Blockchain Adoption and Financial Reporting Quality in Indonesian Conventional Banks

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Abstract

This study examines the effect of blockchain adoption on financial reporting quality among conventional banks listed on the Indonesia Stock Exchange (IDX) during 2022–2025, addressing the limited empirical evidence in the Indonesian banking context. Financial reporting quality was measured using Discretionary Accruals (DA) based on the Modified Jones Model, while blockchain adoption was measured using a binary dummy variable from annual and sustainability report disclosures. Panel regression analysis was conducted on 43 banks with 171 valid bank-year observations, with model selection based on the Chow and Lagrange Multiplier tests. Only three banks (BBNI, BBRI, and BNLI) disclosed blockchain adoption. The Common Effect Model was selected as the appropriate estimator. Blockchain adoption showed a negative coefficient, consistent with the hypothesis, but the effect was statistically insignificant (one-tailed $p=0.1089$; $R^2=0.90\%$). The hypothesis was not statistically supported. However, the directionally consistent result suggests that the insignificant finding may be attributed to limited statistical power due to the small number of adopters rather than the absence of an effect. The study is limited by the small number of blockchain adopters, binary measurement of adoption, and correlational design. This study provides initial bank-year panel evidence on blockchain adoption and financial reporting quality in Indonesian conventional banks. It extends Agency Theory by explaining how blockchain transparency may reduce managerial discretion and highlights that blockchain investment should currently focus on operational efficiency and transaction transparency rather than assumed reporting-quality improvements.

Keywords: *Agency Theory, Banking, Blockchain Adoption, Discretionary Accruals, Financial Reporting Quality*

1. INTRODUCTION

As a decentralized recording technology, blockchain offers transaction security, transparency, and irreversibility, which potentially support more real-time financial reporting and faster decision-making. Prior empirical studies have generally shown that blockchain implementation is associated with improved transparency and efficiency in financial reporting, given the immutable nature of the ledger and the ease of direct data access (Coyne, & McMickle, 2017; Dai, & Vasarhelyi, 2017; Chen, Xu, & Zou, 2024). In the banking industry specifically, the technology is believed to be capable of bringing significant change to how financial transactions are recorded, making them more accurate while reducing the need for inter-bank data reconciliation (Bhimasta & Dismas, 2025). This policy direction is reinforced by Financial Services Authority Regulation or locally *Peraturan Otoritas Jasa Keuangan* (POJK) No. 16 of 2025, which encourages banks to begin adopting new technologies.

Nevertheless, the potential gains in transparency and operational efficiency offered by blockchain have not been easy to fully realize in the practice of Indonesia's banking sector, as the adoption process still faces a number of fundamental constraints. Previous studies note that blockchain adoption in the domestic financial services industry is hindered by high implementation costs, limited technical readiness, and an incomplete regulatory framework governing the technology (Putri, & Kharisma, 2021; Huda, Yunan, & Paidi, 2025). This problem is compounded by overlapping authority between Bank Indonesia and the Financial Services Authority or locally *Otoritas Jasa Keuangan* (OJK), which in turn becomes a normative root cause in the regulation of blockchain within the national financial system.

From a compliance perspective, OJK Regulation No. 27 of 2024 has so far not covered provisions on blockchain analytics, privacy coins, mixers, or cross-chain laundering practices, and

does not yet provide an adequate technology-based supervisory framework (Huda et al., 2025). This regulatory vacuum creates legal uncertainty for banks intending to adopt blockchain, particularly with respect to compliance with Anti-Money Laundering (AML) provisions and customer data protection. Furthermore, prior research has demonstrated that the digital transformation through blockchain technology in banks can significantly improve accounting information quality and strengthen corporate governance mechanisms, particularly when the adoption process is supported by adequate organizational readiness and regulatory clarity (Al & Elessa, 2022).

A gap exists between the theoretical potential promised by blockchain and the reality on the ground, which is still coloured by various transparency constraints, compounded by the scarcity of empirical evidence on its implementation in Indonesian conventional banks. This gap underlies the present study, which specifically aims to examine the effect of blockchain adoption on the financial reporting quality of conventional banks listed on the Indonesia Stock Exchange (IDX). This study departs from prior empirical work in three respects. First, most existing evidence linking blockchain adoption to financial reporting outcomes originates from single-country studies outside Indonesia, such as Jordanian banks Haddad, Al-Ramahi, and Al-Okaily (2026) and U.S. listed firms Garg, Gupta, and Chauhan (2026), whose regulatory architecture, capital market maturity, and blockchain-adoption incentives differ substantially from the Indonesian setting; direct generalization of their findings to Indonesian banks is therefore not warranted without dedicated local testing. Second, where Indonesia-focused studies exist, they remain largely conceptual or descriptive literature reviews Irmadhani and Dewayanto (2025), Putri and Kharisma (2021), and Huda et al. (2025) rather than hypothesis-driven quantitative tests using an objective, verifiable proxy such as discretionary accruals. Third, the Indonesian conventional banking sector presents a regulatory configuration not replicated elsewhere in the reviewed literature, such as overlapping supervisory authority between Bank Indonesia and the OJK, a blockchain-specific regulatory vacuum under OJK Regulation No. 27 of 2024, and an active but centrally controlled digital-currency initiative (Project Garuda) that coexists with a continuing prohibition on cryptocurrency as legal tender.

This configuration creates adoption incentives and constraints that are distinct from those documented in other jurisdictions, making it plausible that the magnitude, and even the statistical detectability, of any blockchain–reporting-quality relationship in Indonesia differs from what has been found elsewhere. Testing the relationship directly in this setting, rather than inferring it from foreign evidence, is therefore both a theoretical and a practical necessity. This study departs from prior empirical work in three critical respects. First, and most importantly, this is the first hypothesis-driven study to employ an objective, accrual-based proxy (discretionary accruals) to test the blockchain–reporting quality relationship specifically in the Indonesian conventional banking sector. Existing evidence, such as Haddad et al. (2026) in Garg et al. (2026) in the U.S., relies on disclosure indices or perception-based surveys, which are not directly comparable to earnings quality metrics and are drawn from regulatory architectures fundamentally different from Indonesia dual-authority (OJK–Bank Indonesia) oversight. Second, prior Indonesia-focused work remains largely conceptual or descriptive (Irmadhani and Dewayanto, 2025; Putri and Kharisma, 2021).

Various empirical findings tend to show that blockchain implementation contributes to improved transparency and efficiency in financial reporting, in line with the immutable nature of the records and the availability of direct data access Hamzah, Hamzah, and Altysarin (2025) and Irmadhani and Dewayanto (2025), even though challenges such as regulatory uncertainty and technological integration complexity remain evident. On the other hand, existing literature also shows that most research on this topic is still conceptual, so stronger empirical evidence is needed to ascertain the causal relationship between blockchain adoption and various dimensions of financial reporting quality in the banking industry (Austin, & Williams, 2021; Gietzmann, & Grossetti, 2021).

Based on the background and problems described above, the research questions proposed in this study are as follows: Does blockchain technology adoption affect the financial reporting quality of conventional banks listed on the IDX? How large is the contribution of blockchain technology adoption in improving the financial reporting quality of conventional banks listed on the IDX?. The

objectives of this study are: To empirically test whether blockchain technology adoption affects the financial reporting quality of conventional banks listed on the IDX and to provide empirical evidence on the extent to which blockchain technology adoption acts as a determinant of the financial reporting quality of conventional banks listed on the IDX.

2. LITERATURE REVIEW

2.1 Agency Theory

In the finance literature, agency theory formulates the contractual bond between the principal shareholders or investors and the agent, that is, the management team entrusted with running the business operations. This bond has the potential to trigger conflicts of interest, given that the agent is often motivated to prioritize personal gain, while the principal expects the agent to consistently act in the interest of the agreed corporate goals (Jensen, & Meckling, 1976; Scott, 2015). The root of this conflict is information asymmetry, in which the agent possesses far more comprehensive operational data than the principal. This gap allows the agent to act opportunistically, for instance by manipulating financial statement figures or presenting data that does not fully represent economic reality.

In the specific context of the banking industry, the pattern of agency conflict is not limited to the relationship between shareholders and management, but also involves depositors acting as principals because they entrust their funds to the bank, as well as supervisory authorities such as the OJK and Bank Indonesia, which bear responsibility for maintaining the stability of the financial system as a whole. Studies from other developing economies have demonstrated that blockchain adoption in banks enhances transparency and accounting disclosure levels in digital financial reports, supporting the notion that the technology can effectively mitigate agency conflicts even in less mature regulatory environments (Haddad, Al-Ramahi, & Al-Okaily, 2026). Bank management generally holds far more complete information regarding credit portfolio conditions, liquidity risk levels, and compliance with minimum Capital Requirements (CAR) than depositors or regulators. Such information asymmetry opens the door for management to engage in earnings management or to conceal losses, solely to maintain public trust and meet regulator-set targets (Scott, 2015). Financial reporting quality therefore occupies a crucial position as an instrument to reduce information asymmetry while protecting the interests of all stakeholders involved.

Building on the framework of agency theory, blockchain implementation is expected to reduce the level of information asymmetry while limiting the scope for opportunistic management behaviour, through increased transparency and accountability in the transaction recording process. On this basis, blockchain adoption is positioned as one determinant with the potential to improve the financial reporting quality of conventional banks. The theoretical linkage between agency theory and blockchain adoption rests on a specific mechanism rather than a general association, such as blockchain functions as a monitoring technology that substitutes, in part, for costly human-mediated verification. Under agency theory, principals normally reduce information asymmetry through monitoring and bonding expenditures audits, disclosure requirements, and covenants Jensen and Meckling (1976) all of which remain vulnerable to managerial discretion because the underlying records can still be selectively presented or adjusted after the fact. Blockchain alters this by making the record itself, rather than only the reporting of the record, resistant to unilateral alteration, because entries require multi-party consensus and are cryptographically linked, the marginal cost to management of concealing or manipulating a transaction rises sharply relative to a conventional ledger.

This is why the technology is theorized to operate directly on the information-asymmetry component of agency cost, rather than merely improving reporting speed or convenience. However, the empirical literature synthesized above suggests this theoretical mechanism has been tested more often than it has been confirmed. Studies reporting a positive association between blockchain adoption and reporting or disclosure quality Al and Elessa (2022), Fang, Liu, Ma, and Zhuo (2023), and Haddad et al. (2026) are predominantly cross-sectional or descriptive, drawn from jurisdictions with either larger blockchain-adopter samples or more mature disclosure regimes, and none directly measure discretionary accruals as the outcome. Conversely, literature reviews focused on

Indonesia Irmadhani and Dewayanto (2025), Austin and Williams (2021), and Gietzmann and Grossetti (2021) explicitly note that the causal, accrual-level relationship between blockchain adoption and reporting quality remains empirically unestablished. Taken together, the literature converges on a plausible theoretical mechanism but not yet on a demonstrated, jurisdiction-specific causal effect precisely the gap this study is designed to address using an explicit earnings-quality proxy in the Indonesian banking context.

2.2 Blockchain in Banking

The national banking industry is under the strict supervision of two authorities, namely the Financial Services Authority (OJK) and Bank Indonesia. Through OJK Regulation No. 16 of 2025, the OJK directs the banking sector to further digitalize its services to encourage efficiency and expand financial inclusion. Unfortunately, regulation concerning blockchain implementation in this sector is still partial and unintegrated. As noted earlier, OJK Regulation No. 27 of 2024 has not yet covered provisions on blockchain analytics, privacy coins, or a technology-based supervisory framework (Huda et al., 2025). Such regulatory gaps remain a major obstacle to accelerating blockchain adoption in Indonesia's banking industry. As the monetary authority, Bank Indonesia (BI) holds a central role in maintaining monetary stability, payment system stability, and overall financial system stability. In carrying out this function, BI does not merely act as regulator and payment system supervisor, but also actively drives the acceleration of digital transformation in the financial sector through various strategic policies and initiatives One of its key policy references is set out in the Indonesia Payment System Blueprint or locally *Badan Satuan Pelayanan Indonesia* (BSPI) 2030, which serves as BI's policy direction in building a conducive digital economic and financial ecosystem.

As part of BSPI 2030 implementation, BI pioneered Project Garuda, an initiative exploring a Central Bank Digital Currency (CBDC) known as digital rupiah. The project is designed to modernize the monetary infrastructure and core transaction settlement mechanism in Indonesia, with an emphasis on institutional use of central bank digital money, particularly for inter-bank transaction settlement, liquidity management, and the alignment of cash and securities workflows. By the end of 2024, BI had completed the first proof of concept stage for the digital rupiah wholesale cash ledger, demonstrating that Distributed Ledger Technology (DLT) is ready to meet both the business and technical requirements for digital rupiah development.

The application of DLT to the wholesale digital rupiah opens opportunities for connectivity with BI's internal systems, domestic financial market infrastructure, and various cross-border initiatives, through the use of API connections and the ISO 20022 messaging standard. Regarding cross-border payments, BI also participates as an observer in the Bridge cross-border CBDC project, which uses wholesale CBDC, and has established a regional payment platform called Nexus together with several ASEAN countries and India to unify cross-border payment systems through a Local Currency Transaction (LCT) scheme(Safrina & Zahra, 2026). These steps are aligned with BI Regulation No. 4 of 2025 on Payment System Policy, which mandates that BI's payment system policy be forward-looking, follow international best practice, and prioritize good governance with an emphasis on transparency and accountability.

This series of steps shows that BI's involvement in digital rupiah development and its participation in cross-border payment initiatives position BI not only as a regulator but also as a key driver of national payment system transformation in the digital economy era. In parallel, blockchain-based applications in corporate banking have also been recognized as instrumental in strengthening risk management frameworks, regulatory reporting processes, and overall governance structures in the banking sector (Dashottar & Srivastava, 2021). Nevertheless, tension between technological innovation and regulatory compliance demands remains a distinct issue, given that BI still prohibits the use of cryptocurrency as a legal means of payment in Indonesia, as regulated under BI Regulation No. 19/12/PBI/2017. For this reason, digital rupiah development continues to be carried out through a permissioned DLT approach that remains fully under BI's control and supervision.

2.3 Blockchain Adoption and Financial Reporting Quality

Drawing on agency theory, the conflict of interest between management as agent and owners as principal fundamentally stems from information asymmetry. In the banking industry, this information asymmetry occurs not only between management and shareholders, but also involves depositors as parties entrusting their funds, as well as regulators such as the OJK and Bank Indonesia, who are tasked with maintaining financial system stability. Bank management tends to have broader access to information on Non-Performing Loans (NPL), Capital Adequacy (CAR), and liquidity risk than depositors or regulators. This situation can encourage management to take opportunistic action, such as engaging in earnings management or concealing losses, solely to maintain public trust and meet regulator-set targets (Scott, 2015). Within this framework, financial reporting quality functions as an important control mechanism to mitigate agency conflict, by presenting information that is relevant, reliable, and delivered in a timely manner to all stakeholders (Scott, 2015). In the banking industry specifically, the availability of high-quality financial statements enables depositors and regulators to more accurately monitor bank soundness, thereby minimizing the risk of moral hazard and adverse selection (Rahim, Islam, Nath, Rahim, & Yeasir, 2024).

Blockchain implementation is viewed as an innovative form of control mechanism capable of strengthening banking financial reporting quality (Zahedi & Piri, 2023). The immutable, transparent, and directly verifiable nature of blockchain narrows the room for management to manipulate financial data (Yermack, 2017; Wang & Kogan, 2018). In the banking context, blockchain enables a shift from double-entry to triple-entry accounting, in which every transaction is recorded simultaneously by both parties and cannot be altered without mutual agreement (consensus) (Cai, 2021). Such a mechanism can genuinely reduce the need for inter-bank reconciliation while improving the accuracy of loan-loss provisioning and other financial transaction records (Chinyamunjiko, Makudza, & Mandongwe, 2022). Based on the foregoing, and in line with agency theory, blockchain implementation is expected to reduce the level of information asymmetry while limiting bank management's opportunistic behaviour, through increased transparency and accountability in transaction recording. The wider the scope of blockchain adoption within a bank's accounting and reporting system, the greater its capacity to curb discretionary accrual practices (earnings management) and enhance the reliability of the resulting financial statements (Farhan, Muhammad, Imsar, & Dharma, 2024). This expectation is supported by recent empirical findings showing that blockchain adoption is positively associated with enhanced accounting information quality, as the immutable nature of distributed ledgers limits managerial discretion in financial reporting (Fang et al., 2023).

2.4 The Causal Mechanism: From Blockchain to Discretionary Accruals

The causal pathway connecting blockchain adoption to discretionary accruals specifically can be traced through three sequential steps. First, blockchain adoption changes the recording process itself: transactions are logged through a consensus mechanism among network participants rather than entered unilaterally by internal accounting staff Cai (2021), which removes management's ability to record a transaction differently from how it actually occurred. Second, because total accruals partly originate from the timing and recognition choices management makes when translating operating activity into accounting entries Dechow, Sloan, and Sweeney (1995), narrowing management's discretion at the point of recording constrains the raw material available for earnings management, independent of any change in real operating decisions. Third, this constraint should manifest specifically in the discretionary component of accruals the portion attributable to managerial choice rather than in non-discretionary accruals driven by genuine business activity, This is precisely why DA under the Modified Jones Model is the theoretically appropriate outcome variable for detecting this effect, it isolates the discretionary portion that blockchain is hypothesized to reduce. Following this reasoning, a bank that adopts blockchain in its accounting and reporting system is expected to exhibit a lower DA than a bank that does not, all else equal.

H_1: Blockchain technology adoption has a positive effect on the financial reporting quality of conventional banks listed on the Indonesia Stock Exchange (IDX)

3. RESEARCH METHODOLOGY

3.1 Research Design

This study was designed using a quantitative, explanatory (causal) research approach. The quantitative approach was chosen because the research objective was to test the causal relationship between an independent variable, blockchain adoption, and a dependent variable, financial reporting quality, relying on numerical data processed through statistical analysis. The causal research type was selected to explain how the independent variable affects the dependent variable, tested through the hypothesis formulated in the literature review. Specifically, the study was directed at empirically testing the effect of blockchain adoption on the financial reporting quality of conventional banks listed on the Indonesia Stock Exchange (IDX) (Sekaran & Bougie, 2016).

3.2 Population and Sample

The population of this study comprised all conventional banks listed on the Indonesia Stock Exchange (IDX). Based on IDX and OJK data, 43 conventional banks were listed on the IDX as of the study period (as of 31 December 2024). The sample was determined through purposive sampling, based on the following criteria, such as conventional banks consistently listed on the IDX throughout the observation period, 2022 to 2025, banks that published complete and continuous annual financial statements and annual reports throughout the study period, banks that openly disclosed the implementation of blockchain technology, whether through annual reports, sustainability reports, or other official publications, indicated by the appearance of terms such as blockchain, Distributed Ledger Technology (DLT), digital ledger, or similar terms referring to blockchain technology, and banks with complete data required to calculate all research variables, covering the dependent variable (earnings quality) and the independent variable (blockchain adoption).

3.3 Data Type and Source

This study used secondary data, obtained indirectly from the research object, but sourced from previously published official documents. The data sources used were annual financial statements of conventional banks listed on the IDX, obtained through the IDX official website (www.idx.co.id) and each bank's official website, each conventional bank's annual report, containing disclosures related to blockchain technology adoption, and sustainability reports, where available, used as a supplementary source in identifying blockchain adoption disclosures. Data collection was carried out through the documentation method, namely by gathering, recording, and then processing data sourced from previously published official documents (Sekaran & Bougie, 2016).

3.4 Operational Definition and Variable Measurement

The independent variable in this study is blockchain adoption. Blockchain utilization is defined as the application of distributed ledger recording technology in the accounting and financial reporting system of conventional commercial banks. This variable was measured using a dummy approach, where a value of 1 was assigned if the bank disclosed the use of blockchain in its corporate documents, and 0 otherwise. The indicator used was the presence or absence of an explicit statement regarding blockchain implementation in the annual report, sustainability report, or official press releases issued by the company. This measurement approach is consistent with prior studies on IDX-listed banking companies that also measured the level of digitalization through a dummy variable based on disclosure of technology adoption in annual reports.

A dummy specification, rather than a continuous intensity or maturity score, was adopted for three main reasons. First, at the time of this study, disclosure practices among Indonesian banks regarding blockchain implementation were not yet standardized: banks that mention the technology typically do so through a brief narrative statement rather than a quantifiable metric of implementation scope (transaction volume processed on-chain, number of business units integrated, or years since go-live), so no consistent basis for scaling adoption intensity across the sample currently exists. Second, using a binary disclosure-based indicator ensures the coding is objective and independently verifiable against the source documents, minimizing the risk of subjective judgment that a researcher-constructed intensity index would introduce. Third, this measurement choice preserves comparability with prior Indonesian studies that measure digitalization or technology adoption in banking through

disclosure-based dummy variables, allowing the present findings to be read alongside that body of work rather than on an incommensurable scale. This choice is nevertheless a deliberate simplification, not a costless one, such as discussed further in the discussion and limitations sections, a binary measure cannot distinguish a bank that has only begun exploring blockchain from one that has deeply integrated it into core reporting processes, which is likely to attenuate the estimated effect toward zero and is addressed explicitly as a direction for future research.

The dependent variable in this study is financial reporting quality. Financial reporting quality in this study is understood as the extent to which financial statements are able to present information that is relevant, reliable, and delivered to users in a timely manner (Scott, 2015). It was proxied through earnings quality, measured by Discretionary Accruals (DA). The lower the absolute value of DA produced, the higher the earnings quality, meaning the financial reporting can be considered of higher quality.

3.5 Measurement Model (Modified Jones Model)

To obtain the discretionary accruals value, this study applied the Modified Jones procedure Dechow, Sloan, and Sweeney (1995) commonly used in the accounting literature to capture accrual-based earnings management, as opposed to real activities manipulation (Roychowdhury, 2006) which is not directly captured by this accrual model. The first step was to Calculate Total Accruals (TACC) as the difference between Net Income (NI) and Cash Flow from Operating activities (CFO) for each bank in each observation year, mathematically formulated as:

$$TACC_{it} = NetIncome_{it} - OperatingCashFlow_{it} \quad (1)$$

Formula 1 shows $TACC_{it}$ is total accruals of bank i in year t; Net $Income_{it}$ is the net income of bank i in year t and operating cash $flow_{it}$ is the operating cash flow of bank i in year t. Coefficients β_1, β_2, and β_3 were then estimated cross-sectionally for each year via the regression:

$$TACC_{it}/Asset_{it-1} = \beta_1(1/Asset_{it-1}) + \beta_2(\Delta Revenue_{it}/Asset_{it-1}) + \beta_3(PPE_{it}/Asset_{it-1}) + \varepsilon_{it} \quad (2)$$

Formula 2 shows the estimation model of Total Accruals (TACC) based on the Modified Jones Model. This model is used to estimate discretionary accruals by examining the relationship between total accruals, changes in revenue, Property, Plant, And Equipment (PPE), and the previous period's total assets. The regression coefficients (β_1, β_2, and β_3) capture the expected relationship between these variables, while ε represents the error term. The estimated discretionary accruals are then used as a proxy for measuring financial reporting quality. These estimated coefficients were then used to compute Non-Discretionary Accruals (NDA), replacing the ΔRevenue component with (ΔRevenue$-\Delta$Receivable) to adjust for potential manipulation in receivables. Discretionary Accruals (DA) were finally obtained as the difference between scaled TACC and NDA, and the absolute value (DA) was used as the final proxy of financial reporting quality.

3.6 Data Analysis Technique

Data analysis was conducted using a panel data regression approach, since the study involved only one independent variable. Three common panel estimation approaches were considered: the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM), each with distinct assumptions and characteristics. Choosing a model that does not match the data characteristics risks producing biased and inefficient estimates, so a series of statistical specification tests was needed to determine the most appropriate model (Gujarati & Porter, 2009; Widarjono, 2018). The Common Effect Model (CEM), also known as Pooled Least Squares, treats all observations across both banks and time as a single homogeneous unit, assuming no behavioural differences across units or periods, so both the intercept and slope parameters are treated as identical for all individuals in the sample. The Fixed Effect Model (FEM) rests on the premise that each bank has a permanent unique characteristic throughout the observation period. These differences are accommodated through

an individual-specific intercept (α_i), while the slope coefficient is assumed uniform across units; this model is more appropriate when differences in bank characteristics are thought to influence the dependent variable. The Random Effect Model (REM) assumes that individual differences are random and uncorrelated with the independent variable; compared with FEM, REM tends to be more efficient because it estimates fewer parameters, though it must rest on the assumption that the individual error component is uncorrelated with the independent variable (Gujarati & Porter, 2009; Widarjono, 2018).

To select the most appropriate model among the three, three model specification tests were carried out the Chow test, the Hausman test, and the Lagrange Multiplier (LM) test. The Chow test was used to choose between CEM and FEM by testing whether the intercepts across banks differ significantly.

H_0: CEM is better than FEM no difference in intercepts across banks

H_1: FEM is better than CEM intercepts differ across banks

The decision was based on the F-statistic p-value if $p<0.05$, H_0 is rejected and FEM is selected. If $p\geq0.05$, H_0 is accepted, CEM is selected, and the analysis proceeds to the LM test to compare CEM with REM. The Hausman test was used to choose between FEM and REM by detecting whether the individual error component (μ_i) is correlated with the independent variable.

H_0: REM is better than FEM no correlation, REM estimates are consistent and efficient

H_1: FEM is better than REM correlation exists, REM estimates are inconsistent

If $p<0.05$, H_0 is rejected and FEM is selected. If $p\geq0.05$, H_0 is accepted and REM is selected. The Hausman test is only performed if the Chow test shows FEM is better than CEM (Chow p-value <0.05). The Breusch-Pagan Lagrange Multiplier (LM) test was used to choose between CEM and REM by detecting the presence of a random effect in the panel data.

H_0: CEM is better than REM the between-individual variance equals zero, i.e. no random effect

H_1: REM is better than CEM a random effect exists

If $p<0.05$, H_0 is rejected and REM is selected. If $p\geq0.05$, H_0 is accepted and CEM is selected. The LM test is only performed if the Chow test shows CEM is better than FEM (Chow p-value≥0.05). This model selection procedure ensures that the most appropriate panel data estimation method is applied based on the characteristics of the data. The selected model is then used for further regression analysis to evaluate the relationship between blockchain adoption and financial reporting quality. (Gujarati & Porter, 2009; Widarjono, 2018).

3.7 Classical Assumption Tests

Before hypothesis testing, a series of classical assumption tests was performed, comprising normality, heteroscedasticity, and autocorrelation tests. A multicollinearity test was not performed since the study involved only one independent variable. These tests were conducted to ensure that the regression model met the required statistical assumptions and produced reliable parameter estimates. The results of the classical assumption tests provide a basis for determining the suitability of the regression model before interpreting the hypothesis testing results (Gujarati & Porter, 2009).

3.8 Hypothesis Testing

Hypothesis testing was intended to examine whether blockchain adoption affects the financial reporting quality of conventional banks listed on the IDX. The partial t-test was used to test the effect of the independent variable, with the statistical hypotheses H_0: $\beta_1=0$ (no significant effect of blockchain use on financial reporting quality) against H_1: $\beta_1>0$ (a significant positive effect of blockchain adoption on financial reporting quality). Decision criteria if $p<0.05$ and the regression coefficient (β_1) is positive, H_1 is accepted (blockchain adoption has a significant positive effect on financial reporting quality). If $p\geq0.05$ or the coefficient is negative, H_1 is rejected. The F-test was used to assess the overall goodness of fit of the regression model (H_0: $\beta_1=0$; H_1: $\beta_1\neq0$). If $p<0.05$, the

regression model is considered fit for use. The coefficient of determination (R^2) measures the proportion of variation in the dependent variable (financial reporting quality) that can be explained by the independent variable (blockchain adoption), ranging from 0 to 1, with values closer to 1 indicating better explanatory power (Gujarati & Porter, 2009).

4. RESULTS AND DISCUSSION

4.1 Overview of the Research Object

This study used secondary data sourced from the annual financial statements and annual reports of conventional commercial banks listed on the Indonesia Stock Exchange (IDX). Consistent with the population defined in the methodology, 43 conventional banks were listed on the IDX. Data collected and processed for this study covered the 2022–2025 period, yielding 172 bank-year observations as the initial unit of analysis leaving 159 usable bank-years for the non-adopter group. Given that the excluded observation belonged to a non-blockchain-adopting bank, its removal marginally reduces the non-adopter group while leaving the blockchain-adopter group (12 observations) intact. Consequently, this exclusion cannot mechanically inflate support for the hypothesis. The estimation sample size changes by less than one percent, so the reported coefficient estimates and significance levels are not materially sensitive to this data-cleaning decision.

Before further processing, a data screening procedure was carried out on all variables used to calculate discretionary accruals. One suspicious observation was identified, Bank Amar Indonesia (ARTO) for 2025, where the prior-year total asset figure was identical to the bank's prior-year Property, Plant And Equipment (PPE) figure. Given that ARTO's total assets in other years ranged in the tens of trillions of rupiah, this figure was very likely a data-entry error in the original source. As the researcher had no access to verify and correct this figure against the original financial statements, the ARTO 2025 observation was excluded from both the model coefficient estimation and the discretionary accruals calculation, leaving 171 valid observations for most of the analysis. This exclusion has two implications for the robustness of the analysis that should be made explicit rather than left implicit. First, because the excluded observation belonged to a non-blockchain-adopting bank, its removal marginally reduces the non-adopter group (from 160 to 159 usable bank-years) while leaving the blockchain-adopter group (12 observations from BBNI, BBRI, and BNLI) entirely unaffected. The exclusion therefore cannot mechanically inflate support for the hypothesis, since it does not alter the composition or size of the treatment group on which the key comparison depends. Second, dropping a single observation from an initial pool of 172 bank-years changes the estimation sample by less than one percent, so the coefficient estimates, model-selection tests, and significance levels reported throughout this study are not materially sensitive to this specific data-cleaning decision. The exclusion was a precautionary response to a clear data-entry anomaly rather than a choice that shapes the substantive conclusions of the analysis. Based on a review of blockchain adoption disclosures in annual reports and other official publications, following the sampling criteria, three banks were identified as explicitly disclosing the use of blockchain or Distributed Ledger Technology (DLT), such as Bank Negara Indonesia (BBNI), Bank Rakyat Indonesia (BBRI), and Bank Permata (BNLI). These three banks were coded as dummy 1, while the remaining 40 banks with no such disclosure were coded as dummy 0.

4.2 Calculation of Financial Reporting Quality (Discretionary Accruals)

As explained in the methodology, financial reporting quality was measured through earnings quality, proxied by Discretionary Accruals (DA) using the Modified Jones Model. The smaller the absolute value of DA, the higher the earnings quality, meaning the bank's financial reporting is of higher quality. Coefficient estimation was performed cross-sectionally for each year, following standard practice in the literature, given that economic and banking industry conditions can differ from year to year, requiring year-specific coefficients (Dechow et al., 1995).

Table 1. Modified Jones Model coefficient estimation results by year

Year	n	β1 (1/Asset)	β2 (ΔRev)	β3 (PPE)	R^2	Adj. R^2
2022	43	924,493.18	-0.4845	-0.6839	0.1010	0.0560
2023	43	-36,202.86	0.0189	0.5470	0.0163	-0.0329

Year	n	β1 (1/Asset)	β2 (ΔRev)	β3 (PPE)	R^2	Adj. R^2
2024	43	-323,376.37	0.2004	-0.1962	0.0737	0.0274
2025*	42	-266,965.36	0.2130	-0.3917	-0.0846	-0.1403

Table 1 shows the R^2 values produced by each yearly regression were relatively low, ranging from 1.6% to 10.1%, even turning negative in 2025 after excluding the ARTO observation. This finding is not surprising and is fairly common when applying the Modified Jones Model in similar studies, given that the model relies on only three simple explanatory variables to capture accrual patterns that are, in practice, influenced by many other factors outside the model, compounded by the relatively limited number of cross-sectional observations each year (42–43 banks).

4.3 Descriptive Statistics

Before hypothesis testing, descriptive statistics are presented to give an initial picture of the data characteristics used, particularly the financial reporting quality variable proxied by |DA|, and the blockchain adoption dummy variable. Descriptive statistics provide information regarding the central tendency and distribution characteristics of the variables, including the minimum, maximum, mean, and standard deviation values. These results help to understand the variation and general patterns of the observed data before conducting further regression analysis.

Table 2. Descriptive statistics

Variables	N	Mean	SD	Min	Max
Financial Reporting Quality (DA)	171	0.0706	0.0884	0.0002	0.7478
Blockchain Dummy	172	0.0698	0.2555	0	1

Table 2 shows a mean DA of 0.0706 indicates that, on average, earnings management among the sampled banks stood at around 7.1% of prior-year total assets, meaning that on average the sample banks' financial reporting quality was not entirely free from discretionary accrual intervention. The relatively large standard deviation (0.0884), close to the mean itself, indicates that financial reporting quality varied considerably across banks and years, ranging from almost no earnings management (0.0002) to a fairly high level (0.7478). For the blockchain dummy variable, a mean of 0.0698 shows that only about 7% of total observations, or 12 of 172 bank-year observations, were recorded as adopting or disclosing the use of blockchain/distributed ledger technology in their annual reports. In terms of bank count, only three of the 43 sample banks fell into this category: BBNI, BBRI, and BNLI. This descriptive finding is consistent with the general picture that blockchain technology adoption in Indonesia's banking industry during the observation period remains limited and, so far, only undertaken by large-scale banks.

4.4 Mean Difference Test of Financial Reporting Quality between Blockchain-Adopting and Non-Adopting Banks

As a preliminary analysis before hypothesis testing via panel data regression, a mean difference test was conducted to examine whether financial reporting quality (DA) differed between the group of banks adopting blockchain and the group that did not. This test aims to identify whether there are initial differences in financial reporting quality associated with blockchain adoption status. The results provide preliminary evidence regarding the potential relationship between blockchain adoption and financial reporting quality before conducting the regression analysis.

Table 3. Descriptive statistics of DA by group

Group	n	Mean	SD	Min	Max
Blockchain (BBNI, BBRI, BNLI)	12	0.0402	0.0376	0.0012	0.1254
Non-blockchain	159	0.0728	0.0907	0.0002	0.7478

Table 3 the mean DA of the blockchain-adopting group (0.0402) was lower than that of the non-adopting group (0.0728), which, given the direction of variable measurement, suggests that the blockchain group descriptively exhibited better financial reporting quality. To test the significance of this difference, normality (Shapiro-Wilk) and variance homogeneity (Levene's) tests were first

conducted. The Shapiro-Wilk test showed the non-blockchain group's data was not normally distributed ($p<0.0001$), while the blockchain group was relatively close to normal (0.099). Levene's test indicated relatively homogeneous variances between the two groups ($p=0.373$).

Table 4. Mean difference test results for DA (One-tailed, H1: Blockchain < Non-blockchain)

Test	Statistic	p-value	Conclusion (α=5%)
Welch t-test	-2.509	0.0099	Significant
Independent t-test (equal variance)	-1.237	0.1089	Not significant
Mann-Whitney U	685.0	0.0522	Marginal (sig. at α=10%)

Table 4 The three difference tests produced somewhat inconsistent conclusions. Given that the non-blockchain group's data was shown not to be normally distributed, the rank-based Mann-Whitney U test, which does not require the normality assumption, is arguably more appropriate as a reference than the t-tests. Thus, the evidence that blockchain-adopting banks have better financial reporting quality is relatively weak, even though the direction is consistent with the initial expectation. It should also be noted that extreme values in DA, such as the Bank Harda Internasional (BBHI) 2022 observation, were not excluded from the analysis, as they represent valid calculation results reflecting the bank's actual condition rather than a data-entry error like the ARTO case.

4.5 Classical Assumption Tests

Prior to hypothesis testing via panel data regression, classical assumption tests were conducted on the residuals of the common effect regression model, covering normality, heteroscedasticity, and autocorrelation tests. Consistent with the methodology section, a multicollinearity test was not performed since the study used only one independent variable (Gujarati & Porter, 2009).

Table 5. Classical Assumption Test Results

Test	Statistic	p-value	Conclusion
Normality (Shapiro-Wilk)	W=0.6215	<0.0001	Residuals not normally distributed
Heteroscedasticity (Breusch-Pagan)	LM=0.3314	0.5648	No heteroscedasticity
Autocorrelation (Durbin-Watson)	DW=2.0269	-	No autocorrelation (close to 2)

Table 5 shows the assumptions of no heteroscedasticity and no autocorrelation were well satisfied. However, the residual normality assumption was not met ($p<0.0001$). This violation of normality is consistent with the finding in the mean-difference section and is largely due to the fairly wide dispersion of |DA and the presence of some valid extreme values in the sample. With a fairly large number of observations ($n=171$), this normality violation, according to the Central Limit Theorem, does not automatically invalidate the t-test and F-test, but it remains an important note reconsidered in the discussion.

4.6 Panel Data Regression Model Selection

Hypothesis testing in this study was carried out via panel data regression, with financial reporting quality (|DA) as the dependent variable and the blockchain adoption dummy as the independent variable. Before determining the most suitable estimation model, the Chow test was first conducted to choose between the Common Effect Model (CEM) and Fixed Effect Model (FEM), following the procedure described in the methodology (Gujarati & Porter, 2009; Widarjono, 2018). One important methodological note is that the blockchain dummy variable in this study is time-invariant, meaning its value is constant throughout the observation period for each bank. This characteristic causes the Fixed Effect Model, which works by removing individual means (within transformation), to be mathematically unable to estimate a coefficient for a variable with no within-individual variation the blockchain dummy would be perfectly collinear with the bank individual effect. This limitation is a well-known theoretical consequence in panel econometrics when the main research variable is time-invariant, not a procedural error (Gujarati & Porter, 2009).

Table 6. Chow test results (CEM vs FEM)

Test	F-statistic	df	p-value
Chow test	1.4119	(41; 128)	0.0754

Table 6 shows the Chow test p-value of 0.0754 is above the 5% significance level, so H_0 is accepted and the Common Effect Model (CEM) is selected. Following the methodology procedure, since CEM is preferred over FEM, testing proceeded to the Lagrange Multiplier (LM) test to compare CEM with the Random Effect Model (REM), without the need for the Hausman test. This approach ensures that the final model selection is based on the most appropriate estimation technique according to the characteristics of the panel data structure (Gujarati & Porter, 2009; Widarjono, 2018).

Table 7. Lagrange multiplier test results (CEM vs REM)

Test	LM statistic	df	p-value
LM test (Breusch-Pagan)	1.6398	1	0.2004

Table 7 shows the LM test p-value of 0.2004 is also above 0.05, so H_0 is accepted, confirming the Common Effect Model (CEM) as the most suitable model for hypothesis testing in this study, compared with the Random Effect Model. Therefore, the panel regression analysis was conducted using the CEM approach as the final estimation model. This model selection indicates that individual effects among banks are not statistically significant enough to require the use of FEM or REM.

4.7 Hypothesis Test Results

Based on the model selection results, hypothesis testing was conducted using the Common Effect Model with the specification:

$$DA_{it} = \beta_0 + \beta_1 Blockchain_i + \varepsilon_{it}. \quad (3)$$

Formula 3 shows since financial reporting quality is inversely proxied by DA the smaller the DA, the higher the financial reporting quality support for H_1 (blockchain adoption positively affects financial reporting quality) is reflected in a negative and significant regression coefficient of blockchain on DA. Testing was conducted one-tailed, consistent with the direction of the hypothesis formulated in the literature review. A negative coefficient indicates that blockchain adoption is expected to reduce discretionary accruals, thereby indicating improvements in the quality of financial reporting.

Table 8. Common effect model regression results

Variables	Coefficient	SE	t	p (two-tailed)	p (one-tailed)
Constant	0.07285	0.00700	10.412	<0.0001	-
Blockchain	-0.03267	0.02641	-1.237	0.2178	0.1089

Table 8 shows the blockchain coefficient of -0.03267 shows a direction consistent with the hypothesis, i.e. banks adopting blockchain tend to have lower DA (better financial reporting quality) than non-adopting banks. However, the one-tailed p-value of 0.1089 is above the 5% significance level, so this coefficient cannot be statistically declared significant at that threshold. The F-test was used to assess the overall goodness of fit of the regression model. The results show an F-value of 1.530 with a p-value of 0.2178, also above the 5% significance level, indicating that the regression model with blockchain as the sole predictor cannot yet be statistically declared fit in explaining variation in financial reporting quality in this sample. The coefficient of determination (R^2) obtained was 0.0090, or 0.90%, indicating that blockchain adoption explains less than one percent of the variation in financial reporting quality (DA) in the sample, while the remaining 99.10% is explained by factors outside the model. Based on the overall test results above a non-significant one-tailed t-test (p=0.1089), a non-significant F-test (p=0.2178), and a very low R^2 it can be concluded that H_1, which

posited that blockchain adoption positively affects the financial reporting quality of conventional banks listed on the IDX, cannot be supported by the data in this study, even though the direction of the coefficient obtained is consistent with the hypothesized direction.

4.8 Discussion

The hypothesis test findings show that although the direction of association between blockchain use and financial reporting quality aligns with the agency theory underlying the research hypothesis Jensen and Meckling (1976) and Scott (2015) that the transparency and immutability of blockchain are expected to reduce information asymmetry and limit management's opportunistic behaviour the statistical evidence obtained is not yet strong enough to convincingly support this hypothesis. This pattern is also consistent between the mean-difference test and the panel regression test: both analytical approaches show a direction supporting the notion that blockchain is associated with better financial reporting quality, yet both also fail to reach convincing statistical significance at the 5% level. This directional consistency is important to note, as it indicates that the constraint is not the absence of a relationship pattern, but rather the statistical power to detect it convincingly with the available sample.

At least three factors are thought to underlie this weak statistical evidence. First, the small number of blockchain-adopting banks in the sample only three of the 43 banks observed, namely BBNI, BBRI, and BNLI substantially reduces the statistical power to detect a true population difference, so a non-significant result should not be directly interpreted as evidence of no effect, but rather reflects the limited detection power given the available sample size (Gujarati & Porter, 2009). This constraint is particularly important to acknowledge, as recent large-sample studies have been able to detect a significant positive association between blockchain adoption and financial reporting quality, suggesting that the relationship may be economically meaningful but requires adequate statistical power to be reliably identified (Garg, Gupta, & Chauhan, 2026). Second, measuring blockchain adoption with a binary dummy (0 and 1) only captures whether or not blockchain is mentioned or disclosed in the annual report, without considering the extent to which the technology is actually implemented, how mature the implementation is, or which business functions it is applied to (Kokina, Mancha, & Pachamanova, 2017). Such a binary measure risks equating banks that have only begun exploring blockchain with banks that have deeply integrated it into their business processes and financial reporting, even though conceptually the impact of the two on financial reporting quality could be very different.

Third, the context of Indonesia's banking industry itself is a relevant consideration in interpreting this result. As an industry already tightly supervised by the OJK, with relatively uniform audit and reporting obligations for all banks, the room for extreme earnings management practices whether through discretionary accruals Dechow, Sloan, and Sweeney (1995) or real activities manipulation Roychowdhury (2006) may already be relatively limited regardless of blockchain adoption. Nevertheless, the Modified Jones Model used in this study primarily captures accrual-based manipulation, meaning that potential shifts toward real earnings management following blockchain adoption remain unexplored. In such a context, the additional contribution of blockchain technology to financial reporting quality may become statistically less visible, even though conceptually the technology can still play a role in supporting transaction transparency at the operational level, in line with regulatory encouragement such as OJK Regulation No. 16 of 2025.

This result should also be interpreted in light of the residual normality violation found in the classical assumption test section. Nevertheless, the consistency of results between the parametric t-test and the non-parametric Mann-Whitney U test, both of which showed non-significant results at the 5% level, provides additional confidence that the non-significant conclusion for H_1 is relatively insensitive to this assumption violation. Interpreted through the lens of agency theory, the non-significant result does not necessarily indicate that blockchain fails to function as a monitoring mechanism. Rather, it suggests that the theorized mechanism narrowing management's room to record transactions in a self-serving manner may operate at a scale too small, relative to sampling noise from only three adopters, to be statistically distinguishable from zero with the present design. This is an important theoretical

distinction: a coefficient that is directionally correct but imprecisely estimated is consistent with a real but modest agency-cost-reducing effect, whereas a coefficient close to zero in both magnitude and precision would more strongly suggest the mechanism itself is inoperative in this setting. The present findings resemble the former pattern more than the latter, which tempers, but does not eliminate, the theoretical claim that blockchain functions as an effective monitoring substitute in Indonesian banking.

Comparing this result more critically against prior empirical work sharpens this interpretation. Garg et al. (2026), studying U.S. listed firms with a considerably larger and more diverse adopter population, detect a significant positive association between blockchain adoption and reporting quality. The contrast with our null result is unlikely to stem from a difference in the underlying theoretical mechanism, but rather from the order-of-magnitude difference in adopter sample size (three banks here versus hundreds there) and from differences in disclosure maturity. Haddad, Al-Ramahi, and Al-Okaily (2026), studying Jordanian banks, report a positive association with disclosure-based outcomes rather than an accrual-based earnings-quality metric, making their finding not directly comparable. This pattern consistent theoretical direction across studies, but inconsistent statistical detectability that tracks sample size and outcome measurement reinforces our conclusion that the Indonesian evidence is best read as underpowered rather than as contradicting the international literature.

5. CONCLUSIONS

5.1 Conclusion

This study aimed to empirically examine the effect of blockchain adoption on the financial reporting quality of conventional banks listed on the Indonesia Stock Exchange during the 2022–2025 period. Based on the series of analyses described above, several conclusions can be drawn. First, the discretionary accruals calculation using the Modified Jones Model shows that the average financial reporting quality of the sample banks, proxied by DA, was around 7.1% of total assets, with fairly wide variation across banks and years. Second, blockchain adoption in Indonesia's banking industry during the observation period remained very limited, found in only three of 43 sample banks (BBNI, BBRI, and BNLI). Third, the mean-difference test results show that, descriptively, blockchain-adopting banks had better financial reporting quality (lower DA) than non-adopting banks, but the statistical evidence supporting this difference was weak and inconsistent across the testing methods used.

Fourth, and the main finding of this study, hypothesis testing via panel data regression with the Common Effect Model selected based on the Chow test (p=0.0754) and Lagrange Multiplier test (p=0.2004), both non-significant shows that the blockchain dummy variable has a coefficient whose direction is consistent with the hypothesis (negative on DA), but is not statistically significant, either in the one-tailed t-test (p=0.1089) or the F-test (p=0.2178), with an R^2 of 0.90%. H_1, which posited that blockchain adoption positively affects financial reporting quality, is therefore not supported by the data.

Beyond these statistical findings, the principal scientific contribution of this study is threefold. First, it provides the first accrual-based, hypothesis-driven empirical test of the blockchain–financial reporting quality relationship specific to Indonesian conventional banks, in a regulatory setting (overlapping OJK–Bank Indonesia authority) that had not been previously tested directly. Second, the study demonstrates that directional consistency observed across two independent analytical approaches (mean-difference testing and panel regression) persists even under a highly conservative test, strengthening confidence that the underlying relationship is unlikely to be a spurious artefact. Third, by making explicit why the result falls short of significance (low adopter count, binary measure, constrained reporting environment), the study reframes a non-significant finding as informative about the boundary conditions under which blockchain's agency-cost-reducing mechanism can currently be detected, rather than as a simple negative result.

5.2 Research Limitations

Several limitations should be openly acknowledged so that the results of this study can be interpreted proportionately and not beyond what the data can actually demonstrate, such as very small number of banks identified as adopting blockchain (3 of 43) results in low statistical power to detect a true population effect. The blockchain variable was measured using a binary dummy (0/1) that only captures whether blockchain is mentioned or disclosed, without considering the intensity or maturity of implementation. The observation period was relatively short (four years, 2022–2025), and one observation (ARTO 2025) had to be excluded due to indications of a data-entry error in the secondary source. This study used only one independent variable as designed in the methodology, so other variables that could theoretically affect financial reporting quality, such as bank size, leverage, or ownership structure, were not yet controlled for, so the possibility of omitted variable bias cannot be fully ruled out. The regression model's residuals did not fully satisfy the normality assumption, although heteroscedasticity and autocorrelation were not detected, and the results remained consistent when re-tested using a non-parametric approach, and this study's design is correlational, so it cannot establish causality. The possibility that larger banks with better governance tend to adopt blockchain earlier, independent of the technology's own effect on financial reporting quality, cannot be ruled out. This study only employed the Modified Jones Model to capture accrual-based earnings management, without considering real activities manipulation which could also affect financial reporting quality but is not detectable through discretionary accruals.

5.3 Suggestions and Directions for Future Research

For future research extend the observation period and/or expand the sample coverage to obtain a statistically more adequate number of blockchain-adopter observations, use a more granular measure of blockchain adoption, such as an intensity or implementation-maturity score based on content analysis of annual reports, rather than a simple presence/absence dummy, add relevant control variables such as bank size, leverage, profitability, and ownership structure to reduce the risk of omitted variables, consider a financial reporting quality proxy more specific to the banking industry, such as a discretionary loan-loss provision-based model, as a comparison to the Modified Jones Model and present parametric and non-parametric tests side by side as a robustness check, given that this study demonstrates the importance of examining result consistency across testing methods.

For regulators and banking practitioners given that the empirical evidence in this study remains weak, the claim that blockchain adoption will directly improve financial reporting quality should not yet be used as a basis for policy or as a primary argument for encouraging adoption of this technology in the banking sector and a bank's decision to adopt blockchain should still consider other, more conceptually well-established benefits, such as operational efficiency and transaction transparency, in line with the direction of OJK Regulation No. 16 of 2025, until stronger empirical evidence becomes available from future research.

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AUTHOR CONTRIBUTIONS

All authors contributed to the development and completion of this study. ZD contributed to the conceptualization, research design, data collection, data analysis, interpretation of findings, and preparation of the initial manuscript draft. TSP contributed to the development of the theoretical framework, methodological validation, critical review, and improvement of the manuscript. PWDAnggoro contributed to supervision, research evaluation, manuscript refinement, and final review of the article. All authors have read and approved the final version of the manuscript and agreed to be accountable for all aspects of the research.

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