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INFLUENCE OF BLOCKCHAIN SECURITY AND DIGITAL PAYMENT ACCESSIBILITY ON CUSTOMER ADOPTION OF FINTECH SERVICES IN SAUDI ARABIA: THE MEDIATING ROLE OF PERCEIVED TRUST

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ABSTRACT

The research queries the effect of blockchain security and the eased access to digital payment on customer adoption of Fintech services in Saudi Arabia, where perceived trust acts as a mediator. This paper offers a picture of successful control of digital transformation and growth in the financial industry and leads to financial inclusion, reliable digital infrastructure, and responsible innovation. Purposive sampling was done to get a total of 400 respondents to achieve diversity in terms of demographics and profession of respondents. The analysis of data was based on the method of partial least squares structural equation Modeling (PLS-SEM). These findings affirm the positive and significant effect that blockchain security ($b = 0.221$, $p < 0.001$) and digital payment accessibility ($b = 0.490$, $p < 0.001$) have on Fintech adoption. In spite of the fact that there was a strong direct influence on adoption, perceived trust failed to mediate these relationships. The theoretical contribution of this research is a refined theoretical model of adoption and an emphasis on difference between the technological and psychological factors. Practical implications suggest that policy and business stakeholders prioritize a secure, readily available, and accessible infrastructure and enhance users' trust in Fintech.' The limitations and future research directions are presented, including the relevance of longitudinal designs, more variables, cross-cultural comparison, and mixed-methods approaches to better understand the complexities of the adoption of the Fintech in various contexts.

KEYWORDS: FinTech adoption; Blockchain security; Digital payment accessibility; Perceived trust; Technology Acceptance Model (TAM); PLS-SEM; Customer behavior; Financial inclusion; Vision 2030; Saudi Arabia.

INTRODUCTION

The purpose of analyzing the effects of blockchain security and ease of access to digital payments on the customer adoption of FinTech services, combined with the perceived trust factor acting as a moderating variable, is to understand how to effectively gather and grow the sphere of digital transformation in the economy in general and in the financial sector, in particular, in an emerging economy, like Saudi Arabia. The study has a contribution to be made to the sphere of financial inclusion improvement, work on the creation of secure and user-centric digital infrastructures, and the responsible innovation development based on trust-based systems (Gaur and Verma 2025). Technological attributes related to customer trust are commonly used in the establishment of customer adoption behaviors, and so, the focus of an interested management, in management terms, is to provide tactical snippets to financial service providers and decision-makers about how perceived technological attributes might be correlated with customer trust to determine the adoption behaviors. This helps in guiding the leadership in making the correct decision concerning investments, service design, and regulatory policies. In addition, integrating approaches to trust-based management systems with FinTech adoption processes can help organizations to meet the digital transformation objectives of the Saudi Arabian Vision 2030, in addition to reducing user resistance and increasing the involvement of consumers (Jain and Jain 2024). As confirmed in previous research, fintech adoption is a strategic priority for Saudi Arabia and plays a key role in achieving Vision 2030's goals of financial inclusion and technological innovation (Malik, 2025).

With the growing trend towards a digital financial environment both globally and at a country level, there is an essential need to investigate the role of blockchain security and digital payment accessibility on customer uptake of FinTech services, where perceived trust acts as a moderating role. Financial technological changes in countries like Saudi Arabia that currently experience a great pace of development are induced by the national program, such as Vision 2030, and require a better comprehension of the psychological and technological forces defining consumer adoption behavior. As innovative as the promises of digital financial services are, they can be prevented by insecurity, misuse of data, and restricted access to the low-trust population (Angorani 2024). The studies have shown that trust perceptions are at the center of modifying the relationship between technical attributes (e.g., blockchain protocols and platform accessibility) and consumer decision-making. Trust is even more significant in Islamic finance and conservative cultures where cultural and religious elements propagate an even closer examination of the digital system. Moreover, trust is particularly applicable in emerging economies where literacy in digital matters and connectivity deficiency influence access to it. As such, an integrated examination of this model can enable FinTech companies, banks, and policy makers to create safe, transparent, and inclusive financial systems that can not only adhere to technological best practices, but also to the expectations of user trust and behaviorally acceptable standards (Li, Khaliq et al. 2023).

This study is strategically important to the management since it complements the gap between innovation and its adoption by providing data-driven recommendations on the design of the systems,

customer engagement, and the governance of the FinTech policy (Puente-Cavazos, Cavazos-Arroyo et al. 2025).

The background of this research is that globally, FinTech innovations and, in particularly blockchain technology and digital payment systems, have disrupted how end-users can access and utilize financial services. In Saudi Arabia, this is directly linked to the goals of Vision 2030s, such as an economy diversification and the use of a cashless society, thus making adoption of FinTech an issue of national concern. Nevertheless, the user adoption is brought about by the insecurities, inaccessibility, and lack of trust in digital formats, despite the introduction of technology (Dimitrova and Öhman 2024). The concept of blockchain, with its decentralization and immutable characteristics, provides an exciting mix of possibilities to eliminate the issue of security, and digital payment systems are supposed to make payments more accessible and convenient to unbanked as well as banked people. Nevertheless, the perceived trust or lack therefore plays a significant role in adopting the technologies as a key intermediate variable in user decision making. With the gradual change of Saudi consumers to FinTech platforms, it is necessary to realize how blockchain security, accessibility, and trust build resilient and inclusive digital financial environments that enable economic prosperity and digital-related resilience (Maharjan, Devkota et al. 2022).

Although there is some research interest in the area of Fintech adoption, there still exist gaps of understanding the process through which security in blockchain and accessibility of digital payments can affect the adoption of Fintech services by customers, with a perceived trust being a mediating factor. There are also empirical and evidence gaps given that most of the literature reports on developed countries, and the context may not relate well with specific studies of the Gulf countries, and more so, Saudi Arabia (Yusran, Hardini et al. 2024). There is also a gap in knowledge in terms of how and why the perceived trust mediates between technological attributes (including security and accessibility) and behavioral outcomes, but not merely correlates such factors. On a more material level, there remains a knowledge gap between the technical capacity of Fintech platforms and the customer acceptance of the platform because many Fintech providers still neglect the importance of user trust-building mechanisms in system design and customer outreach. Methodologically, past research uses similar types of correlation or regressive analysis without the use of a mediation testing model, like SEM or the use of the PROCESS macro model, which is another methodological shortcoming (Hopalı, Vayvay et al. 2022). A third theoretical deficiency is that there has been minimal intersection of trust-based behavioral theories, e.g., Technology Acceptance Model (TAM), Trust Theory, or Unified Theory of Acceptance and Use of Technology (UTAUT), and FinTech constructs in Saudi Arabia. Lastly, the population gap cannot be ignored because the majority of empirical research is skewed towards either general or tech-savvy users and leaves underrepresented audiences of rural, female, and religiously orthodox shoppers in Saudi Arabia. The study of such multidimensional gaps will enhance both the scientific and practical knowledge of Fintech adoption dynamics in the digital economy of the Kingdom, which is actively shaping new business models in the Kingdom (Hurani and Abdel-Haq 2025).

This research will be of great value to differing parties in the Fintech industry in Saudi Arabia since it

will yield useful information and utility value to them. The use of perceived trust in shaping the customer taking up or adoption of blockchain security and accessibility of digital payments can guide developers and service providers of fintech development to understand the customer assessments when it comes to mediation by perceived trust. These results can be used by policymakers and regulators, especially those working in Vision 2030 and the Saudi Central Bank (SAMA), to facilitate frameworks that will enable digital transformation and financial inclusion as a way to ensure an important level of stakeholders' trust in Fintech services (Albastaki, Hamdan et al. 2024). The financial institutions and Islamic banks can utilize the findings to optimize services to a wide range of clientele, especially those with low digital confidence and high tolerability threshold to security and privacy concerns. The study would also be very useful in the field of academia, as it will fill gaps related to theory and methodology regarding FinTech adoptive studies in the context of the developing world, a foundation that can be used to encourage further empirical studies. Lastly, consumers will enjoy the consequent betterment of the Fintech services better aligned to their needs and expectations and driven by consumer trust requirements, thus, leading to a more comprehensive digital inclusion and customer satisfaction rates within the Kingdom (Dhamija, Manrai et al. 2025).

Although Fintech services are widely utilized across different regions in the world, customer adoption can be regarded narrow in Saudi Arabia metrics, which is a matter of concern, and there should be an attempt to understand the underlying root cause. Although security issues in blockchain and digital payment capabilities are considered important technological determinants of successful adoption of FinTech in general, they have not been thoroughly examined in the Saudi Arabian context where, due to cultural and regulatory differences and trust-related barriers, these issues play a more significant role. As much as the blockchain technology provides increased security and digital payment systems that show promise of convenience and inclusivity, there is still reluctance of users to use them due to concerns related to trust. Existing studies fail to address the role of the perceived trust as a moderating variable that describes how these technological variables affect customer behavior and use decisions (Dhamija, Manrai et al. 2025). Unless they know this mediating relationship, Fintech developers and policymakers will be out of sync with what the industries users desire. In addition, the available literature lacks empirical data in emerging economies including Saudi Arabia whereby digital transformation is a national priority under the vision 2030. Thus, this paper aims to address such a research gap by investigating the role of blockchain security and digital payment accessibility on customer adoption of FinTech services in Saudi Arabia, whereas the perceived trust is a mediating constituent of this relationship (Patnaik, Kudal et al. 2023).

The major aim of the research will be to explore the impact of the security of blockchain and the ease of access to the digital payments on customer use of FinTech services within the Saudi Arabian context. In particular, this paper investigates how the perceived trust mediates the cause-effect relationship existing between the technological factors and the adoption behavior. It aims to find out whether blockchain technology security significantly increases customer trust in FinTech platforms and whether the availability of additional digital payment services contributes to the increase in the readiness of customers to use new technologies (Nim, Jeong et al. 2025). Along with this, it is also sought to test the mediating effect of the perceived trust and its coloniality and spans between

technological enablers and user behavioural outcomes. In doing this, this paper will also contribute to the theoretical advancement through FinTech adoption model in the emerging markets and provide empirical evidence that can guide policy design by policymakers, developers and the financial institutions that want to implement strategies to encourage high FinTech adoption among the various user groups in Saudi Arabia (NIK ABDULLAH, BASARUD-DIN et al. 2024).

LITERATURE REVIEW

Theoretical Foundation

The proposed study is based on the Technology Acceptance Model (TAM) and extended by a Trust Theory application that will offer a thorough theoretical framework through which customer adoption of Fintech services in the Saudi Arabia context is analyzed. Developed by Davis, (1989), the TAM locates explanations of technology adoption in two main variables referred to as perceived usefulness and perceived ease of use. Within the frames of this study, ease of use and accessibility of digital payments is synonymous to similarity to blockchain security, which can be identified as perceived usefulness in terms of system trustworthiness and safety. Though, the TAM should be insufficient, considering that the role of trust is crucial in the digital financial communities, especially in those societies where attitudes toward privacy and security are high (Dimitrova and Öhman 2024). Therefore, this research includes Trust Theory, that states that trust is fundamental in alleviating doubt and promoting participation in the high-risk technological context. The proposed study, by framing perceived trust as a mediating factor, integrates the TAM emphasis on technological characteristics with the Trust Theory emphasis on the psychological assurance, providing a solid framework to comprehend how security and ease of use of blockchain and the digital interface can be used to clarify user adopter patterns in the context of FinTech. This combined lens is also quite applicable in Saudi Arabia, since sociocultural practices and regulatory trends influence trust-based acceptance levels of the user (Mensah and Adukpo 2025). Empirical studies, including Malik (2025), demonstrate a significant positive correlation between blockchain security and user trust. Despite this direct effect, the mediating role of blockchain in technology adoption models remains unproven and is a subject of ongoing debate.

Blockchain Security

Blockchain security A blockchain-based system has structural and cryptographic integrity that provides data transaction security, transparency, and immutability and resists tampering or unauthorized access. In FinTech, blockchain is improving trust by supplanting the middle men and offering a decentralized framework in which financial transactions take place. Applications in digital finance have been linked to better fraud resistance, lower operational risks, and increased levels of transparency, which are considered major factors that affect users and their trust and credibility in a system. In Saudi Arabia, blockchain implementation into financial services is being perceived as strategic between securing the digital transactions as per Vision 2030 (Ghose, Bhuiyan et al. 2025).

The security built into blockchain can make it much easier to run an organization by providing

administrators with a reliable, unspoiled and unmodifiable framework that can severely minimize corporate fraud, operational risks, and transaction mistakes. In the case of financial institutions, this technology removes the centralized validation to save money, a reduced settlement time, and to improve transparency throughout the processes. Fintech and banks around the world use blockchain to enhance secure identity, cross border payments and real time auditing. In the Saudi Arabian Opportunity, blockchain will support Vision the 2030 objectives because it improves the security and transparency of the overall financial transactions in the country, encouraging citizens to trust digital financial frameworks. The Islamic banks and local FinTech companies will help adhere to the Sharia-compliant finance principles and it will decrease the need of the traditional intermediaries, which will increase the operational efficiency and customer trust (Kala and Chaubey 2023).

Digital Payment Accessibility

Digital payment accessibility is the measure of how easily people can fee access to using digital financial systems in order to conduct transactions (e.g. money transfer, purchase or payment of bills). It includes even the following factors: the design of user interface, availability of mobile devices, Internet connection, language support, and even technical help. The latter could be explained by accessibility being one of the main adoption drivers in some developing economies, in particular, Saudi Arabia because of the different degrees of literacy and connectivity to the internet . Increased accessibility has the capacity to empower the population that has difficulty accessing financial services, diminish financial exclusion and encourage its use through convenience, rapidity, and the presence of the financial services at the fingertips of the user (Koloseni and Mandari 2024).

The ease of accessing digital payments increases the reach of organizations and their service delivery directly to customers through mobile, online, and contactless payments. The findings that blockchain security and accessibility of digital payments facilitate adoption validate the existing model proposed by Malik (2025) and highlight the importance of these technological characteristics. To organizations, this means reduced transaction costs, greater market reach, and enhanced customer interaction due to the convenience of in-time and real-time services. In Saudi Arabia, the issue of accessibility to the FinTech segment is critical in ensuring that underbanked citizens, especially women, young people, and those living in rural areas, have access to finance and contribute to financial inclusion and growth in the client base. With the government's move towards achieving a cashless economy under Vision 2030, financial institutions are setting up more user-friendly platforms to make payment systems easier to use and interconnected with other national digital systems, such as SADAD and STC Pay. Consequently, accessibility to digital payments positively relates to the scalability of services and competitiveness to banks and the Fintech companies (Puente-Cavazos, Cavazos-Arroyo et al. 2025).

Perceived Trust

Perceived trust can be considered as the belief of a user about the reliability, safety and integrity of a technology or a service provider, particularly in those situations where risks and uncertainty are significant, as in the case of everyday digital financial transactions. It is a cognitive concept and it determines the quality of credibility of Fintech services, especially in the adoption of new

technologies, like blockchain or accounts of the digital wallets. As presented in FinTech, because trust decreases perceived risks to privacy, loss of money or other assets due to data breaches or unsuccessful offerings, trust is specified to be a factor that determines customer satisfaction and adoption. In Saudi Arabia, trust plays a special role because of cultural sensitivity and regulatory limitations since it is a very significant mediator between technological features and behavioral intention (Farhana and Muthaiyah 2022).

Trust is a central facilitator of accomplished organizational success in digital financial market because it diminished customer uncertainty, acquired a long-term customer relationship and increased user adoption rates of services. In the case of Fintech companies, trust is critical in dispelling doubts that may be said to cover data security, privacy, and system stability, especially where financial data is involved. Trust can help create a effortless process of customer onboarding, boost retention rates, and enable word of mouth marketing which are also pivotal in achieving long-term growth. The issue of trust takes even greater precedence in Saudi Arabia whereby the use of cultural and religious considerations influence user perceptions making trust to be even more important than being taken into consideration in making a decision to adopt digital financial platforms. Companies that pay attention to the issues of trust by providing secure systems, proper policies, and employee support are in a better position to gain acceptance in the market and to keep in line with the roles of the nation to modernize the financial sector without renouncing social values (Fomin, Kerulis et al. 2025).

It is of paramount importance to study the concept of perceived trust in the sphere of financial technology (FinTech), as the concept is one of the several psychological dimensions that shapes the behavior of consumers in the digital financial realm. In an industry where activities are intangible and risks, such as data breach, fraud, and theft of identity are common, trust plays a critical role in mitigating the uncertainties and promoting the confidence level of users. Even the safest and most convenient Fintech systems may never get popular unless the attitudes of people in trust are built to the appropriate level. In the Saudi Arabia context, where the culture adheres to strict conservatism, there is tight control by regulation, and a fast pace of digital transformation, it is even more important to understand trust as a central mechanism to align pace of technological innovations with the trade offs in user behaviors and expectations (Wu, Ishfaq et al. 2022). Trust-related issues that are not addressed may produce resistance, insufficient utilization of digital services, reputational harm of organizations providing data-driven services, and other missed opportunities in terms of economic inclusion and national financial maturity. On the other hand, the development of trust can speed up the adoption, maintain a sustainable growth process, and enhance the efficacy of the digital financial policies as a part of Vision 2030. Thus, the study into perceived trust can not only lead to the academic theory, but has straightforward technological application in the design of devices to be used in FinTech, as well as customer relationship management as well as the strategic decision making processes in FinTech (El Hajj and Farran 2024).

Customer Adoption of FinTech Services

Customer adoption of FinTech services is defined as the process and behavioral intention of customers to use or further use digital financial service platforms, e.g., mobile money, internet banking, or blockchain-based applications. A number of variables can affect adoption, which include technological readiness, perceived usefulness, ease of use, security, and trust. In the Saudi context, there is an increased use of Fintech services that are used differently due to color, socioeconomic, and regulatory differences. Looking at the motivations of customer adoption is crucial to the attainment of financial inclusion and to making progress on the national digital transformation agenda as part of Vision 2030 (Kaur, Kaur et al. 2024).

The use of Fintech services by customers is the most important factor that defines the success of digital transformation projects in financial institutions. When a high number of customers adopt an organization, the organization is more cost-effective in terms of service delivery, less reliant on physical infrastructure, and it also increases customer engagement via the digital channel. Adoption can guarantee the real-time collection of data, personalized marketing and predictive analytics that would enhance customer satisfaction which improves decision-making. In Saudi Arabia, customer adoption is key to the integration of Vision the 2030s target of having a digitally advanced financial sector and moving towards less cash-based transactions. With mobile banking, digital wallets, blockchain adoption and active involvement of customers into these spheres, financial institutions can scale, expand their services and approach all users and populations better (Bhat, Khan et al. 2024).

Hypotheses Development

The emerging use of blockchain technology in finance has altered the ways in which consumers interact with the Fintech platforms by providing better data integrity, transparency measures, and tamper-resistance. Blockchain security is structural and cryptographic safeguards, enshrined in blockchain-based systems and protecting financial data and transactions against the unauthorized access, fraud and manipulation. These are features, which satisfy critical consumer concerns relating to digital insecurities especially within high risk financial settings, where the disintermediation in consumer-philosophy raises alarm bells in the minds of consumers based on perceived unpredictability. In theory, the possible positive impacts of perceived usefulness on user intention and behavior have been indicated as a positive influence of secure transaction systems (Idrees and Ullah 2024). Blockchain in FinTech has several advantages in addition to the strengthening of security since it also promotes transparency and trust in customers, which is fundamental to raising adoption. In regards to such a situation as Saudi Arabia, where the sphere of digital financial services is only getting its start, where customers are still wary of online transactions, the introduction of blockchain can have a substantial impact on trust and users readiness to adopt new technology. Empirical research has indicated that customers have higher chances of using the FinTech services when they feel comfortable that the infrastructure used to deliver the services is secure and unchangeable. Hence, it is hypothesized that blockchain security plays a huge and positive role in influencing the adoption of FinTech services

by customers (See Figure 1).

H1: Blockchain security exerts a substantial positive impact on the customer adoption of FinTech services.

An important way that Fintech companies can increase customer adoption of their services is by ensuring that they have been made accessible to customers through digital means such as mobile apps, online platforms, and integrated payment systems that improve and make engagement with financial technologies convenient and efficient. In this case, accessibility means how conveniently people may get access to and use digital financial services through the availability of mobile devices, Internet connection, the convenience of using the application, and the availability of localized financial interfaces . The Technology Acceptance Model states that the ease of using a technology is one significant influencing factor to adoption of the technology which means that people are more prone to adopt the digital payment services when they are more user-intended and user-friendly (Ghose, Bhuiyan et al. 2025). The Vision 2030 strategy in the Saudi Arabia detail the idea of promotion of a cashless society that has the digital access to payment at the core of the digital transformation challenges in the country. Previous studies have found that user adoption and levels of satisfaction could be tremendously boosted through greater availability of digital payment platforms that are geared toward addressing the unique demands of those using them, particularly in rural population, the underbanked and less technologically savvy demographics. Thus, the enhancement of digital payment access has a technical, as well as strategic, aspect, which FinTech providers can further develop in Saudi Arabia. It can devise the above hypothesis based on this, that digital payment accessibility positively influences customer adoption of the services offered by FinTech in a significant manner (Dabbous, Merhej Sayegh et al. 2022).

H2: The accessibility of digital payment also has a substantial positive influence on the customer adoption of FinTech services.

Trust has been one of the factors which is realized as so much relevant in the process of adopting technology especially in areas, which touch on sensitive issues and financial dealings. In principle, blockchain-based technology enables greater security due to its decentralized nature, cryptographic validation and immutability, all of which help mitigate perceived risks with regard to digital financial services. What these technical aspects provide excellent objective security to the FinTech platforms, subjective trust perceptions in the perceived reliability and safety of the platform can be just as important in influencing the actual adoption behavior. This implies that such security might not directly translate to adoption, unless it delivers a similar effect on trust. Trust theory notes that users have to feel that a digital platform is competent and acts with integrity before they will interact with it, even in high-stakes contexts, like financial transactions online. Similarly, in the Saudi Arabian FinTech environment, where technology acceptance is still in development in various classes of the population, the intricate processes of blockchain might not be comprehended and benefited in the absence of translating the technology into the trust-building experiences. Mediation effect of trust the secondary variables trust and perceived trust are also supported by empirical findings as mediating

between system quality and technology acceptance showing that user perceptions of trust mediate the path between secure infrastructure quality and acceptance and adoption behavior. Thus, I suppose that the mediating role of perceived trust will exist between blockchain security and customer adoption of FinTech services (Hashem 2023). Unlike previous research (Malik, 2025), which found a mediating role for trust, the results of this study did not show a significant mediating effect, highlighting how model structures can produce different results across studies.

H3: Perceived trust mediates in the connection between block chain security and customer adaption to the services of FinTech.

Although digital payment accessibility is a central enabler of Fintech adoption, its success in motivating customers to use it is to a large degree limited to the degree to which users trust the platforms where they find digital payment. Accessibility, which is manifested by the presence of mobile payment systems, an understandable interface, multilingualism, and comprehensive design, can reduce technological barriers in order to attract new target audiences. Nevertheless, accessibility does not necessarily mean adoption in case the users doubt the reliability of the platform, the level of privacy, and the general credibility. In that regard, the perceived trust is a mediating factor that can be taken to the perception of ease of access to actual usage behaviour (Farhana and Muthaiyah 2022). Trust Theory implies that human beings tend to utilize digital services when they feel that the provider is efficient, fair and capable of safeguarding their positions. Trusts are one of the key decisive elements of adoption in the Saudi Arabian context where consumers might hesitate to engage in digital transactions based on religious, cultural, and cybersecurity issues. Even when the digital services are readily available, research studies showed that they are not necessarily managed, but trust needs to be ensured as the conversion of access to adoption. Thus, it is expected that the relationship between digital payment accessibility and customer adoption of FinTech services can be mediated by perceived trust (Iqbal and Hayat 2025).

H4: The relationship between the accessibility of digital payment and the adoption of the FinTech services by the customers is mediated by perceived trust.

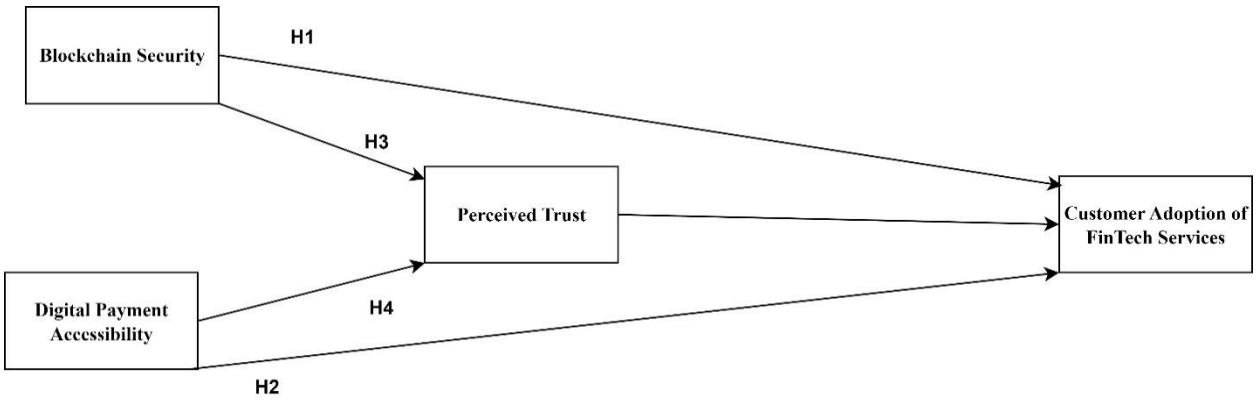

Figure 1: *Proposed Research Model*

Methodology

The population the current study targets is individual consumers in Saudi Arabia that have been already using FinTech services and those that are also potential consumers of such services, including mobile banking apps, e-wallets (STC Pay, Apple Pay), online investment services and systems and blockchain-based payment systems. In order to get a multi-faceted perspective of adoption behavior and perceptions towards blockchain security, digital payment accessibility and perceived trust the targets were 400 respondents who were sampled using non-probability purposive sampling method. Such an approach is suitable to screen those who have been relevant to exposure or having experience with digital financial technologies and it is fundamental to a valid response in FinTech studies (Wu, Ishfaq et al. 2022).

The sampling frame was structured in such a way that there was the representation of demographic and professional diversities. Regarding the gender variable, it was sought to find a balance between male 220 and female 180 participants (See Figure 2) to denote emerging trends in financial inclusion and gender involvement in the Saudi digital economy. The age structure was not very selective, as there may be young adult (1825 years), middle life (2645 years), and elderly users (> 46 years) as the age range of online or digital users is significantly different. This variation can be used in order to examine the generational differences in trust and uses of technology (Lontchi, Yang et al. 2023).

The respondents represented a diverse mix of occupational sectors (departments) without being specific to banking and finance, education, healthcare, public administration, retail and the technology sector. This cross-sectoral study can offer an opportunity to evaluate to what extent industry-specific digital literacy and exposure to FinTech tools can affect adoption behavior. The sample consisted of university students, the employees of both private and public companies, and small owners, which gave the sample the combination of digital familiarity and the need to improve their financial situation (Xia, Gao et al. 2025).

The sample also had major regional areas in Saudi Arabia including Riyadh, Jeddah, Dammam, Mecca and Medina and smaller cities and towns to consider regional differences in infrastructure and Internet connectivity and access to FinTech services. This mixed sampling methodology contributes to the aim of the study to provide an overarching understanding of customer behavior and customer attitudes to the adoption of FinTech within the Saudi Arabia socioeconomic and cultural schema and particularly as Saudi Arabia undergoes an increased pace of modernization of the financial sector, as being part of Vision 2030 (Metwally, Gad et al.).

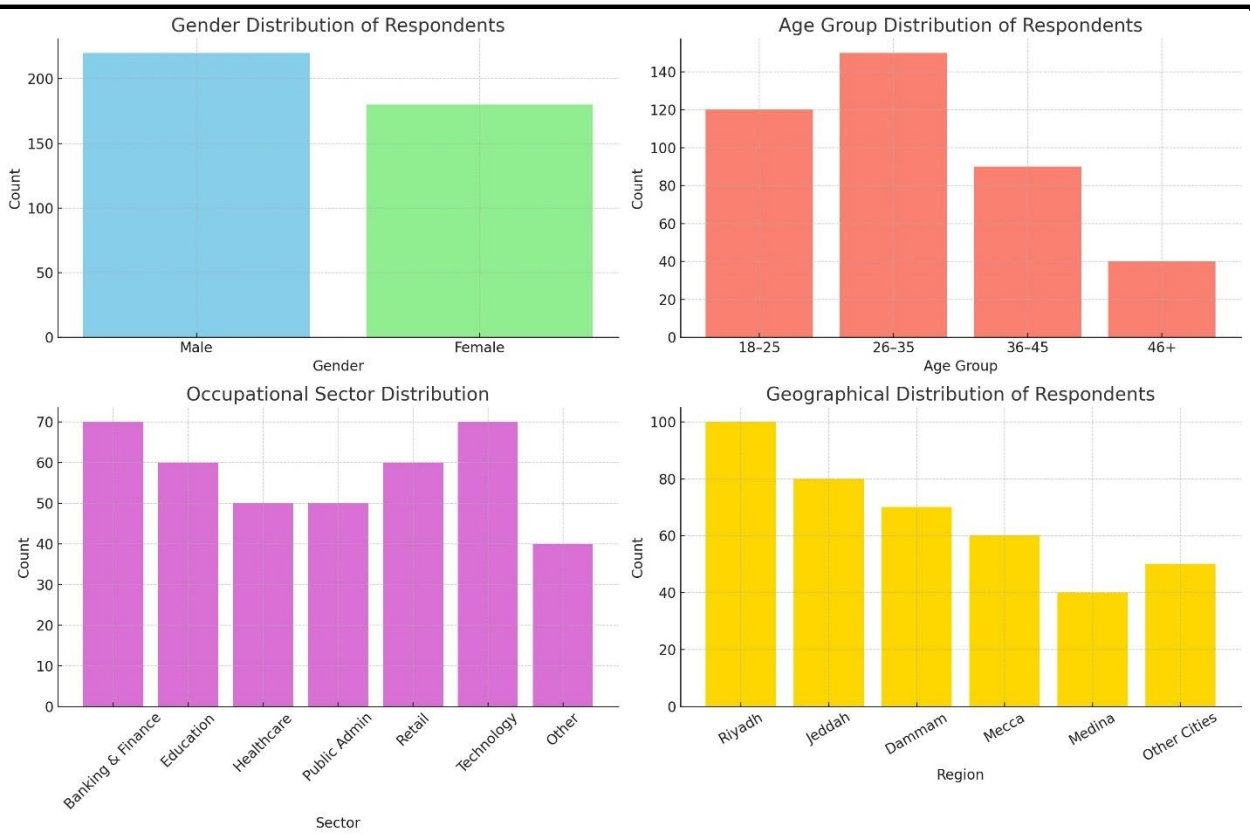

Figure 2: *Data Collection Demographic*

Questionnaire Development

One of the questionnaires used in this study was designed by the researcher after adapting the existing validated items of the literature to guarantee a reasonable level of reliability and content validity. It is designed in five main sections which matched the core variables of the research- blockchain security, access to digital payments, perceived trust and adoption of the FinTech services by customers, and demographic information of the respondents. All the constructs were ascertained in a 5-point Likert type scale ranged between 1 (strongly disagree) and 5 (strongly agree). The elements of blockchain security that were adapted were based on works that investigated trust in platforms that carried out blockchain functions, citing immutability, security, and data integrity. Accessibility items are the digital payments as they determine the levels of ease of use, availability, and user friendliness. Perceived trust consisted of items that were concerned with indicators of system reliability, transparency, and credibility of service providers. The 11-item customer adoption construct consisted of items pertaining to the intention to use and actual behavioral use of FinTech services (See Table 1). The questionnaire was also tested with a pilot study of 30 people in order to check their understanding, timing and consistency. The feedback was used to slightly amend the wording and the final research instrument was sent to the preferred sample size of 400 participants in Saudi Arabia.

Table 1: Instruments

Construct	Number of Items	Source	Scale
Blockchain Security	**7**	Siyal et al. (2023), Shuhaiber et al. (2025)	5-point Likert (1–5)
Digital Payment Accessibility	**7**	Almaiah et al. (2022)	5-point Likert (1–5)
Perceived Trust	**7**	Abdalla (2025), Alrsheedi & Iskandar (2025)	5-point Likert (1–5)
Customer Adoption	**7**	Abed & Alkadi (2025)	5-point Likert (1–5)

Common Method Bias

To solve the common method bias (CMB) whereby the error in measurement is over attributed to the metric as opposed to the constructs being measured, both procedural and statistical solutions are used in this study. Evaluation apprehension and social desirability biases were mitigated by the fact that anonymity and confidentiality were guaranteed; this aspect was procedural in nature. The questions were well framed and the wording at appropriate places in the questionnaire to ensure that the pattern of responding was reduced. Harman single-factor test was applied to ascertain whether one factor contributed in most of the variance implying the existence of CMB. Using the single-factor test developed by Harman, the common method bias is disregarded because a single factor only reflects 39.78 of the total variance, which is inferior to the critical value of 50 percent (Lontchi, Yang et al. 2023).

Assessment of Measurement Model

The data analysis technique employed is Partial Least Squares (PLS) that is a combination of variance and structural equation modeling (SEM). The analysis was performed through SmartPLS 4. As Hair et al. (2009) state SEM is well suited to a study that would involve multiple constructs and variables since it allows multiple relationships to be estimated concurrently. Moreover, the PLS-SEM would be more appropriate than the CB-SEM when evaluating the predictive ability of the model. To estimate the measurement model factor loadings and internal consistency reliability were determined (Kumari, Bala et al. 2023).

As Table 2 suggests, the results have proven that the levels of internal consistency, reliability, and convergent validity are within acceptable levels of all the constructs that were being measured. The

loading values of each of the indicators were more than 0.70, which indicated that each indicator was an adequate representation of the corresponding factor. The alpha values of all the study variables are higher than 0.70, showing that the variables have good internal consistency. In the same manner, the Composite Reliability (CR) values are above the 0.70 threshold, which reflects sufficient construct reliability (Hair et al., 2017). The value of the Average Variance Extracted (AVE) of the constructs is above 0.50, indicating that each construct has attained convergent validity because enough variance has been captured by the constructs with respect to the measurement error (Fornell & Larcker, 1981). All these findings are signs that indeed the measurement model is sufficient and appropriate to be used in the further structural analysis (Kumari, Bala et al. 2023).

Table 3 results based on the heterotrait-monotrait (HTMT) ratio show that the majority of the construct pairs fulfill the criterion of discriminant validity. As Henseler et al. (2015) note, values of HTMT less than 0.90 (or, better, 0.85) should be observed to identify proper discriminant validity of constructs. In this table all HTMT values are much less than the threshold, with the exception of the relationship between Perceived Trust (PT) and Customer Adoption of FinTech Services (CAFS) which is 0.813. Although this value is still less than the 0.85 threshold, it is rather high, which implies a great conceptual overlap between these two variables. Nonetheless, it is within acceptable levels, thus, justifying the occurrence of discriminant validity between all construct couples and indicating that the constructs within the model are distinctly different and allow structural equation modeling (Hashem 2023).

Table 4 shows the Variance Inflation Factors (VIF) values of all the indicators to check multicollinearity in the measurement model. Kock and Lynn (2012) recommend that VIF values below 5 portray cases that are free of collinearity problems, which may inflate regression estimates. On the other hand, values above 5 indicate possible cases of collinearity in regression model estimation. The VIF values in this table were all less than 5 representing a critical level of 3.568-4.976. This indicates that the issue of multicollinearity does not exist between the measures of Blockchain Security, Digital Payment Accessibility, Customer Adoption of FinTech Services and Perceived Trust. Thus, all predictors included in the model were rather independent, and the estimations of the path coefficients would be stable and reliable when used in further structural analysis (Li, Khaliq et al. 2023).

Table 5 shows the indices, with the overall fit according to the estimated model being excellent, compared to the null model. The estimated model chi-square value (455.736) was much lower than that of the null model (13,681.792), although the p-value of 0.000 is often significant in large samples, and the relative chi-square (2/df) ratio (1.325) is still below the acceptable level (less than 3), which means that the model was well-fitting (Kline, 2015). Having an RMSEA of 0.028 with a 90% confidence interval 0.021-0.035 is less than the benchmark of 0.05 hence indicating a close fit (Browne and Cudeck, 1993). Other indices served to support these findings: The GFI (0.926), AGFI (0.913) and PGFI (0.785) all outperformed the recommended minimum providing good model appropriateness. In addition, the SRMR of 0.022 is less than the benchmark of 0.08, indicating that the model fits well in regard to residuals. The incremental fit measures, the NFI (0.967) and the TLI (0.991) exceed 0.90 indicating a good fit to the data which is extremely close to near perfection (Hu-

Bentler, 1999). As a general statement, the specified model describes data rather well, which means that it serves the purpose of further structural analysis (Trivedi, Patra et al. 2022).

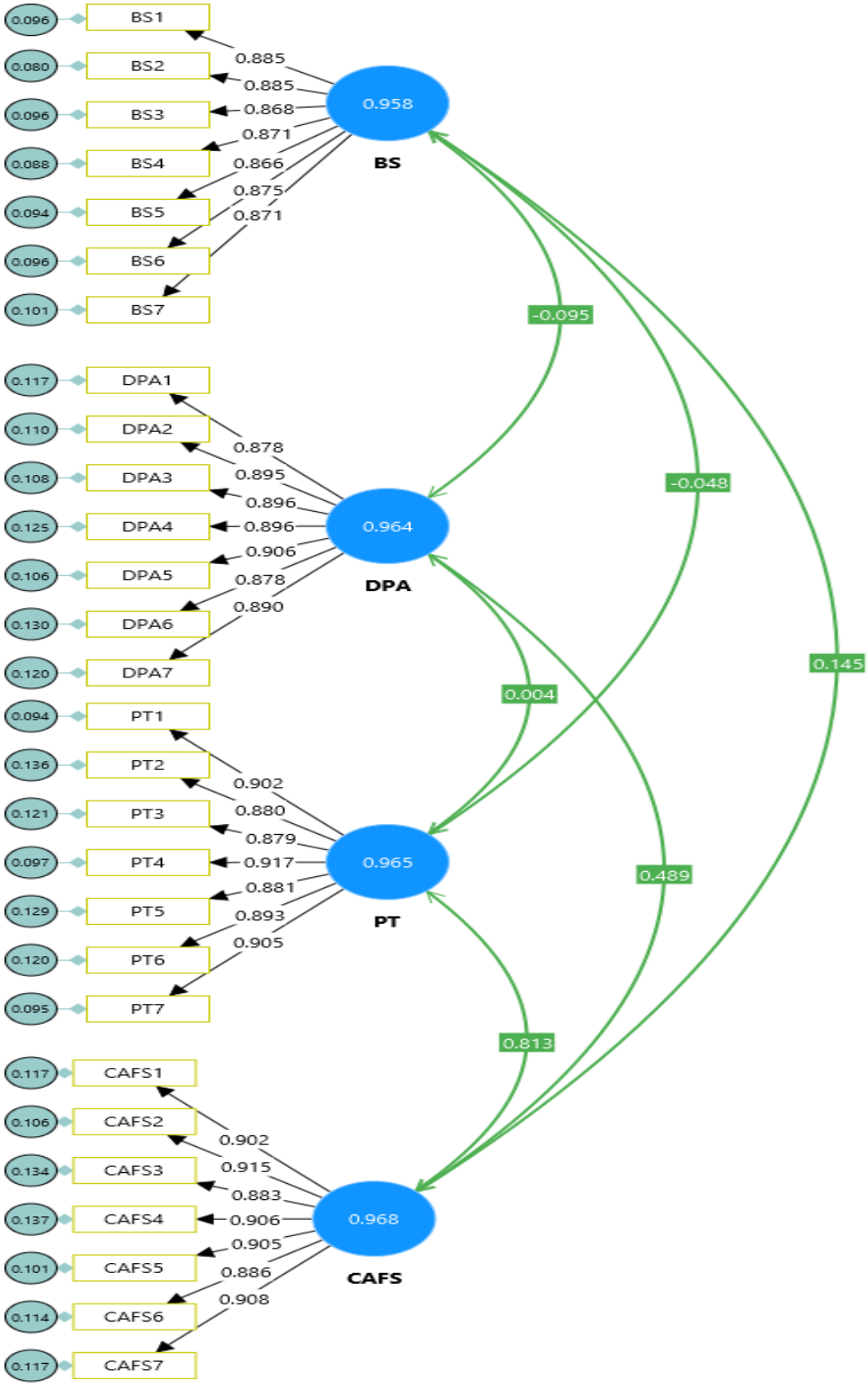

Figure 3: *CB- SEM with Factor Loading and Alpha Values of Variables*

Table 2: Internal Consistency, Reliability, and Convergent Validity

Construct	Indicator	Factor Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
	BS1	0.885			
	BS2	0.885			
	BS3	0.868			
BS	BS4	0.871	0.958	0.958	0.765
	BS5	0.866			
	BS6	0.875			
	BS7	0.871			
	CAFS1	0.902			
	CAFS2	0.915			
	CAFS3	0.883			
CAFS	CAFS4	0.906	0.968	0.968	0.811
	CAFS5	0.905			
	CAFS6	0.886			
	CAFS7	0.908			
	DPA1	0.878			
	DPA2	0.895			
DPA	DPA3	0.896	0.964	0.964	0.795
	DPA4	0.896			
	DPA5	0.906			

	DPA6	0.878			
	DPA7	0.890			
	PT1	0.902			
	PT2	0.880			
	PT3	0.879			
PT	PT4	0.917	0.965	0.965	0.799
	PT5	0.881			
	PT6	0.893			
	PT7	0.905			

Table 3: Discriminate Validity Heterotrait-Monotrait (HTMT) Ratio

	BS	**CAFS**	**DPA**	**PT**
BS				
CAFS	0.146			
DPA	0.094	0.489		
PT	0.049	0.813	0.027	

Table 4: Variance Inflation Factor (VIF)

Item	**VIF**	**Item**	**VIF**
BS1	3.996	DPA1	3.951
BS2	4.022	DPA2	4.414
BS3	3.676	DPA3	4.641
BS4	3.832	DPA4	4.544
BS5	3.568	DPA5	4.969
BS6	3.765	DPA6	3.977

BS7	3.808	DPA7	4.158
CAFS1	4.865	PT1	4.609
CAFS2	4.213	PT2	3.994
CAFS3	4.031	PT3	3.928
CAFS4	4.755	PT4	4.110
CAFS5	4.216	PT5	3.939
CAFS6	4.051	PT6	4.159
CAFS7	4.873	PT7	4.976

Table 5: Model Fit

	Estimated model	**Null model**
Chi-square	455.736	13681.792
Number of model parameters	62.000	28.000
Number of observations	400.000	n/a
Degrees of freedom	344.000	378.000
P value	0.000	0.000
Chi Sqr/df	T.325	36.195
RMSEA	0.028	0.297
RMSEA LOW 90% CI	0.021	0.292
RMSEA HIGH 90% CI	0.035	0.301
GFI	0.926	n/a
AGFI	0.913	n/a
PGFI	0.785	n/a
SRMR	0.022	n/a

NFI	0.967	n/a
TLI	0.991	n/a
CFI	0.992	n/a
AIC	579.736	n/a
BIC	827.206	n/a

Hypotheses Testing:

Table 6 shows the results of testing of two direct relationship using bootstrapping a robust non-parametric bootstrap that estimates the precision of the model parameters. The resultant data provide standardized beta (7 9 L Cohen, 1988), t-values, p-values, and 95 % confidence interval (CI), which together test the significance and strength of the hypothesized relationships.

There is a strong positive influence of the Blockchain security on the use of FinTech services by the customers.

H1: According to the data on H1, there is a significant positive direct relationship between blockchain security and the customer adoption of FinTech services. The standardized path coefficient of 0.221 would indicate that the higher the perceived security in blockchain technology the higher the adoption levels of customers. This result is statistically significant and is corroborated by the t- value 11.507 and the p- value of 0.000, and the confidence interval between 0.191-0.254 further illustrates the reliability of this effect. These findings point to the significance of a safe and trustworthy blockchain infrastructure to inculcate the sense of safety among the users and encourage them to adopt the technology within the FinTech industry.

The availability of digital payments contributes positively to ensuring adoption of FinTech services to a great extent (Amofah and Chai 2022).

H2: Equally, H2 has a strong association with the direct correlation between the accessibility of digital payment services and customer uptake of FinTech services. The magnitude of 0.490 indicates that the path coefficient has a high level of antiregulation, thus, the ease of access of digital payment systems affects the behavior the use of digital payment systems by the customers positively. A t -value of 20.266 and a p -value of 0.000 confirm that the relationship was significant, and the confidence interval between 0.450 and 0.530 indicates that the effect was reliable. This observation indicates the key importance of convenient and accessible digital payments platforms contributing to adoption of financing technology (Kala, Chaubey et al. 2025).

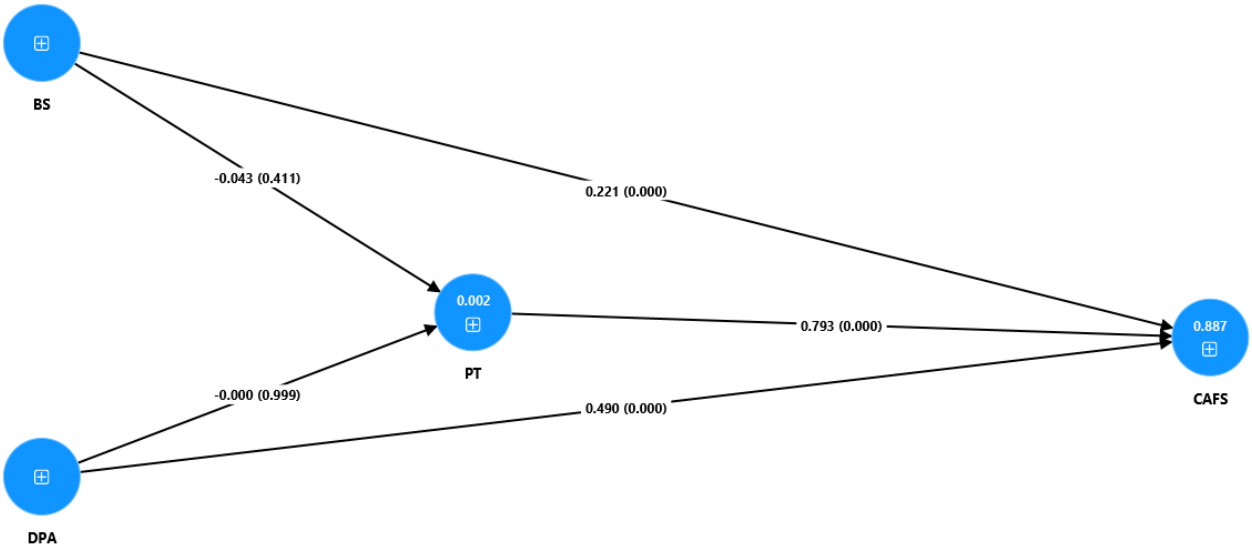

Figure 4: *Path Analysis of Model*

Table 6: Summary of Direct relationship Hypotheses Results (Bootstrapping Report)

Hypothesis	**β Value**	**t-value**	**P - Value**	**C I (LL, UL)**	**Results**
H1:BS→ CAFS	0.221	11.507	0.000	(0.191, 0.254)	**Supported**
H2:DPA→CAFS	0.490	20.266	0.000	(0.450, 0.530)	**Supported**

(Note: LL,Low Level , UL, Upper Level, CI, Confidence Interval)

H3: There is a mediation relationship between the security of blockchain and customer adoption of Fintech services which is achieved through perceived trust.

Table 7 provides the mediation analysis results of the path of indirect relationship in the structural model. Hypothesis H3, which hypothesizes that perceived trust mediates the impact of blockchain security and customer adoption of FinTech services is not supported. The indirect effect was deemed negative at -0.034, t-value of 0.817 and p-value of 0.207 which were non-significant. Also, the confidence interval (-0.102, 0.034) overlapped semi zero, and the p value of0.437 was marginally above the signification line of 0.05. The variance that is accounted by partial mediation (VAF) was obtained and its value was found to be < -18%, making its partial mediation fils way below the acceptable minimum of 20%. Although the direct influence of blockchain security on customer adoption was tremendous, the mediating effect of the perceived trust was not recorded in such a relationship (Vadithe, Kesari et al. 2025).

H4: The introduction of digital payments through better accessibility leads to customer adoption of FinTech services by way of mediated relationship of perceived trust.

In Hypothesis H4, the mediation analysis was conducted to evaluate whether perceived trust mediates the association between having access to digital payments and the customer adoption of FinTech services. The results also indicated the lack of mediation. The indirect effect value is actually null (-0.000), the t-value was 0.001, and the p-value was 0.499 showing clearly that there is no significant overall effect. The interval of confidence through the range of -0.066 to 0.065 supports this as well since it straddles zero. The VAF = 0, which indicates that the impact of accessibility of digital payments on customer adoption has no path via perceived trust. Thus, the direct impact is still prevailing in this relation and perceived trust does not mediate it (Vadithe, Kesari et al. 2025).

Table 7: Mediation Type and Effect

Hypothesis	**Indirect Effect (β)**	**t-value**	**P - Value**	**CI(LL, UL)**	**Direct Effect (β)**	**Total Effect (β)**	**VAF (%)**	**Mediation Result**
H3:BS → PT→CAFS	-0.034	0.817	0.207	(-0.102, 0.034)	0.221	0.187	-18 %	No Mediation
H4:DPA → PT→CAFS	-0.000	0.001	0.499	(-0.066, 0.065)	0.490	0.490	0%	No Mediation

Predive relevance and effect size

Table 8 will show the predictive relevance (Q 2) and the effect size (f 2), which will give details on how well the independent variables predict the dependent variables within the structural model. The Q 2 values of perceived trust (0.001) and customer adoption of Fintech services (0.737) are both positive, and therefore, it is an indication that the model is predictively relevant according to Hair et al. (2017). The value of Q 2 of perceived trust is low to indicate low predictive power on this outcome variable and value of customer adoption is high (Nahwan and Sugiono 2024).

Regarding strength of effects, the values display the impact of each predictor with regard to variance of respective dependent variables. The effect sizes of blockchain security (almost insignificant 0.002)

and accessibility to digital payments (insignificant 0.000) to payment indicate no significant impact of those two factors in explaining perceived trust. Comparatively, the blockchain security had a small-to-moderate (0.430) effect size in customer adoption, accessibility of a digital payment had a large (2.114) effect and perceived trust had a very large (5.573) effect size. Such results allow concluding that the availability of online payments and the perception of their trust are the key words that promote adoption by customers and blockchain security plays a lesser albeit substantial role.

Table 8: Predive relevance and effect size

	PT	**CAFS**
BS	0.002	0.430
CAFS		
DPA	0.000	2.114
PT		5.573
Q^2	0.001	0.737

DISCUSSION

The findings of the study support strongly the significance of blockchain security to the customer adoption of the FinTech services. The results indicate a significant statistical positive correlation (beta = 0.221, $p < 0.001$) between the perceptions of Blockchain security and the use of FinTech. This adds to the more current literature as it shows the potential of blockchain and its decentralized, immutable, and transparent nature to contribute to consumer trust and fraud risk reduction in digital financial systems . One of the recent surveys on the impact of blockchain-based security systems by Xu et al. (2024) highlighted how such security systems help build consumer trust since losing data and any form of insider threat is minimized. Such technologies appear to have a direct impact on whether or not the users are willing to participate in Fintech platforms. Nevertheless, there are opposing views highlighting that despite the technological soundness of the blockchain, the implementation can be thwarted in the systems where organizational reliability and regulatory transparency are wanting. However, findings of the study affirm the role of perceptions of blockchain security as an aspect whose presence facilitates FinTech adoption in settings where such technology is not perceived as a risk (Dimitrova, Öhman et al. 2022).

In parallel, accessibility to digital payments by the users had an even more significant effect ($\beta = 0.490$, $p < 0.001$), meaning that an inclusive environment is crucial to the expansion of FinTech. This is in line with McKinsey and Company (2024), who had found that ease of use, smooth transactions and compatibility with the mobile have become requirements in realms of digital financial services. The popularity of services like India Unified Payments Interface (UPI), which has allowed real-time and

low-cost digital payments, is just one of the examples of how a payment tool can dramatically increase the number of users when it becomes friendly and widely available (National Payments Corporation of India [NPCI], 2024). In addition to this, the idea of frictionless finance is gaining ground, in which the ease of paying removes the cognitive load, and, therefore, use . Nonetheless, there are still some difficulties in some markets. As an example, in the UK the phenomenon of adoption in the open banking environment has not taken place as fast as elsewhere because of complexities in regulations and lack of consumer awareness. Nevertheless, irrespective of these regional specifics, this paper supports the fact that digital payment availability constitutes a key determinant in stimulating the uptake of FinTech, particularly in economies that are digitally advanced (Mishra, Srivastava et al. 2024).

The mediating role of perceived trust between blockchain security and customer adoption of FinTech services was not supported by the mediation analysis carried out in H3. Despite the fact that the security of blockchain demonstrated a strong positive direct impact on adoption, the very indirect effect of perceived trust was negative (-0.034) and not statistically significant ($p = 0.207$), and its confidence interval (-0.102, 0.034) inclined to zero. The variance attributed (VAF) was -18, which was quite low as it failed to reaches the 20 percent mark that is needed when seeking partial mediation (Raza, Bilal et al. 2024). It suggests that although the customers believe that blockchain systems are safe, this belief does not greatly influence their trust on FinTech services such that it would make them adopt it. These findings go against previous claims that trust plays an important mediating role in technology acceptance and thus perhaps indicate that contemporary users might view blockchain security and trust as two separate entities as opposed to sequential concepts. In addition, the building of trust will become unimportant, as with the increasing awareness and technical understanding, users might directly correlate the notion of blockchain to something that is safe and take direct actions without the presence of the trust as a mediating aspect (Jamal, Asghar et al. 2025).

On the same note, H4 did not stand, because the perceived trust was not instrumental in mediating the relationship between customer adoption and accessibility to digital payments. The indirect effect was almost negligible (-0.000), with its p-value of 0.499 and a confidence interval (-0.066, 0.065) that crossed the zero-point. VAF was 0, which indicated that, none of the variance in adoption was explained via trust pathway. Although it may appear counterintuitive at first, since previous studies found trust to be an important factor in digital transactions (Alamoudi, Glavee-Geo et al. 2025), accessibility in digital payment tools may imply that we are talking about usability and security, which presents the lesser degree of influenced decision-making. A digital market that quickly becomes digitized will be prepared to expressly value the functional convenience of the technology over the emotional security of the tool when the helpers are already so popular and integrated into the financial lives of their users (Yang, Ali et al. 2024).

To supplement the mediation analysis, Table 8 shows us on relevance and the effect size of the model. The values of Q 2 that assessed the power of the model in predicting the out-of-sample were positive (perceived trust 0.001; customer adoption 0.737) indicating predictive power (Hair et al., 2017). Even though the value of Q 2 perceived trust is insignificant, the values of customer adoption depict a good

predictive power. Concerning the effect sizes (f 2), the blocks security and accessibility of digital payments were negligibly connected to the perceived level of trust (0.002 and 0.000, respectively). On the contrary, the impact they have on customer adoption is massive, whereby digital payment accessibility signifies a large effect size (2.114) and blockchain security moderate (0.430). Perceived trust produces a huge impact on customer adoption (5.573) and has a direct strong impact. These findings imply that, when assessed on their own, perceived trust is a key factor determining adoption even though it is not a mediator (Rahardja, Chen et al. 2023).

Theoretical Implications

The current research has helped to fill the gap that has been created in the literature regarding the Fintech adoption by testing how the factors of blockchain security and the availability of digital payments have a direct influence on customer behavior. The results complement and confirm existing technology acceptance theories and innovation diffusion theories by showing that technological infrastructural factors including the sense of security and accessibility of technology are the key to adoption stages in the Fintech setting. In addition, it raises the questions of how much of the relationship between blockchain security and digital payment accessibility and adoption are mediated by perceived trust since perceived trust did not mediate effects of either blockchain security and digital payment accessibility on adoption, and only had a small direct effect on adoption in the interactional model. This subtlety gives a detailed overview of the interplay between technical and psychological constructs in Fintech adoption model. These results also correspond and supplement similar FinTech frameworks that lay increased focus on the differentiated roles of security and usability, especially in a setting where digital literacy is high (EL-Hendawy and Metawea).

Practical Implications

The findings in a practical perspective will be of help in guiding Fintech companies, developers and policymakers. To begin with, the positive relationship between blockchain security and customer adoption is strong and it shows that financial technologies platforms need to market themselves as product to customers using effective communications strategies. The investments in the solid blockchain infrastructure are not only technically necessary, but also play a strong role in customer attraction and retention. Second, the associated importance of digital pay-ability implies that optimization of user interfaces, inter-device compatibility, and coverage of underprivileged areas should be on the strategic priorities of Fintech providers. Also, the results indicate that perceived trust is a direct factor in adoption, meaning that service providers should create approaches that are open, accountable, and to-be responsive to the clients. Such insights can also be used by policymakers to develop stronger rules and awareness programs to strengthen security and accessibility requirements, which will result in a more inclusive denizens of the digital financial environment (Irfan 2024).

CONCLUSION

This paper explored the effects of blockchain security, digital payment facility, and perceived trust to the adoption of Fintech services by offering a comprehensive view of the same based upon structural

equation modeling. The results reveal that the security of blockchain technology as well as its ease of access in making digital payments positively and significantly influence customer adoption and hence, their importance as technology enablers in the area of FinTech. Even though the effect of perceived trust has a direct impact on adoption, it does not moderate the connection between independent variables of adoption thus making the users consider trust as a factor independent of the security and accessibility factors.

This paper makes a theoretical contribution by having improved on the extant adoption models by distinguishing between the role played by technology and psyche. In practice, this asks that FinTech providers focus on the provision of secure and accessible infrastructure, and the instilling of user trust via user transparency and user-friendly design. Collectively, this study contributes to the knowledge of what drives FinTech adoption, and the study provides some recommendations on what scholars, developers, and policy designers can do to stimulate digital financial inclusion and customer base.

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

Although the study provides significant information about the determinants of Fintech adoption, there are also some limitations that should be mentioned and that leave room to conduct additional studies. First, it used cross-sectional design which cannot determine how user behavior and perceptions changes over time. Further research must be carried out with the consideration of the longitudinal study method so that the changes in adoption patterns can be observed as technology users continue to have more experience with Fintech platforms and develop other technological capacities. Second, the measurement of the key constructs in the study was narrow: blockchain security, digital payment accessibility, and perceived trust, which, though formative, do not expose fully the contributing factors that affect adoption. The identification of perceived risk, user innovativeness, digital literacy, regulatory perceptions, or social influence as possible additional variables to include in a future research should also be considered to provide a more complex model.

Other limitations to the generalizability of the findings were geographical and demographic constraints. Future research ought to examine cross-country or between-regions comparison to perhaps reveal aspects like levels of digital infrastructure and financial inclusion as driving uptake factors. Also, there is nothing to be said about the role of the perceived trust, which had no mediating effect, thus, further research is needed to focus on it as a moderator or a part of more intricate interaction model of user experience/ platform reputation. Future contributions can also examine segment behaviors by examining differences based upon generation or income levels, or the level of expertise users have concerning digital finance. To address the unresolved relationships identified in previous research (Malik, 2025), a fruitful direction for future research could be to examine financial literacy as an important moderating variable in blockchain-based financial adoption models. Finally, a mixed-method approach involving both quantitative and qualitative data (e.g., data gathered through interviews or case studies) may help to make this picture complete by understanding user preferences and context-specific motivations to adopt FinTech. These guidelines will inform theory further and serve as the basis of practice in the periodically developing Fintech arena.

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