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Financial technology (Fintech) innovation and financial inclusion: comparative study of urban and rural consumers post-Covid-19 pandemic

Budi Setiawan[1], Dien Triana[2], Ummu Salma Al Azizah[3], Andi Sri Wahyuni[2,4], Vijay Victor[5,6], Robert Jeyakumar Nathan[7*] and Maria Fekete-Farkas[8*]

*Correspondence: robert.jeyakumar@mmu.edu.my; Farkasne.Fekete.Maria@uni-mate.hu

[1] Faculty of Economics, Universitas Indo Global Mandiri, Palembang, Indonesia
[2] Department of Accounting, Politeknik Negeri Ujung Pandang, Makassar, Indonesia
[3] Faculty of Economic and Business, Universitas Muhammadiyah Prof. DR. HAMKA, Jakarta, Indonesia
[4] Faculty of Economics and Businesses Administration, University of Szeged, Szeged, Hungary
[5] Department of Humanities and Social Sciences, Indian Institute of Technology Roorkee, Roorkee, India
[6] College of Business and Economics, University of Johannesburg, Johannesburg, South Africa
[7] Faculty of Business, Multimedia University, Melaka, Malaysia
[8] Institute of Agricultural and Food Economics, Hungarian University of Agriculture and Life Sciences, Gödöllő, Hungary

Abstract

This study refines the technology acceptance model (TAM) to explore the determinants of financial innovation or financial technology (Fintech) adoption and their impact on use behavior, particularly in the context of financial inclusion. It investigates how these drivers differ between urban and rural populations in terms of the innovation of digital financial literacy, behavioral intentions, and government support. Data from 654 respondents in Indonesia were analyzed using partial least squares-structural equation modeling (PLS-SEM). The findings indicate that value of status quo is the principal factor influencing Fintech adoption, while personal innovativeness has a minimal effect. Behavioral intention positively correlates with use behavior, which in turn significantly enhances financial inclusion. The study also identifies personal innovativeness, government support, and value of status quo as mediating factors between behavioral intention and use behavior. Notable differences were found between urban and rural respondents regarding the influence of digital financial literacy on behavioral intention and the impact of government support on use behavior in the post-Covid-19. This research not only empirically assesses the role of Fintech in advancing financial inclusion through behavioral intention and use behavior, but also provides strategic insights for digital finance innovation providers to tailor financial access according to the location of the respondents.

Keywords: Technology acceptance model, Fintech, Financial inclusion, Financial innovation service, SDG8

Introduction

The rapid expansion of the innovation and technology industry has emerged as a pivotal driver of global economic development (Danish et al., 2023). The innovation and technology growth has, in turn, placed the stage for an unprecedented change in financial service provision (Dehnert, 2020). In recent years, the innovation of financial service or financial technology (Fintech) sector has experienced exponential growth, facilitating secure, efficient, user-friendly, and high-quality online banking services (Barroso &

Laborda, 2022; Bhat et al., 2023; Igamo et al., 2024; Nugraha et al., 2022). Fintech refers to digital financial platforms that enable contactless and remote transactions, eliminating the need for physical interaction (Cai et al., 2024; Puschmann, 2017).

However, a significant proportion of users are reluctant to use Fintech services (Al Nawayseh, 2020). Users often have apprehensions related to conducting financial transactions online, with many concerns centered on the security, privacy risks, the virtual characteristics of payment activities, abilities and training required, ease of use, and availability of Fintech providers (Al Nawayseh, 2020; Li, 2023; Suryono et al., 2020; Wonglimpiyarat, 2018). Prior empirical studies have also highlighted users' reservations regarding the availability of supporting infrastructure, such as lack of access to the internet, and level of uncertainty, effectiveness of services and information technology (IT) skills for online transactions (Suryono et al., 2020). Consequently, it is imperative for policymakers, Fintech employees, and digital-based finance business providers to gain a deeper understanding of consumer adoption towards Fintech services (Dafri & Al-Qaruty, 2023). Such insights are crucial for formulating policies, improving the uptake of Fintech services and promoting financial inclusion.

The adoption and acceptance of Fintech varies across different demographic groups, social contexts, and cultural backgrounds (Chinnasamy et al., 2021; Cui et al., 2019; Das & Das, 2020; Hasan et al., 2023; Hua & Huang, 2021; Mahmud et al., 2022). Financial inclusion, particularly in several developing countries, remains relatively low (Rufaidah et al., 2023). Recent reports indicate that Indonesia is one of four countries with a significant unbanked population, where 100 million (37%) of its citizens did not have a bank account in 2021 (Demirgüç-Kunt et al., 2022). This emphasizes the low level of financial literacy in Indonesia. Furthermore, the data show that Indonesia is one of the three countries where cash is still the predominant form of transaction (Demirgüç-Kunt et al., 2022).

In addition to these challenges, the recent economic crisis triggered by the pandemic has had a profound impact on people's financial conditions and behavior (Khetan et al., 2022). Digital financial literacy, especially in the context of Fintech, has become critical to individuals' financial security and preparedness (Lyons et al., 2022). This topic is also relevant to stakeholders, including the government, in efforts to optimize the adoption of Fintech in society (Aik & Zhang, 2023; Rufaidah et al., 2023). Furthermore, the adoption of Fintech, with its impact on financial inclusion, is closely linked to the need to accelerate the achievement of the United Nations Sustainable Development Goals (UNSDGs) (Klapper et al., 2016). Previous research demonstrates the positive impact of financial inclusion on the realization of Sustainable Development Goals, particularly with regard to the SDGs, which include zero hunger (SDG 2), gender equality (SDG 5), and economic growth (SDG 8) (Yap et al., 2023).

This research offers nuanced insights for Fintech businesses and policy makers. It sheds light on the relatively low usage of digital financial services in Indonesia, especially in the post-crisis period, where Fintech is still seen as a new innovation (Nugraha et al., 2022). Over the past few years, substantial progress has been achieved in the advancement of Fintech services within Indonesia (Nugraha et al., 2022; Rufaidah et al., 2023; Setiawan et al., 2021, 2023). The Indonesian government has declared the establishment of e-government systems and services as one of the most important national goals (OJK,

2020). A priority goal is to advance financial inclusion (OJK, 2020), to replace unofficial financial alternatives with official financial services for marginalized groups, particularly individuals residing in remote areas lacking access to banking facilities (Igamo et al., 2024; Rufaidah et al., 2023). Acknowledging the potentials and challenges that Indonesian Fintech consumers have encountered in implementation can provide valuable insights to service providers and professionals around the world, especially those in developing countries who want to improve and develop Fintech services.

Moreover, this study contributes to the theory of the technology acceptance model (TAM), whose extension to new contexts is recommended by researchers (Ahmad et al., 2020). Specifically, this study examines the relevance of the TAM in the context of Fintech after Covid-19 pandemic. The COVID 19 pandemic significantly accelerated the adoption of digital financial services across various regions. According to the World Bank's Global Findex Database 2021, there was a substantial increase in digital payments during the pandemic, particularly in developing countries. Over 40% of adults in low and middle income economies made their first digital payment since the pandemic began, highlighting a major shift towards digital financial inclusion (World Bank, 2022). This study concretely examines the differences between user groups in urban and rural areas within a specific cultural environment. The heterogenous Indonesian population, with different academic backgrounds and wealth levels (Igamo et al., 2024; Nugraha et al., 2022; Rufaidah et al., 2023), brings an interesting element to this research, such as value of status quo on behavioral intention, and provides specific insights among the main variables that matter for technology adoption and intention to continue using Fintech products (Goyal et al., 2022).

This study addresses several important research questions related to Fintech adoption and usage in Indonesia. Our study examines Fintech adoption drivers by extending the technology acceptance model (TAM) with personal innovativeness (PI), government support (GS), digital financial literacy (DFL), and value of status quo (VSQ). This research also evaluates the direct impact of behavioral intention (BI) on use behavior (UB) and how use behavior affects financial inclusion (FI). Additionally, we investigate how PI, GS, and DFL mediate the relationship between BI and UB. Finally, this study explores whether there are significant differences between rural and urban respondents regarding the impact of DFL on BI and GS on UB.

The extension of TAM by incorporating personal innovativeness is supported by previous studies, which indicates that individuals with high personal innovativeness are more open to new technologies and faster to adopt digital financial services (Setiawan et al., 2021; Truc, 2024). Innovative individuals are more likely to experiment with new technologies and recognize their potential benefits, thereby accelerating the adoption process. Government support, including policies and regulations, plays a crucial role in fostering technology adoption (Igamo et al., 2024). By providing necessary infrastructure, supporting research and development, and offering various incentives, governments can significantly facilitate technology adoption.

Digital financial literacy is a critical factor in the adoption of digital financial services, as it enhances individuals' understanding of the benefits and usage of financial technology. This improved comprehension strengthens their perception of the technology's usefulness and ease of use, which in turn increases behavioral intention and promotes the

adoption of digital financial services (Igamo et al., 2024). Furthermore, a recent study conducted by Marhadi et al. (2024) revealed the importance of value of status quo in explaining behavioral intention toward Fintech adoption in Indonesia. The value of status quo is significant because it can influence the decision-making process; even if a new financial service is perceived as useful and easy to use, individuals with a high value of status quo may resist change and prefer to stick with existing practices.

Furthermore, we evaluate whether PI, GS and DFL mediate the relationship between behavioral intention (BI) and use behavior (UB). Personal innovativeness plays a pivotal role in mediating the transition from behavioral intentions to actual usage by enhancing individuals' receptivity to emerging technologies. This readiness to engage with new technologies not only accelerates the adoption process, but also increases the likelihood of continued use of Fintech services, as individuals with high levels of personal innovativeness are generally more proactive in identifying and integrating new technological solutions into their daily routines (Setiawan et al., 2021). Government support is essential for alleviating barriers to technology adoption and enhancing individuals' ability to realize their intentions. This support not only facilitates the initial adoption of new technologies, but also ensures their sustainability by providing both soft and hard infrastructure, which might otherwise impede the integration process (Marhadi et al., 2024). Digital financial literacy can bridge the gap between individuals' intentions to adopt Fintech services and their actual usage. By enhancing their understanding of how to effectively utilize digital financial tools, individuals are more likely to translate their intentions into the actual use of Fintech services. This perspective is supported by Prete (2022) who documented that increasing access to digital finance without concurrent improvements in financial literacy can negatively impact users, underscoring the importance of integrating comprehensive financial education with technological adoption efforts.

This study also employs a multigroup analysis to explore significant differences between urban and rural respondents regarding how digital financial literacy (DFL) influences behavioral intention (BI) and government support (GS) on use behavior (UB). This examination is crucial because socioeconomic factors and access to technology can vary significantly between two different locations (Matthews, 2017). Addressing identified research gaps, this study responds to the demand highlighted in earlier investigations. Setiawan et al. (2021) advocated for an analysis of Fintech use across specific geographical regions; accordingly, our study delves into Fintech usage among respondents from both urban and rural settings. Prior studies indicate that digital financial literacy affects Fintech adoption differently depending on geographical context, with urban respondents typically having better access to and understanding of technology compared to their rural counterparts (Aik & Zhang, 2023; Hasan et al., 2023; Wu & Peng, 2024). Additionally, government support may have varying effects based on the level of infrastructure development in each region, with urban areas often benefiting from more extensive resources and support than rural areas (Marhadi et al., 2024). Understanding these differences enables policymakers to develop more targeted strategies and tailor support to the unique needs of each region. This approach promotes more comprehensive financial inclusion and fosters equitable and inclusive Fintech adoption (Igamo et al., 2024).

The questionnaires from Indonesian respondents were collected from 31 January to 16 June 2023 ($n=654$). The study started with pilot study ($n=40$), prior to rolling out the final questionnaire. The data collected using purposive and quota sampling allow us to differentiate respondents by their residential areas, specifically urban and rural areas, which enables cross-group analysis to uncover differences in Fintech adoption between the groups. To assess Fintech adoption and behavioral intention, this study used PLS-SEM for direct hypothesis and PLS-MGA for multigroup analysis.

The structure of this article is organized in the following order: the first section describes the research model and questions. The second section provides an extensive literature review, followed by an explanation of the research methodology utilized in this study. The fourth section presents the results derived from the statistical analysis. The fifth section discusses these results in depth. The conclusion, limitations, and potential avenues for further research are presented at the end of this article.

Literature review

Prior research has explored the relationship between Fintech adoption and several theoretical models, including the technology acceptance model (TAM) by Davis (1989), and the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003). However, this study will specifically concentrate on TAM, given its established prominence as a foundational theory for assessing the adoption of new technologies, as endorsed by recent studies such as Ahmad et al. (2020). This will enable a precise examination of how the principles of TAM can be applied to understand Fintech adoption in the evolving financial landscape post-Covid 19.

In the aftermath of the Covid-19 pandemic, digital financial transactions have transitioned from being perceived as novel innovations to becoming essential components of the 'new normal'. This shift underscores their integral role in daily financial activities and highlights the accelerated acceptance of digital solutions in the financial sector (Le, 2021). The shift towards digital transactions for safety and health reasons has familiarized the public with this mode of financial interaction (Cruz-Cárdenas et al., 2021; Fu & Mishra, 2022). Along with this, the mass adoption of Fintech during the pandemic has prompted various Fintech innovations to emerge in response to the surge in usage (Pu et al., 2021). In Indonesia, a multitude of digital payment methods have surfaced, including the adoption of Quick Response (QR) codes for shopping (Musyaffi et al., 2021) and online purchasing with digital payment methods (Djalante et al., 2020). The widespread use of Fintech during the pandemic has resulted in a sustained adoption of Fintech as the new normal in financial transactions.

However, in several developing nations, limited progress has been observed in achieving financial inclusion after Covid-19 period. Current reports highlight Indonesia as one of four nations grappling with a significant unbanked populace, with approximately 100 million citizens, constituting 37% of the population, lacking access to bank accounts in the year 2021 (Demirgüç-Kunt et al., 2022). Surprisingly, this phenomenon persists even though the Indonesian government has actively promoted the growth of Fintech industries, as part of the economic recovery initiative post-Covid 19 (OJK, 2020; Sugandi, 2021). This programme, aimed at bolstering the national economy, includes direct

financial support to beneficiaries as a crucial component of the social aid response to the Covid-19 crisis.

Despite the growth of the Fintech sector in Indonesia, challenges persist in offering formal financial access to all segments of the population. Empirically, prior research from Indonesia on Fintech adoption has mostly concentrated on the preceding period and during the Covid-19 pandemic. One prior investigation focused on a gender issue in Indonesia related to inclusive finance through Fintech during Covid-19 pandemic (Setiawan et al., 2023). Their findings imply that the behaviors exhibited throughout the pandemic have weakened the relationship between society's innovativeness and their behavioral intention to use Fintech (Setiawan et al., 2023). Another work explored the factors driving Fintech adoption among small and medium-sized enterprises (SMEs) during the Covid-19 pandemic in Indonesia (Nugraha et al., 2022). Their findings corroborated that SMEs' inclination towards adopting Fintech is directly influenced by government support, perceived usefulness, perceived ease of use, user innovativeness, and trust. Additionally, the study indicated that financial literacy indirectly affects Fintech adoption, mediated by user innovativeness.

Understanding the factors that drive the adoption of Fintech after Covid-19 pandemic period is of paramount importance for achieving financial inclusion in Indonesia. Given the limited literature available on this subject, the current study conducts an empirical analysis to examine the impact of factors among BI and UB with the goal of promoting FI after Covid-19 pandemic in Indonesia. This research presents an original viewpoint by examining several factors that influence Fintech adoption, including PI, DFL, GS, and VSQ in the context following the Covid-19 pandemic. Based on the best knowledge of the authors, this study marks the first endeavor to analyze the factors influencing the adoption of Fintech in Indonesia, and is also still very limited globally within the unique timeframe of the post-Covid 19 outbreak.

Research framework and hypotheses

The conceptual framework is derived from the technology acceptance model (TAM) (Davis, 1989), which examines perceived usefulness (PU) and perceived ease of use (PEU) in relation to behavioral intention (BI) to adopt Fintech. This study extends the basic conceptual framework by incorporating the analysis of personal innovativeness (PI), government support (GS), digital financial literacy (DFL), and value of status quo (VSQ) in relation to BI. It also examines how these factors impact use behavior (UB) with the aim of promoting financial inclusion (FI) after the Covid-19 pandemic.

Additionally, personal innovativeness (PI), government support (GS), and value of status quo (VSQ) are investigated as mediating factors between BI and UB. The present investigation also assessed whether there is a disparity in the effect of DFL on BI and GS for UB among society in rural and urban areas, as illustrated by the conceptual model in Fig. 1.

Perceived usefulness (PU)

Perceived usefulness (PU) refers to the extent to which technological advances can enhance performance (Rizvi et al., 2024). In this study, PU evaluates how Fintech use may fulfill user needs such as rapid response and other benefits. Previous research in

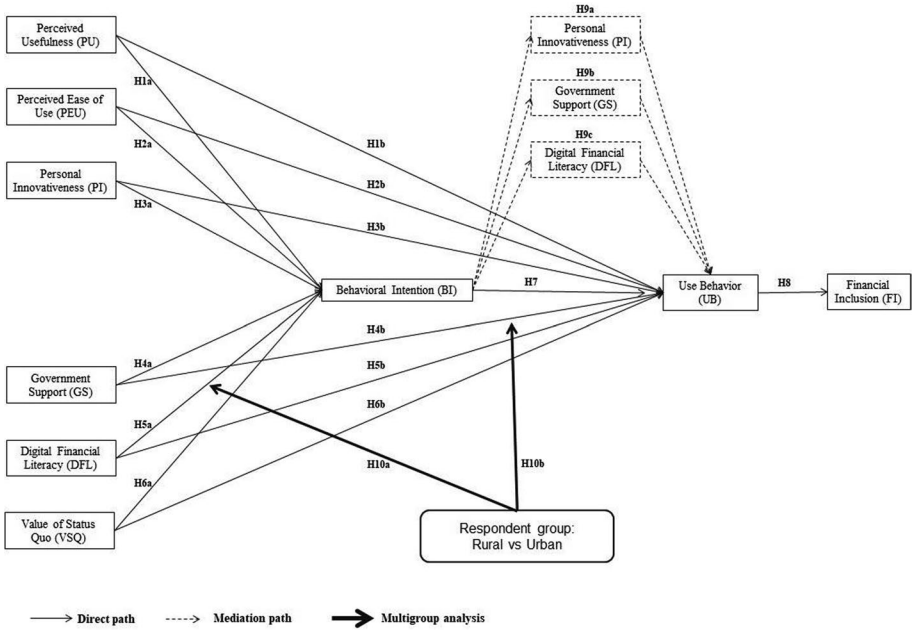

Fig. 1 Conceptual model

Indonesia has shown a significant impact of PU on technology adoption (Igamo et al., 2024; Nugraha et al., 2022; Rizvi et al., 2024). However, Mufarih et al. (2020) found that PU did not significantly influence digital banking adoption. The mixed findings suggest that PU's impact may vary by context, making it essential to understand the specific factors at play in different environments. Thus, the following hypotheses are proposed:

H1a: PU has a positive effect on BI.

H1b: PU has a positive effect on UB.

Perceived ease of use (PEU)

Perceived ease of use (PEU) relates to the effort required to use new technology effectively (Igamo et al., 2024). In this research, PEU is defined by the efficiency with which individuals use Fintech services, including the user interface and accessibility across various providers. Studies have shown a positive relationship between PEU and Fintech usage (Abdul-Halim et al., 2022; Baba et al., 2023; Igamo et al., 2024; Rizvi et al., 2024). The rationale is that easier to use technology reduces both cognitive and physical effort, thereby encouraging adoption. When users perceive a technology as simple and straightforward to use, they are less likely to experience frustration or confusion during interaction. This ease of use lowers the barrier to entry, making users more willing to try and continue using the technology. Based on this, the hypotheses are:

H2a: PEU positively impacts BI.

H2b: PEU positively impacts UB.

Personal innovativeness (PI)

Personal innovativeness (PI) is a mindset that leads to the generation of novel ideas (Jahanmir & Cavadas, 2018; Slade et al., 2015). This study examines whether individuals with innovative tendencies influence the acceptance of Fintech products. PI involves a

readiness to try new technologies, upgrade to the latest technology, and enthusiasm for experimenting with Fintech services. Prior research has shown a positive relationship between PI and technology platform usage (Baba et al., 2023; Igamo et al., 2024; Nugraha et al., 2022; Wu & Peng, 2024). However, Fung et al. (2020) found that PI's impact varies by market. These findings suggest that PI's effect on Fintech adoption is context dependent, indicating that the impact of personal innovativeness can vary based on specific environmental or market conditions. This variability underscores the importance of considering contextual factors when examining the relationship between PI and Fintech adoption. Based on this nuanced understanding, the following hypotheses are proposed:

H3a: PI positively impacts BI.

H3b: PI positively impacts UB.

Government support (GS)

Government support (GS) is crucial for creating a favorable environment for Fintech enterprises through research and development centers and regulatory frameworks (UNSGSA, 2019). GS in this study includes infrastructure development, regulatory frameworks, and laws promoting Fintech growth and network connectivity. Research indicates a significant and positive impact of GS on Fintech adoption (Balaskas et al., 2024; Igamo et al., 2024). This positive impact can be attributed to the fact that robust government support reduces uncertainties and risks associated with new technologies, thereby fostering a conducive environment for innovation and adoption. Additionally, government initiatives can provide essential resources and infrastructure that individual firms may lack, further facilitating the adoption process. However, decentralized support may yield better results as it allows for more tailored and region-specific interventions, addressing local needs more effectively (Wu et al., 2023). Considering these aspects, the following hypotheses are proposed:

H4a: GS has a positive effect on BI.

H4b: GS has a positive effect on UB.

Digital financial literacy (DFL)

DFL is an encompassing concept that covers an expansive spectrum of understanding and consciousness in terms of the products and services of digital finance, understanding the risks of digital financial, understanding of risk prevention parameters, and familiarity with the rights of consumer and protocols for settling disputes (Igamo et al., 2024). In this study, we assess DFL by asking respondents about their awareness and understanding of frequently utilized electronic methods of payment in their everyday lives, protection procedures, and multiple kinds of digital financial services (Ravikumar et al., 2022).

Prior research underscores the critical role of digital financial literacy in the adoption and effective use of Fintech services. For instance, Choung et al. (2023) and Igamo et al. (2024) highlight that higher levels of DFL lead to better decision-making regarding Fintech usage. Rizvi et al. (2024) further assert that users with higher DFL are more confident in using digital financial services, which reduces their perceived risk and increases their likelihood of adopting such technologies. This is because knowledgeable users can

better navigate the digital financial landscape, understand the benefits and limitations of various services, and protect themselves from potential risks.

H5a: DFL offers a positive effect on BI.

H5b: DFL offers a positive effect on UB.

Value of status quo (VSQ)

The term value of status quo (VSQ) refers to a psychological assessment of the current technology, incorporating several dimensions such as unpredictability, availability of alternatives, and individual rationale (Goyal et al., 2022). In this study, VSQ is measured by individuals' perceptions of the pleasantness, usefulness, and security of Fintech services compared to non-digital financial products.

It is important to understand that the tendency to favor the status quo is often shaped by factors like familiarity, perceived stability, and a reluctance to take risks. These factors play a significant role in users' decision-making processes regarding whether to adopt new digital financial technologies or stick with traditional methods. The status quo can be valued for providing a sense of control and predictability, which may outweigh the perceived benefits of switching to new technologies.

Recent studies, albeit limited, have shown that VSQ can have a beneficial effect on technology adoption and use. Goyal et al. (2022) and Putro et al. (2023) suggest that understanding the value individuals place on the status quo can provide insights into their likelihood of adopting new technologies. This understanding helps to tailor strategies that address the concerns and preferences of users who are hesitant to transition from non-digital to digital financial services. Based on these insights, the following hypotheses are proposed:

H6a: VSQ has a positive effect on BI.

H6b: VSQ has a positive effect on UB.

Behavioral intention (BI)

The intention to accept new technology precedes the actual use of Fintech services (Igamo et al., 2024). Understanding BI is crucial for promoting sustainable Fintech products. BI encompasses the capacity, intent, and preparedness to adopt digital financial transactions. Research shows a significant positive correlation between BI and use behavior (UB) (Almashhadani et al., 2023; Igamo et al., 2024; Rizvi et al., 2024). However, Singh et al. (2020) found an insignificant impact, indicating that the BI–UB relationship may be context dependent. Based on prior studies, we propose the following hypothesis:

H7: BI has a positive effect on UB.

Use behavior (UB)

Use behavior (UB) is defined as a direct result of behavioral intention (BI) and indicates a person's readiness to perform a particular action (Igamo et al., 2024). In this study, UB is characterized by the expectation, positive perception, and attitude toward using Fintech services (Bongomin et al., 2018). Previous studies have demonstrated a positive relationship between UB and financial inclusion, indicating that as individuals engage more with Fintech services, their financial inclusion improves (Odei-Appiah et al., 2022). Building upon this empirical evidence, the following hypothesis is proposed:

H8: UB has a positive effect on FI.

The mediating effect of PI, GS, and VSQ

PI denotes a person's willingness to embrace and experiment with emerging technologies (Slade et al., 2015), and it shapes BI (Almashhadani et al., 2023), which is positively correlated with UB in the context of Indonesian respondent (Igamo et al., 2024). From one side, GS makes it easier for users to use Fintech, which boosts the intention to adopt Fintech products (Hua & Huang, 2021; Mejia-Escobar et al., 2020). Furthermore, the VSQ has been demonstrated to enhance the convenience of utilizing technology products (Putro et al., 2023). This study comprehends the previous studies by investigating PI, GS, and VSQ as mediating variables among BI and UB in adopting Fintech. Considering a collection of findings from prior investigations, we state the following hypotheses:

H9a: PI positively mediates the impact of BI on UB.

H9b: GS positively mediates the impact of BI on UB.

H9c: DFL positively mediates the impact of BI on UB.

Multigroup analysis of rural and urban respondents, DFL on BI

DFL has demonstrated significant promise in expanding its reach to historically underprivileged society by providing more personalized financial products (Choung et al., 2023; Rizvi et al., 2024). This study distinguishes respondents based on their residential areas, specifically, between cities and countryside locations. Earlier research has substantiated high adoption of Fintech due to the elevated expertise in digital financial literacy among non-rural populations than their respective counterparts (Choung et al., 2023; Rizvi et al., 2024). Several findings from various empirical studies reveal a significant difference in digital financial literacy between rural and urban regions, shaping the intention to embrace digital-based financial services (Aik & Zhang, 2023; Hasan et al., 2023; Wu & Peng, 2024). Considering a collection of findings from prior investigations, we state the following hypothesis:

H10a: The influence of DFL on BI significantly differs across rural and urban participants.

Multigroup analysis of rural and urban respondents, GS on UB

GS has demonstrated a substantial potential to expand its presence within rural areas (Balaskas et al., 2024). This emphasizes the critical role of the government in improving financial accessibility in rural society regarding the public's adoption behavior of Fintech. Furthermore, a recent study by Aik and Zhang (2023) revealed that the consumption behavior of society in urban areas is significantly affected by government support, particularly in the adoption of Fintech services. Additionally, empirical existing studies consistently demonstrated the significant impact of government support in shaping public behavior regarding the adoption of Fintech services (Igamo et al., 2024; Tang & Sun, 2022; Wu & Peng, 2024). However, in contrast to previous studies, Kumar and Barua (2023) and Yadav and Shaikh (2023) found that the favorable influence of government support remained ambiguous and may possibly have negative impacts in the area of finance. Based on several findings, we state the following hypothesis:

H10b: The influence of GS on UB significantly differs across rural and urban respondents.

Methodology

Sample and data collection

This study applies purposive sampling, involving individuals who are familiar with Fintech services, regardless of whether they have used them before. To ensure respondents' familiarity with Fintech services, we implemented three strategies. First, the questions included in the questionnaire for this study were derived from previous relevant literature and content validity interviews ($n=5$) with academics, Fintech users, and Fintech business professionals in Indonesia. The content validity process aimed to simplify the questionnaire items to ensure clarity and comprehensibility for Indonesian respondents (Al-Swidi et al., 2023).

Second, we conducted a pilot study to evaluate the suitability of the questions, where respondents were asked to provide answers related to the topics in the questionnaire. Fink (2003) suggests that a minimum of 10 samples is recommended for a pilot survey, whereas Ruel et al. (2016) advocate for using between 12 and 50 respondents for pilot testing. In this study, we collected 40 samples from respondents for the pilot phase.

Third, while collecting data from a larger group of respondents, we enhanced their understanding of Fintech services by providing an explanation in the introduction of the questionnaire. This explanation included several examples of well-known Fintech products and services available in Indonesia. Additionally, we translated the original English questionnaire into Indonesian to prevent any potential ambiguity and bias in questions during the process of data collection. The measurements of indicators within the questionnaire utilized a five-point Likert scale. The scale is ranging from "strongly disagree" to "strongly agree". Additionally, this study employed quota sampling to meet the minimum number of group samples (64 per group), ensuring that PLS-MGA could be conducted (Cheah et al., 2020).

The sample size has been determined using the 10-times rule of thumb since the exact total number of Fintech users across Indonesia is unknown. The minimum acceptable sample size is required to be 10 times the maximum number of latent variables measured in the model (Kock & Hadaya, 2018). Therefore, a minimum sample of 90 respondents is required, since this study used 9 latent variables. Additionally, another previous study recommended targeting a sample size ranging from 100 to 200 respondents for optimal results when conducting factor analysis (Hair et al., 2019).

The data collection was administered online and gathered 683 respondents between February 1st and June 16th, 2023. Incomplete responses were screened, including cases where participants selected the same response for all questions. Specifically, this study excluded individuals who consistently responded with 'strongly agree' (9 respondents), 'agree' (3 respondents), 'neutral' (15 respondents), 'disagree' (0 respondent), and 'strongly disagree' (2 respondents). As a result, 29 participants were eliminated from the dataset, leaving 654 respondents for further analysis. The impressive response rate results from the use of Google Forms, where each question is required, ensuring respondents answer all items in the survey. As suggested by previous study, common method bias (CMB) test was performed to solve the potential biases in data collection (Al-Swidi et al., 2023).

Common method bias

This study employed the Harman Single Factor to conduct the CMB test to mitigate potential data bias resulting from the amalgamation of independent and dependent variables in a single questionnaire during data collection. Podsakoff et al. (2012) emphasized the significance of addressing CMB as it can magnify observed relationships among measurement items, especially when dealing with self-reported data. Recent studies also utilized the Harman Single Factor test to confirm the lack of CMB in their data (Al-Swidi et al., 2023; Guang-Wen & Siddik, 2022). Another study suggested that if a single factor explains greater than 50% of the variance, it may signal the presence of CMB (Fuller et al., 2016). In this study, the Harman Single Factor test revealed that a single unrotated factor accounted for 47.13% of the cumulative variance, indicating the absence of CMB in the dataset.

Method of confirming measurement quality (MCMQ)

In this study, the quality model measurement employs MCMQ or partial least squares confirmatory composite analysis (PLS-CCA) (Hubona et al., 2021), taking into account various benefits it offers in contrast to alternative methods used for validating measurement models (Hair et al., 2020). Furthermore, convergent validity was confirmed using factor loadings and average variance extracted (AVE) and the criteria were that the AVE and factor loadings touched the minimum threshold of 0.5. Discriminant validity was assessed using the Fornell–Larcker criterion and the cross-loadings analysis. The reliability of the factors is assessed using composite reliability and Cronbach's Alpha, with thresholds set at values above 0.6 and 0.7, respectively. Model fit is evaluated by considering the standardized root mean square residual (SRMR), with an upper threshold of 0.8.

Furthermore, following the evaluation of MCMQ, partial least squares-structural equation modeling (PLS-SEM), and multigroup analysis (PLS-MGA) were conducted utilizing SmartPLS® 4. This study employs PLS-SEM, which can assess a relatively complex set of relationships established simultaneously between independent and dependent variables. Additionally, a recent study by Hair et al. (2022) confirms that PLS-SEM is an appropriate method for evaluating complex theoretical relationships in social science research. This study investigates the drivers of Fintech adoption by extending the technology acceptance model (TAM) with several additional variables, including personal innovativeness, government support, digital financial literacy, and value of status quo. Given that this research involves more than three constructs and is inherently complex, PLS-SEM analysis is considered appropriate (Hair et al., 2019). In this study, PLS-SEM is used to examine the direct influence of independent variables on BI, UB, and FI. This investigation also explores the potential mediating roles of PI, GS, and VSQ in the relationship between BI and UB.

Finally, this study employed partial least squares multigroup analysis (PLS-MGA) to evaluate whether there were significant differences between respondents from urban and rural areas regarding the impact of digital financial literacy (DFL) on behavioral intention (BI) and government support (GS) for Fintech services. PLS-MGA is essential for examining the adoption of digital financial services in different geographical contexts

as it facilitates the analysis of behavioral differences between these groups. By applying PLS-MGA, researchers can gain insights into how digital financial literacy and government support influence Fintech adoption and usage in each context. This approach helps in developing more effective strategies and policies tailored to the specific needs of each group, thereby improving the understanding of variability in digital financial service adoption. To determine significant differences in group-specific path coefficients, PLS-MGA requires a p-value below 0.05 or above 0.95 (Henseler et al., 2009; Zarifis & Cheng, 2022).

Results

Table 1 shows the demographic profile of the respondents. It clearly showed that the number of female respondents was almost twice as high as the number of males. Among the survey participants, adult respondents in urban areas aged 18 to 25 years predominate. In the data collected, respondents are also categorized according to their area of residence, specifically rural and urban respondents. Considering the differences between residential areas, the impact of DFL on Fintech is assessed in terms of BI and GS for usage behavior with PLS-MGA.

Table 2 shows the demographic background of the rural and urban respondents in this study. The proportion of women was higher in the countryside than in the city: 71.7% compared to 64.2%. The age profile and employment status shows that the majority of respondents are adults aged 18 to 25, with a significant number enrolled

Table 1 Respondents' profile

Category	Criteria	Frequency	Percentage
Gender	Male	220	33.6
	Female	427	65.3
	Prefer not to say	7	1.1
Age	18 to 25 years old	402	61.5
	26 to 35 years old	88	13.5
	36 to 45 years old	116	17.7
	46 to 55 years old	43	6.6
	Above 55 years old	5	0.8
Residence location	Urban	562	85.9
	Rural	92	14.1
Education	Secondary school or higher secondary school or below	286	43.7
	The undergraduate or bachelor or diploma	227	34.7
	Master and doctoral	141	21.6
Employment status	Student	358	54.7
	Employed	235	35.9
	Entrepreneur	42	6.4
	Unemployed	19	2.9
Income per month	< IDR.1.300.000,-	322	49.2
	> IDR.1.300.000,-—IDR.15.000.000,-	281	43.0
	Above IDR. 15.000.000,-	51	7.8
Fintech use reason	Personal finance	437	66.8
	Business reason	23	3.5
	Personal finance and business reason	194	29.7

Table 2 Urban and rural respondents' profile

Category	Criteria	Urban		Rural	
		Frequency	Percentage	Frequency	Percentage
Gender	Male	195	34.7	25	27.2
	Female	361	64.2	66	71.7
	Prefer not to say	6	1.1	1	1.1
Age	18 to 25 years old	338	60.1	64	69.6
	26 to 35 years old	76	13.5	12	13.0
	36 to 45 years old	107	19.0	9	9.8
	46 to 55 years old	36	6.4	7	7.6
	Above 55 years old	5	0.9	0	0.0
Education	Secondary school or higher secondary school or below	247	44.0	40	43.5
	The undergraduate or bachelor or diploma	188	33.5	38	41.3
	Master and doctoral	127	22.6	14	15.2
Employment status	Student	300	53.4	57	62.0
	Employed	205	36.5	25	27.2
	Entrepreneur	39	6.9	8	8.7
	Unemployed	18	3.2	2	2.2
Income per month	< IDR.1.300.000,-	269	47.9	53	57.6
	> IDR.1.300.000,- – IDR.15.000.000,-	247	44.0	34	37.0
	> IDR. 15.000.000,-	46	8.2	5	5.4
Fintech use reason	Personal finance	374	66.5	63	68.5
	Business reason	17	3.0	6	6.5
	Personal finance and business reason	171	30.4	23	25.0

as students. In the city, the proportion of respondents with a bachelor's or diploma degree is lower than in the countryside, but the proportion of respondents with a postgraduate degree is higher in the city than in countryside. Table 2 also illustrates income inequality, the proportion of urban respondents with an income of less than IDR 1.3 million is 47.9%, while that of rural respondents is 57.6%. However, urban consumers with an income of more than IDR 1.3 million, outnumber those in rural areas. Moreover, most respondents in urban and rural areas still use Fintech services for personal purposes.

Table 3 contains a number of construct indicators from previous studies. In order to verify the suitability of these questions for assessing the variables of Fintech adoption in Indonesia, interviews with Fintech experts were conducted as part of the study. Based on the feedback collected during these interviews, and taking into account possible differences in digital infrastructure, respondents were categorized into two groups: those from urban and rural areas.

Table 4 provides a comprehensive overview of the MCMQ. In this examination, we evaluate various parameters including FL, CR, α, and AVE to assess convergent validity, following the guidelines outlined by Hair et al., (2020). Most factor loading values are higher than the standard, 0.70, except for DFL1 (0.584) and BI2 (0.460). In this regard, DFL1 and B12 were subsequently removed from the research model.

Table 3 Variable description

Construct	Items	Question	References
PU	PU1	"Using Fintech can meet my financial service needs"	(Hu et al., 2019)
	PU2	"Fintech services can save time"	
	PU3	"Fintech services can improve efficiency"	
	PU4	"Overall, Fintech services are useful to me"	
PEU	PEU1	"It is easy to use Fintech services"	(Hu et al., 2019)
	PEU2	"I think the operation interface of Fintech is friendly and understandable"	
	PEU3	"It is easy to have device to use Fintech services (cellphone, WIFI, etc.)"	
PI	PI1	"When I hear about a new product, I look for ways to try it"	Hu et al., (2019)
	PI2	"Among my peers, I am usually the first one to try a new product"	
	PI3	"I like to experiment with new Fintech services"	
GS	GS1	"I believe the government supports and improve the use of Fintech services"	(Marakarkandy et al., 2017)
	GS2	"The government has introduced favorable legislation and regulations for Fintech services"	
	GS3	"The government is active in setting up all kinds of infrastructure such as telecom network which has a positive role in promoting Fintech services"	
DFL	DFL1	"I am aware of digital payment methods such as ShopeePay, OVO, Go-pay, LinkAja, Amazon pay, etc."	(Ravikumar et al., 2022)
	DFL2	"I know about online trading of financial securities"	
	DFL3	"I know about digital lending methods such as Peer to Peer lending, App-based lending, supply chain finance, and so on"	
	DFL4	"Insurance products can be purchased online"	
VSQ	VSQ1	"Fintech makes me feel comfortable"	(Goyal et al., 2022)
	VSQ2	"Fintech makes me feel free of uncertainty"	
	VSQ3	"Fintech is much beneficial to my routine activities"	
	VSQ4	"Fintech has much intangible treasure to my work and life"	
	VSQ5	"Fintech is the most economic choice comparing with alternative"	
	VSQ6	"Fintech is the safest and riskless choice comparing with switching to alternatives"	
BI	BI1	"Assuming that I have access to Fintech. I intend to use them"	(Kim & Han, 2010)
	BI2	"I haven't used but would like to use Fintech services soon"	
	BI3	"I will recommend Fintech services to my friends"	
UB	UB1	"I expect to use Fintech services in the next few weeks"	(Bongomin et al., 2018)
	UB2	"I have strong positive perception toward use of Fintech services"	
	UB3	"My attitude toward use of Fintech services is always positive"	
FI	FI1	"The numbers of documents required by the Fintech services to open an account are few"	(Bongomin et al., 2018)
	FI2	"The minimum loan amount offered by the Fintech services is satisfactory"	
	FI3	"The number of days taken by the Fintech companies to process financial services is favorable"	
	FI4	"The fees charged by the Fintech services on use of its services are favorable"	

Table 4 Method of confirming measurement quality (MCMQ)

Constructs	FL	CR	α	AVE	CV
PU1	0.857	0.940	0.915	0.796	Yes
PU2	0.892				
PU3	0.901				
PU4	0.918				
PEU1	0.910	0.916	0.862	0.783	Yes
PEU2	0.869				
PEU3	0.875				
PI1	0.864	0.917	0.865	0.787	Yes
PI2	0.891				
PI3	0.905				
GS1	0.900	0.909	0.850	0.769	Yes
GS2	0.898				
GS3	0.831				
DFL1	0.584	0.874	0.784	0.698	Yes
DFL2	0.820				
DFL3	0.862				
DFL4	0.824				
VSQ1	0.886	0.941	0.923	0.726	Yes
VSQ2	0.837				
VSQ3	0.879				
VSQ4	0.890				
VSQ5	0.875				
VSQ6	0.734				
BI1	0.910	0.900	0.777	0.817	Yes
BI2	0.460				
BI3	0.898				
UB1	0.802	0.887	0.809	0.724	Yes
UB2	0.898				
UB3	0.850				
FI1	0.829	0.919	0.883	0.741	Yes
FI2	0.899				
FI3	0.886				
FI4	0.826				

DFL1 and BI2 are not considered in the indicator since FL = < 0.7

AVE = average variance extracted; CR = composite reliability; CV = convergent validity; FL = factor loading; α = Cronbach's alpha

Furthermore, the validity together with the reliability meet the criteria, with CR, α, and AVE values exceeding thresholds of 0.70, 0.70, and 0.50, respectively.

Discriminant validity is determined by employing two methods. The first is the Fornell–Larcker criterion as shown in Table 5, and the second is the cross-loading analysis as shown in Table 6. According to Hair et al. (2014), the Fornell–Larcker criterion is considered confirmed if the square root of a variable's AVE exceeds its largest correlation with any other variable. In the model analyzed, all constructs (highlighted in bold) have AVE values that exceed the threshold for the common variance. Furthermore, in Table 5, the items are highlighted with their respective cross-loadings, and each of these items (also highlighted in bold) has a cross-loading value that is higher than its corresponding counterpart (Hair et al., 2014).

Table 5 Fornell–Larcker criterion

	BI	DFL	FI	GS	PEU	PI	PU	UB	VSQ
BI	**0.904**								
DFL	0.430	**0.836**							
FI	0.725	0.436	**0.861**						
GS	0.612	0.398	0.651	**0.877**					
PEU	0.614	0.447	0.667	0.618	**0.885**				
PI	0.507	0.324	0.438	0.441	0.337	**0.887**			
PU	0.661	0.449	0.690	0.623	0.823	0.346	**0.892**		
UB	0.798	0.436	0.773	0.623	0.614	0.512	0.661	**0.851**	
VSQ	0.832	0.445	0.787	0.667	0.717	0.541	0.751	0.792	**0.852**

Table 6 Cross-loadings

	BI	DFL	FI	GS	PEU	PI	PU	UB	VSQ
BI1	**0.910**	0.384	0.677	0.563	0.605	0.404	0.651	0.724	0.800
BI3	**0.898**	0.394	0.633	0.542	0.502	0.517	0.541	0.720	0.702
DFL2	0.332	**0.820**	0.364	0.323	0.339	0.293	0.358	0.344	0.364
DFL3	0.372	**0.862**	0.353	0.349	0.376	0.304	0.385	0.357	0.375
DFL4	0.371	**0.824**	0.376	0.326	0.402	0.218	0.381	0.390	0.377
FI1	0.572	0.342	**0.829**	0.486	0.509	0.355	0.520	0.625	0.610
FI2	0.639	0.403	**0.899**	0.590	0.578	0.383	0.627	0.700	0.697
FI3	0.677	0.409	**0.886**	0.615	0.682	0.389	0.701	0.689	0.748
FI4	0.603	0.344	**0.826**	0.545	0.518	0.381	0.518	0.643	0.651
GI1	0.595	0.370	0.614	**0.900**	0.614	0.357	0.627	0.583	0.646
GI2	0.565	0.368	0.580	**0.898**	0.553	0.407	0.549	0.568	0.610
GI3	0.431	0.303	0.511	**0.831**	0.441	0.405	0.444	0.480	0.482
PEU1	0.552	0.404	0.608	0.551	**0.910**	0.288	0.801	0.568	0.642
PEU2	0.571	0.435	0.584	0.550	**0.869**	0.355	0.677	0.539	0.654
PEU3	0.505	0.345	0.577	0.541	**0.875**	0.247	0.706	0.521	0.607
PI1	0.418	0.282	0.365	0.382	0.281	**0.864**	0.302	0.428	0.462
PI2	0.430	0.303	0.357	0.375	0.262	**0.891**	0.257	0.417	0.455
PI3	0.494	0.279	0.437	0.415	0.345	**0.905**	0.353	0.509	0.516
PU1	0.619	0.446	0.594	0.542	0.679	0.363	**0.857**	0.579	0.678
PU2	0.520	0.326	0.572	0.505	0.720	0.261	**0.892**	0.549	0.615
PU3	0.566	0.426	0.630	0.594	0.748	0.298	**0.901**	0.591	0.659
PU4	0.644	0.398	0.661	0.577	0.787	0.306	**0.918**	0.634	0.720
UB1	0.687	0.344	0.575	0.460	0.445	0.383	0.495	**0.802**	0.619
UB2	0.719	0.405	0.714	0.592	0.607	0.434	0.649	**0.898**	0.729
UB3	0.634	0.362	0.676	0.532	0.505	0.490	0.535	**0.850**	0.669
VSQ1	0.743	0.438	0.706	0.605	0.683	0.468	0.709	0.721	**0.886**
VSQ2	0.672	0.354	0.610	0.547	0.563	0.502	0.559	0.632	**0.837**
VSQ3	0.740	0.425	0.707	0.596	0.703	0.415	0.765	0.698	**0.879**
VSQ4	0.730	0.376	0.708	0.590	0.641	0.422	0.684	0.706	**0.890**
VSQ5	0.732	0.376	0.702	0.591	0.614	0.453	0.640	0.678	**0.875**
VSQ6	0.628	0.296	0.580	0.468	0.440	0.520	0.451	0.607	**0.734**

Table 7 Coefficient determinant, effect terms of size, and power of prediction

Construct	f^2	Effect size	R^2	Q^2
PU—> BI	0.007	Small		
PU—> UB	0.008	Small		
PEU—> BI	0.002	Small		
PEU—> UB	0.000	No effect		
PI—> BI	0.012	Small		
PI—> UB	0.014	Small		
GS—> BI	0.009	Small		
GS—> UB	0.014	Small		
DFL—> BI	0.007	Small		
DFL—> UB	0.004	Small		
VSQ—> BI	0.487	Medium		
VSQ—> UB	0.050	Small		
BI—> UB	0.163	Medium		
UB—> FI	1.482	Large		
BI			0.706	0.566
UB			0.708	0.505
FI			0.597	0.439

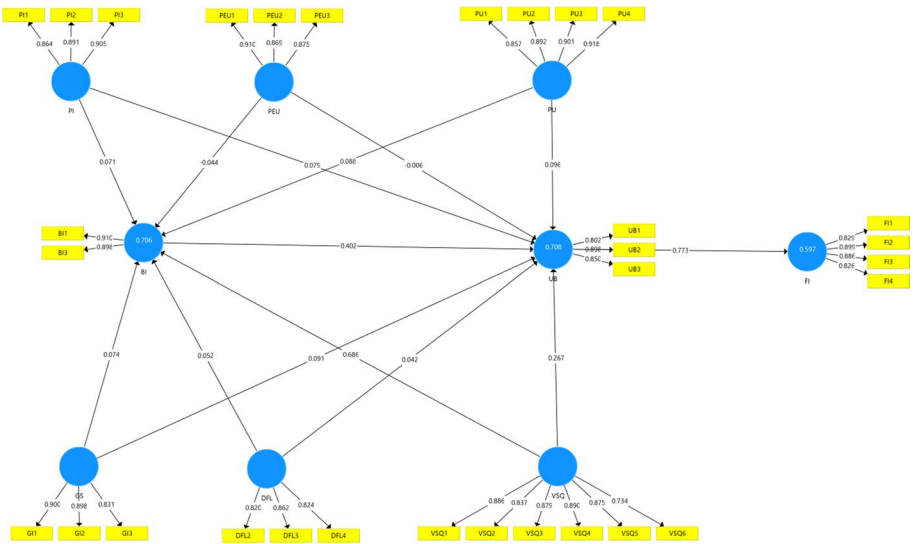

Fig. 2 Results of hypotheses tests

Table 7 shows the main statistical measures, including the effect size (f^2), the coefficient of determination (R^2), and the prediction model (Q^2). The effect size is assessed in accordance with guideline by Cohen (2013). Based on this guideline, the value of 0.35 is considered large, 0.15 is considered medium, and 0.02 is considered small. In addition, the explanatory power is assessed using R^2. In line with Chin (1998), a substantial level is identified when the value reaches 0.67, while values of 0.33 is considered moderate and values 0.10 is considered weak. In this study, the R^2 values for BI and UB are 0.706 and 0.708, respectively. These results indicate that the independent factors comprise 70.6% of the variance in the explanation of BI and 70.8% in UB. With a value of 0.597, UB has a

moderate explanatory power for FI in Indonesia. Finally, the Q^2 value of above 0 reveals that the model is a predictive model.

The result of the structural model evaluation to test the direct hypotheses with a two-sided test is shown in Fig. 2.

Table 8 provides an overview of the direct hypotheses, highlighting that the main variable influencing Fintech adoption in Indonesia is VSQ, while PI exhibits the least influencing effect. Notably, BI documented statistically significant and positive influence on UB. Furthermore, UB has a significant and positive influence on FI.

As can be seen in Table 9, the mediation hypotheses resulting from the mediation decision on tree framework (Hair et al., 2022). Specifically, all mediation variables, including PI, GS, and the VSQ, significantly mediate the influence of BI on use behavior.

Table 10 presents the MGA between respondents in rural versus urban areas. The finding signals that DFL has a considerable gap for society in rural and urban areas

Table 8 The results of direct path hypotheses

Hypotheses	Direct path	Original sample	p-value	Decision
H1a	PU—> BI	0.088	0.081	Not supported
H1b	PU—> UB	0.096	0.081	Not supported
H2a	PEU—> BI	-0.044	0.384	Not supported
H2b	PEU—> UB	-0.006	0.905	Not supported
H3a	PI—> BI	0.071	0.013	Supported
H3b	PI—> UB	0.079	0.030	Supported
H4a	GS—> BI	0.074	0.050	Not supported
H4b	GS—> UB	0.091	0.013	Supported
H5a	DFL—> BI	0.052	0.052	Not supported
H5b	DFL—> UB	0.042	0.183	Not supported
H6a	VSQ—> BI	0.686	0.000	Supported
H6b	VSQ—> UB	0.267	0.000	Supported
H7	BI—> UB	0.402	0.000	Supported
H8	UB—> FI	0.773	0.000	Supported

Table 9 The results of mediating path

Hypotheses		Path coefficient	p-value	Decision
H9a	BI—> PI—> UB	0.039	0.032	Partial mediation
H9b	BI—> GS—> UB	0.055	0.014	Partial mediation
H9c	BI—> VSQ—> UB	0.221	0.000	Partial mediation

Table 10 Multigroup analysis results

Hypotheses		Path coef. Dif	PLS-MGA: p-value	Result	Decision
		Rural versus urban	Rural versus urban		
H10a	DFL—> BI	0.413	0.020	(+) significant	Supported
H10b	GS—> UB	0.286	0.016	(+) significant	Supported

toward Fintech adoption, while GS exhibits significant differences for UB among cities and countryside society in Indonesia.

Discussion

This study investigated several factors contributing to Fintech adoption and aimed to explore BI, and the impact of UB on FI. The TAM model was extended by integrating constructs related to PI, GS, DFL, and the VSQ. Drawing upon the proposed hypotheses testing results, this study provides valuable insights, highlighting the pivotal role of DFL adoption in promoting FI. The findings also offer recommendations for Fintech providers to implement different strategies aimed at improving access to digital financial services in different residential settings.

The results found an insignificant influence of PU on both BI and UB. This suggests that individual perceptions of Fintech's ability to meet financial service needs, save time, and improve efficiency may not substantially influence the BI and UB in the adoption of Fintech. Hence, developers in the Fintech sector may consider deprioritizing this construct in their strategic planning. Although the findings are not in line with TAM theory (Davis, 1989) and other previous studies (Baba et al., 2023; Igamo et al., 2024; Nugraha et al., 2022; Wu & Peng, 2024), this finding is consistent with another prior study (Mufarih et al., 2020). In some cultural and economic environments, users might prioritize trust, security, and social influence over the ease of use. For instance, in regions with higher concerns about data privacy and financial fraud, users may value the security features of Fintech services more than their ease of use. Furthermore, the result indicates that PEU has an insignificant influence on both BI and UB. This suggests that the PEU, which includes an evaluation of Fintech service interface and ease of access to Fintech products through various electronic tools, has no influence on BI and UB.

In terms of PI, the results show a significant influence on BI and UB when adopting Fintech. This suggests that PI, as measured by willingness to explore new technologies, adopt the latest technologies early and experiment with Fintech services, has a significant impact on Fintech adoption. This finding supports previous studies that indicate a positive correlation between user innovation and technology (Baba et al., 2023; Nugraha et al., 2022; Patil et al., 2020; Setiawan et al., 2021), and contrasts with another study which found that innovation in Fintech does not always show a positive correlation, but rather depends on the specific market in which Fintech adoption takes place (Fung et al., 2020). For instance, in emerging markets, where Fintech services are relatively new, the primary adoption drivers might be necessity and accessibility rather than innovativeness. Conversely, in mature markets with well-established Fintech services, PI may play a more significant role.

For GS, the results reveal a significant impact on BI but an insignificant impact on UB. This suggests that although the development of infrastructure, legal structures, and policies can influence the behavioral intention of adopting Fintech, government support does not affect the usage behavior of adopting Fintech. GS can attract initial interest and intention to use Fintech by promoting awareness and addressing security concerns. Campaigns and endorsements can successfully make users consider adopting these services (Amnas et al., 2024). However, translating this intention into regular usage

requires more than just initial trust. The significant impact of GS to BI aligns with previous studies (Chinnasamy et al., 2021; Hua & Huang, 2021; Mejia-Escobar et al., 2020), and insignificant impact of GS on UB also supports previous study (Wu et al., 2023), providing evidence that decentralized government support yields better results in Fintech adoption.

Regarding DFL, the results indicate insignificant impact on both BI and UB in the adoption of Fintech. This suggests that being knowledgeable about digital payment methods, understanding online trading of financial securities and digital lending methods, and having the ability to purchase Fintech products may not significantly impact the BI together with UB in the usage of Fintech. This study does not support prior studies that indicated the positive influence of DFL on Fintech usage process (Rizvi et al., 2024; Wu & Peng, 2024), but consistent with another previous study assessing DFL to other individual finance status (Kumar et al., 2023). The reason for the different result could be that the influence of DFL might vary depending on the type of Fintech service (e.g., payment services vs. investment platforms). For example, simpler services like mobile payments might not require high levels of literacy compared to more complex services like online trading. If services are straightforward to use, the impact of DFL on adoption might be less significant.

In the context of VSQ, the results prove significant impact on both BI and UB in the adoption of Fintech. The findings suggest that individuals perceiving comfort, benefits, and security in the adoption of Fintech, compared to alternative options, have a significant impact on both BI and UB in relation to Fintech. The results supported the findings of the previous study (Goyal et al., 2022), assessing VSQ impact to Fintech adoption. Users who compare Fintech services with traditional financial methods and find the former to be superior in terms of benefits and security are more likely to adopt Fintech by breaking the status quo bias. The positive evaluation of Fintech compared to other options drives both BI and UB.

For BI, the results prove significant impact on UB. The findings indicate that the accessibility, intention, and preparedness significantly influence the UB of Fintech. This relates to previous studies (Chinnasamy et al., 2021; Igamo et al., 2024; Senyo & Osabutey, 2020; Wu & Peng, 2024), which indicate that BI could play a pivotal role on UB in adopting Fintech. This differs from another study (Singh et al., 2020) which highlighted no significant influence among BI and UB to use Fintech.

Furthermore, the result shows significant impact of UB on FI. This result indicates that expectation, positive perception, and attitude toward using Fintech positively impact on FI. The result supports studies demonstrated a positive association between UB and FI. Specifically, as individuals engage more with Fintech services, their financial inclusion tends to improve, highlighting the role of user behavior in facilitating access to financial services. This result aligns with previous studies that have demonstrated a positive association between Use Behavior and Financial Inclusion, reinforcing the notion that increased utilization of Fintech can enhance overall financial accessibility and integration (Odei-Appiah et al., 2022).

Moreover, our findings indicate that all mediation variables, including PI, GS, and VSQ, can facilitate the relationship between BI and UB. This indicates that individual's willingness to embrace and experiment with emerging technologies shapes BI and

positively correlates with UB of Fintech adoption. This result is echoed by the findings of previous research (Almashhadani et al., 2023; Slade et al., 2015). On the other hand, the result indicates GS allows personal user to more convenience in using Fintech and it probably increase the BI of Fintech products industry, as support by previous studies (Chinnasamy et al., 2021; Hua & Huang, 2021; Mejia-Escobar et al., 2020). Furthermore, the finding also indicates VSQ can enhance the convenience of using Fintech services, as backed up by other previous study (Goyal et al., 2022).

In the context of multigroup analysis, the findings discerned distinctions between rural and urban society regarding the level of DFL that impacts on the BI to adopt Fintech services. This indicates a significant difference in DFL between cities and countryside areas, thereby impacting the BI to use Fintech products. The findings consistently align with prior research (Das & Das, 2020; Hasan et al., 2023; Igamo et al., 2024; Mahmud et al., 2022; Rufaidah et al., 2023).

Moreover, the results also indicate a significant difference between rural and urban society in terms of the influence of government assistance on Fintech service usage behavior. This underlines the essential role of the government in promoting financial inclusion in rural areas in terms of individual Fintech adoption behavior. This finding contradicts other studies (S. Kumar & Barua, 2023; Yadav & Shaikh, 2023), but is in line with previous research showing, that GS in urban areas has a significant impact on social consumption behavior through the use of Fintech (Aik & Zhang, 2023; Igamo et al., 2024; Le, 2021; Tang & Sun, 2022).

Practical implications and future study directions

This study has theoretical contributions by highlighting on the interplay between the antecedents of BI, UB and FI toward Fintech services in Indonesia. First, prior study has evaluated the influence of VSQ on continuance intention in Hong Kong (Goyal et al., 2022). This study shed fresh light on examining the impact between VSQ toward BI and UB in different countries to fill contextual gaps. The finding shows that VSQ was found to be the strongest driver of BI toward Fintech adoption in Indonesia.

Second, our study responded to a call from a previous study suggesting empirically measuring the impact of UB on FI outside the African region (Odei-Appiah et al., 2022). This result advances knowledge in explaining the direct impact of Fintech adoption on FI which has proven to be positive and significant in the context of different countries and continents. Finally, the result shows significant differences between cities and countryside society in using Fintech products. This finding advances the existing literature and answers a call from another study to conduct further research by considering geographical location of respondents (Nugraha et al., 2022). This study also fills the gap from prior study suggested to evaluate Fintech adoption in Indonesia after Covid-19 pandemic (Igamo et al., 2024).

In practice, this research contributes by shedding light on the pivotal role of PI and GS on mediating the connections among BI and UB. Policy makers need to consider the pivotal role of education to increase PI which can bridge the gap between intention and usage of Fintech services, which contribute in accelerating the government goals of increasing financial inclusion in Indonesia. In addition, the results of this study suggest that Fintech service providers should focus on individual personal innovativeness, such

as the willingness to explore new technologies, adopt the latest technologies early, and experiment with Fintech services, rather than focussing on perceived usefulness and perceived ease of use factors. This implies that industries like banking, retail, e-commerce, and SMEs should concentrate on expanding access to Fintech, particularly in rural areas. This could involve introducing Fintech more intensively to rural communities through promotions that are friendly and accessible to them, enabling more frequent engagement and expansion with Fintech, as suggested by prior work (Kong & Loubere, 2021).

Our study demonstrates the continued relevance of the technology acceptance model (TAM) in explaining Fintech adoption in Indonesia when extended to include additional constructs like PI, GS, DFL, and VSQ. While Perceived Usefulness (PU) and Perceived Ease of Use (PEU) were found to be less influential, integrating these new variables provides a more comprehensive understanding of the factors driving Fintech adoption. This suggests that TAM remains a robust framework for understanding technology adoption but benefits from incorporating contextual and innovative factors specific to Fintech.

Future research should consider expanding the study to other countries and incorporating new variables to enhance the understanding of Fintech adoption dynamics globally. For instance, while this study found an insignificant influence of Perceived Usefulness (PU) and Perceived Ease of Use (PEU) on Behavioral Intention (BI) and Use Behavior (UB), it is important to explore these constructs further in different contexts and with larger, more diverse samples. Additionally, evaluating factors such as socioeconomic status, education level, and access to technology could further strengthen the reliability of the findings. Furthermore, investigating the nuanced impact of Digital Financial Literacy (DFL) on various types of Fintech services, such as mobile payments versus online trading, could provide deeper insights. Different Fintech services might require varying levels of financial literacy, and understanding this distinction can help tailor strategies to improve adoption rates.

Conclusion

This study focuses on extending TAM theory to evaluate financial innovation service (Fintech) adoption and its impact on financial inclusion in the aftermath of the Covid-19 outbreak. Several antecedents are assessed in relation to BI and UB. Multiple variables that serve as mediating roles, such as PI, GS and VSQ are also explored to provide more comprehensive results in explaining UB and BI. Furthermore, this investigation also addresses possible differences in Fintech adoption between rural and urban respondents.

The findings highlight that while PI has positive and significant influences on BI, its impact is observed to be lower than VSQ. The indirect relationship between BI and UB was partially mediated by PI, GS and VSQ. Additionally, the proposed model on PLS-MGA between rural and urban respondents was documented significantly differs in relation to DFL toward BI and the correlation between GS and UB. These findings advance knowledge regarding the key significant contribution of digital financial innovation services adoption in fostering financial inclusion and provide suggestions for Fintech business providers to implement different strategies in improving digital financial innovation access in the diverse resident locations.

Limitations and future studies

The respondents used in this investigation were only Indonesian, so Fintech adoption with respondents from other countries may provide different findings. Although quota sampling was employed to gather data from both urban and rural respondents consistently, obstacles such as limited internet access and low digital literacy in rural areas have led to inconsistent sample sizes between rural and urban populations. These inconsistencies may have affected the results, potentially making them less representative of the broader population. The self-reported surveys have inherent limitations, such as potential biases and inaccuracies, which might have impacted this study as well. These limitations can arise from respondents' tendencies to overstate or understate their behaviors and attitudes, affecting the reliability of the data. Future research can extend the theoretical framework by integrating new outcomes in relation to UB, such as intention to upgrade, intention to switch or intention to discontinue as suggested by prior study due to the proliferation of ICT has resulted in shorter product life cycles (Jeyaraj et al., 2023). Although this study covers some crucial aspects of the antecedents of Fintech adoption, it is still possible that there are other dimensions that have not been covered, such as perceived security risk and cultural factors.

The study may not account for differences between various types of Fintech services, such as mobile payments and online trading, each having unique adoption drivers. Apart from that, several recent studies often integrate Fintech services and green finance because they are assumed to provide more sustainable use of natural resources and reduce carbon emissions. However, it is still limited to a descriptive explanation and, leaving room to elaborate more empirical analysis. Future research needs to consider empirically testing the relationship between Fintech adoption and individual perceptions about green finance. Finally, a study to examine the impact of Fintech adoption on financial inclusion using respondents from less developed, developing and developed countries, including individualist and collectivist societies is important to conduct in the future.

Abbreviations

Fintech	Financial technology
TAM	Technology acceptance model
UTAUT	Unified theory of acceptance and use of technology
PLS-SEM	Partial least squares structural equation modeling
PLS-MGA	Partial least squares structural group analysis
IT	Information technology
UNSDGs	United Nations Sustainable Development Goals
SDGs	Sustainable Development Goals
PU	Perceived usefulness
PEU	Perceived ease of use
PI	Personal innovativeness
GS	Government support
BI	Behavioral intention
VSQ	Value of status quo (VSQ)
UB	Use behavior
DFL	Digital financial literacy
FI	Financial inclusion
QR	Quick response
SMEs	Small and medium-sized enterprises
CMB	Common method bias
MCMQ	Method of confirming measurement quality
PLS-CCA	Partial least squares confirmatory composite analysis

AVE Average variance extracted

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Availability of data and materials
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Competing interests
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