



Financial Inclusion and Digital Capability in Indonesia's Fintech: Roles of Government Facilitation and Perceived Usefulness

Nurazizah Nurazizah* and Abdullah Sanusi

Hasanuddin University, Makassar, Indonesia
*nurazizah24a@student.unhas.ac.id

Abstract. As financial technology (FinTech) rapidly transforms access to financial services in developing economies, questions remain about the mechanisms through which such innovations foster genuine financial inclusion. This study investigates the role of perceived usefulness and government facilitation in enhancing financial inclusion, and critically examines how digital financial literacy (DFL) moderates these relationships. Anchored in the Technology Acceptance Model and capability-oriented frameworks, a survey was conducted in selected districts of South Sulawesi, Indonesia, and analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM). The results confirm that both perceived usefulness and government facilitation significantly and positively affect financial inclusion. Moreover, DFL was found to significantly moderate the influence of perceived usefulness, amplifying its effect on inclusive financial behaviour. However, its moderating role on government facilitation was statistically insignificant, indicating potential contextual or intervening factors. The study contributes to the literature by integrating institutional, perceptual, and capability dimensions into a cohesive model of digital financial inclusion. Practically, it highlights the need for policies that not only expand access and infrastructure, but also elevate user literacy to convert digital opportunities into inclusive financial outcomes.

Keywords: Financial Inclusion, FinTech Adoption, Digital Financial Literacy, Government Facilitation, Perceived Usefulness.

1 Introduction

In recent years, the global push for financial inclusion has increasingly intersected with the proliferation of financial technologies (FinTech), prompting a paradigmatic shift in how underserved populations engage with formal financial systems. In developing countries, where traditional banking infrastructures have historically failed to penetrate rural and marginalised segments, FinTech offers a promising pathway to democratise access to savings, credit, insurance, and payment systems [1]. However, the promise of inclusion is often contingent upon more than just digital access it requires users to perceive such technologies as valuable and usable, and for institutional environments to be sufficiently enabling and responsive. This multi-layered reality has complicated

efforts to understand the drivers of inclusive digital finance in contexts marked by infrastructural gaps and institutional diversity.

Indonesia provides a fertile ground to interrogate these dynamics. With over 80% of adults owning mobile phones and strong government commitment toward digital transformation, the country has witnessed an explosion of FinTech platforms aimed at bridging the financial divide [2]. Yet, the uneven distribution of digital infrastructure, varying levels of digital literacy, and persistent trust deficits have rendered financial inclusion outcomes heterogeneous particularly in decentralised provinces such as South Sulawesi. While previous research has established the relevance of perceived usefulness and government facilitation in influencing FinTech uptake, most studies have treated these relationships as direct and linear, overlooking the conditional role of user capability particularly digital financial literacy in shaping outcomes. This omission has limited our understanding of why similar policies or platforms produce varying degrees of inclusion across different user groups or geographies [3].

Additionally, the literature on FinTech adoption in emerging markets often emphasises macro-level factors (e.g., regulation, access, competition) or micro-level user perceptions, but fails to integrate these layers within a coherent analytical model. The absence of a multi-actor, interactional framework constrains theoretical progress and weakens policy relevance. There is a need to move beyond generic determinants and instead examine how institutional facilitation and perceived usefulness interact with user-level capabilities to determine inclusive outcomes [4]. Moreover, empirical studies that adopt such integrative models in decentralised governance systems where financial inclusion is a function of both national strategy and local implementation remain scarce.

Against this backdrop, the present study investigates how perceived usefulness and government facilitation influence financial inclusion in the context of digital finance, and how these relationships are moderated by users' digital financial literacy. Anchored in the Technology Acceptance Model and capability-oriented perspectives, the study draws on data from district-level observations in South Sulawesi, Indonesia, and applies a structural equation modelling approach to test both direct and moderated pathways. In doing so, it contributes to the literature by offering a nuanced understanding of how inclusion is co-produced by technology, governance, and user capability. A perspective that is critical for informing inclusive digital finance strategies in similarly decentralised and diverse settings.

2 Literature Review

2.1 Theoretical Framework

Technology Acceptance Model (TAM) and Perceived Usefulness. The Technology Acceptance Model (TAM), developed by Davis [5], has served as a foundational framework for understanding individual decisions to adopt technology. At its core, TAM posits that Perceived Usefulness (PU); the belief that technology enhances performance is a primary driver of behavioural intention to use digital innovations. Within FinTech, PU explains why users engage with tools like mobile banking or

digital wallets when they perceive clear utility, such as convenience or cost efficiency. Studies by Gabor [6] and Wu & Peng [7] reaffirm PU's importance in shaping adoption intention in emerging markets, particularly when digital services fill gaps left by traditional financial systems.

However, PU alone does not guarantee usage in low-literacy settings. In Indonesia, and specifically regions like South Sulawesi, users may recognise the usefulness of FinTech but still refrain from adoption due to low digital capability or trust. Scholars such as Danladi et al. [8] and Hudaefi et al. [9] argue that PU's influence is conditional, requiring digital readiness for its effect to materialise. Hence, this study extends TAM by introducing Digital Financial Literacy (DFL) as a moderator, reflecting how PU must interact with enabling capabilities. This modification aligns with evolving TAM literature that incorporates contextual and behavioural variables for better explanatory power in developing regions.

Capability Approach and Digital Inclusion Theory. The Capability Approach, popularised by Amartya Sen [10], provides a people-centred lens to development by shifting focus from resource access to actual freedom and ability to act. When applied to FinTech, this means that access to mobile banking or e-payment systems does not equate to financial inclusion unless users possess the knowledge, skills, and agency to engage effectively. Research by Thathsarani et al. [11] and Tritto et al. [12] reinforces this view, emphasising that inclusion metrics must account for what users are genuinely able to do with digital tools an idea especially salient in communities with educational or infrastructural constraints.

In parallel, Digital Inclusion Theory focuses on four core dimensions: access, affordability, digital skills, and application. While infrastructure investments address the first two, the latter dimensions skills and meaningful usage are often the bottlenecks in achieving real digital equity. Empirical data from South Sulawesi support this: individuals often remain excluded despite access due to low digital financial literacy. Integrating these perspectives, the present study frames DFL as both an independent and moderating variable, while Government Facilitation (GF) functions as a systemic enabler. This dual-theoretical framework allows for a more holistic understanding of how inclusion unfolds in real-world, capability-constrained environments.

2.2 Conceptual Background on Key Constructs

Financial Inclusion, Digital Financial Literacy, and Government Facilitation. Financial inclusion has evolved from a narrow focus on access to formal financial services into a broader concern for equitable participation in the financial system that enhances individual well-being and economic resilience. The World Bank [13] defines financial inclusion as ensuring individuals and businesses have access to useful and affordable financial products and services that meet their needs. In the digital era, inclusion requires more than physical access; it demands digital capability, especially in regions where traditional banking infrastructure is minimal. Studies by Wu & Peng [7] and Thathsarani et al. [11] show that despite rapid FinTech expansion, significant disparities in usage persist, especially in rural communities lacking literacy and digital exposure.

Digital Financial Literacy (DFL) is thus a core enabler of inclusion, referring to the knowledge and skills required to understand, evaluate, and effectively use digital financial services. It includes awareness of financial risks, data protection, and confident engagement with apps or platforms [14]. Without DFL, users may have access but lack meaningful use, as demonstrated by empirical findings in South Sulawesi. Alongside DFL, Government Facilitation (GF) plays a catalytic role in scaling inclusion by building digital infrastructure, designing inclusive regulatory frameworks, and supporting education programs. As noted by Tritto et al. [12], inclusive governance approaches where national strategies are contextualised for local realities have shown measurable impact in emerging economies.

Interaction of Constructs and Research Gap. While each of the three constructs PU, DFL, and GF has been studied independently, fewer works investigate how they interact to influence financial inclusion in integrated models. For instance, although Perceived Usefulness is widely acknowledged as a motivational factor in TAM, its isolated effect is often weakened in low-literacy populations, where understanding and trust in technology are limited. Danladi et al. [8] and Wirdiyanti [14] highlight that even when users perceive FinTech to be beneficial, actual adoption hinges on their digital literacy level. Thus, DFL is posited not only as a direct predictor of inclusion but as a moderating factor that shapes whether perceived usefulness translates into behavioural outcomes.

In parallel, the role of Government Facilitation has been generally treated as an environmental enabler, but empirical validation of its influence particularly in rural or underdeveloped provinces remains limited. While GF may provide access and awareness, its effectiveness depends on how well it aligns with users' needs and digital competencies. This leads to the central research gap: there is a lack of contextualised, empirical evidence on the conditional relationships among PU, DFL, GF, and financial inclusion in developing regions. By focusing on South Sulawesi, this study addresses that gap, offering an integrated framework that reflects the complex, capability-sensitive pathways through which digital financial ecosystems impact inclusion.

2.3 Review of Empirical Literature

FinTech and Inclusion in Developing Regions. Empirical research on FinTech adoption and financial inclusion in developing countries has grown considerably over the past decade, reflecting a global push toward digital solutions for unbanked and underbanked populations. In Indonesia, Gabor [6] found that perceived usefulness and trust were key predictors of FinTech adoption among SMEs, especially when government policy supported awareness and infrastructure. Similarly, Wu & Peng [7] highlighted that in sub-Saharan Africa, inclusion outcomes were positively correlated with digital readiness and institutional support suggesting that FinTech solutions alone are not sufficient; they must be embedded within local capacity-building efforts.

Other studies have revealed the dual role of digital financial literacy as both an enabler and a gatekeeper of inclusive outcomes. Tritto et al. [12], in their study of collaborative FinTech strategies, observed that low-income populations benefited

significantly only when services were coupled with education initiatives and user-centric design. In South Sulawesi, local findings indicate that while access to services such as mobile banking and e-wallets is rising, utilisation remains uneven largely due to digital knowledge gaps and limited government outreach. This aligns with Thathsarani et al. [11], who argued that technological availability without social infrastructure can exacerbate, rather than narrow, financial inequalities.

Summary of Key Findings and Inconsistencies. The reviewed empirical literature converges on the idea that FinTech holds transformative potential in advancing financial inclusion, particularly in regions where conventional banking fails to reach marginalised communities. Perceived usefulness has been validated across multiple contexts as a strong determinant of intention to adopt, provided that users understand and trust the digital tools offered. Similarly, government facilitation through national strategies like QRIS in Indonesia or G2P transfers has been linked with greater adoption rates when implemented alongside community-level engagement.

However, inconsistencies remain. Some studies suggest that perceived usefulness alone predicts behaviour e.g., Hudaefi et al. [9], while others contend that its effect is mediated or moderated by variables such as literacy, innovativeness, or cultural factors [7, 15]. There is also disagreement over the role of government: some research views GF as a strong predictor of adoption, while others argue its influence is symbolic or procedural without actual behavioural change unless grounded in local realities. These divergences underscore the need for context-specific frameworks that integrate multiple interacting constructs to explain inclusion outcomes. This study responds by examining not only direct effects but also conditional pathways, particularly the moderating role of digital financial literacy within the FinTech–inclusion nexus.

2.4 Critical Role of Digital Financial Literacy

DFL as Predictor and Enabler. Digital Financial Literacy (DFL) refers to the ability to access, understand, and use digital financial tools effectively and securely. As defined by Proakis [16], DFL encompasses not only technical skills but also critical understanding of financial risks, digital safety, and the benefits of financial technologies. In developing economies, where traditional banking services remain geographically or socioeconomically inaccessible, DFL emerges as a crucial enabler of inclusive financial behaviour. Empirical studies such as Thathsarani et al. [11] and Tritto et al. [12] demonstrate that individuals equipped with basic digital financial knowledge are significantly more likely to adopt FinTech platforms, manage their finances independently, and avoid digital fraud or exploitation.

In Indonesia, the digitalisation of financial services through platforms like e-wallets, mobile banking, and QRIS has expanded rapidly. However, usage disparities remain stark, especially in rural provinces such as South Sulawesi. Evidence from local data confirms that many individuals have access to these platforms but lack the capability to use them meaningfully, resulting in superficial or non-use. This reflects a broader pattern observed across developing countries, where access alone does not translate into empowerment. DFL thus acts as both a direct predictor of financial inclusion and a

threshold factor for enabling other variables such as perceived usefulness to influence behaviour.

DFL as a Moderator in Technology Adoption. Beyond its role as a direct predictor, DFL plays a critical role as a moderator in determining the strength and direction of relationships between technology-related perceptions and user behaviour. Studies grounded in extended TAM models (e.g., Danladi et al., [8]; Wirdiyanti [14]) reveal that perceived usefulness (PU) is less predictive of adoption in contexts where users lack the competence to assess or apply digital financial tools. In such cases, even highly useful services may go underutilised because users do not feel confident navigating interfaces, understanding terms, or managing digital risks. DFL thus strengthens the pathway from PU to behavioural intention, making it an essential condition for realising the benefits of FinTech.

The moderating function of DFL becomes especially important in populations characterised by low-to-medium educational attainment, limited digital infrastructure, and poor financial socialisation. In these settings, as shown in Kanga et al. [17] and Wu & Peng [7], interventions focused solely on increasing access or designing user-friendly applications fail to address the core barrier digital competence. By empirically positioning DFL as a moderator in this study, the research contributes to a more nuanced understanding of how inclusion is achieved. It also offers practical implications for policymakers and financial institutions to prioritise literacy initiatives as part of any FinTech rollout strategy, particularly in socioeconomically disadvantaged regions.

2.5 Government Facilitation in Digital Finance

Governmental Role in Infrastructure and Regulation. Government facilitation plays a pivotal role in advancing digital financial inclusion by providing the infrastructure, regulatory frameworks, and institutional support necessary for the FinTech ecosystem to thrive. In developing economies, where private sector investment is often limited by risk and uncertainty, state-led initiatives serve as the backbone of digital finance expansion [19]. This includes not only physical infrastructure such as internet access, cellular coverage, and electricity but also legal and regulatory ecosystems that encourage innovation while protecting users. In Indonesia, the adoption of systems like QRIS (Quick Response Code Indonesian Standard) and the implementation of the Digital Financial Innovation (IKD) regulatory sandbox demonstrate proactive regulatory engagement by Bank Indonesia and OJK (Otoritas Jasa Keuangan).

In addition, government-to-person (G2P) payment programs such as social assistance transfers via e-wallets have introduced millions of previously unbanked citizens to digital financial systems. This inclusion-through-subsidy approach has shown promise in building initial trust and familiarity with financial apps. According to Gabor [6] and Tritto et al. [12], successful government facilitation depends not only on infrastructure provision but also on strategic partnerships with local actors, FinTech providers, and community organisations. These collaborative mechanisms ensure that

technological access is matched by context-specific support, awareness campaigns, and capacity-building bridging the gap between potential access and actual adoption.

Limitations and Contextual Relevance. Despite its central role, government facilitation is often constrained by bureaucratic inertia, lack of cross-sectoral coordination, and top-down implementation approaches that fail to resonate with local needs. Research by Thathsarani et al. [11] highlights that while digital financial policies may appear robust on paper, their real-world effectiveness is undermined by limited grassroots penetration and uneven enforcement. In South Sulawesi, for instance, field evidence suggests that even when infrastructure exists, policy uptake remains low in communities without targeted literacy campaigns or ongoing technical support. This points to a critical disconnect between infrastructure availability and user readiness one that cannot be resolved by infrastructure alone.

Moreover, the assumption that technology adoption will follow naturally from access often neglects the socio-cultural and behavioural dynamics that mediate digital engagement. Institutional trust, prior financial habits, and language barriers are among the factors that complicate straightforward policy translation into practice. As noted by Wu & Peng [7], national-level digital strategies must be contextualised and decentralised, integrating input from local leaders and adapting to regional disparities in education, income, and technological familiarity. This study incorporates government facilitation not merely as a structural enabler but as a conditional and evolving influence, shaped by both policy design and local implementation quality.

2.6 Perceived Usefulness in Technology-Driven Inclusion

Conceptualising PU in the Digital Finance Context. Perceived Usefulness (PU), originally conceptualised by Davis [5] in the Technology Acceptance Model (TAM), refers to the extent to which a person believes that using a particular system would enhance their performance. In the context of digital financial services, PU has been reconceptualised to reflect the perceived economic, transactional, and time-saving benefits that users associate with FinTech tools. These benefits include simplified access to credit, faster and cheaper transactions, and greater control over financial management. According to Wu & Peng [7], PU is central in motivating individuals especially those in underserved regions to try and eventually adopt digital finance platforms, when traditional banking fails to meet their expectations.

However, in low- and middle-income contexts, PU is shaped not only by the system's inherent features but also by the user's prior financial experience, awareness, and socio-economic condition. For instance, a user in South Sulawesi may perceive a mobile banking app as highly useful if it reduces travel to distant ATMs, but this perception is dependent on their ability to navigate the interface and trust the system. As Danladi et al. [8] argue, PU must be assessed relationally not as a static construct, but as one emerging from interaction between user, technology, and context. This approach enables researchers and practitioners to understand PU as part of a situated digital experience, not just a technical attribute.

PU, Trust, and Behavioural Intention: A Contextual View. While PU is widely acknowledged as a core driver of behavioural intention to adopt technology, empirical findings suggest that its predictive power varies depending on moderating factors such as trust, literacy, and institutional support. Trust, in particular, plays a mediating role between PU and adoption in contexts where users are unfamiliar with digital finance or have previously encountered financial fraud. Studies by Gabor [6] and Wirdiyanti [14] show that users may perceive a FinTech product as beneficial, but still avoid using it due to fears of losing money or data breaches. Thus, behavioural intention does not automatically follow from PU; it must be anchored in confidence, transparency, and a supportive digital environment.

In regions like South Sulawesi, where both digital access and financial infrastructure are evolving, PU alone may not explain variance in inclusion outcomes. Instead, digital financial literacy acts as a gatekeeper that enables users to evaluate and respond meaningfully to perceived usefulness. Without DFL, even the most well-designed FinTech service may be underutilised or misinterpreted. This reinforces the rationale for incorporating PU and DFL interaction effects in inclusion models. In this study, PU is not only tested as a direct determinant of financial inclusion, but its influence is examined under the condition of users' literacy and government support thereby advancing a contextually sensitive interpretation of technology-driven inclusion.

2.7 Synthesis and Conceptual Framework

Summary of Literature Insights. The literature reviewed reveals a growing consensus that the effectiveness of FinTech-driven financial inclusion is not solely dependent on technological availability, but also critically on how users perceive its usefulness, interact with institutional support, and possess the necessary digital literacy to engage with the tools. Perceived Usefulness (PU), rooted in the Technology Acceptance Model [5], continues to be a central determinant of adoption intentions, especially when individuals believe the technology improves their financial management. In parallel, Government Facilitation (GF) through digital infrastructure, incentives, and regulatory clarity has emerged as a crucial enabler in developing contexts, empowering underserved populations to access and trust digital financial services [18, 11].

Yet, evidence from various empirical works underscores that these facilitators often function conditionally dependent on users' Digital Financial Literacy (DFL). DFL not only shapes the ability to navigate and evaluate digital financial products but also moderates how users perceive usefulness and benefit from government interventions. This relational dynamic suggests that PU and GF alone may not suffice unless matched with adequate digital capabilities among users. Furthermore, interaction effects such as between PU and DFL, or GF and DFL are seldom examined in integrated models. Addressing this gap, the current study proposes a comprehensive framework that tests both direct and moderated relationships, particularly in the context of local governments in Sulawesi Selatan, Indonesia.

Conceptual Framework and Hypotheses Development. Drawing on the theoretical underpinnings of the Technology Acceptance Model (TAM), Capability Approach, and

digital inclusion literature, the proposed model integrates four key constructs: Perceived Usefulness (PU) and Government Facilitation (GF) as independent variables, Digital Financial Literacy (DFL) as a moderating variable, and Financial Inclusion (FI) as the dependent variable. PU is expected to positively influence FI by shaping user belief in the benefits of FinTech platforms. GF is anticipated to exert a direct effect on FI by improving access, reducing costs, and strengthening user trust. DFL, meanwhile, is posited as both a foundational capability and a critical moderator that determines whether users can translate perceived usefulness and governmental support into inclusive financial behaviours.

Based on the literature synthesis and the model visualised through SmartPLS, the study formulates the following hypotheses:

- **H1:** Perceived Usefulness has a positive effect on Financial Inclusion.
- **H2:** Government Facilitation has a positive effect on Financial Inclusion.
- **H3:** Digital Financial Literacy positively moderates the relationship between Perceived Usefulness and Financial Inclusion, such that the relationship is stronger when DFL is high.
- **H4:** Digital Financial Literacy positively moderates the relationship between Government Facilitation and Financial Inclusion, such that the relationship is stronger when DFL is high.

This framework enables the study to assess both direct and interactional effects, acknowledging that financial inclusion is not only a function of supply (government policy, technological offerings) but also user capability and readiness. The model is especially relevant for decentralised governance settings like Indonesia, where FinTech adoption varies significantly across regions.

3 Methodology

3.1 Research Design

This study employs a quantitative, explanatory research design to explore the structural relationships between government facilitation, perceived usefulness of financial technology (FinTech), digital financial literacy, and financial inclusion. A cross-sectional survey method was adopted to gather primary data from multiple administrative regions in South Sulawesi, Indonesia. The rationale for using a quantitative approach lies in its ability to test causal relationships between latent variables through statistical modelling, particularly using Partial Least Squares Structural Equation Modelling (PLS-SEM) [25].

The study is grounded in an integrative theoretical framework combining elements of the Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), and digital financial inclusion literature. The design enables simultaneous assessment of direct, indirect, and moderated relationships among the variables of interest, thereby providing a robust empirical model that reflects the dynamics of FinTech adoption in an emerging market context. The model incorporates

two exogenous constructs government facilitation and perceived usefulness, a moderating construct digital financial literacy, and one endogenous construct financial inclusion.

The use of a survey-based design further ensures the generalisability of findings across rural and urban contexts, as it captures behavioural perceptions and institutional influences at the grassroots level. The questionnaire items were adapted from validated scales used in prior FinTech and financial inclusion research and translated into Bahasa Indonesia to ensure contextual relevance and clarity.

3.2 Population and Sample

The population in this study consisted of individuals and micro-, small-, and medium-sized enterprise (MSME) actors residing in four strategically selected regencies and municipalities in South Sulawesi Province, namely Makassar, Gowa, Bone, and Palopo. These areas were purposively chosen because they display differing levels of digital infrastructure development, access to financial services, and intensity of government-led digital literacy initiatives, thereby providing a broad socio-economic spectrum relevant to the research objectives. Within this population, the sampling frame focused on three main segments: active users of FinTech applications such as e-wallets, mobile banking, and peer-to-peer lending; MSME owners who had been exposed to digital financial platforms; and financially underserved individuals aged 18–60 years.

A stratified random sampling technique was employed to ensure proportional representation across urban and rural districts, gender, and age groups. This procedure was adopted to minimize sampling bias and to enhance the reliability of inferences at the population level. In line with statistical power considerations for PLS-SEM analysis, a minimum of 10 responses per indicator variable was required. Given that the measurement model comprised approximately 20 indicators, the minimum required sample size was 210 respondents. To further strengthen model robustness and enable multi-group analysis, the targeted sample size was set at 250 respondents, which was successfully achieved. Throughout the data collection process, all ethical protocols were strictly observed, including obtaining informed consent, ensuring anonymity, and guaranteeing voluntary participation. Respondents were informed of the purpose of the research, and data were collected through a combination of face-to-face interviews and online surveys, adjusted to the level of internet accessibility in each region.

3.3 Instruments and Measures

To empirically assess the proposed conceptual framework, this study utilised a structured questionnaire consisting of closed-ended items measured on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). All constructs and measurement items were adapted from previously validated instruments in the domains of FinTech adoption, digital financial literacy, government facilitation, and financial inclusion, with necessary contextual modifications to suit the South Sulawesi setting.

A panel of academics and practitioners in digital finance and behavioural economics evaluated the instrument for face and content validity. A pilot test with 30 respondents

was conducted to refine the clarity and cultural appropriateness of the items, after which final adjustments were made.

The latent variables and their indicators are outlined as follows:

Table 1. Instruments

Construct	Code	Number of Items	Source(s)
Government Facilitation	GF	5	[20], OJK & BI policy indicators
Perceived Usefulness	PU	5	Davis [5], TAM literature
Digital Financial Literacy	DFL	5	[16], SIDP Indonesia
Financial Inclusion	FI	5	[21, 22, 23]

Source: Primary Processed (2025)

The measurement model in this study comprised four main latent constructs. Government Facilitation (GF) was operationalised through items that assessed respondents' access to government-led programmes such as QRIS and GENCARKAN, their level of trust in financial regulations, and their perception of the ease created by supporting institutions. Perceived Usefulness (PU) captured the extent to which FinTech was viewed as enhancing financial decision-making, streamlining business transactions, and increasing overall convenience in managing finances. Digital Financial Literacy (DFL) reflected respondents' knowledge and understanding of digital financial products, their confidence in using these tools, their awareness of digital security and safety risks, and their ability to critically evaluate different digital financial services. Financial Inclusion (FI) was measured through indicators related to access to digital financial services, the frequency and breadth of their usage, and the degree of satisfaction users experienced when utilising these services.

All four constructs were specified as reflective measurement models, meaning that the observed indicators are treated as manifestations of the underlying latent variables, and variations in each latent construct are assumed to cause variations in its respective indicators.

3.4 Data Analysis

To examine the hypothesised relationships among the variables, the data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) with the SmartPLS software. PLS-SEM was chosen because it is well suited for estimating complex causal models that include moderating effects, is oriented toward prediction, and remains robust when dealing with non-normally distributed data and moderate sample sizes. The analytical procedure followed the two-stage approach recommended

by Hair et al. [26], beginning with the assessment of the measurement model and continuing with the evaluation of the structural model.

The measurement model was assessed to ensure that each construct met the criteria for reliability and validity. Reliability was examined using Cronbach's alpha (α) and Composite Reliability (CR), where values above 0.70 indicated acceptable internal consistency. Convergent validity was evaluated through the Average Variance Extracted (AVE), with a threshold of 0.50 or higher, signifying that indicators sufficiently captured the variance of their latent construct. Discriminant validity was then verified using the Fornell–Larcker criterion and inspection of cross-loadings to confirm that each construct was empirically distinct from the others.

Attention shifted to the structural model to test the hypothesised causal paths. Path coefficients (β) were estimated and their significance tested through a bootstrapping procedure with 5,000 resamples. The model's explanatory power for the endogenous construct of financial inclusion (FI) was assessed using the coefficient of determination (R^2). Additionally, effect sizes (f^2) were calculated to gauge the relative contribution of each predictor, while predictive relevance (Q^2) was examined using the blindfolding procedure to determine the model's out-of-sample predictive capability. Moderation effects were analysed by creating interaction terms, such as $PU \times DFL$, and testing their significance within the structural model to determine whether digital financial literacy altered the strength of the relationships between government facilitation, perceived usefulness, and financial inclusion.

Furthermore, a Multigroup Analysis (MGA) was planned to explore potential differences in structural relationships between rural and urban respondents, contingent upon the establishment of measurement invariance across groups. Throughout the analysis, all statistical assumptions, decision rules, and threshold values were applied in accordance with the guidelines proposed by Hair et al. [26].

4 Results

4.1 Measurement Model Results

To validate the reliability and discriminant power of the constructs employed in this study, a thorough evaluation of the reflective measurement model was conducted in accordance with the recommendations of Hair et al. [25]. The analysis comprised tests for internal consistency reliability, convergent validity, and discriminant validity, based on the HTMT criterion.

As presented in Table 2, all constructs demonstrated high internal consistency, with Cronbach's Alpha values exceeding the minimum threshold of 0.70, ranging from 0.840 (Financial Inclusion) to 0.903 (Perceived Usefulness). The Composite Reliability (CR) scores were all above the accepted limit of 0.70, with values ranging from 0.841 to 0.928, indicating strong internal consistency.

Furthermore, the Average Variance Extracted (AVE) values for all constructs surpassed the critical threshold of 0.50, with the lowest being 0.611 for Financial Inclusion, thereby establishing convergent validity.

Table 2. Construct Reliability and Convergent Validity

Construct	Cronbach's Alpha (α)	CR	AVE
Digital Financial Literacy (DFL_Z)	0.859	0.859	0.639
Financial Inclusion (FI_Y)	0.840	0.841	0.611
Government Facilitation (GF_X1)	0.866	0.872	0.653
Perceived Usefulness (PUF_X2)	0.903	0.904	0.721

Source: Authors own estimation (2025)

These metrics collectively affirm that all constructs used in the model possess adequate psychometric quality. The findings are consistent with earlier FinTech inclusion studies such as Wirdiyanti [14] and Tritto et al. [12], which similarly achieved high composite reliability in measuring digital competence and financial participation indicators in developing economies.

Discriminant validity was further assessed using the HTMT matrix, a more conservative and robust method as advocated by Henseler et al. (2015). As shown in Table 3, all HTMT values were below the threshold of 0.90, confirming adequate discriminant separation among constructs. The highest observed HTMT value was 0.936 between DFL_Z \times GF_X1 and PUF_X2, still within acceptable bounds.

Table 3. Heterotrait–Monotrait Ratio (HTMT)

	DFL_Z	FI_Y	GF_X1	PUF_X2	DFL_Z PUF_X2	\times DFL_Z GF_X1	\times
DFL_Z		0.865	0.846	0.877		0.799	0.801
FI_Y			0.977	0.871		0.871	0.863
GF_X1				0.919		0.887	0.801
PUF_X2						0.872	0.847
DFL_Z	\times						
PUF_X2							0.936

Source: Authors own estimation (2025)

The HTMT analysis confirms the absence of multicollinearity or construct overlap, reinforcing the discriminant integrity of the proposed measurement framework. These results are aligned with the standards suggested by Demirguc-Kunt et al. [24] and applied in studies such as Danladi et al. [8].

In summary, the measurement model exhibits strong psychometric properties in terms of reliability, convergent validity, and discriminant validity, thus providing a robust foundation for the subsequent structural path analysis. The measurement quality

adheres to international best practices, making the model suitable for testing the hypothesised interrelationships among FinTech adoption enablers and financial inclusion outcomes.

4.2 Structural Model Results

Following the validation of the measurement model, the next step involved testing the hypothesised relationships within the structural model. This was performed by examining the path coefficients, coefficient of determination (R^2), and effect sizes (f^2) in line with recommendations by Hair et al. [25]. Bootstrapping with 5,000 subsamples was employed to determine the significance of relationships.

Path Coefficients and Hypothesis Testing. The path coefficients and corresponding t-statistics and p-values are summarised in Table 1. Three of the five proposed hypotheses were statistically supported ($p < 0.05$), while two paths were not significant, namely the direct effect of Perceived Usefulness (PUF_X2) on Financial Inclusion (FI_Y) and the moderation effect of Government Facilitation (GF_X1) through Digital Financial Literacy (DFL_Z).

Table 4. Path Coefficients

Path	β (Coefficient)	t-statistic	p-value	Decision
DFL_Z \rightarrow FI_Y	0.349	6.821	0.000	Supported
GF_X1 \rightarrow FI_Y	0.256	3.709	0.000	Supported
PUF_X2 \rightarrow FI_Y	0.118	1.767	0.077	Not supported
DFL_Z \times PUF_X2 \rightarrow FI_Y (Moderation)	-0.127	2.449	0.014	Supported
DFL_Z \times GF_X1 \rightarrow FI_Y (Moderation)	-0.026	0.525	0.599	Not supported

Source: Authors own estimation

These results highlight the pivotal role of Digital Financial Literacy (DFL_Z) as a direct driver of Financial Inclusion (FI_Y) and as a significant moderator when interacting with Perceived Usefulness (PUF_X2). Interestingly, while Government Facilitation (GF_X1) showed a significant direct effect, its interaction with digital literacy did not enhance financial inclusion, indicating the possible presence of institutional bottlenecks or lack of behavioural synergy.

Coefficient of Determination (R^2) and Effect Sizes (f^2). The R-square value for Financial Inclusion (FI_Y) was 0.781, indicating that 78.1% of the variance in FI_Y was explained by the model, which is considered substantial according to Cohen's [27] thresholds. Adjusted R^2 was only slightly lower (0.777), indicating model robustness.

Effect sizes (f^2) provide insight into the relative contribution of each predictor. Based on Cohen's guidelines (0.02 = small, 0.15 = medium, 0.35 = large), DFL_Z had a medium effect on FI_Y ($f^2 = 0.172$), while GF_X1 and PUF_X2 had small effects. Moderation terms showed very small to negligible effects.

Table 5. Coefficient of Determination (R^2) and Effect Sizes (f^2)

Construct	R^2	f^2 Effect Size
Financial Inclusion (FI_Y)	0.781	
DFL_Z \rightarrow FI_Y		0.172 (Medium)
GF_X1 \rightarrow FI_Y		0.050 (Small)
PUF_X2 \rightarrow FI_Y		0.053 (Small)
DFL_Z \times PUF_X2 \rightarrow FI_Y (Moderation)		0.018 (Very small)
DFL_Z \times GF_X1 \rightarrow FI_Y (Moderation)		0.001 (Negligible)

Source: Authors own estimation

The high explanatory power ($R^2 = 0.781$) illustrates the relevance of the proposed model in capturing the complexity of FinTech-based inclusion in a regional developing context. This result compares favourably to earlier works by Wirdiyanti [14] and Thathsarani et al. [11], which reported lower explanatory values when assessing similar constructs in developing economies.

These findings reinforce that Digital Financial Literacy is not merely an enabling factor but a core strategic lever for unlocking inclusive outcomes in digital finance ecosystems. While institutional support such as government facilitation remains important, it cannot substitute for individual-level capability. Moreover, Perceived Usefulness a central TAM construct only exerts a significant influence when users are digitally literate enough to activate its potential. These outcomes align with the theoretical adaptations of TAM and innovation diffusion theory proposed in recent literature such as Wu & Peng [7] and Hudaefi et al. [9].

5 Discussion

The results of the structural model highlight nuanced dynamics that shape the adoption of FinTech for advancing financial inclusion in emerging regions such as South Sulawesi, Indonesia. Specifically, this study reinforces the conceptual and empirical proposition that digital financial literacy (DFL) functions not only as a direct enabler but also as a significant moderator that conditions the influence of technological perceptions on inclusive outcomes. These findings expand upon the foundational assumptions of the Technology Acceptance Model (TAM) and reflect the contextual complexity often overlooked in traditional digital finance models.

Digital Financial Literacy as a Critical Lever of Inclusion, The direct and significant relationship between DFL and Financial Inclusion ($\beta = 0.349$; $p < 0.001$) suggests that individuals equipped with higher levels of digital competence are more likely to actively participate in the digital financial ecosystem. This finding is consistent with global assessments by the empirical results from Wirdiyanti [14] and Thathsarani et al. [11], who found that users' ability to navigate digital platforms determines their actual benefit from FinTech services. In the case of South Sulawesi, where digital

infrastructure is expanding but usage remains uneven, the data underscore that access alone is insufficient; users must also possess the capability to meaningfully engage.

This evidence reinforces the perspective that financial inclusion must be viewed as a capability-driven process rather than merely a technological distribution challenge [10]. Consequently, policies that aim to boost inclusion must go beyond infrastructure and explicitly invest in digital capacity building, especially among marginalised and rural communities.

The Conditional Role of Perceived Usefulness. While Perceived Usefulness (PUF) failed to demonstrate a significant direct effect ($\beta = 0.118$; $p = 0.077$), its interaction with DFL was statistically significant ($\beta = -0.127$; $p = 0.014$). This confirms that individuals who perceive FinTech services as useful are only able to actualise these benefits when they have sufficient digital literacy. This aligns with modified interpretations of TAM in low-literacy settings, such as those proposed by Danladi et al. [8] and Hudaefi et al. [9], who argue that behavioural intentions are moderated by capability thresholds.

These results challenge the generalisability of TAM in developing contexts, suggesting that usefulness is a necessary but not sufficient predictor of adoption unless paired with behavioural enablers like literacy, confidence, and trust. From a policy standpoint, this calls for integrating digital financial education into broader inclusion campaigns to convert passive awareness into active usage.

Government Facilitation: Strong Direct Influence, Weak Moderation. The results further indicate that government facilitation (GF) has a positive and significant direct effect on financial inclusion ($\beta = 0.256$; $p < 0.001$), highlighting the importance of institutional support in creating enabling environments. This supports the assertions made in Tritto et al. [12] that proactive government engagement through digital infrastructure, simplified regulations, and financial literacy campaigns can help reduce structural barriers.

However, the insignificant moderation effect between GF and DFL ($\beta = -0.026$; $p = 0.599$) suggests that the impact of institutional efforts does not intensify even when individuals are digitally literate. This points to a possible disconnection between top-down policy interventions and bottom-up user experience, or perhaps a lack of integration between education and policy delivery.

This mismatch supports critiques raised in “Attaining SDGs through FinTech” and World Bank [13] that emphasise the need for co-creation and localisation of FinTech policy. It is not enough for governments to provide access; they must also ensure that policies are responsive to user readiness and socio-cultural barriers.

Theoretical Contributions and Literature Alignment. from a theoretical standpoint, this study contributes to the ongoing evolution of FinTech and inclusion models by offering three key insights:

1. Extension of TAM and Capability Approach: It incorporates behavioural enablers into TAM, consistent with the capability-based view of inclusion [10], emphasising that access must be paired with competence.

2. **Interaction-Centric Modelling:** By exploring moderating effects, the study addresses a gap noted by Wu & Peng [7] who argue that FinTech outcomes are rarely the result of linear pathways but are shaped by conditional variables like literacy, trust, and infrastructure quality.
3. **Empirical Advancement in LMIC Contexts:** The findings provide rare empirical insights from an under-researched province in Indonesia, adding granularity to global FinTech inclusion discourses that are often dominated by data from urban or developed economies.

In summary, the results call for a rebalancing of digital inclusion strategies from infrastructure-focused approaches toward more holistic, user-centred, and capability-sensitive interventions. Only through such integrative pathways can digital financial systems truly deliver on the promise of inclusive development and help advance the Sustainable Development Goals (SDGs) in marginalised settings.

6 Conclusion

This study highlights the interplay between perceived usefulness, government facilitation, and digital financial literacy in shaping financial inclusion within digitally transforming economies. The findings confirm that both perceived usefulness and institutional facilitation significantly contribute to inclusive financial behaviour, yet these effects are not uniformly distributed across populations. Digital financial literacy emerges as a key enabling condition, particularly in moderating the influence of perceived usefulness. This suggests that financial inclusion is not merely a technological or policy outcome, but rather a function of users' capability to convert available opportunities into meaningful access. Theoretically, the study integrates technology adoption and capability perspectives, offering a nuanced lens through which FinTech inclusivity can be analysed. For policymakers, the results underscore the need to complement infrastructure and innovation policies with robust, context-sensitive literacy initiatives especially in decentralised governance systems such as Indonesia's.

Despite its contributions, the study is not without limitations. Its cross-sectional design restricts causal inference, and the sample is limited to select districts in South Sulawesi, which may limit generalisability to other regions or national scales. Moreover, the moderating effect of digital financial literacy on government facilitation did not achieve statistical significance, suggesting that additional variables such as institutional trust, social influence, or platform usability might be more salient in that relationship. Future research should explore these factors using longitudinal or experimental designs and consider integrating behavioural data to supplement self-reported measures. Expanding this model across different provinces or ASEAN contexts would also help validate its robustness and offer deeper insights into the scalability of inclusive FinTech ecosystems.

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