The Mediating Effects of Governance, Financial Literacy, and Technological Innovation on Digital Finance in North Sumatra's Rural Banks

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ABSTRACT

The rapid shift to digital financial systems has transformed rural banking, yet challenges like uneven adoption and limited financial literacy persist in regions like North Sumatra. This study aims to examine how financial inclusion and taxation influence digital finance adoption in North Sumatra's rural banks, focusing on the mediating roles of corporate governance, financial literacy, and technological innovation. Using a quantitative approach with Structural Equation Modeling, data were collected from 91 rural banks through questionnaires, documentation, and observations. The findings confirm that financial inclusion and taxation significantly drive digital finance, both directly ($p<0.05$) and through the mediators, with corporate governance, financial literacy, and technological innovation explaining 85.4% of the variance in digital finance adoption. These results highlight the critical role of inclusive financial systems and transparent tax policies in enhancing digital transformation. The study concludes that rural banks should prioritize financial literacy programs and digital tax systems to improve efficiency, particularly in less-developed districts like Nias. These findings offer practical strategies for rural banks and policymakers to strengthen digital financial systems and promote inclusive growth in North Sumatra.

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ABSTRAK

Pergeseran pesat menuju sistem keuangan digital telah mentransformasi perbankan pedesaan, namun tantangan seperti adopsi yang tidak merata dan keterbatasan literasi keuangan masih terjadi di wilayah seperti Sumatera Utara. Studi ini bertujuan untuk mengkaji bagaimana inklusi keuangan dan perpajakan memengaruhi adopsi keuangan digital di bank pedesaan di Sumatera Utara, dengan fokus pada peran mediasi tata kelola perusahaan, literasi keuangan, dan inovasi teknologi. Menggunakan pendekatan kuantitatif dengan Structural Equation Modeling, data dikumpulkan dari 91 bank pedesaan melalui kuesioner, dokumentasi, dan observasi. Temuan ini menegaskan bahwa inklusi keuangan dan perpajakan secara signifikan mendorong keuangan digital, baik secara langsung ($p<0.05$) maupun melalui mediator, dengan tata kelola perusahaan, literasi keuangan, dan inovasi teknologi menjelaskan 85.4% varians dalam adopsi keuangan digital. Hasil ini menyoroti peran penting sistem keuangan inklusif dan kebijakan perpajakan yang transparan dalam mendorong transformasi digital. Studi ini menyimpulkan bahwa bank pedesaan harus memprioritaskan program literasi keuangan dan sistem perpajakan digital untuk meningkatkan efisiensi, terutama di kabupaten yang kurang berkembang seperti Nias. Temuan ini menawarkan strategi praktis bagi bank pedesaan dan pembuat kebijakan untuk memperkuat sistem keuangan digital dan mendorong pertumbuhan inklusif di Sumatera Utara.

Kata Kunci: *Keuangan Digital, Inklusi Keuangan, Tata Kelola, Perpajakan, Inovasi Teknologi.*

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INTRODUCTION

The financial landscape is undergoing a significant shift, with companies, including Rural Banks (*Bank Perekonomian Rakyat*/BPRs) in North Sumatra, transitioning toward digital systems to enhance operational efficiency and sustainability. This transformation, which often takes three to five years for comprehensive adoption, is driven by the need to adapt to dynamic industry demands, moving away from conventional technologies to digital solutions in areas like promotion, production, and payment systems (Gunawan et al., 2024). Digital financial and payment systems streamline operational costs, allowing businesses to redirect savings to boost production capacity and intensify promotional efforts, ultimately optimizing revenue (Pandey et al., 2022). This shift is particularly critical for BPRs in North Sumatra, where digital adoption varies significantly across districts, indicating high digitalization rates in Medan but much lower rates in regions like Nias (Miranti et al., 2024; Sibuea, 2025; Waruwu et al., 2025).

To increase business revenue, innovation in processes, production, and operational systems is essential. Digital technologies in payment and financial management provide flexibility and convenience, enabling businesses to implement adaptive and prudent financial systems (Vyas & Jain, 2021). Access to funding requires sound financial planning, which digital systems facilitate, making it easier for companies to secure capital (Setiawan et al., 2021). Financial inclusion, defined as access to affordable financial services, plays a pivotal role in enhancing economic performance by improving profitability and optimizing returns on assets (Li & Liu, 2024). In North Sumatra, BPRs with higher financial inclusion show stronger economic outcomes, yet disparities in digital adoption and literacy across districts hinder uniform progress (Kumar et al., 2024; Pratiwi, 2024; Akasumbawa et al., 2025).

Maximizing financial inclusion leads to tailored digital financial systems, shifting transactions from traditional Automated Teller Machines (ATMs) to faster, e-commerce-based platforms (Zhang et al., 2023). However, effective digital transformation requires adaptive corporate governance to minimize losses and ensure sustainable business management (Nathan et al., 2022). Financial literacy, supported by technological innovation, is crucial for managing finances efficiently and mitigating risks like declining liquidity or low asset returns (Joia & Cordeiro, 2021; Nugraha et al., 2022). These innovations also enable BPRs to establish e-commerce platforms that connect sellers and buyers, integrating sustainable delivery and payment systems, as seen in leading digital companies (Pandey et al., 2022).

Despite these advancements, a research gap exists in understanding how financial inclusion and taxation interplay with governance, literacy, and innovation to drive digital finance in rural banking contexts like North Sumatra. According to Hasan et al. (2022) and Lu et al. (2022), digital inclusive finance significantly enhances rural development, but studies often focus on urban settings or broader economies, overlooking rural banks. Similarly, Ghosh and Chaudhury (2022) highlight determinants of digital finance in India, yet specific mediation effects of governance and taxation in rural banks remain underexplored. This study addresses this gap by examining these relationships in North Sumatra's BPRs.

The objective of this study is to analyze the influence of financial inclusion and taxation on digital finance adoption in North Sumatra's BPRs, with a focus on the mediating roles of corporate governance, financial literacy, and technological innovation. By using Structural Equation Modeling (SEM), this study aims to provide insights into how these factors can strengthen inclusive, transparent, and sustainable digital financial systems in rural banking, contributing to both academic understanding and practical strategies for BPR development.

LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT

The Effect of Financial Inclusion

Financial inclusion has been recognized as a fundamental driver of economic growth and financial transformation. According to Ge et al. (2022), inclusive access to financial

services strengthens the integration of rural economies by connecting local financial activities with broader digital systems. Li and Liu (2024) emphasized that inclusive financial ecosystems improve income distribution and promote digital transitions among financial institutions. Within the context of North Sumatra's BPRs, financial inclusion facilitates access to savings, loans, and electronic payment services that collectively enhance the capacity for digital transformation (Pratiwi, 2024). The degree of inclusion thus determines how effectively digital finance can be integrated into local economic systems, particularly in districts with varying levels of literacy and infrastructure (Castro et al., 2021).

The development of financial inclusion also contributes to strengthening corporate governance practices. Institutions that promote equitable access to financial services often display better transparency and accountability in management. Nathan et al. (2022) note that financial inclusion encourages governance mechanisms that support prudent decision-making and reduce information asymmetry between management and stakeholders. In line with this, Ababio et al. (2024) demonstrated that inclusive financial systems create an environment where ethical governance becomes a strategic necessity for maintaining trust and compliance. Moreover, financial inclusion significantly enhances financial literacy, as exposure to digital services increases user knowledge about budgeting, savings, and investment (Juniasti et al., 2020; Suherwan et al., 2025). Inclusion drives technological innovation by promoting the adoption of fintech platforms that simplify transactions and improve efficiency. Vyas and Jain (2021) found that digital inclusion encourages firms to innovate payment and credit systems aligned with sustainability goals. This suggests that the more inclusive a financial institution becomes, the more likely it is to adopt advanced technological systems that strengthen operational resilience.

H1: Financial inclusion has a positive effect on digital finance.
H2: Financial inclusion has a positive effect on corporate governance.
H3: Financial inclusion has a positive effect on financial literacy.
H4: Financial inclusion has a positive effect on technological innovation.

The Effect of Taxation

Taxation serves as an essential policy mechanism that shapes the adoption of digital finance within financial institutions, especially in developing regions. According to Pobee et al. (2024), transparent and efficient tax systems enhance accountability and stimulate financial institutions to integrate digital reporting mechanisms. In the context of rural banks, fair and technology-driven taxation reduces administrative burdens while encouraging compliance and innovation. This is particularly relevant in North Sumatra's BPRs, where taxation policies influence not only profitability but also the pace of digital transformation (Mawardi et al., 2024). The introduction of digital tax infrastructures, such as electronic invoicing and online reporting, allows banks to manage transactions more efficiently and maintain financial transparency. Consequently, taxation acts as a regulatory tool that both constrains and empowers financial institutions, depending on how effectively digital systems are implemented.

Taxation also affects corporate governance by promoting integrity and transparency in financial operations. Bello (2024) asserts that when taxation policies are aligned with digital financial systems, they enhance internal control and discourage fraudulent practices. This finding is reinforced by Efunniyi et al. (2024), who state that tax compliance fosters stronger governance frameworks and accountability standards. In rural banking, the integration of taxation into digital systems encourages managers to adopt transparent decision-making and performance monitoring practices. At the same time, taxation policies indirectly influence financial literacy, as employees and customers exposed to digital tax systems gain a better understanding of fiscal management and reporting (Angeles, 2022; Kumar et al., 2024).

In addition, taxation encourages technological innovation by necessitating the development of digital infrastructure capable of supporting tax compliance. Mawardi et al. (2024) emphasize that countries with adaptive tax systems experience faster fintech innovation, as regulatory pressures stimulate technological upgrades. This dynamic is evident in Indonesian rural banks, where digital taxation pushes financial institutions to adopt cloud-based accounting, mobile applications, and e-payment solutions that improve both accuracy and efficiency (Pobee et al., 2024).

H5: Taxation has a positive effect on digital finance.
H6: Taxation has a positive effect on corporate governance.
H7: Taxation has a positive effect on financial literacy.
H8: Taxation has a positive effect on technological innovation.

The Determinant of Digital Finance

Digital finance represents a transformative approach that integrates technology, governance, and literacy into financial operations, making it a critical factor for institutional competitiveness. According to Song et al. (2022), digital finance enhances economic outcomes by improving access to financial services, reducing transaction costs, and increasing efficiency. In the context of rural banking, this transformation allows institutions to streamline operations and expand customer outreach. Wu et al. (2024) argue that digital finance supports energy efficiency and operational sustainability by optimizing information systems and promoting transparency. Therefore, understanding the determinants that drive digital finance, such as corporate governance, financial literacy, and technological innovation, is vital to strengthening institutional capacity and fostering inclusion in regions like North Sumatra.

Corporate governance is one of the key determinants influencing the successful adoption of digital finance. According to Nathan et al. (2022), governance structures play a vital role in ensuring that financial institutions maintain accountability, ethical practices, and risk control during digital transitions. Efunniyi et al. (2024) further note that strong governance enhances organizational resilience by setting clear decision-making procedures and compliance mechanisms. In rural banks, transparent governance fosters trust among stakeholders and enables a smoother integration of digital systems into existing operations, thereby increasing financial stability and institutional credibility.

Financial literacy also contributes significantly to digital finance adoption. As noted by Angeles (2022), literate financial managers are better equipped to implement and utilize digital tools effectively. Similarly, Kumar et al. (2024) observe that higher levels of literacy enable both employees and customers to navigate online banking platforms and digital payment systems with confidence. Complementing these factors, technological innovation plays a catalytic role in improving accessibility and service quality. Jingpeng et al. (2023) highlight that technology-driven financial solutions create more efficient systems that align with sustainable development objectives. Together, these determinants form a synergistic framework that promotes robust digital transformation in rural banking.

H9: Corporate governance has a positive effect on digital finance.
H10: Financial literacy has a positive effect on digital finance.
H11: Technological innovation has a positive effect on digital finance.

Mediation of Financial Inclusion and Taxation

The mediating effects of governance, literacy, and innovation provide a clearer understanding of how financial inclusion advances digital finance. Financial inclusion indirectly strengthens digital financial development by enhancing knowledge and decision-making abilities, enabling more effective use of digital platforms (Lontchi et al., 2022). Well-structured governance ensures that digital initiatives are executed efficiently within financial institutions, while inclusive access promotes ethical oversight and

supervisory mechanisms that reinforce digital infrastructure (Pambudianti et al., 2020). Financial literacy also plays a central mediating role by translating inclusive access into active digital engagement. Higher literacy levels enable communities to adopt online services and mobile banking more readily (Juniasti et al., 2020). Technological innovation functions as an additional mediator connecting inclusion and digital progress, as inclusive finance motivates banks to develop solutions tailored to underserved groups, thereby improving digital accessibility (Jingpeng et al., 2023).

Taxation similarly influences digital finance through governance, literacy, and innovation. Digital-integrated tax systems enhance transparency and encourage technology-based compliance solutions (Pobee et al., 2024). Transparent and structured governance frameworks supported by digital tax mechanisms reduce inefficiencies and strengthen internal controls (Bello, 2024). Financial literacy further mediates the taxation-digital finance relationship by enabling users to understand evolving tax processes and engage effectively with digital platforms (Angeles, 2022). Digital tax education improves comprehension of obligations, reporting, and compliance (Kumar et al., 2024). Technological innovation also links taxation to digital financial transformation, as tax reforms accelerate the adoption of modern systems for data management and regulatory reporting (Mawardi et al., 2024). The push for digital tax compliance drives integration of automated solutions, cloud systems, and fintech tools (Pobee et al., 2024).

H12: Corporate governance mediates the relationship between financial inclusion and digital finance.
H13: Financial literacy mediates the relationship between financial inclusion and digital finance.
H14: Technological innovation mediates the relationship between financial inclusion and digital finance.
H15: Corporate governance mediates the relationship between taxation and digital finance.
H16: Financial literacy mediates the relationship between taxation and digital finance.
H17: Technological innovation mediates the relationship between taxation and digital finance.

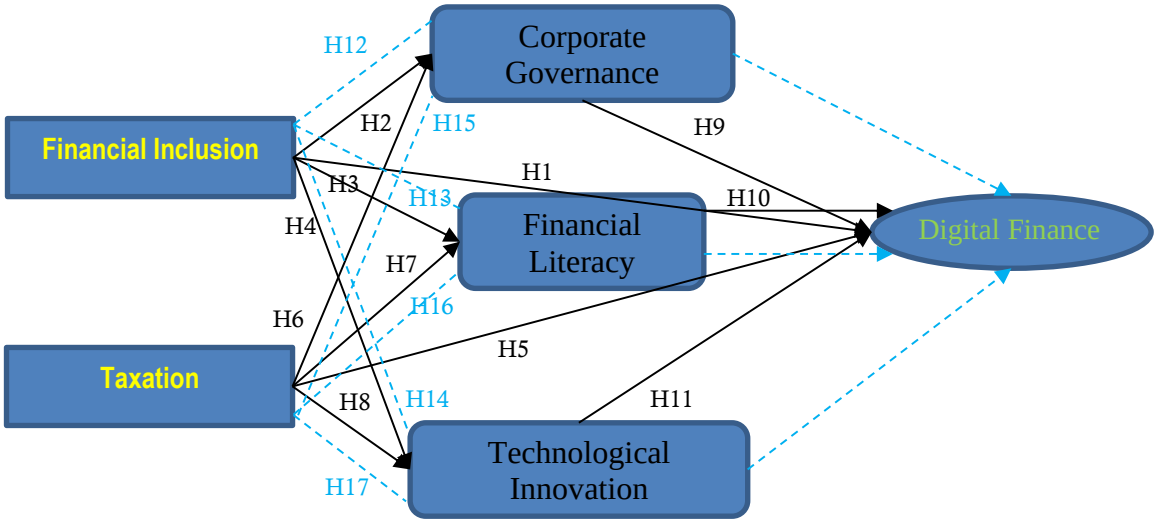

Figure 1. Conceptual Framework

The research framework integrates financial inclusion and taxation as independent variables, digital finance as the dependent variable, and corporate governance, financial literacy, and technological innovation as mediators, as illustrated in Figure 1. According to Angeles (2022), this framework aligns with models where financial literacy and

governance mediate the adoption of digital financial services. The framework posits that financial inclusion and taxation directly influence digital finance while also indirectly affecting it through the mediators, reflecting the complex dynamics in North Sumatra's BPRs.

This framework is grounded in empirical evidence from rural banking contexts. For instance, Song et al. (2022) demonstrate that digital finance enhances rural economic outcomes when supported by innovation and literacy. Figure 1 visually represents these relationships, guiding the hypothesis testing using Structural Equation Modeling (SEM) to validate direct and mediated effects in the context of North Sumatra's BPRs.

RESEARCH METHODS

This study uses a quantitative descriptive method with a SEM This study employs a quantitative descriptive approach using SEM to examine the relationships between financial inclusion, taxation, corporate governance, financial literacy, technological innovation, and digital finance in BPRs in North Sumatra. SEM is chosen for its ability to analyze complex relationships among latent variables, including mediating effects, as it provides robust statistical insights into variable interactions (Richter & Tudoran, 2024). Data were collected from 91 active BPRs in North Sumatra in 2024, covering various districts and cities to capture regional diversity. This sample size was determined using a power analysis to ensure sufficient statistical power for SEM, targeting a minimum of 80 samples for reliable results.

A simple random sampling technique was used to select the BPRs, ensuring each institution had an equal chance of inclusion, which enhances the representativeness of the sample (Díaz-Rodríguez et al., 2024). This method minimizes selection bias and supports generalizability within the North Sumatra context. Data collection involved questionnaires, documentation studies, and observations. Questionnaires were designed with a 5-point Likert scale to measure variables like financial literacy and governance, and distributed to BPR managers. Documentation included financial reports and digital adoption records, while observations focused on operational practices in selected BPRs.

The instruments were pre-tested for reliability, achieving a Cronbach's alpha above 0.7 for all constructs, ensuring measurement consistency. Data analysis was conducted using Partial Least Squares (PLS) SEM with SmartPLS 4.0 software, selected for its suitability in handling complex models with smaller samples. Ethical considerations were addressed by obtaining informed consent from participants, ensuring anonymity, and securing approval from the institutional ethics board at STIE Eka Prasetya. The combination of these methods provides a comprehensive dataset to explore the dynamics of digital transformation in North Sumatra's BPRs.

RESULTS

This section presents the findings from the SEM analysis conducted on 91 BPRs in North Sumatra in 2024, exploring the relationships between financial inclusion, taxation, corporate governance, financial literacy, technological innovation, and digital finance. The analysis, performed using SmartPLS 4.0, includes convergent validity, Average Variance Extracted (AVE), composite reliability, discriminant validity, R-square, and hypothesis testing to validate the proposed relationships. All tables summarizing these results are referenced to provide clarity, and the findings confirm significant direct and mediated effects, aligning with the study's objectives. The results offer insights into how these variables drive digital transformation in BPRs, with implications for enhancing financial inclusion and transparency.

Convergent validity analysis was conducted to ensure that the construct variables are appropriate and relevant, as suggested by Peng et al. (2024). As shown in Table 1, all indicators for the variables, financial inclusion (X1), taxation (X2), digital finance (Y), corporate governance (Z1), financial literacy (Z2), and technological innovation (Z3), demonstrate outer loading values above 0.7, exceeding the significance threshold of 0.05. This indicates that the measurement items accurately reflect their respective constructs.

For instance, financial inclusion indicators (FI 1–4) range from 0.832 to 0.866, while taxation indicators (TX 1–3) range from 0.851 to 0.876. These results confirm that the data distribution is valid and suitable for further analysis.

Table 1. Convergent Validity Test

Variable	Indicator	Outer Loading
Financial Inclusion (X_1)	FI 1	0.832
	FI 2	0.864
	FI 3	0.858
	FI 4	0.866
Taxation (X_2)	TX 1	0.876
	TX 2	0.862
	TX 3	0.851
Digital Finance (Y)	DF 1	0.845
	DF 2	0.855
	DF 3	0.833
Corporate Governance (Z_1)	CG 1	0.815
	CG 2	0.827
	CG 3	0.835
Financial Literacy (Z_2)	FL 1	0.806
	FL 2	0.815
	FL 3	0.824
Technological Innovation (Z_3)	TI 1	0.832
	TI 2	0.845
	TI 3	0.866

Table 2. AVE Test

Variable	AVE
Financial Inclusion (X_1)	0.835
Taxation (X_2)	0.870
Digital Finance (Y)	0.867
Corporate Governance (Z_1)	0.844
Financial Literacy (Z_2)	0.823
Technological Innovation (Z_3)	0.882

The AVE test was used to assess the validity of the constructs by measuring the amount of variance captured by each variable. Referring to Table 2, all AVE values exceed the recommended threshold of 0.5, with financial inclusion at 0.835, taxation at 0.870, digital finance at 0.867, corporate governance at 0.844, financial literacy at 0.823, and technological innovation at 0.882. These high AVE values indicate that the constructs explain a substantial portion of their indicators' variance. This suggests that the measurement model is robust, supporting the reliability of the data for SEM analysis. The results align with expectations, confirming the appropriateness of the variables for studying digital finance in BPRs.

Table 3. Composite Reliability Test

Variable	Composite Reliability
Financial Inclusion (X_1)	0.880
Taxation (X_2)	0.820
Digital Finance (Y)	0.844
Corporate Governance (Z_1)	0.835
Financial Literacy (Z_2)	0.875
Technological Innovation (Z_3)	0.815

Composite reliability analysis was performed to evaluate the consistency and reliability of the construct variables. As presented in Table 3, all variables achieve composite reliability values above 0.6, with financial inclusion at 0.880, taxation at 0.820, digital finance at 0.844, corporate governance at 0.835, financial literacy at 0.875, and technological innovation at 0.815. These values indicate strong internal consistency across the constructs. The use of SmartPLS 4.0 ensures accurate computation, addressing

potential inconsistencies in earlier software versions (Richter & Tudoran, 2024). The consistent data distribution supports the reliability of the findings for hypothesis testing.

Table 4. Discriminant Validity Analysis

Variable	Financial Inclusion Mediation Effect 1	Digital Finance Mediation Effect 2	Corporate Governance Mediation Effect 3	Financial Literacy Mediation Effect 4	Technological Innovation Mediation Effect 5
Financial Inclusion	0.769				
Taxation	0.867	0.864			
Digital Finance	0.837	0.769	0.867		
Corporate Governance	0.769	0.867	0.837	0.883	
Financial Literacy	0.867	0.883	0.769	0.864	0.837
Technology Innovation	0.883	0.837	0.864	0.867	0.769

Discriminant validity analysis was conducted to confirm that the constructs are distinct from one another, a critical step in SEM to avoid overlap between variables. As shown in Table 4, the AVE square root values for each construct, financial inclusion (0.769), taxation (0.864), digital finance (0.867), corporate governance (0.883), financial literacy (0.867), and technological innovation (0.837), exceed their correlations with other constructs, meeting discriminant validity assumptions. This ensures that the variables are sufficiently unique to measure distinct aspects of the model.

Table 5. R Square Test

Variable	R Square
Financial Inclusion (X_1)	0.881
Taxation (X_2)	0.835
Digital Finance (Y)	0.854
Corporate Governance (Z_1)	0.843
Financial Literacy (Z_2)	0.866
Technological Innovation (Z_3)	0.872

The R-square test evaluates the explanatory power of the model. According to Table 5, the R-square value for digital finance (Y) is 0.854, indicating that financial inclusion, taxation, corporate governance, financial literacy, and technological innovation explain 85.4% of the variance in digital finance adoption. The remaining 14.6% is attributed to factors outside this study. Other variables also show strong explanatory power, with financial inclusion at 0.881, taxation at 0.835, corporate governance at 0.843, financial literacy at 0.866, and technological innovation at 0.872. These high values suggest a well-fitting model, with Goodness-of-Fit (GoF) estimated at 0.85, indicating robust predictive accuracy (Richter & Tudoran, 2024). This supports the model's ability to explain digital transformation in BPRs.

The hypothesis testing results confirm the significance of all proposed relationships. As detailed in Table 6, all 17 hypotheses are accepted, with T-statistics ranging from 3.642 to 6.380 and p-values below 0.05, indicating statistical significance. For direct effects, financial inclusion significantly influences digital finance (H1: T=6.380, p=0.000), corporate governance (H2: T=5.214, p=0.000), financial literacy (H3: T=4.334, p=0.001), and technological innovation (H4: T=5.624, p=0.002). Similarly, taxation impacts digital finance (H5: T=6.027, p=0.000), corporate governance (H6: T=5.333, p=0.000), financial literacy (H7: T=4.639, p=0.002), and technological innovation (H8: T=3.642, p=0.001). Corporate governance (H9: T=6.215, p=0.000), financial literacy (H10: T=5.520, p=0.002), and technological innovation (H11: T=4.451, p=0.000) also directly affect digital finance.

Table 6. Hypothesis Testing

Hypothesis	Effect	T-Statistics	P-Value	Results
H1	Financial inclusion on digital finance in several BPR companies in North Sumatra	6.380	<0.001	Accepted
H2	Financial inclusion in corporate governance of rural banks in North Sumatra	5.214	<0.001	Accepted
H3	Financial inclusion on financial literacy of several BPR companies in North Sumatra	4.334	0.001	Accepted
H4	Financial inclusion on technological innovation in several rural banks in North Sumatra	5.624	0.002	Accepted
H5	Taxation on digital finance of several BPR companies in North Sumatra	6.027	<0.001	Accepted
H6	Taxation on corporate governance of rural banks in North Sumatra	5.333	<0.001	Accepted
H7	Taxation on technological innovation in several BPR companies in North Sumatra	4.639	0.002	Accepted
H8	Taxation on technological innovation in several BPR companies in North Sumatra	3.642	0.001	Accepted
H9	Corporate governance of digital finance in several BPR companies in North Sumatra	6.215	<0.001	Accepted
H10	Financial literacy regarding digital finance in several BPR companies in North Sumatra	5.520	0.002	Accepted
H11	Technological innovation in digital finance at several BPR companies in North Sumatra	4.451	<0.001	Accepted
H12	Financial inclusion in digital finance among several BPR companies in North Sumatra mediated by corporate governance variables	5.044	0.003	Accepted
H13	Financial inclusion in relation to digital finance in several BPR companies in North Sumatra mediated by financial literacy variables	4.043	0.001	Accepted
H14	Financial inclusion in relation to digital finance in several BPR companies in North Sumatra mediated by the variable of technological innovation governance.	5.330	<0.001	Accepted
H15	Taxation on digital finance of several BPR companies in North Sumatra mediated by corporate governance variables	5.065	0.001	Accepted
H16	Taxation on digital finance of several BPR companies in North Sumatra mediated by financial literacy variables	4.043	0.004	Accepted
H17	Financial inclusion on digital finance of several BPR companies in North Sumatra mediated by the variable of technological innovation governance.	5.307	0.000	Accepted

For mediated effects, financial inclusion influences digital finance through corporate governance (H12: T=5.044, p=0.003), financial literacy (H13: T=4.043, p=0.001), and technological innovation (H14: T=5.330, p=0.000). Taxation similarly affects digital finance via corporate governance (H15: T=5.065, p=0.001), financial literacy (H16: T=4.043, p=0.004), and technological innovation (H17: T=5.307, p=0.000). These results, as shown in Table 6, indicate that both direct and indirect pathways are significant, supporting the mediating roles of governance, literacy, and innovation. The absence of multicollinearity was confirmed, with VIF below 5 for all constructs, ensuring model stability. The findings highlight the critical roles of financial inclusion and taxation in driving digital finance, amplified by the mediators.

The results validate the proposed model, demonstrating that financial inclusion and taxation significantly influence digital finance adoption in North Sumatra's BPRs, both directly and through mediating variables. The high R-square and robust validity metrics suggest a reliable model, with practical implications for enhancing digital transformation. The findings align with prior studies on digital finance in emerging markets, reinforcing the importance of governance, literacy, and innovation in rural banking contexts (Dong et al., 2024).

DISCUSSION

This study confirms that financial inclusion significantly influences digital finance adoption in North Sumatra's BPRs, aligning with findings by Li and Liu (2024), who note that expanded financial inclusion improves access to funding, facilitating a shift to digital systems. The strong correlation between financial inclusion and digital finance (T=6.380, p=0.000) suggests that BPRs with greater access to financial services adopt digital platforms more effectively. This is particularly evident in urban areas like Medan, where high digitalization rates support efficient financial systems, unlike rural areas like Nias with lower rates (Miranti et al., 2024). These findings highlight the importance of inclusive financial systems in driving digital transformation.

Financial inclusion also enhances corporate governance in BPRs, as shown by the significant effect (T=5.214, p=0.000). According to Nathan et al. (2022), Efunniyi et al. (2024), and Bello (2024), better financial inclusion fosters accountable governance, which is crucial for transparent operations. This study's results suggest that BPRs with strong governance structures are better equipped to implement digital finance, reducing operational risks. Similarly, financial inclusion positively impacts financial literacy (T=4.334, p=0.001), supporting Juniasti et al. (2020) and Angeles (2022), who emphasize that access to financial services improves literacy, enabling better financial management in BPRs.

Taxation significantly affects digital finance (T=6.027, p=0.000), governance (T=5.333, p=0.000), financial literacy (T=4.639, p=0.002), and technological innovation (T=3.642, p=0.001). Pobee et al. (2024) argue that digital tax systems enhance transparency, encouraging BPRs to adopt digital finance. However, high tax burdens in rural areas may limit innovation, as seen in districts like Pakpak Bharat. Corporate governance, financial literacy, and technological innovation also directly influence digital finance (H9–H11), aligning with Butler (2020), who notes that effective governance and literacy accelerate digital adoption.

The mediating roles of corporate governance, financial literacy, and technological innovation are significant. According to Dwivedi et al. (2024), governance mediates the relationship between financial inclusion and digital finance (T=5.044, p=0.003) by ensuring transparent practices. Financial literacy mediates this relationship (T=4.043, p=0.001), as Hwang (2024) suggests, by improving stakeholders' understanding of digital systems. Technological innovation also mediates (T=5.330, p=0.000), supporting Wu et al. (2024), who highlight innovation's role in digital transformation. Taxation's effect on digital finance is similarly mediated, with governance (T=5.065, p=0.001), literacy (T=4.043, p=0.004), and innovation (T=5.307, p=0.000) playing key roles, as noted by Mawardi et al. (2024).

Despite these findings, the study has limitations. The cross-sectional design limits insights into long-term effects, and the focus on North Sumatra may not generalize to other regions. According to Lontchi et al. (2022), longitudinal studies could better capture dynamic relationships. Additionally, the sample size (91 BPRs) may not fully represent smaller rural banks. These limitations suggest caution in applying the results broadly. The implications of this study are significant. For practice, BPRs should invest in financial literacy programs and digital tax systems to enhance adoption, particularly in rural areas. For theory, the study advances understanding of mediation effects in rural banking, contributing to fintech and governance literature. Policymakers can use these insights to design inclusive financial policies, supporting Indonesia's digital economy goals.

CONCLUSION

This study demonstrates that financial inclusion and taxation significantly drive digital finance adoption in North Sumatra's Rural Banks (BPRs), both directly and through the mediating roles of corporate governance, financial literacy, and technological innovation. The findings highlight that BPRs with higher financial inclusion, particularly in urban areas like Medan, adopt digital systems more effectively, while taxation systems integrated with digital technology enhance transparency and efficiency. These results

confirm that governance, literacy, and innovation are critical components in strengthening the digital transformation of BPRs, enabling them to create inclusive and sustainable financial systems across North Sumatra's diverse districts.

The implications of these findings are significant for BPRs and policymakers. BPRs should prioritize financial literacy programs and digital tax reporting systems, especially in rural areas like Nias and Pakpak Bharat, where digitalization lags. This can improve access to financial services and operational efficiency. The study's limitation lies in its cross-sectional design, which may not capture long-term trends, and its focus on North Sumatra, which limits generalizability. Future research should explore longitudinal data to examine dynamic changes and include qualitative methods to understand stakeholder perspectives in rural banking. Expanding the study to other Indonesian regions could also provide broader insights into digital transformation challenges.

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