | 3 |
| Where do you currently live? | | |
| Rural area | 45 | 13 |

| | | |
|---|-----|----|
| Suburban area | 78 | 22 |
| Urban area | 230 | 65 |
| How would you rate your knowledge of financial services and technology? | | |
| Beginner | 85 | 24 |
| Intermediate | 160 | 45 |
| Advanced | 108 | 31 |

5.2 Reliability and Validity of Measures

Table 3 outlines the reliability and validity metrics for various constructs related to the intention to adopt FinTech services, including relative advantage, compatibility, complexity, trust, data security, and intention to adopt FinTech services. All constructs' Item loadings were reported above the 0.70 threshold, and Cronbach's alpha (α) values exceeded the acceptable threshold of 0.7 (Saleem et al., 2023; Chin et al., 2024). In addition, composite reliability assesses the reliability of latent constructs. Additionally, the average variance extracted (AVE), which measures the amount of variance captured by the construct relative to measurement error, exceeds the desirable threshold of 0.5 for all constructs (Saleem et al., 2023). These statistical metrics collectively demonstrate that the variables are valid and reliable in the context of the present study, providing a robust framework for assessing key factors influencing the intention to adopt FinTech services among digital natives and digital immigrants in Pakistan.

Table 3: Measurement Model

| Constructs | Loadings | Source |
|---|----------|--------------------|
| Relative Advantage $\alpha=0.749$ CR=0.857 AVE=0.668 | | Tan and Teo (2000) |
| RA1 | 0.851 | |
| RA2 | 0.862 | |
| RA3 | 0.732 | |
| Compatibility $\alpha=0.785$ CR=0.715 AVE=0.552 | | Tan and Teo (2000) |
| CMP1 | 0.974 | |
| CMP2 | 0.718 | |
| CMP3 | 0.746 | |
| Complexity $\alpha=0.789$ | | Tan and Teo (2000) |

Behavioral Intention to Adopt FinTech Services

| Constructs | Loadings | Source |
|--|-----------------|--------------------------|
| CR=0.784 AVE=0.550 | | |
| COP1 | 0.774 | |
| COP2 | 0.757 | |
| COP3 | 0.787 | |
| Trust α =0.733 CR=0.779 AVE=0.579 | | Hu et al. (2019) |
| TRT1 | 0.759 | |
| TRT2 | 0.713 | |
| TRT3 | 0.823 | |
| TRT4 | 0.815 | |
| Data Security α =0.862 CR=0.885 AVE=0.558 | | Stewart & Jürjens (2018) |
| DS01 | 0.705 | |
| DS02 | 0.792 | |
| DS03 | 0.751 | |
| DS04 | 0.786 | |
| DS05 | 0.747 | |
| DS06 | 0.742 | |
| DS07 | 0.751 | |
| DS08 | 0.724 | |
| DS09 | 0.768 | |
| DS10 | 0.765 | |
| DS11 | 0.726 | |
| DS12 | 0.793 | |
| DS13 | 0.738 | |
| DS14 | 0.765 | |
| Intention to adopt Fintech α =0.839 CR=0.898 AVE=0.746 | | Hu et al. (2019) |
| INT1 | 0.925 | |
| INT2 | 0.809 | |
| INT3 | 0.853 | |

Additionally, Table 4 presents the discriminant validity (Fornell-Larcker criterion) of the variables, which validates whether a variable is strongly correlated with its indicators than other variables (Ab Hamid et al., 2017). Thus, the diagonal values of the discriminant validity present the square root of the AVE for each variable, while the off-diagonal elements represent the association between variables (Henseler et al., 2015). The results indicate that each construct meets the criterion of discriminant validity.

Table 4: Discriminant Validity (Fornell-Larcker Criterion)

| Constructs | 1 | 2 | 3 | 4 | 5 | 6 |
|--------------------------------|-------|-------|-------|-------|-------|-------|
| Compatibility (1) | 0.693 | | | | | |
| Complexity (2) | 0.498 | 0.741 | | | | |
| Data Security (3) | 0.582 | 0.608 | 0.598 | | | |
| Intention to adopt Fintech (4) | 0.440 | 0.538 | 0.426 | 0.864 | | |
| Relative Advantage (5) | 0.510 | 0.548 | 0.446 | 0.612 | 0.817 | |
| Trust (6) | 0.431 | 0.530 | 0.524 | 0.750 | 0.493 | 0.692 |

5.3 Hypotheses Testing

The path coefficients in Table 5 and Figure 2 illustrate the relationships among various constructs and the intention to adopt Fintech across different groups (full sample, digital immigrants, and digital natives). The results show that relative advantage significantly influences trust with coefficients of (0.492) for the full sample, (0.427) for digital immigrants, and (0.574) for digital natives, supporting H1. Similarly, relative advantage positively affects data security with coefficients of (0.283), (0.255), and (0.316), respectively, supporting H2. Complexity is another significant factor, positively impacting trust (0.351), (0.332), and (0.392), as well as data security (0.556), (0.521), and (0.565), thereby supporting H3 and H4. The influence of compatibility on trust (0.312), (0.237), and (0.339) and data security (0.304), (0.281), and (0.368) is also confirmed, supporting H5 and H6. Trust is a crucial determinant of the intention to adopt FinTech services, with strong coefficients of (0.486), (0.398), and (0.512), supporting H7. The indirect effects of relative advantage, compatibility, and complexity on the intention to adopt Fintech through trust are also significant, with path coefficients supporting H8 (0.459, 0.442, and 0.522), H9 (0.357, 0.332, and 0.462), and H10 (0.398, 0.356, and 0.411). Data security also significantly influences the intention to adopt Fintech, with coefficients of 0.522, 0.469, and 0.575, supporting H11. Additionally, the indirect effects of relative advantage, compatibility, and complexity on the intention to adopt Fintech through data security are confirmed with path coefficients supporting H12 (0.393, 0.362, and 0.414), H13 (0.293, 0.258, and 0.306), and H14 (0.411, 0.337, and 0.449). All proposed hypotheses (H1 to H14) are supported across the full sample, as well as among digital immigrants and digital

natives. The above mentioned finding highlights the importance of addressing data security issues to encourage FinTech adoption, particularly among digital natives.

Table 5: Path Coefficients (Full Sample)

| Paths | β (Full Sample) | β (Digital Immigrants Sample) | β (Digital Natives Sample) | Results |
|--|-----------------------------|--|---|------------------|
| Relative Advantage → Trust | 0.492*** | 0.427** | 0.574*** | H1 is supported |
| Relative Advantage → Data Security | 0.283** | 0.255*** | 0.316*** | H2 is supported |
| Complexity → Trust | 0.351*** | 0.332*** | 0.392** | H3 is supported |
| Complexity → Data Security | 0.556*** | 0.521* | 0.565*** | H4 is supported |
| Compatibility → Trust | 0.312*** | 0.237*** | 0.339* | H5 is supported |
| Compatibility → Data Security | 0.304* | 0.281** | 0.368*** | H6 is supported |
| Trust → Intention to adopt Fintech | 0.486*** | 0.398*** | 0.512*** | H7 is supported |
| Relative Advantage → Trust → Intention to Adopt Fintech | 0.459** | 0.442** | 0.522** | H8 is supported |
| Compatibility → Trust → Intention to adopt Fintech | 0.357*** | 0.332*** | 0.462*** | H9 is supported |
| Complexity → Trust → Intention to adopt Fintech | 0.398* | 0.356*** | 0.411*** | H10 is supported |
| Data Security → Intention to adopt Fintech | 0.522*** | 0.469** | 0.575** | H11 is supported |
| Relative Advantage → Data Security, Intention to adopt Fintech | 0.393** | 0.362*** | 0.414*** | H12 is supported |
| Compatibility → Data Security → Intention to adopt Fintech | 0.293*** | 0.258* | 0.306** | H13 is supported |
| Complexity → Data Security → Intention to adopt Fintech | 0.411*** | 0.337*** | 0.449*** | H14 is supported |

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

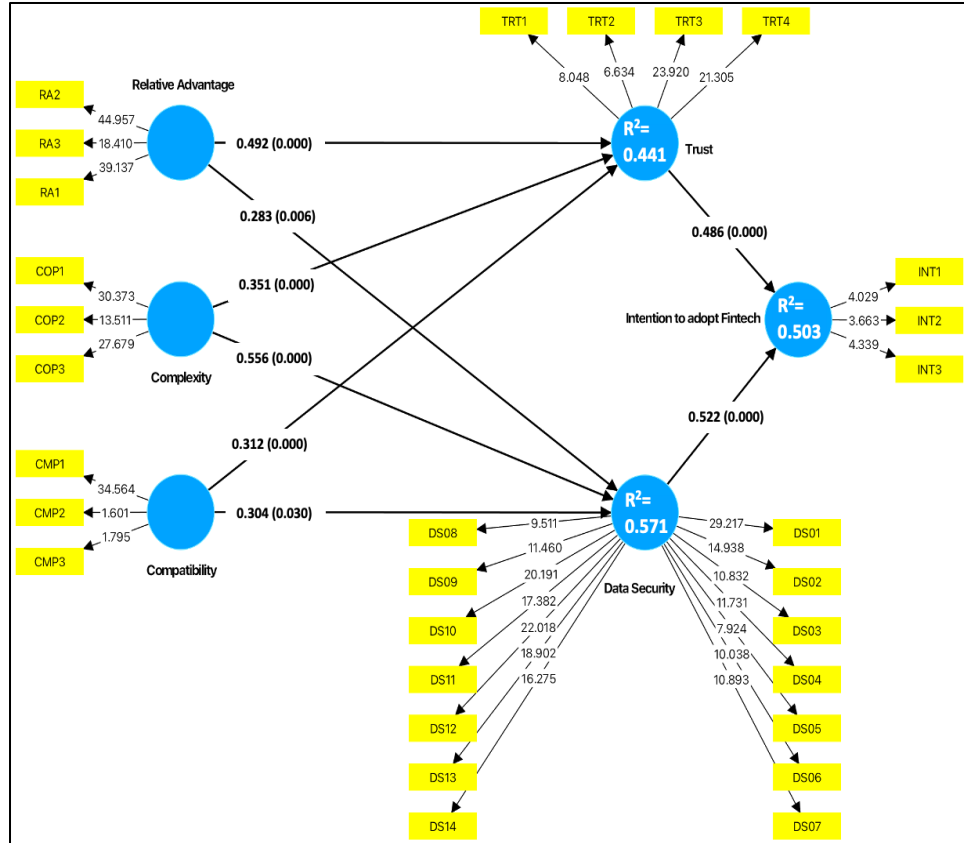


Figure 2. Structural Model (Full Sample)

5.4 Multigroup Analysis

The multigroup analysis comparing digital immigrants and digital natives reveals intriguing insights into their perceptions regarding the relationships among key constructs and the intention to adopt FinTech services, as shown in Table 6 and Figures 3 and 4. While H1, H4, H5, and H6 suggest that no significant differences exist between digital immigrants and digital natives in their perceptions of the relationships between relative advantage, compatibility, complexity, trust, and data security, respectively, are upheld. This implies a consistent perception regarding these relationships across both groups. However, significant differences are observed when discussing H2, H3, and H7. While H2 indicates a significant difference between digital immigrants and digital natives in their perceptions of the relationship between relative advantage and data security, H3 suggests

varying perceptions regarding the compatibility-trust dynamic. H7 highlights that digital natives may be more strongly influenced by trust in their decisions to adopt FinTech compared to digital immigrants.

Moreover, a significant difference was outlined in the relationship between data security and the intention to adopt FinTech services (H11), indicating that digital natives may perceive data security concerns as more influential in their FinTech adoption decisions compared to digital immigrants. Overall, while both digital natives and digital immigrants share commonalities in their perceptions of certain relationships, such as those between relative advantage, compatibility, complexity, trust, and data security, revealed differences emerge, particularly concerning the influence of trust and data security on the intention to adopt FinTech services. These findings suggest considering demographic differences when designing strategies to encourage FinTech adoption among diverse user groups.

Table 6: Multigroup Analysis

| Paths | Difference (Digital Natives - Digital Immigrants) | 1-tailed (Digital Natives vs Digital Immigrants) p-value | 2-tailed (Digital Natives vs Digital Immigrants) p-value | Results |
|--|---|--|--|------------------|
| Relative Advantage → Trust | 0.147 | 0.033 | 0.066 | H1 no difference |
| Relative Advantage → Data Security | 0.061 | 0.623 | 0.003 | H2 difference |
| Compatibility → Trust | 0.060 | 0.211 | 0.001 | H3 difference |
| Compatibility → Data Security | 0.044 | 0.814 | 0.372 | H4 no difference |
| Complexity → Trust | 0.102 | 0.630 | 0.740 | H5 no difference |
| Complexity → Data Security | 0.087 | 0.293 | 0.585 | H6 no difference |
| Trust → Intention to adopt Fintech | 0.114 | 0.755 | 0.003 | H7 difference |
| Data Security → Intention to adopt Fintech | 0.080 | 0.144 | 0.000 | H11 difference |

Note: *p < 0.05; **p < 0.01; ***p < 0.001.

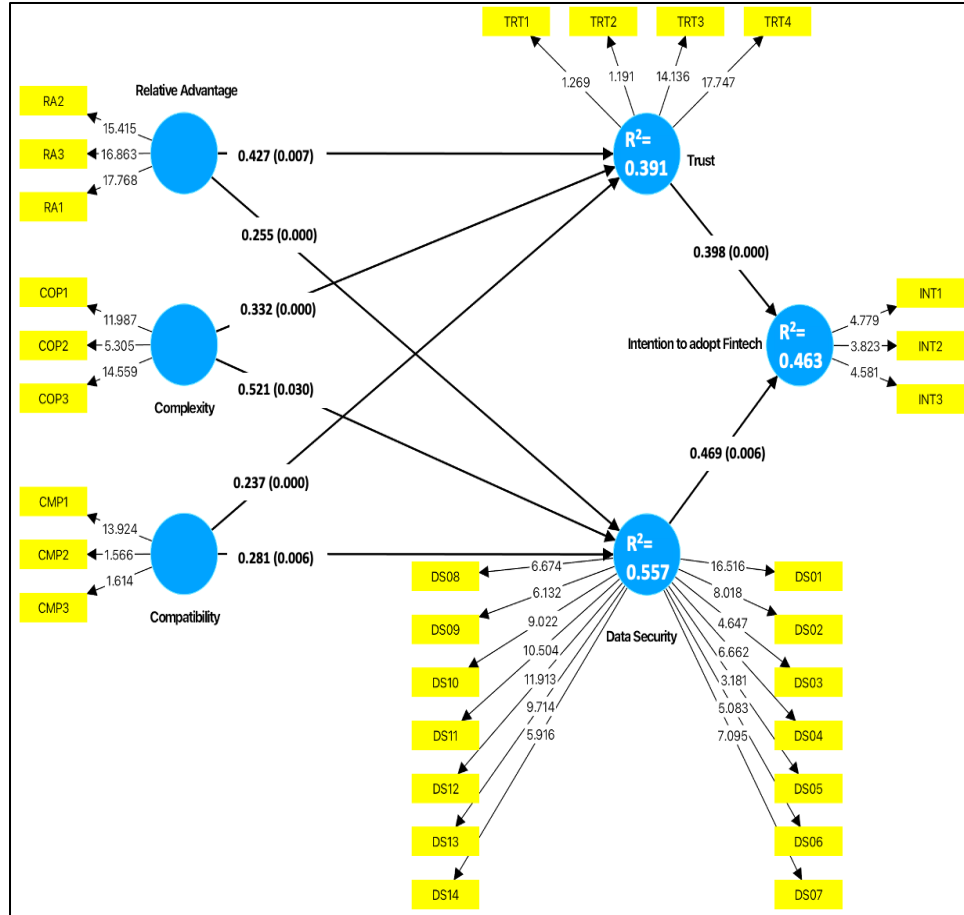


Figure 3. Structural Model (Digital Immigrants Sample)

The structural model (Figure 3) indicates that data security and trust are critical constructs influencing the intention to adopt FinTech services among digital immigrants in Pakistan. For instance, intention to adopt Fintech is significantly and positively influenced by trust (0.398) and data security (0.469). The present study also validated that trust is significantly and positively influenced by relative advantage (0.427), complexity (0.332), and compatibility (0.237), aligning with constructs from the DOI theory. Hence, findings from the present study suggest that digital immigrants tend to first believe in the credibility of FinTech platforms before acting on perceived benefits. This finding aligns with other empirical studies from developed nations, such as the UK, where perceived usefulness is

directly linked to user intention (Slade et al., 2015). On the other hand, data security is significantly and positively influenced by the relative advantages (0.255), complexity (0.521), and computability (0.281). This paradox underscores the importance of user-friendly yet secure designs for digital immigrants, who may equate complexity with safety but struggle with usability. Thus, compatibility also enhances data security, emphasizing the importance of cultural fit, financial literacy, and perceived relevance, consistent with findings from in-country studies (Beckker et al., 2020). Comparative insights reveal that while digital natives respond more readily to technological features, digital immigrants place a greater emphasis on trust and ease of use. This highlights the need for differentiated adoption strategies. Unlike countries with homogeneous digital maturity, Pakistan’s demographic and generational diversity necessitates tailored communication, training, and interface design to bridge this adoption gap.

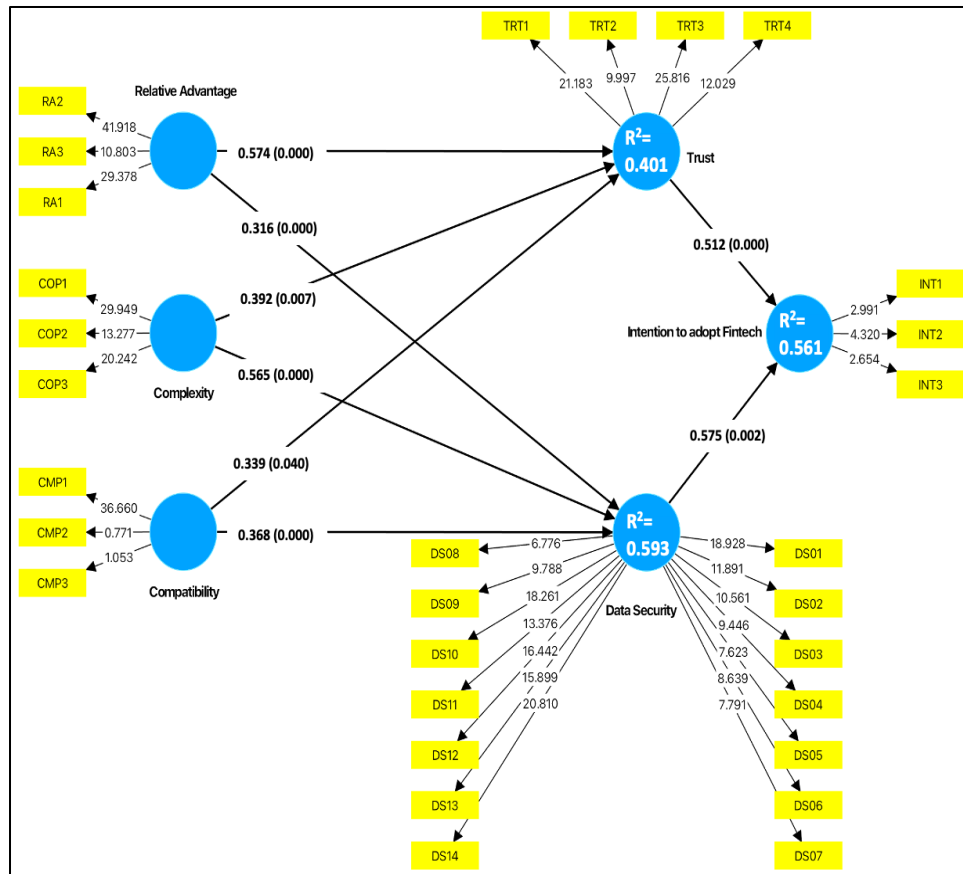


Figure 4. Structural Model (Digital Natives Sample)

The presented structural model (Figure 4) provides a robust explanation of FinTech adoption behavior among digital natives, with an R^2 of 0.561 for Intention to Adopt FinTech, indicating that over 56% of the variance in this behavior is explained by trust and data security. The model is grounded in core theories of technology adoption, including DOI theory. This analysis compares the results with those of recent studies from different regions and theoretical contexts. Trust and data security have a significant and positive influence on the intention to adopt FinTech (0.512 and 0.575), which is consistent with the DOI theory. Previously, the findings from the prior empirical study aligned with those of the present study. For instance, Roh et al. (2024) indicate that trust has a significant and positive impact on the behavioral intention to adopt Fintech in China. On the other hand, relative advantages have a significant and positive impact trust (0.574) and data security (0.316) findings from the present study supported by the previous scholarly work in Western Europe (e.g., Laukkanen, 2021) found that relative advantage plays a lesser role due to saturation and familiarity with digital financial services. Furthermore, complexity has a significant and positive impact on trust (0.392) and data security (0.565). Hence, complexity significantly contributes to the perception of data security among digital natives regarding FinTech services. Users may associate sophisticated or multi-step processes with higher protection, a notion echoed in Aji et al. (2021), who studied Islamic FinTech in Indonesia. However, this perception can deter digital immigrants, underlining the need for streamlined yet secure user interfaces. Compatibility has a significant and positive impact on trust (0.339) and data security (0.368), aligning with the findings of Stewart and Jürjens (2018), who noted that perceived difficulty in using FinTech systems discourages adoption. This supports the DOI theoretical principle that innovations must align with users' existing values and experiences.

6. Discussion and Conclusion

This paper contributes to the body of knowledge by extending the DOI theory to incorporate users' trust and data security constructs. Prior studies believe that the additional constructs (i.e., trust and data security) support identifying the antecedents of digital immigrants' and digital natives' intention to adopt FinTech services. Thus, developing trust and data security while using FinTech services is still challenging for financial companies (Zhang et al., 2023), as the use of FinTech services is still questionable in Pakistan. Due to the lack of potential information and awareness on FinTech security measures, people in Pakistan believe that the conventional online and offline banking system is more trustworthy and secure (Ali et al., 2021), which raises the urgency and importance of the present paper.

However, based on the findings of the present study, relative advantage, compatibility, and complexity play significant roles in shaping perceptions of trust and data security, which, in turn, influence the intention of digital immigrants and digital natives to adopt FinTech services. The findings are supported by exciting studies that indicate the importance of relative advantages, compatibility with existing systems, and the complexity of using new

services (Widyanto et al., 2022; Shoaib and Saleem, 2023). Moreover, the present study's findings suggested that digital natives and digital immigrants share similar perceptions regarding the relationships between relative advantage, compatibility, complexity, trust, and data security. Digital natives tend to exhibit higher associations between trust and the intention to adopt Fintech than digital immigrants in Pakistan. This suggests that trust may play a more crucial role in Fintech adoption decisions among digital natives, possibly due to their higher familiarity and comfort with digital technologies. This aligns with the findings of Saadah and Setiawan (2024) and Setiawan et al. (2024).

Furthermore, the present study reveals significant differences between digital immigrants and digital natives in their intention of certain relationships. For example, digital natives demonstrate a higher level of influence of relative advantage on data security perceptions, implying a discriminating acknowledgement of the importance of data security features in FinTech services. Additionally, digital natives perceive data security concerns as more influential in their decisions to adopt FinTech than digital immigrants.

6.1 Theoretical and Practical Implications

Building on the extant literature to investigate the predictors of intention to adopt FinTech services among digital natives and digital immigrants, we expanded the current model of DOI theory by incorporating trust and data security, which recent empirical studies have explored less. Ali et al. (2019) extended the original DOI theory by incorporating consumer awareness and religiosity to understand better consumers' intention to adopt Takaful banking services. Still, the authors failed to address the critical issues of trust and data security when adopting FinTech services. Prior studies have attempted to partially address the trust and security concerns to predict users' intention to adopt FinTech services (Hussain et al., 2021; Aldboush and Ferdous, 2023). However, a lack of empirical studies has shed light on the relationship between the constructs mentioned above when comparing the intention to adopt FinTech services of digital natives and digital immigrants.

Therefore, we highlighted a notable gap in body knowledge in the present study, particularly in the context of FinTech services in Pakistan, as trust and data security issues have been raised (Zhang et al., 2023). Therefore, Saleem (2021) mentioned that FinTech services are still in the early stages of development in Pakistan. Thus, due to its early-stage implications, building users' trust and ensuring data security in FinTech services is crucial for most financial companies to capture the maximum market share. By extending the DOI theory with two additional constructs (i.e., trust and data security), the current study facilitates a potential understanding of the distinct effects of digital natives' and digital immigrants' intentions to adopt FinTech services.

Noticeably, the present study also addressed specific practical implications. First, FinTech service-providing companies should consider all latent constructs, as they can understand the direct and indirect impact on the intention to adopt FinTech services among both digital immigrants and digital natives. However, we found that all constructs of extended DOI theory significantly impacted the intention to adopt FinTech services. Practically, the

findings from this study offer actionable insights for FinTech startup companies seeking to enhance user engagement and refine their market penetration strategies. By adapting marketing and communication efforts to cater to the distinct financial preferences of digital immigrants and digital natives, FinTech companies can effectively promote their offerings and attract a broader user base. FinTech service providers must be able to introduce multiple channels to connect and educate their broader user base by utilizing key opinion leaders, such as social media celebrities, influencers, and reputable websites, to address the trust and data security relevant factors.

Concerned stakeholders of the FinTech service companies' ecosystem in Pakistan should also ensure that the "supporting infrastructure" is broadly available, including reasonable smart devices (such as tablets and mobile phones), stable internet coverage and bandwidth, and online and/or offline merchants that accept the payment methods. Therefore, the State Bank of Pakistan and FinTech service companies in Pakistan should also design user-friendly financial technology (FinTech) applications. This study found that the complexity of services has a positive effect on users' intention to adopt FinTech services. Specifically, trust and data security were identified as significant mediators of the relationship between complexity and users' intention to adopt FinTech services. This confirms the importance of trust-based services and data security while using FinTech services. As emphasized earlier, several digital immigrants and digital natives have raised serious concerns about the issue of trust and data security when adopting FinTech services. Furthermore, the present study's findings demonstrate that the compatibility and security features of FinTech services can foster trust and alleviate concerns among potential users. Lastly, to increase the adoption rate of digital immigrants and digital natives using FinTech services, all concerned stakeholders, policymakers, and community organizations, including the SBP, should initiate strategies to ensure the security of all financial and personal data. By addressing these research implications, industry and academia can contribute to advancing knowledge in the adoption of FinTech services and developing more inclusive and accessible financial solutions for society.

6.2 Limitations and Future Research

Like every other empirical research, the current study has several notable limitations. First, although the data for the present study were gathered from Pakistan to gain a comprehensive understanding of the subject matter, some regions or provinces may be underrepresented, as most respondents still came from Islamabad and Karachi, the country's most populous cities. Thus, for the boarder understanding of the FinTech concept, the future researchers are suggested to conduct similar study in different regions of the country (i.e., Quetta and Khyber Pakhtunkhwa). Second, the results may have been skewed because most respondents in this study (digital immigrants, 45%) and (digital natives 55%) are thought to be more accustomed to using FinTech services in general. As a result, the results are primarily relevant to these two generational cohorts. Thus, the future researchers

are recommended to examine the two newest cohorts which may have distinct behavioral intentions toward FinTech services compared to those of previous generations.

Thirdly, the data were collected over a relatively short period from January 2024 to April 2024, and the researchers did not conduct long-term surveillance. Future studies on this topic might consider the following recommendations. To further understand the adoption of FinTech phenomena, future research should collect longitudinal data by evaluating the behavioral changes of digital immigrants and digital natives across specific periods. In contrast, the current study only collected data at a single point in time. Second, as digital immigrants and digital natives comprise the majority of study participants, future research can improve it by incorporating different variables such as the effort expectancy construct and cultural aspects using of technology acceptance model or social cognitive theory.

Research Funding

Authors are thankful to the Research Management Centre (RMC), Universiti Teknologi Malaysia (UTM) for allowing to conduct this research. This research was funded by Universiti Teknologi Malaysia PDRU Grant (Q.K130000.21A2.07E18).

REFERENCES

Ab Hamid, M. R., Sami, W., & Mohmad Sidek, M. H. (2017). Discriminant validity assessment: Use of Fornell & Larcker criterion versus HTMT criterion. *Journal of Physics: Conference Series*, 890(1), 21-63.

Abbas, J., Najam, H. (2024). Role of environmental decentralization, green human capital, and digital finance in firm green technological innovation for a sustainable society. *Environment, Development and Sustainability*, Published online: 27 March 2024.

Al-Rahmi, W. M., Yahaya, N., Aldraiweesh, A. A., Alamri, M. M., et al. (2019), Integrating technology acceptance model with innovation diffusion theory: An empirical investigation on students' intention to use E-learning systems. *IEEE Access*, 7, 26797-26809,

Aldboush, H. H., & Ferdous, M. (2023), Building trust in fintech: an analysis of ethical and privacy considerations in the intersection of big data, AI, and customer trust. *International Journal of Financial Studies*, 11(3), 1-18.

Ali, M., Raza, S.A., Khamis, B., Puah, C.H. and Amin, H. (2021), How perceived risk, benefit and trust determine user Fintech adoption: a new dimension for Islamic finance. *Foresight*, 23(4), 403-420.

Ali, M., Raza, S.A., Puah, C.H. and Amin, H. (2019), Consumer acceptance toward takaful in Pakistan: An application of diffusion of innovation theory. *International Journal of Emerging Markets*, 14(4), 620-638.

Aloulou, M., Grati, R., Al-Qudah, A.A. and Al-Okaily, M. (2024), Does FinTech adoption increase the diffusion rate of digital financial inclusion? A study of the banking industry sector. *Journal of Financial Reporting and Accounting*, 22(2), 289-307. .

Appiah, T. and Agblewornu, V. (2025). the interplay of perceived benefit, perceived risk, and trust in fintech adoption: insights from Sub-Saharan Africa. *Heliyon*, 11(2), e41992.

Autry Jr, A. J., & Berge, Z. (2011). Digital natives and digital immigrants: getting to know each other. *Industrial and commercial training*, 43(7), 460-466.

Ayimah, J.C., Kuada, J. and Ayimey, E.K. (2024), Digital financial service adoption decisions of semi-urban Ghanaian university students – implications for enterprise development and job creation. *African Journal of Economic and Management Studies*, 15(2), 263-278.

Beckker, K., Witte, K., & Campenhout, G. (2020). the role of national culture in financial literacy: cross-country evidence. *journal of consumer affairs*, 54(3), 912-930.

Carlos Roca, J., José García, J. and José de la Vega, J. (2009), The importance of perceived trust, security and privacy in online trading systems. *Information Management & Computer Security*, 17(2), 96-113. .

Chan, R., Troshani, I., Rao Hill, S. and Hoffmann, A. (2022), Towards an understanding of consumers' FinTech adoption: the case of Open Banking. *International Journal of Bank Marketing*, 40(4), 886-917.

Chaudhry, S. M., Ahmed, R., Huynh, T. L. D., & Benjasak, C. (2022). Tail risk and systemic risk of finance and technology (FinTech) firms. *Technological Forecasting and Social Change*, 174, 121191.

Chin, C. H., Wong, W. P. M., & Ngian, E. T. (2024). The behavioral intention of young travelers to use virtual reality technology in cultural tourism destinations: An application of technology acceptance model. *Pakistan Journal of Commerce and Social Sciences*, 18(3), 552-570.

Das, A. and Das, D. (2023), Adoption of FinTech services amidst COVID-19 pandemic: empirical evidence from Assam. *Managerial Finance*, 49(6), 1075-1093.

Digitt (2024) Unveiling the Future: A Deep Dive into Fintech's Evolution in 2024. Retrieved from: <https://digitt.com.pk/unveiling-the-future-a-deep-dive-into-fintechs-evolution-in-2024/> [accessed on 2 Jun 2025].

Esawe, A.T. (2022), Understanding mobile e-wallet consumers' intentions and user behavior. *Spanish Journal of Marketing - ESIC*, 26(3), 363-384.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015), A new criterion for assessing discriminant validity in variance-based structural equation modelling. *Journal of the academy of marketing science*, 43, 115-135.

- Himel, M.T.A., Ashraf, S., Bappy, T.A., Abir, M.T., Morshed, M.K. and Hossain, M.N. (2021), Users' attitude and intention to use mobile financial services in Bangladesh: an empirical study. *South Asian Journal of Marketing*, 2(1), 72-96. .
- Hoffmann, C. P., Lutz, C., & Meckel, M. (2014), Digital Natives or Digital Immigrants? The Impact of User Characteristics on Online Trust. *Journal of Management Information Systems*, 31(3), 138–171.
- Hu Z, Ding S, Li S, Chen L, Yang S. (2019). Adoption Intention of Fintech Services for Bank Users: An Empirical Examination with an Extended Technology Acceptance Model. *Symmetry*; 11(3):340.
- Hussain, M., Nadeem, M. W., Iqbal, S., Mehrban, S., Fatima, S. N., Hakeem, O., & Mustafa, G. (2021), Security and privacy in FinTech: a policy enforcement framework. In *Research anthology on concepts, applications, and challenges of FinTech*, pp. 372-384.
- Jena, R. K. (2025). Factors Influencing the Adoption of FinTech for the Enhancement of Financial Inclusion in Rural India Using a Mixed Methods Approach. *Journal of Risk and Financial Management*, 18(3), 150.
- Kapronasia (2024). Fintech sector in Pakistan faces mounting challenges. Retrieved from: <https://www.kapronasia.com/research/blog/fintech-sector-in-pakistan-faces-mounting-challenges.html>. [accessed on 3 Jun 2025].
- Koloseni, D. and Mandari, H. (2024), Expediting financial inclusion in Tanzania using FinTech: the perspective of diffusion of innovation theory. *Technological Sustainability*, 3(2), 171-194.
- Kumar, J. and Rani, V. (2022), Journey of Financial Technology (FinTech): A Systematic Literature Review and Future Research Agenda, Rana, S., Sakshi and Singh, J. (Ed.) Exploring the Latest Trends in Management Literature (Review of Management Literature, Vol. 1), Emerald Publishing 1ed, Leeds, pp. 89-108.
- Laksamana, P., Suharyanto, S. and Cahaya, Y.F. (2023), Determining factors of continuance intention in mobile payment: fintech industry perspective. *Asia Pacific Journal of Marketing and Logistics*, 35(7), 1699-1718.
- Lopez, C. E., & Tucker, C. S. (2017), A quantitative method for evaluating the complexity of implementing and performing game features in physically interactive gamified applications. *Computers in Human Behavior*, 71, 42-58.
- MacVaugh, J. and Schiavone, F. (2010), Limits to the diffusion of innovation: A literature review and integrative model. *European Journal of Innovation Management*, 13(2), 197-221.
- Mithe, A. (2015). Mobile financial services for microfinance institutions: Case study of Easypaisa and Tameer in Pakistan. *IFC and Swiss Confederation*. Available online: <https://documents1.worldbank.org/curated/en/852401500461391376/pdf/117452-WP->

PK-Tool-11-3-Mobil-Finan-Serv-Tameer-in-Pakistan-1-29-15-Series-IFC-mobile-money-toolkit-PUBLIC.pdf [accessed on 29 July 2024].

Ngo, H.T. and Nguyen, L.T.H. (2024), Consumer adoption intention toward FinTech services in a bank-based financial system in Vietnam. *Journal of Financial Regulation and Compliance*, 32(2), 153-167.

Nguyen, Y.T.H., Tapanainen, T. and Nguyen, H.T.T. (2022), Reputation and its consequences in Fintech services: the case of mobile banking. *International Journal of Bank Marketing*, 40(7), 1364-1397.

Pauliukevičienė, G., & Stankevičienė, J. (2022), Assessment of the impact of sustainable development goals indicators on the sustainable development of FinTech Industry. In *Business and management*, 12, 290-298.

Qi, J., Chatterjee, S., Worthy, S., Herndon, K. and Wojdowski, B. (2024), Using an extended post-acceptance framework to examine consumer adoption of fintech. *International Journal of Bank Marketing*, 42(3), 642-668.

Rabaa'i, A. A. (2023), An investigation into the acceptance of mobile wallets in the FinTech era: An empirical study from Kuwait. *International Journal of Business Information Systems*, 44(4), 536-580.

Roh, T., Yang, Y. S., Xiao, S., & Park, B. I. (2024). What makes consumers trust and adopt fintech? An empirical investigation in China. *Electronic Commerce Research*, 24(1), 3-35.

Saadah, K. and Setiawan, D. (2024), Determinants of fintech adoption: evidence from SMEs in Indonesia. *LBS Journal of Management & Research*, 22(1), 55-65.

Saleem, A. (2021). Fintech revolution, perceived risks and Fintech adoption: Evidence from financial industry of Pakistan. *International Journal of Multidisciplinary and Current Educational Research*, 3(1), 191-205.

Saleem, M., Kamarudin, S., Shoaib, H. M., & Nasar, A. (2023), Influence of augmented reality app on intention towards e-learning amidst COVID-19 pandemic. *Interactive Learning Environments*, 31(5), 3083-3097.

Saleem, M., Khalid, H., Wijenayake, A., Gaete-Sepulveda, M. A., Almaslukh, F. M., & Mahroof, K. (2025). The impact of supply chain management 4.0 on the performance of the tea manufacturing firms: mediating role of market and entrepreneurial orientation. *Journal of Enterprise Information Management*, [Ahead of print: 15 April 2025].

Setiawan, D., Marzal, J., & Fitri, L. E. (2024). Integrating religiosity with Technology Acceptance Model (TAM) and Technology Organization Environment (TOE) frameworks: A study on ICT adoption in micro and small enterprises. *Pakistan Journal of Commerce and Social Sciences*, 18(3), 651-675.

- Shoaib, H. M., & Saleem, M. (2023). An online market in your pocket: how does an augmented reality application influence consumer purchase decision. In *Technological sustainability and business competitive advantage* (pp. 307-313). Cham: Springer International Publishing.
- Slade, E., Dwivedi, Y., Piercy, N., & Williams, M. (2015). modeling consumers' adoption intentions of remote mobile payments in the United Kingdom: extending UTAUT with innovativeness, risk, and trust. *Psychology and Marketing*, 32(8), 860-873.
- Sobti, N. (2019), Impact of demonetization on diffusion of mobile payment service in India: Antecedents of behavioral intention and adoption using extended UTAUT model. *Journal of Advances in Management Research*, 16(4), 472-497.
- Statista (2024). FinTech-Pakistan. Retrieved from: <https://www.statista.com/outlook/dmo/fintech/pakistan>. [accessed on 3 Jun 2024].
- Stewart, H. and Jürjens, J. (2018), Data security and consumer trust in FinTech innovation in Germany. *Information and Computer Security*, 26(1), 109-128.
- Sun, Z., Liu, L., Johan, S., & Zhao, L. (2024). Fintech adoption and corporate greenwashing: a technology affordance perspective. *British Journal of Management*. First published: 16 November 2024.
- Tan, M., & Teo, T. S. (2000), "Factors influencing the adoption of Internet banking. *Journal of the Association for Information Systems*, 1(1), 1-42.
- Widyanto, H.A., Kusumawardani, K.A. and Yohanes, H. (2022), Safety first: extending UTAUT to better predict mobile payment adoption by incorporating perceived security, perceived risk and trust. *Journal of Science and Technology Policy Management*, 13(4), 952-973.
- Wong, C. B., Rebecca, T. S., & Tan, K. E. (2024), The Influence of Perceived Relative Advantage on Customers' Initial Trust Towards Unfamiliar Online Store Retailer. *Journal of Management & Marketing Review*, 9(2), 66.
- Zhang, W., Siyal, S., Riaz, S., Ahmad, R., Hilmi, M. & Li, Z. (2023), Data security, customer trust and intention for adoption of Fintech services: an empirical analysis from commercial bank users in Pakistan. *Sage Open*, 13(3), 1-17.