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FinTech and Financial Inclusion: Exploring the Mediating Role of Digital Financial Literacy and the Moderating Influence of Perceived Regulatory Support

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Abstract: Exploring the potential of financial technology (FinTech) to promote financial inclusion is the aim of this research. This study concentrated on understanding why people use FinTech and how it affects their access to financial services by taking into account the mediating role of digital financial literacy and the moderating effect of perceived regulatory support. This study used partial least squares structural equation modeling (PLS-SEM) for testing the research model by collecting data from 608 FinTech users in India. The results revealed the role of trust, service quality, and perceived security are essential in promoting the utilization of FinTech services. This study also demonstrated that FinTech positively impacts financial inclusion, making it easier for individuals to get into formal financial services. Furthermore, digital financial literacy emerged as an important mediator between FinTech use and financial inclusion. The research also confirmed that perceived regulatory support has a significant moderation influence on the relationship between FinTech and financial inclusion. This research would contribute to advancing theoretical frameworks and offer practical advice for policymakers and FinTech companies to make financial services more inclusive.

Keywords: FinTech; financial inclusion; digital financial literacy; perceived regulatory support

1. Introduction

The issue of financial exclusion continues to be an important barrier to equitable development in the global financial landscape, even with all the economic progress we are seeing around the world. A significant segment of the population continues to face challenges in accessing the formal financial system (Senyo and Osabutey 2020). The World Bank's 2021 report shows this unequal access to financial services and highlights the necessity for some creative solutions to fix this gap (Demirgüç-Kunt et al. 2022). FinTech has emerged as a tech-savvy solution to make financial services way more accessible for everyone, especially those who are underserved (Aleemi et al. 2023; Senyo and Osabutey 2020).

FinTech is changing the way how individuals handle money. Individuals can now do their financial transactions anytime, anywhere, thanks to FinTech platforms (Yang and Zhang 2022). Fintech companies are using technology to create easy and innovative channels for financial services. Fintech is a game-changer, especially in places where traditional banking facilities are scarce, which enables individuals to perform financial transactions using their smartphones (Asif et al. 2023; Yeyouomo et al. 2023). FinTech services are way more cost-effective than traditional financial services (Shaikh et al. 2023). That means financial services become more affordable and reachable for a larger group of people, having a real effect on financial inclusion. In developing countries such as India, the support of digital financial literacy is essential to ensure access to financial services. Prominent international organizations such as the World Bank and the United Nations

are seeing FinTech as a key player in the fight against poverty and a driver for economic development (Feyen et al. 2023).

The Digital India policy of the government and the technology adoption mind-set of people have sparked a digital financial services boom in the context of India (Vyas and Jain 2021). The Global Findex database of 21 reveals that 24 percent of adults worldwide were unbanked globally and 30 percent in India (Paul 2022). In India, around 35 percent of the population uses digital methods of transactions though over 70 percent have bank accounts. Government initiatives such as UPI, AePS, Bharat QR code, and BHIM are transforming how individuals and businesses handle their money, which has a real impact on improving financial inclusion (Asif et al. 2023). However, the swift adoption of FinTech services has presented new challenges. Users face risks such as identity theft, privacy problems, unregulated service providers, and security issues (Jangir et al. 2022; Nasir et al. 2023). In response to these challenges, the role of digital financial literacy (DFL) becomes important, which involves knowledge about FinTech products and their management (Ravikumar et al. 2022).

A distinction should be made between 'digital literacy' and 'financial literacy'. While financial literacy is related to the ability of an individual to understand the fundamentals of economics and finance that help in making financial decisions, digital literacy is concerned with an individual's proficiency in using digitally delivered financial products (Prete 2022). Financial literacy thus focuses on the knowledge itself and the ability of an individual to acquire financial knowledge, whereas using technologies to create, evaluate, and acquire cognitive and technical skills to use digital technology is called 'digital financial literacy' (Zait and Bertea 2014).

For the purpose of using FinTech services effectively, education in the digital age must include digital financial literacy (Morgan et al. 2020). Even individuals with a reasonable amount of financial literacy may face difficulty in using FinTech services without adequate digital financial literacy (Kakinuma 2022). In this study, it is acknowledged that digital financial literacy has a substantial impact on the widespread usage of FinTech services. This underscores the necessity of a concise evaluation of digital financial literacy that accommodates unique opportunities and challenges presented by digital finance, in addition to traditional financial literacy.

This study is going to explore the relationship between FinTech and financial inclusion, considering digital financial literacy as a mediator and perceived regulatory support as a moderator. Previous studies on FinTech have focused on factors related to adoption of FinTech services or the direct effect of FinTech on financial inclusion (Alrawad et al. 2023; Asif et al. 2023; Bajunaied et al. 2023; Savitha et al. 2022; Shaikh et al. 2023; Xie et al. 2021). As far as our knowledge extends, there is a gap in the research concerning the examination of digital financial literacy as a mediator in the FinTech use and financial inclusion relationship. By understanding the crucial role of digital financial literacy in FinTech-enabled financial inclusion, this study intends to evaluate the mediating function of digital financial literacy in the pathway from FinTech use to financial inclusion. Previous research on perceived regulatory support has primarily focused on its direct effects on FinTech adoption (Ng and Kwok 2017; Nugraha et al. 2022). This study selects perceived regulatory support as a key moderator because its presence is essential for customers to use FinTech to meet their day-to-day financial needs. Perceived regulatory support (PRS) is defined as the extent to which individuals engaged in FinTech activities believe that the regulatory environment is supportive, transparent, and capable of safeguarding their interests (Chandra et al. 2010; Khan et al. 2023). It denotes the subjective perceptions and levels of confidence that participants have in the legal framework, which is crucial for FinTech adoption (Madan and Yadav 2016).

This study makes three significant contributions to the literature in behavioral finance. Firstly, it provides evidence indicating that the adoption of FinTech alone does not lead to improved financial inclusion. The association between FinTech usage and financial inclusion is indirect and complex, and a positive relationship is possible with the involvement

of mediating and moderating factors. Secondly, the FinTech use and financial inclusion relationship is mediated by digital financial literacy, emphasizing the significance of digital financial literacy in our contemporary, progressively digitized society. Thirdly, the research discloses a notable moderating impact of perceived regulatory support on FinTech-enabled financial inclusion. People who believe there is strong regulatory support are more likely to use FinTech services with confidence to meet their financial needs. This sense of regulatory support fosters confidence that FinTech services are perceived to be subject to strict government regulation to protect the interests of consumers. The goal of this study is to provide valuable insights that can guide the development of strategies to enhance FinTech-enabled financial inclusion, through the analysis of these key elements. In addition, this study aims to contribute to the domain of our present knowledge related to FinTech usage and financial inclusion and offer practical recommendations for both industry stakeholders and policymakers.

The paper's remaining segments are arranged in the following order: Section 2 undertakes a literature review, theoretical foundations, and hypotheses development. Section 3 outlines the data and methodology utilized in this study. Section 4 shows the results and provides an explanation of their implications. Section 5 includes the conclusion, study limitations, and suggestions for further work.

2. Theoretical Foundation, Review of Literature, and Hypothesis Development

2.1. Theoretical Foundation

The present study is grounded in the theoretical frameworks of the Unified Theory of Acceptance and Use of Technology (UTAUT2) (Venkatesh et al. 2003) and the Value-based Adoption Model (VAM) (Kim et al. 2007). These models serve as the theoretical underpinnings for the research. UTAUT2 helps us to understand the factors influencing behavioral intentions of adopting and using technology in the human–computer interface (Gansser and Reich 2021; Kilani et al. 2023). Prior researchers have used the UTAUT2 framework in assessing and predicting technology adoption in various contexts (FinTech use, mobile apps, and information systems) (De Blanes Sebastián et al. 2023; Ong et al. 2023). This study employs the UTAUT2 framework as a theoretical perspective due to its effective explanatory capabilities.

This study also builds on the Value-based Adoption Model (VAM) (Kim et al. 2007) in explaining the proposed hypothesized relationships in this study. The gist of VAM is that individuals' use of new technology largely depends on the perceived advantages and disadvantages of adopting new technology (Jun et al. 2018)—customers intention and adoption of FinTech hinges upon value-based adoption (Lee et al. 2015). Since trust, service quality, and perceived security add value to adopting new technology, i.e., FinTech, we applied VAM in this study. Furthermore, digital financial literacy and perceived regulatory support enhance the value. Some of the contemporary researchers also used VAM in explaining FinTech adoption (Hasan et al. 2021b). Thus, this research uses both UTAUT2 and VAM in FinTech adoption by individuals.

2.2. Trust and FinTech Use

Trust, in the context of FinTech services, denotes the faith or assurance that users place in the safety, dependability, and ethical conduct of financial technology platforms (Alrawad et al. 2023). Studies consistently demonstrate that trust has a strong influence on individuals' willingness to utilize FinTech platforms (Bajunaied et al. 2023; Savitha et al. 2022; George and Sunny 2021; Roh et al. 2022). This is especially relevant in the payment service domain, where maintaining a significant level of trust is considered crucial due to the frequent incidents of fraudulent activities, posing financial risks (Kilani et al. 2023). If users have a high level of trust in a FinTech platform, they are inclined to embrace and utilize it for their financial requirements (Nugraha et al. 2022). Confidence regarding the protection, privacy, and integrity of digital products is heightened while users place trust in FinTech platforms (Zhang et al. 2023). Consumers who have trust in FinTech platforms

perceive lower risks associated with utilizing these services (Shahzad et al. 2022). Users who have trust in a platform are more likely to remain loyal to it, engaging in repeated use of the services and possibly referring it to others (Bajunaied et al. 2023). Among the primary determinants of users' attitudes and behaviors toward FinTech services, trust stands out as a fundamental factor (Zarifis and Cheng 2022). It contributes to user confidence, increases user loyalty, diminishes perceived risk, and promotes positive word-of-mouth (Amnas et al. 2023; Savitha et al. 2022; Wang et al. 2019). Based on the empirical evidence, the following hypothesis was formulated.

H1. *Trust significantly and positively influences the use of FinTech services.*

2.3. Service Quality and FinTech Use

Service quality is defined as the overall benefit or superiority of a service in meeting customer expectations (George and Sunny 2021). The acceptance and continued use of FinTech platforms can be significantly impacted by users' perception of the quality of services offered (Ahmed et al. 2021; George and Sunny 2023). Customer satisfaction with FinTech services is associated with service quality (Gautam and Sah 2023). The degree to which FinTech platforms are adopted and used can be significantly influenced by users' experience of reliable, efficient, and fulfilling interactions with a FinTech platform (Ahmed et al. 2021; George and Sunny 2023). When the users believe FinTech services exceed their expectations in terms of quality, they are more likely to use them (Ghosh 2018). The customers evaluate the value they receive from FinTech, based on the quality of the services (Patnaik et al. 2023). Higher service quality contributes to a positive perception of value, which encourages them to keep using services (Roh et al. 2022). High service quality includes secure and reliable services, which positively influence users' confidence in the digital platform (Mujinga 2020). Customer loyalty and sustainable use of FinTech services are facilitated by positive perception of service quality, which also contributes to satisfaction and overall positive user experiences (George and Sunny 2023; Gautam and Sah 2023; Sultana et al. 2023). As a result, the following hypothesis was framed.

H2. *Service Quality significantly and positively influences the use of FinTech services.*

2.4. Perceived Security and FinTech Use

In the context of FinTech, perceived security refers to individuals' subjective assessment of the safety and protection associated with their financial data and transactions (Chandra et al. 2010; Nasir et al. 2023). Customer confidence in FinTech platforms is directly influenced by their perception of security (George and Sunny 2023). High levels of perceived security of users contribute to greater reliability of FinTech platforms, which is necessary for FinTech use (Putri et al. 2023). Using FinTech services will be less risky for users if they are confident that their financial information is secure (Jangir et al. 2022). Secure FinTech experiences contribute to customer retention and lower perception of risk (Bajunaied et al. 2023). If users feel that their data are secure, they are more inclined to remain loyal to FinTech platforms (Zhang et al. 2023). The common barriers to the utilization of FinTech such as concern about identity theft, data breaches, and unauthorized access can be eliminated by improving the perception of security (Bajunaied et al. 2023; Lim et al. 2019; Meng et al. 2019; Nasir et al. 2023). Hence the following hypothesis was proposed, based on the literature mentioned above.

H3. *Perceived security significantly and positively influences the use of FinTech services.*

2.5. FinTech Use and Financial Inclusion

FinTech makes it possible for customers in underserved or rural locations to obtain financial services via digital platforms, doing away with the necessity for physical bank branches (Arner et al. 2020; Shaikh et al. 2023; Yang and Zhang 2022). FinTech is making

financial services both convenient and budget-friendly. FinTech can cut down the costs associated with traditional banking (Shen et al. 2020). So, FinTech is not just for tech-savvy customers; it is making financial services way more affordable for underserved people. This opens up the door for those who might not have been part of a formal financial system to start using FinTech services and become part of a formal financial system (Bongomin and Munene 2021; Senyo and Osabutey 2020). FinTech is helping small businesses and individuals who might not qualify for traditional loans to receive financial assistance through microfinance and peer-to-peer lending services. This sparks more economic activity and entrepreneurship in underserved communities (Björkegren and Grissen 2018; Yue et al. 2022). FinTech companies collaborate with the government to make initiatives for financial inclusion, which facilitate the disbursement of social benefits, subsidies, and other financial assistance effectively to the people (Asif et al. 2023). FinTech is breaking down the barriers that used to keep people away from formal financial systems and using tech magic to make it more accessible (Aleemi et al. 2023; Yeyouomo et al. 2023). In the light of the literature mentioned above, the following hypothesis was developed.

H4. *The use of FinTech services significantly and positively influences financial inclusion.*

2.6. FinTech Use and Digital Financial Literacy

FinTech platforms provide educational content like articles, videos, and tutorials related to finance within their websites or apps. They are breaking down financial concepts and investment strategies and covering all kinds of useful topics to boost the financial literacy of the users (He et al. 2024; Kumar et al. 2023; Setiawan et al. 2022). Some of these apps even provide budgeting and financial management tools, helping users track spending, set goals, and manage finances more effectively (Carè et al. 2023; Uthaileang and Kiattisin 2023). These FinTech companies use artificial intelligence (AI) to provide personalized financial advice (Zarifis and Cheng 2022). It is like having a virtual money guru helping you make savvy decisions (Gautam et al. 2022; Shen et al. 2018). FinTech apps make learning about finance joyful by adding game elements (Lai and Langley 2023). Users can play around with virtual financial activities, gain some real-world experience, and level up their financial know-how in a risk-free way (Kakinuma 2022; Şenol and Onay 2023). FinTech platforms facilitate community engagement, where users can chat with other users, share experiences, pose inquiries, and gain knowledge from one another (Ravikumar et al. 2022). A collaborative learning environment is fostered by this sense of community, especially for individuals who are new to digital financial tools (Malladi et al. 2021). Hence the following hypothesis was proposed.

H5. *Use of FinTech services significantly and positively influences digital financial literacy (DFL).*

2.7. Digital Financial Literacy and Financial Inclusion

Digital financial literacy (DFL) provides people with the knowledge and understanding of financial technology, promoting greater awareness and comprehension of digital financial services, which ultimately leads to digital financial inclusion (Choung et al. 2023; Malladi et al. 2021). Digital financial literacy enhances people's ability to effectively mitigate potential risks, and it has positive influence on individuals' perception of risks associated with using digital services (Kumar et al. 2023; Panos and Wilson 2020). Higher levels of digital financial literacy generate greater confidence in using digital financial services, which contributes to a positive attitude toward the formal financial system (Lyons and Kass-Hanna 2021). Digital financial literacy plays a crucial role in empowering individuals to make informed decisions through the use of digital financial services, facilitating their greater integration into the digital financial landscape (Prasad et al. 2018; Shen et al. 2018). Digital financial literacy has a favorable influence on financial inclusion by encouraging greater use of digital services, empowering people to make informed decisions, raising security awareness, and enhancing decision-making in digital transactions (Hasan et al. 2021a;

Ravikumar et al. 2022; Uthaileang and Kiattisin 2023). The following hypothesis was put forward in light of the earlier empirical research.

H6. *Digital financial literacy (DFL) significantly and positively influences financial inclusion.*

2.8. Digital Financial Literacy as a Mediator

Previous research studies indicate FinTech use and financial inclusion have a complex relationship that is influenced by various factors (Sampat et al. 2023; Yue et al. 2022; Wang 2023). Bongomin and Ntayi (2020) found that digital consumer protection acted as a mediator in the pathway from FinTech adoption to financial inclusion. In a similar vein, Al-Slehat (2023) discovered digital marketing acts as a mediator in the FinTech usage and financial inclusion relationship. However, a detailed analysis of the literature revealed a research gap; none of the studies had looked at digital financial literacy as a mediator in the connection between FinTech use and financial inclusion. This study asserts that the use of FinTech not only has direct impact on financial inclusion but also exerts an indirect effect through digital financial literacy. Digital financial literacy significantly aids FinTech-enabled financial inclusion by empowering individuals with the capabilities and guidance required to proficiently use digital platforms (Kumar et al. 2023; Panos and Wilson 2020; Ravikumar et al. 2022). However, the direct effects of FinTech on financial inclusion are well documented in the existing literature, but no prior study has, as far as we are aware, examined the indirect pathway of FinTech through digital financial literacy. Considering the available literature, the following exploratory mediation hypothesis was formulated.

H7. *Digital financial literacy mediates the relationship between FinTech use and financial inclusion.*

2.9. Perceived Regulatory Support as a Moderator

In the context of FinTech services, perceived regulatory support denotes the individuals' subjective beliefs about the degree of encouragement, support, and regulatory environment that the government offers (Chandra et al. 2010; Khan et al. 2023). Following the VAM, we argue that users' perceptions of regulatory support play a crucial role in contributing to the reliability and confidence that individuals have in FinTech platforms (Nugraha et al. 2022). FinTech platforms are trusted by users if they perceive that regulators support and endorse them (Madan and Yadav 2016; Xia et al. 2023). When users are confident that their financial transactions are conducted within a regulated and secure environment, they are more likely to use these digital services (Ediagbonya and Tioluwani 2023; Ng and Kwok 2017). Perceived regulatory support implies that there are regulations and mechanisms in place to protect the rights and interests of consumers (Brown and Piroska 2022). When consumers believe that regulatory bodies are actively monitoring and enforcing consumer protection laws, they are more willing to utilize FinTech services (AlBenJasim et al. 2023). This assurance promotes the broader use of FinTech, especially among those who have limited access to traditional banking services (Otieno and Kiraka 2023). Perceived regulatory support acted as a critical factor in facilitating the integration of FinTech services into the formal financial system, thereby contributing to the inclusion of more individuals in mainstream finance (Bu et al. 2022). This study argues that the connection between FinTech use and financial inclusion is subject to moderation by the perception of regulatory support. Lack of research on the moderating effect of perceived regulatory support was identified; it would be interesting to see how perceived regulatory support affects the strength of the positive association between FinTech usage and financial inclusion. Consequently, the following exploratory moderating hypothesis based on the limited empirical evidence, was formulated.

H4a. *Perceived regulatory support moderates the relationship between FinTech use and financial inclusion such that higher (lower) levels of perceived regulatory support are associated with stronger (weaker) relationship between FinTech use and financial inclusion.*

The conceptual model is presented in Figure 1.
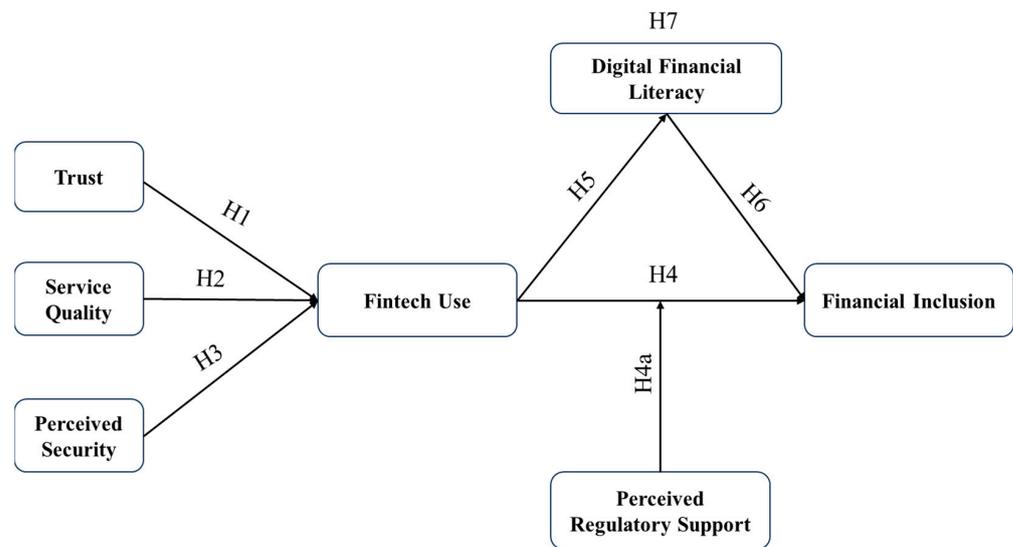
Figure 1. The conceptual model. Source: the authors.

3. Research Methodology

3.1. Measurement Development

A research framework was created in order to meet this study's goals, and it is depicted in Figure 1. This study employed seven variables, which were assessed by using different items, adapted from the existing literature (Appendix A). The variable, trust, was measured by using items adapted from Singh and Srivastava (2018) and Kumar et al. (2018), and items for evaluating perceived security were taken from George and Sunny (2023). The measures of service quality were modified from Zhou (2013), while items evaluating perceived regulatory support were borrowed from Chandra et al. (2010). Items for measuring the variable FinTech use were adapted from the previous study by Venkatesh et al. (2012). The variables utilized in this study were assessed through multiple items derived from the existing literature, and they were then adjusted to suit the specific research context. The items employed to gauge FinTech usage were adapted from Venkatesh et al. (2012). Users primarily utilize FinTech platforms for four main types of services: payment services, investment or wealth management services, credit services, and insurance services. In this study, we employ the items from Venkatesh et al. (2012) to measure these four types of services. For example, the statement 'I leverage FinTech investment platforms to oversee my investment portfolio' is employed to assess whether users utilize FinTech for managing their investments. A recently conducted study on FinTech use by Xia et al. (2023) employed the same measure to tap the FinTech construct. Furthermore, previous scholars (e.g., Xie et al. 2021) measured the variable of wealth management by adapting items from Venkatesh et al. (2012). Additionally, Senyo and Osabutey (2020) and George and Sunny (2023) also utilized items from Venkatesh et al. (2012) to measure mobile money usage behavior and mobile wallet continuous intention, respectively. Similarly, in this study, we used items from Venkatesh et al. (2012) to measure the utilization of FinTech platforms.

The items used to test digital financial literacy were modified from those developed by Ravikumar et al. (2022), and those items related to financial inclusion were taken from Bongomin and Ntayi (2020). A five-point Likert scale with the values of 'strongly disagree' to 'strongly agree' was employed to assess each measurement item.

The questionnaire was divided into two sections: the first was used to gather demographic data, while the second was designed to garner respondents' opinions about each variable in the research model. Before collecting data, we received informed consent from the respondents and assured them about the anonymity of their responses. We adhered to

ethical guidelines when gathering data. The questionnaire was finalized after careful scrutinization and confirmation by two persons from the FinTech industry and four academic experts. Each survey item was assessed by the experts for clarity and understandability. They considered factors such as the use of language, possible ambiguity, and the suitability of terminology for the intended audience. To confirm that the measurement tool was suitable, a pilot study with thirty people was tested before administering the questionnaire to the intended participants. Some items were modified after the pilot test in response to the initial validity evaluation of the pilot sample. Notably, some survey items were modified to enhance clarity and mitigate the likelihood of participant misunderstanding. To improve the flow and continuity of the survey, structural changes were also made, such as the order of questions. We also ensured that the survey instrument was very long so that the mandatory questions in Google Forms do not discourage the respondents from filling out the form dispassionately.

3.2. Sample and Data Collection

The research focuses on people, who were engaged with FinTech services in India. The organized survey instrument was made with Google Forms and distributed to individuals using FinTech platforms. The lack of information regarding the population that used FinTech services led to the employment of the convenience sampling method, which was suggested by previous research (Alrawad et al. 2023; Kakinuma 2022; Kilani et al. 2023; Senyo and Osabutey 2020). The three months, ranging from September 2023 to November 2023, were used for data collection. In the non-availability of a predefined list of individuals using FinTech, we followed the snowball sampling technique of data collection by using Google Forms and sent the link to various social media platforms (email, WhatsApp, and Facebook). The first respondents were requested to spread the survey instrument widely to obtain a large sample. During the pandemic and post-pandemic period, several researchers used Google Forms to collect data considering health-related issues and periodical social distancing problems, and we followed an approach that is consistent with the contemporary method of data collection.

We received 608 fully completed questionnaires. Google Forms gives the option to mark questions as mandatory, which forbids respondents from moving forward without answering all questions. Using the G*Power software version 3.1, researchers have calculated the sample size required to meet this study's objectives (Faul et al. 2007). In this study, the model comprised five predictors. A sample size of 138 was recommended by the software with a power level of 0.95 and an effect size of 0.15. This study's actual sample size of 608 was more than four times larger than the required size. By comparing the first 75 respondents with the last 75 respondents, we assessed for non-response bias and discovered no notable distinction between these two groups. The respondents' demographic details are shown in Table 1.

Table 1. Demographic profile of the respondents. Source: the authors.

Demographic Variable	Groups	Frequency	Percentage
Gender	Male	308	50.66
	Female	300	49.34
Age (in years)	15–25	251	41.28
	26–35	205	33.72
	36–45	61	10.03
	46–55	56	9.22
	Above 55	35	5.76
Education level	Primary	17	2.80
	Secondary	92	15.13
	Graduation	226	37.17
	Post graduation	186	30.59
	Professional qualification	87	14.31

Table 1. *Cont.*

Demographic Variable	Groups	Frequency	Percentage
Place of residence	Rural	369	60.69
	Urban	239	39.31
Experience in FinTech use	Less than 1 year	47	7.73
	1–3 years	119	19.57
	2–5 years	139	22.86
	More than 5 years	303	49.84
Frequency of FinTech use	Rare	28	4.61
	Sometimes	120	19.74
	Often	173	28.45
	Always	287	47.20

4. Data Analysis and Results

To conduct measurement and structural model analyses, we used the partial least squares structural equation model (PLS-SEM). This study's data analysis was performed by using Smart PLS version 4.0 (Hair et al. 2019)

4.1. Common Method Bias (CMB) Test

To ascertain the potential existence of CMB in the data, the data were thoroughly investigated for collinearity, to ensure its absence. The term 'common method bias' (CMB) describes a potential source of bias in research data that results from the commonality of the data collection method rather than from the constructs to be measured. Harman's one-factor test (Podsakoff et al. 2003) was used to conduct the common method bias (CMB) test. The findings indicated that only 48.55% of the variance in the research data was accounted for, and it was less than the critical threshold of 50%. A full collinearity test was also performed to evaluate CMB thoroughly. The findings revealed that the VIF values for all variables were below 3.3, as suggested by Kock (2015). In other words, the dataset showed no signs of CMB.

4.2. Assessment of Measurement Model

The foundational aspect of structural equation modeling relies on the measurement model. It ensures the validity and reliability of instruments in effectively capturing the constructs (Hair et al. 2021). The composite reliability and Cronbach's alpha scores were assessed to ensure the internal consistency and reliability of each construct. In general, satisfactory reliability is attained when the value of Cronbach's alpha coefficient and composite reliability exceeds the threshold of 0.70 (Henseler et al. 2016). As per Table 2, values of Cronbach's alpha coefficients and composite reliability ranged from 0.816 to 0.913, and it confirmed the internal consistency and reliability of the constructs.

A construct's AVE value needs to be higher than 0.50 in order to exhibit convergent validity (Hair et al. 2021). A strong convergent validity is evident from Table 2 as all variables in the research model reported AVE values greater than 0.50. To assess discriminant validity, the Fornell–Larcker Criterion was used in the research (Fornell and Larcker 1981). Table 3 demonstrates that the square route of AVE values consistently surpasses the correlations between any two constructs under study. This finding established the discriminant validity of this study by the guidelines provided by Hair et al. (2021). Furthermore, we evaluated multicollinearity using variance inflation factors (VIFs). The VIF values varied from 1.551 to 2.656 in our study, which were less than the suggested threshold value of 3 (Hair et al. 2021). Consequently, we do not find any significant multicollinearity issues in our dataset.

Table 2. Reliability and convergent validity. Source: the authors.

Construct	Items	Loading	Cronbach's Alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)	Average Variance Extracted (AVE)
Perceived security	PS1	0.821	0.837	0.838	0.891	0.672
	PS2	0.847				
	PS3	0.816				
	PS4	0.795				
Trust	TR1	0.831	0.872	0.879	0.913	0.723
	TR2	0.873				
	TR3	0.876				
	TR4	0.821				
Service quality	SQ1	0.808	0.867	0.868	0.909	0.715
	SQ2	0.885				
	SQ3	0.851				
	SQ4	0.836				
FinTech use	FU1	0.818	0.847	0.851	0.897	0.685
	FU2	0.874				
	FU3	0.81				
	FU4	0.807				
Financial inclusion	FI1	0.783	0.844	0.853	0.896	0.683
	FI2	0.886				
	FI3	0.86				
	FI4	0.771				
Digital financial literacy	DFL1	0.747	0.816	0.823	0.879	0.645
	DFL2	0.801				
	DFL3	0.845				
	DFL4	0.816				

Table 3. Discriminant validity: Fornell–Larcker Criterion. Source: the authors.

	DFL	FI	FU	PRS	PS	SQ	TR
DFL	0.803						
FI	0.79	0.826					
FU	0.729	0.736	0.828				
PRS	0.661	0.665	0.643	0.796			
PS	0.679	0.63	0.656	0.641	0.82		
SQ	0.652	0.653	0.659	0.722	0.664	0.845	
TR	0.652	0.679	0.653	0.773	0.727	0.735	0.851

### 4.3. Assessment of the Structural Model

We proceeded to evaluate the hypotheses of the research after establishing the validity of the measurement model. Table 4 presents the results of the hypotheses test, which revealed significant positive effects of trust (β = 0.210; $p < 0.001$), service quality (β = 0.304; $p < 0.001$), and perceived security (β = 0.301; $p < 0.001$) on FinTech use; therefore, H1, H2, and H3 were accepted. Similarly, the results indicated that FinTech use (β = 0.281; $p < 0.001$) exerted a positive and significant impact on financial inclusion. Hence, H4 was supported. Regarding the relationship between FinTech use and digital financial literacy, the results indicated that FinTech use had significant positive impact on digital financial literacy (β = 0.729; $p < 0.001$), which validated H5. The findings also demonstrated the significant effect of digital financial literacy on Financial Inclusion (β = 0.482; $p < 0.01$), thereby supporting H6. The findings indicated a substantial mediation effect of digital financial literacy (β = 0.352; $p < 0.001$) in the FinTech use and financial inclusion relationship; therefore, H7 was supported.

Table 4. Results of hypotheses testing.

| Hypothesis	Path	β	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	p Values	Decision
H1	TR->FU	0.21	0.059	3.553	0.000	Supported
H2	SQ->FU	0.304	0.054	5.673	0.000	Supported
H3	PS->FU	0.301	0.063	4.797	0.000	Supported
H4	FU->FI	0.281	0.043	6.506	0.000	Supported
H5	FU->DFL	0.729	0.025	29.425	0.000	Supported
H6	DFL->FI	0.482	0.045	10.669	0.000	Supported
H7	FU->DFL->FI	0.352	0.032	11.082	0.000	Supported
H8	PRS x FU->FI	0.053	0.02	2.631	0.009	Supported

The results also demonstrated that the FinTech use and financial inclusion relationship has the moderation effect of perceived regulatory support (β = 0.053; $p < 0.01$), supporting H4a. Figure 2 shows that the correlation between FinTech usage and financial inclusion is stronger when there is a high perceived level of regulatory support, as compared to moderate or lower levels of perceived regulatory support. Moreover, when Fintech usage escalates from low to high, the relationship between FinTech usage and financial inclusion becomes stronger, especially when there is high perceived regulatory support in contrast to moderate or low perceived regulatory support. The variation in the slope of the curve provides additional evidence for supporting the moderation hypothesis (H4a).

According to the R-squared values, the model could explain 53.5% of the variability in FinTech use, 53.1% in digital financial literacy, and 69.7% in financial inclusion. These findings suggest a satisfactory level of fit for the model. Additionally, the Stone–Geisser test criterion (Q^2) values for the dependent variables were calculated to verify the predictive relevance of the research model. The analysis revealed that the values of FinTech use ($Q2 = 0.527$), digital financial literacy ($Q^2 = 0.499$), and financial inclusion ($Q^2 = 0.527$) were greater than zero ($Q^2 > 0$), which confirmed the predictive accuracy of our model (Hair et al. 2021).
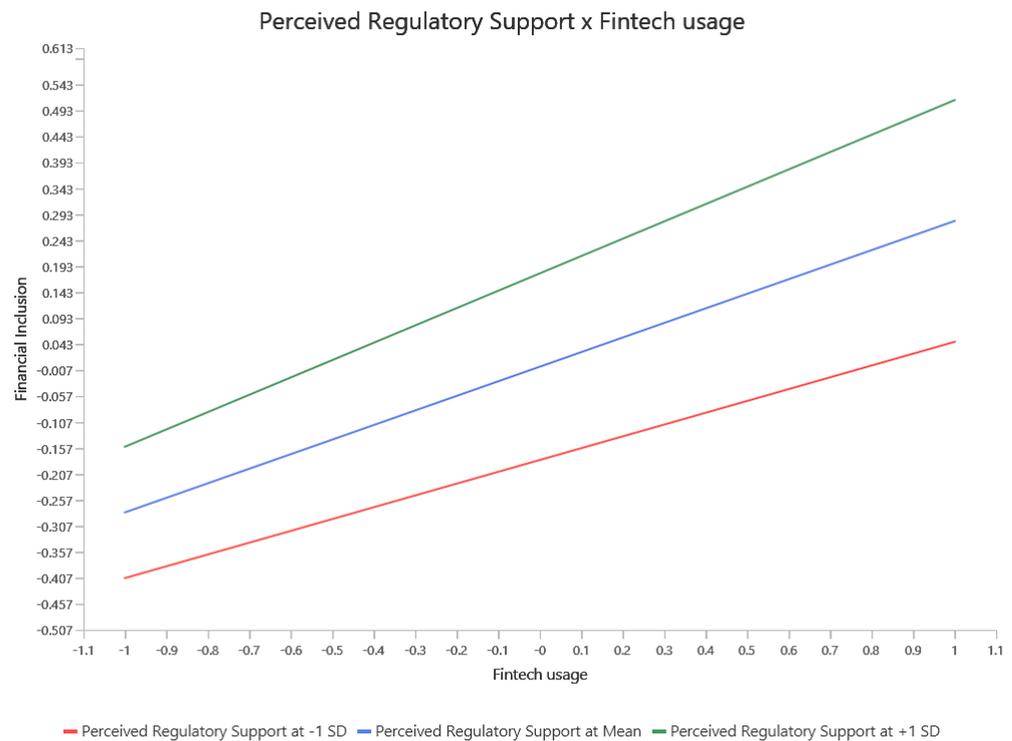
Figure 2. Perceived regulatory support as a moderator in the relationship between FinTech and financial inclusion. Source: the authors.

The empirical model is presented in Figure 3.
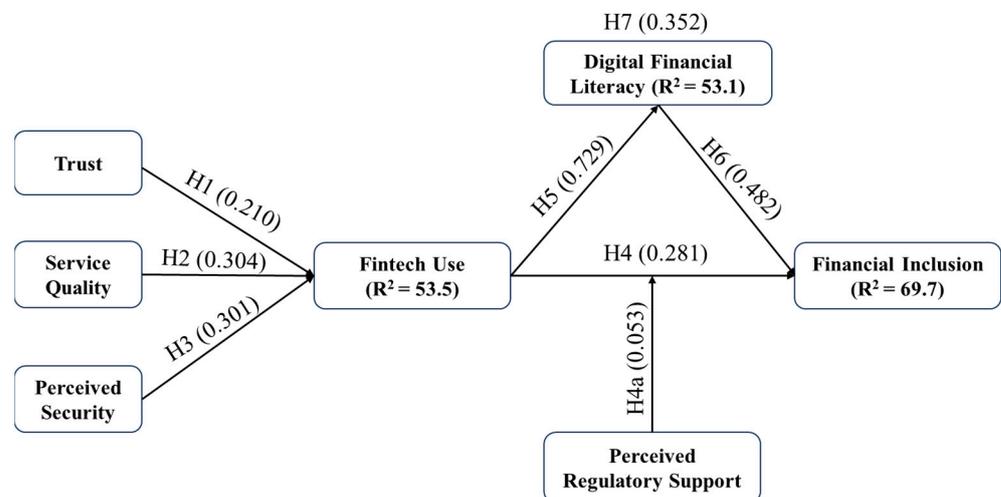
Figure 3. The empirical model. Source: the authors.

5. Discussion

Recognizing the importance of digital financial literacy and perceived regulatory support in FinTech-enabled financial inclusion, this study empirically tested the mediating and moderating effects of these variables in the association between FinTech use and financial inclusion. The motivation for this research emanated from a gap in the existing literature, which has not explored the mediating role of digital financial literacy and the moderating influence of perceived regulatory support.

First, the results demonstrated that trust significantly and positively influenced the use of FinTech services (Hypothesis 1), concurring with prior research (Alrawad et al. 2023; Amnas et al. 2023; Savitha et al. 2022; Wang et al. 2019; Zarifis and Cheng 2022). This

confirmation established the essential function that trust plays in promoting the utilization of FinTech platforms. The likelihood of users accepting and utilizing FinTech platforms increases when they feel that the service provider is committed to protecting their financial information. Second, the results also revealed that the usage of FinTech services is significantly and favorably impacted by service quality (Hypothesis 2), in line with other studies (Ahmed et al. 2021; George and Sunny 2023; Gautam and Sah 2023; Sultana et al. 2023). In other words, the quality of the FinTech products like user-friendly designs, extensive features, speed, customization options, quick customer support, and clear communication can attract users to FinTech platforms and promote continuous usage of these services. Third, the positive association of perceived security with FinTech use (Hypothesis 3) found support in this study, which is consistent with other studies from the literature (Bajunaied et al. 2023; Lim et al. 2019; Meng et al. 2019; Nasir et al. 2023) that shows when people feel secure about their sensitive information, they are more inclined to use FinTech platforms. In other words, the perception of security helps ease worries about privacy, boosts confidence, and lowers the risks tied to online transactions.

The fourth key finding in this research is the positive and substantial influence of FinTech use on financial inclusion (Hypothesis 4), which is consistent with previous studies (Arner et al. 2020; Asif et al. 2023; Shaikh et al. 2023; Yang and Zhang 2022). It means getting into FinTech can increase access to financial services through digital channels. Fifth, this study found that the utilization of FinTech services also enhanced digital financial literacy (Hypothesis 5). This means FinTech is facilitating learning about finances with educational resources, hands-on learning experiences, and real-time monitoring. Sixth, this study found that digital financial literacy has significant influence on financial inclusion (Hypothesis 6) consistent with other research (He et al. 2024; Kumar et al. 2023; Ravikumar et al. 2022). That indicates consumers with greater levels of digital financial literacy can make informed financial decisions, reduce the risk involved with FinTech services, and actively engage in the formal financial system. Seventh, this study shows that the FinTech use and financial inclusion relationship is mediated by digital financial literacy (Hypothesis 7). So, when people use FinTech, they are likely to improve their digital financial literacy with the support of educational resources provided by FinTech platforms, which, in turn, helps out with improved financial inclusion.

The eighth finding is support for the moderating influence of perceived regulatory support in the relationship between FinTech and financial inclusion (Hypothesis 4a). When users feel like there is good regulatory backup, it creates a positive impact on the association between FinTech and financial inclusion. Having strong support from the regulators makes users more confident and willing to stick with FinTech services. The perceived regulatory support can make a difference in how FinTech impacts financial inclusion by acting as an important factor for the development of confidence in users of FinTech.

6. Theoretical Implications

This study's theoretical implications are important because this research sheds further light on the complicated interaction between FinTech, digital financial literacy, regulatory support, and financial inclusion. One of the noteworthy contributions this study made was to bring in digital financial literacy as a mediator in the FinTech and financial inclusion relationship. In the context of FinTech, theoretical frameworks for financial inclusion need to be updated to consider the growing importance of digital financial literacy, as it is a necessary intermediate step toward financial inclusion. This study also confirmed that perceived security, trust, and service quality are key factors that influence people's decision to use FinTech. This study introduced perceived regulatory support as a moderator, showing that rules and regulations can amp up FinTech's impact on financial inclusion. So, the existing theories about financial systems might need an update to consider the relevance of perceived regulatory support in FinTech. The research opens opportunities for future scholars to look deeper into these theoretical dimensions and refine existing frameworks to better capture the complexities of the FinTech-driven financial inclusion landscape.

7. Practical Implications

This research holds various implications for financial institutions, policymakers, and FinTech service providers. First, FinTech companies need to make sure users trust them. That means being super clear in communication, implementing increased security, and having top-notch customer support will help to create customers' trust. Second, investment for making their services better in terms of user interface, speed, and reliability is a smart move to improve service quality, which is essential for retaining users. Now, security is a big deal. Regularly updating users on security information and educating them about how their data is being protected can help ease the worries of the users. It is all about building confidence. Third, policymakers and educational institutions should team up to take steps to improve the digital financial literacy of the people. FinTech companies can facilitate improving literacy by offering tutorials and educational content on their platforms in innovative and interesting ways. Third, policymakers also may focus on making clear rules and frameworks and being transparent about regulatory frameworks, which can boost confidence and make people more likely to depend on FinTech for their financial needs. Special initiatives to boost digital financial literacy, especially in underserved groups, could be a game-changer. Lastly, FinTech companies, policymakers, and regulators need to keep their eyes on the evolving FinTech platforms. Regular checks on user experiences, security measures, and how well digital literacy programs are working will maintain the favorable impact on financial inclusion by FinTech going strong.

8. Limitations and Future Scope of this Study

Though this study offers insightful information, it is not free from limitations. This study employed a convenience sampling method because there was no predefined list of FinTech customers. It is a practical approach, but it could introduce bias since it might not represent all FinTech users out there. Also, this study focused on FinTech users in India, so the findings might not fit for other places, because the different geographical locations have different economic situations, rules, and FinTech landscapes. Furthermore, the effect of the personality characteristics of respondents on FinTech use and financial inclusion was not investigated in this study. It is more likely that age, experience, and attitude toward the use of technology may have profound influence on FinTech use and financial inclusion.

To increase our knowledge in this area, future research could go beyond quantitative research and focus on qualitative studies. First, the interaction with people through interviews or focus groups could give us a deeper knowledge of how users see and deal with FinTech. Second, it might also be interesting to compare how FinTech services change across different groups based on age, income, and education levels. That could uncover some interesting findings regarding how FinTech affects financial inclusion. Third, future studies can also focus on specific FinTech services like mobile payments, peer-to-peer lending, or robo-advisors. Each one might have a different impact on financial inclusion, so it is worth checking out. Fourth, large samples may be used to increase the generalizability of the findings from this study.

9. Conclusions

This study offers insightful information on the complex association between the use of FinTech and financial inclusion. The research found that trust, service quality, and perceived security are key factors that make people stick with FinTech services. As per the findings, FinTech promotes financial inclusion by increasing accessibility to financial services and lowering transaction costs. According to this study, knowing how to handle digital finances is super important for making the most out of FinTech services. In other words, in this age of crazy tech advancements, being digitally literate is a must for making smart money moves and being part of the formal financial system.

The research also brings up an interesting point about how people's perception of regulatory support affects the connection between FinTech use and financial inclusion. If people feel like there is good regulatory support, it amplifies the favorable effects on

financial inclusion by FinTech use. So, having a supportive regulatory environment is crucial for building trust and allowing more people to jump on the FinTech landscape. This study not only fills gaps in the existing research by looking into digital financial literacy and regulatory support but also gives us a clear picture of how FinTech use and financial inclusion are connected. The model and concepts introduced by this research would contribute substantially to the growing body of literature in the realms of FinTech use and financial inclusion.

Appendix A. Survey Instrument (with Sources of Constructs)

Constructs	Items	Questions	Sources
Trust (TR)	TR1	I trust that FinTech platforms will securely handle and protect my financial information.	Singh and Srivastava (2018) and Kumar et al. (2018)
	TR2	I have confidence in the reliability and stability of FinTech services for my financial transactions.	
	TR3	I trust that FinTech platforms will promptly address any issues or concerns I may have.	
	TR4	I trust that FinTech platforms adhere to ethical standards and guidelines in their business practices.	
Service quality (SQ)	SQ1	FinTech services consistently meet my expectations in terms of reliability and performance.	Zhou (2013)
	SQ2	I am satisfied with the speed and efficiency of problem resolution when I encounter issues with FinTech services.	
	SQ3	The user interface of FinTech apps is intuitive and easy to navigate.	
	SQ4	FinTech platforms provide clear and transparent information about fees, charges, and terms of use.	
Perceived security (PS)	PS1	I believe that my personal and financial information is secure when using FinTech platforms.	George and Sunny (2023)
	PS2	I am confident that FinTech platforms promptly address and resolve any security vulnerabilities.	
	PS3	I have confidence in the effectiveness of the authentication methods employed by FinTech services to prevent unauthorized access.	
	PS4	I believe that FinTech companies implement sufficient measures to safeguard against fraud and cyber threats.	

Constructs	Items	Questions	Sources
FinTech use (FU)	FU1	I frequently employ FinTech for making payments and transferring funds.	Venkatesh et al. (2012)
	FU2	I leverage FinTech investment platforms to oversee my investment portfolio.	
	FU3	I turn to FinTech services when I require financial assistance.	
	FU4	I actively engage with FinTech insurance services to purchase and oversee insurance policies.	
Financial I inclusion	FI1	FinTech services have expanded my access to financial products and services.	Bongomin and Ntayi (2020)
	FI2	FinTech services have increased my ability to save and invest my money.	
	FI3	FinTech adoption has made it easier for me to send and receive money.	
	FI4	FinTech services have improved my ability to access credit and loans.	
Digital financial literacy	DFL1	I am knowledgeable about the various features and functionalities of fintech apps.	Ravikumar et al. (2022)
	DFL2	I am aware of the potential risks and security measures associated with using digital payment systems.	
	DFL3	I know how to troubleshoot common issues related to digital financial transactions.	
	DFL4	I am familiar with the terms and concepts related to digital financial services.	
Perceived regulatory support	PRS1	My decision to utilize FinTech services is positively impacted by governmental initiatives and policies.	Chandra et al. (2010)
	PRS2	Government promotions highlighting the advantages of FinTech services make me more predisposed to using them.	
	PRS3	The backing of the government instills a greater sense of security and confidence in my utilization of FinTech services.	
	PRS4	Government support plays a role in enhancing the accessibility and affordability of FinTech services.	

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