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Enhancing Corporate Governance with Blockchain and Smart Contracts: A Systematic Review of Agency Conflict Mitigation

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ABSTRACT: Agency conflicts remain a persistent challenge in corporate governance because information asymmetry and misaligned incentives can weaken monitoring and accountability. This systematic literature review synthesizes international empirical evidence on how blockchain and smart contracts relate to agency conflict mitigation and governance outcomes, and it clarifies boundary conditions and implications for Agency Theory. We followed PRISMA reporting guidance and searched Scopus for English journal articles published between 2018 and 2025. After title, abstract, and full-text screening, 13 empirical studies were included for quality appraisal and thematic narrative synthesis. Across contexts, blockchain adoption or innovation intensity is most consistently associated with improved information environments, including higher transparency and reporting quality and lower opportunism related proxies, and it is also associated with improved investment efficiency and selected compliance and risk outcomes. Evidence on smart contracts is substantially thinner. Smart contracts are explicitly analysed in one case study and they are discussed secondarily in one additional study, while none of the large sample quantitative studies operationalises smart contract use as a distinct construct. The synthesis indicates that governance benefits depend on data integrity supported by internal controls, external monitoring and assurance capacity, and regulatory and legal alignment that enables auditability and enforceability. Overall, blockchain-enabled corporate governance is best interpreted as governance by system design that complements conventional mechanisms and motivates future research on measurable smart contract use cases and stronger causal identification.

Keywords: Blockchain, Smart Contracts, Corporate Governance, Agency Theory, Transparency, Systematic Literature Review.

INTRODUCTION

Over the past decade, digitalisation, more complex value chains, and rising expectations for transparency and accountability have increased the strategic importance of corporate governance. In many corporations, dispersed ownership and delegated managerial control create incentive misalignment and information asymmetry, generating agency costs that can weaken resource allocation efficiency and firm value (Fama & Jensen, 1983; Jensen & Meckling, 1976). Accordingly, governance mechanisms such as board oversight, auditing, incentive contracting, and shareholder

protections aim to constrain opportunism and reduce monitoring and bonding costs (Shleifer & Vishny, 1997).

To ensure conceptual clarity, this review uses two working constructs. Governance quality refers to the effectiveness of governance arrangements and information environments in supporting accountable decision making and constraining opportunism. In the empirical literature synthesised in this review, governance quality is operationalised through governance-relevant proxies, including transparency measures, reporting quality and accounting information quality, earnings management, investment efficiency, compliance or risk indicators, firm performance, and composite governance indicators. Agency conflict mitigation refers to a reduction in agency frictions such as information asymmetry and moral hazard between principals and agents, and it is inferred from improvements in these observable proxies rather than from direct observation of monitoring or enforcement behaviour.

Despite continuous evolution, many governance tools remain periodic, fragmented, and costly, especially in cross-border organisations and digital ecosystems involving multiple intermediaries for verification and record keeping. Data-intensive operations can raise efficiency but also create opportunities for manipulation and dependence on third parties that control core information infrastructures. This shifts attention toward how information technologies can function as governance infrastructures that reduce verification frictions, enhance traceability, and support more durable accountability.

Blockchain is a distributed ledger technology that enables shared record keeping with cryptographic integrity, traceability, and auditability. In corporate settings, these features can strengthen audit trails and reduce verification frictions in reporting and inter-organisational processes (Smith & Castonguay, 2020). Smart contracts complement this infrastructure by enabling specified contractual clauses or compliance procedures to execute automatically when predefined conditions are met, while producing execution logs that can be audited when data inputs are reliable and appropriately governed (Jayasuriya & Sims, 2020). From an agency perspective, both technologies can complement governance mechanisms by improving information credibility and constraining some forms of discretion, although most empirical studies test associations using adoption or intensity proxies rather than direct observation of monitoring or enforcement processes.

However, blockchain and smart contracts do not automatically eliminate agency problems. Control can shift to code governance, protocol governance, and the integrity of external inputs that determine whether smart contracts execute conditions correctly. Code rigidity may reduce flexibility under uncertainty, and design errors or security vulnerabilities can generate technology-mediated agency frictions that differ from classical agency costs. Organisational and governance scholarship therefore increasingly examines how blockchain and decentralised structures, including decentralised autonomous organisations, may alter contracting, the allocation of decision rights, and the configuration of corporate control (Murray et al., 2021).

The rapid expansion of research at the intersection of blockchain and corporate governance has created a growing but dispersed literature across finance, accounting, information systems,

corporate law, and organisational studies. Conceptual discussions of governance and regulation are well established (Singh et al., 2020), and auditing-focused syntheses have mapped potential disruption in assurance practice (Lombardi et al., 2022). Nevertheless, empirical findings on agency-relevant governance outcomes remain fragmented across contexts, industries, and measurement strategies. Key gaps include an imbalance between conceptual arguments and empirically tested evidence, limited operationalisation of smart contracts as a distinct construct in large-sample governance research, insufficient mapping of boundary conditions related to internal controls, external monitoring, assurance capacity, and institutional environments, and the need to refine Agency Theory to account for additional technology-mediated actors and incentives related to system design, protocol governance, and external data inputs (Murray et al., 2021).

These gaps matter for emerging markets where supervisory capacity, reporting quality, and capital market depth vary. For Indonesia, recent scholarship highlights how technological disruption is reshaping corporate control and governance thinking in a rapidly digitalising economy, while discussions of blockchain as a potential solution for agency problems remain largely prospective (Fahlevi et al., 2022). Accordingly, this review treats Indonesia primarily as a context for comparative relevance and a future research agenda rather than as a mature evidence base.

Against this background, this study conducts a systematic literature review to consolidate international empirical evidence on blockchain and smart contracts in corporate governance through the lens of Agency Theory. The review focuses on peer reviewed empirical journal articles that link blockchain, distributed ledger technology, or smart contracts to corporate governance mechanisms or governance-relevant outcomes.

To structure the review, we address four research questions. RQ1: What governance-relevant outcomes and agency conflict proxies have been empirically associated with blockchain adoption or blockchain-related innovation in corporate settings? RQ2: What empirical evidence exists on smart contracts as a governance mechanism, and how are smart contracts operationalised in the corporate governance literature? RQ3: What organisational, technological, and institutional conditions shape the strength and direction of the reported associations between blockchain or smart contracts and governance outcomes? RQ4: How can the synthesised empirical evidence refine Agency Theory by clarifying which agency frictions are mitigated, which persist, and which new technology-mediated agency relationships emerge in blockchain-enabled governance?

The remainder of the paper describes the systematic review method, reports the results of study selection and synthesis, and then discusses theoretical and practical implications for boards, investors, regulators, and system designers.

METHOD

This section describes the systematic review procedures used to examine how blockchain and smart contracts relate to corporate governance and agency conflict mitigation, with transparency

supported by a predefined protocol, explicit eligibility criteria, and documented search, screening, and appraisal decisions.

Research Type

This study employed a systematic literature review in the corporate governance and finance domain and interpreted the evidence through Agency Theory, following evidence-informed management review principles and methodological guidance for business literature review (Paul & Criado, 2020; Snyder, 2019; Tranfield et al., 2003; Xiao & Watson, 2019). Reporting followed the PRISMA 2020 statement, and synthesis decisions were reported in line with SWiM because constructs, contexts, and empirical designs were heterogeneous (Campbell et al., 2020). A protocol was prepared prior to screening with reference to PRISMA-P elements and is provided in Appendix A; it was not registered in an external registry (Moher et al., 2015; Shamseer et al., 2015).

Population and Sample/Informants

The unit of analysis was peer-reviewed empirical journal articles. In this review, an empirical article was defined as a study that analyses primary or secondary data using a clearly described method and reports interpretable findings. Eligible designs therefore included archival and panel-data studies, survey-based studies, structural equation modeling studies, and empirical case studies, provided that the reported findings were extractable for synthesis.

The population comprised English-language journal articles indexed in Scopus and published between 2018 and 2025. The scope was global and did not restrict eligibility by country, region, or industry. Evidence from Indonesia was retained when available to support comparative discussion, but it was not used as an inclusion requirement because the objective was to consolidate international empirical evidence.

Inclusion additionally required topical and governance relevance. Studies had to examine blockchain, distributed ledger technology, or smart contracts in corporate or organisational settings and link them to corporate governance mechanisms or governance-relevant outcomes interpretable through an agency lens. Governance mechanisms were interpreted broadly as arrangements shaping monitoring, accountability, and control, such as board and ownership oversight, audit and assurance, and disclosure practices. Governance-relevant outcomes included commonly used empirical proxies such as transparency, reporting quality, earnings management, investment efficiency, tax compliance or evasion, default risk, firm performance, or aggregate governance indicators. Conceptual or normative papers and non-journal outputs were excluded, as were studies focused on technical artefacts or cryptocurrency markets without governance relevance, and publications outside the defined time window or language.

Research Location

This review treated country, region, and industry context as analytical attributes rather than sampling criteria. These attributes were coded during extraction to support cross-context comparison and to inform discussion of institutional boundary conditions.

Instrumentation or Tools

Scopus was used as the bibliographic database due to broad journal coverage and support for reproducible Boolean searching (Gusenbauer & Haddaway, 2020; Mongeon & Paul-Hus, 2016; Pranckutė, 2021). The search was executed on 1 December 2025 (UTC+7) in TITLE-ABS-KEY using: TITLE-ABS-KEY((blockchain OR "distributed ledger" OR "distributed ledger technolog*" OR DLT OR "smart contract*") AND ("corporate governance" OR "board of directors" OR "board oversight" OR "shareholder rights" OR "corporate control")). Filters were Year = 2018 to 2025, Language = English, Document type = Article, and Source type = Journal. The earlier manuscript version omitted the smart contract term; this paragraph documents the executed query and does not alter PRISMA counts. Screening and extraction used structured spreadsheet forms, and appraisal drew on JBI guidance and the Mixed Methods Appraisal Tool (Aromataris et al., 2024).

Data Collection Procedures

Scopus records were exported (CSV), de-duplicated, and screened in two stages (title and abstract, then full text) against predefined criteria. Two reviewers independently screened titles and abstracts ($\varkappa$ = 0.81; n = 93), then screened full texts (n = 13) with 84.6 percent agreement (11 of 13); disagreements were resolved by discussion and, when needed, senior adjudication. A screening log recorded exclusion reasons and supports the PRISMA 2020 flow diagram (Page et al., 2021). Data extraction used a piloted form; one reviewer extracted and a second verified items against the full text.

Quality Appraisal

Methodological quality and risk of bias were assessed after full-text inclusion using a ten-item 0/1 rubric operationalised for cross-design comparability (Hong et al., 2018). The rubric covers clarity of aims and theory, design and sampling transparency, validity of blockchain or smart contract and governance measures, data integrity, appropriateness of analysis including endogeneity considerations when relevant, robustness or triangulation, and transparency of reporting. Total scores range from 0 to 10 (8 to 10 high; 6 to 7 moderate; 0 to 5 low). Two reviewers scored independently; no study was excluded solely based on score.

Data Analysis

Extraction captured study context, design, blockchain proxies, governance mechanisms, and agency-relevant outcomes. Agency Theory guided interpretation. Evidence was synthesised using descriptive mapping and thematic synthesis (Braun & Clarke, 2021; Kiger & Varpio, 2020) due to heterogeneity, no meta-analysis was conducted, and reporting follows SWiM principles (Campbell et al., 2020).

Ethical Approval

This review analysed published studies and did not involve human participants; formal ethical approval was therefore not required, but transparent documentation and accurate attribution were maintained.

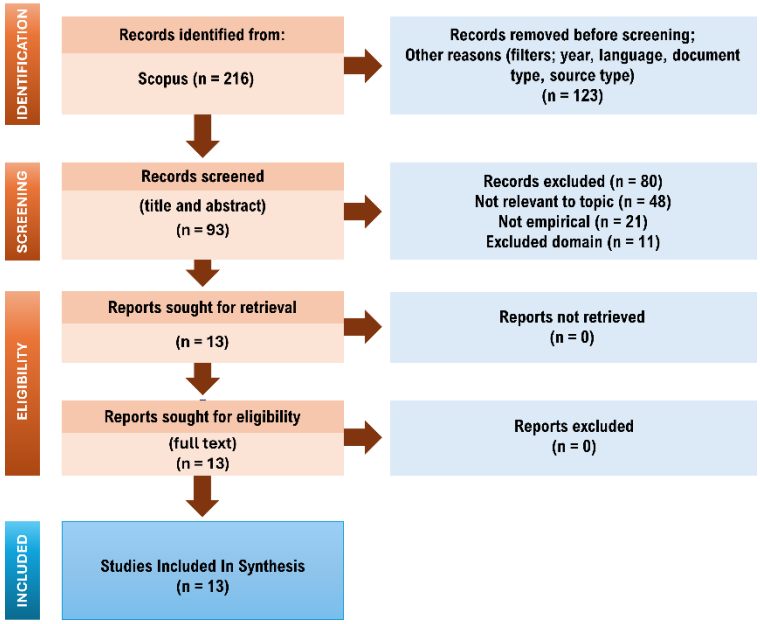
RESULT AND DISCUSSION

This section reports study selection, describes the characteristics of the included studies, and summarises cross-study empirical patterns that inform the discussion. Study selection is presented using a PRISMA 2020 flow diagram.

Study Selection and PRISMA Flow Diagram

The search retrieved 216 records. After applying predefined filters, 93 records were screened at title and abstract, 80 were excluded, and 13 studies were included after full-text assessment. Figure 1 summarises the selection process.

Figure 1. PRISMA 2020 flow diagram of study selection (Page et al., 2021)



Characteristics of the Included Studies

The included evidence base is recent and reflects a rapid rise in empirical research linking blockchain to corporate governance. Studies span multiple countries and institutional settings, with repeated coverage of banking, SMEs, and listed firms, and with a notable presence of emerging market contexts.

Most studies apply quantitative methods, particularly archival and panel-data econometrics, while a smaller subset uses surveys with structural equation modelling and one study applies case-based evidence. This mix enables cross-context insights but also contributes to heterogeneity in constructs and measurement.

Table 1. Characteristics of Included Studies (n = 13)

Code	Study	Main Design /Method	Context and Sample (Summary)	Agency-Relevant Outcomes (Summary)
S1	Saeed, (2025)	Panel-data econometrics; IV-2SLS and HDFE	Firm-level panel, China, 2015–2024	Earnings management and earnings quality
S2	Salehi & Molavi (2025)	Survey; PLS-SEM	304 managers, auditors, and board of SMEs, Iran (2024)	Accountability, reporting transparency, reporting quality
S3	Chang et al. (2025)	Archival panel regression	Chinese listed firms (A-share), 2017–2023	Corporate transparency; external supervision mechanisms
S4	Al-Shahamani et al. (2025)	Survey; PLS-SEM	136 private-bank employees, Iraq	Financial reporting quality; governance effectiveness
S5	Islam et al. (2025)	SEM with primary and secondary data	20 banks, Bangladesh; annual reports over six years	Default risk and governance-related board communication dynamics
S6	Ben Salah & Kammoun (2025)	Panel-data regression; FGLS and SYS-GMM	197 ESG index firms, 2010–2022	Corporate governance (aggregate indicators)
S7	Akhtar, Chen, & Tareq (2024)	Panel-data; GMM	Blockchain50 indexed firms, China, 2009–2022	Ownership monitoring and cash holdings; agency-related governance
S8	Akhtar, Afridi, & Islam (2024)	Panel-data; GMM with DiD and PSM checks	2,844 firms	Firm performance; changes in governance mechanism effectiveness
S9	Chouaibi, Ardhaoui, & Affes (2024)	Panel-data; GLS with GMM robustness	50 STOXX 600 firms, Europe, 2010–2019	Tax evasion; moderation by good governance
S10	Fang et al. (2023)	Archival regression	33,242 firm-year observations, China, 2007–2019	Accounting information quality; governance and audit-related systems
S11	Du et al. (2023)	Archival regression with robustness tests	Corporate data, China	Investment efficiency; financing costs and agency conflict channels
S12	Ezzi, Abida, & Jarboui (2023)	Panel-data; FGLS	297 STOXX Europe 600 firms, Europe, 2014–2018	Investment efficiency; corporate governance as a mediating systems
S13	Sun et al. (2020)	Empirical case study	Peer-to-peer insurance case	Transaction cost and agency cost; transparency, and smart contracts

Source: Authors' compilation.

Overall, Table 1 indicates a small but diverse evidence base in which governance implications are most frequently tested through reporting and transparency proxies, investment efficiency outcomes, compliance indicators, and related measures that are interpretable through Agency Theory.

Operationalization of Key Constructs Across Included Studies

To support cross-study comparison, Table 2 summarises how each study operationalises blockchain or smart-contract related constructs, the governance mechanism examined, and the agency-relevant outcome used for interpretation.

Table 2. Operationalization of Key Constructs Across Included Studies (n = 13)

Code	Study	Blockchain Proxy (Study Construct)	Smart Contracts (Explicitly Addressed?)	Governance Proxy or Governance Mechanism	Agency-Conflict Proxy or Agency-Relevant Outcome
S1	Saeed (2025)	Blockchain adoption or exposure proxy in firm-level archival data	Not explicitly operationalized as a distinct construct	Governance mechanisms related to board oversight and audit committee functions (tested in relation to outcomes)	Earnings management and earnings quality as proxies for opportunism and monitoring effectiveness
S2	Salehi & Molavi (2025)	Perceived or reported blockchain technology use in a survey setting	Not explicitly operationalized as a distinct construct	Accountability, reporting transparency, and reporting quality as governance-relevant information environment constructs	Reduced information asymmetry and improved monitoring capacity inferred via reporting and accountability outcomes
S3	Chang et al. (2025)	Blockchain innovation proxy at firm level	Not explicitly operationalized as a distinct construct	Corporate transparency as a governance outcome, with external supervision mechanisms as conditioning factors	Information asymmetry reduction proxied by transparency and strengthened monitoring from external supervision
S4	Al-Shahamani et al. (2025)	Blockchain-related digital transformation construct in a banking survey context	Not explicitly operationalized as a distinct construct	Corporate governance effectiveness and financial reporting quality	Reporting quality and governance effectiveness as agency-relevant monitoring outcomes
S5	Islam et al. (2025)	Blockchain technology evolution or adoption construct in banking	Discussed in governance-related narrative; not separately measured as a distinct variable	Board communication dynamics as a governance process factor	Default risk as a governance-related risk-control outcome connected to monitoring and discipline
S6	Ben Salah & Kammoun, (2025)	Blockchain adoption proxy among ESG-oriented firms	Not explicitly operationalized as a distinct construct	Corporate governance measured using aggregate governance indicators	Governance quality as an agency-relevant outcome reflecting monitoring and accountability capacity
S7	Akhtar, Chen, et al., (2024)	Blockchain enterprise context or adaptation proxy within a	Not explicitly operationalized as a distinct construct	Ownership structure and monitoring incentives as	Cash holdings policy as an agency-relevant corporate policy

		blockchain-related firm sample		governance-related mechanisms	outcome linked to monitoring and alignment motives
S8	Akhtar, Afridi, & Islam (2024)	Blockchain technology adoption proxy in large-sample firm data	Not explicitly operationalized as a distinct construct	Board and ownership governance variables, including changes in governance mechanism effectiveness under blockchain	Firm performance as an agency-relevant outcome, interpreted alongside shifts in governance mechanisms
S9	Chouaibi et al. (2024)	Blockchain technology use or intensity proxy	Not explicitly operationalized as a distinct construct	Good governance proxy as a moderating governance condition	Tax evasion as an opportunism and compliance-related agency-conflict proxy
S10	Fang et al. (2023)	Blockchain technology adoption proxy in archival data	Not explicitly operationalized as a distinct construct	Governance and audit-related systems, including audit capacity as a strengthening condition	Accounting information quality as an agency-relevant information environment proxy
S11	Du et al., (2023)	Blockchain integration or adoption proxy in a corporate setting	Not explicitly operationalized as a distinct construct	Governance-relevant conditioning factors linked to reporting quality and financing conditions	Investment efficiency and agency-conflict-related channels as resource allocation and monitoring outcomes
S12	Ezzi, Abida, & Jarboui (2023)	Blockchain implementation proxy	Not explicitly operationalized as a distinct construct	Corporate governance proxy modeled as a mediating mechanism	Investment efficiency as an agency-relevant outcome reflecting reduced misallocation and improved discipline
S13	Sun et al. (2020)	Blockchain implementation in an empirical case setting	Explicitly discussed as an automation and enforcement mechanism within the case evidence	Transparency and trust as governance-relevant outcomes	Agency cost and transaction cost implications interpreted as governance frictions and mitigation pathways

Note: Smart contracts are discussed in a small subset of studies and are rarely measured as a distinct construct.

Narrative Summary of Study Quality Appraisal

Using the rubric in Appendix B, 11 studies were classified as high quality (scores 8 to 10) and two as moderate quality (scores 6 to 7), with scores ranging from 6 to 10. All studies were retained because they met eligibility criteria, while appraisal categories informed the strength of interpretation in the synthesis.

Empirical Synthesis of Findings

The synthesis integrates findings across the included studies and links the evidence to RQ1 to RQ4, while Tables 2 and 3 provide transparency on operationalisations and thematic grouping.

For RQ1, blockchain adoption, innovation, or use is most consistently associated with a stronger information environment, including higher transparency and reporting credibility, higher

accounting information quality, and lower earnings management, which are outcomes commonly interpreted as agency-relevant monitoring improvements (Al-Shahamani et al., 2025). Evidence also links blockchain to improved investment efficiency and to selected performance, compliance, and risk outcomes in specific settings (Akhtar, Afridi, et al., 2024).

For RQ2, smart contracts receive limited explicit empirical attention in the included evidence base. They are mostly discussed as a mechanism, and quantitative studies generally do not operationalise smart contract utilisation as a distinct measurable construct, while case-based evidence highlights automation and enforcement potential in particular organisational settings.

For RQ3, boundary conditions appear as moderators or mediators, especially external oversight, audit and assurance capability, and governance strength that shape whether blockchain-related transparency translates into governance improvements across contexts.

For RQ4, the overall pattern supports an agency interpretation in which blockchain contributes to governance primarily through information credibility and auditability, while effectiveness depends on complementary governance institutions and control infrastructures.

Mapping of Themes and Supporting Evidence

To complement Table 2, Table 3 maps the included studies to the main synthesis themes and summarises the dominant empirical patterns reported within each theme.

Table 3. Mapping of Synthesis Themes and Supporting Studies

Synthesis Theme (Summary)	Main Supporting Studies	Dominant Empirical Pattern
Transparency and reduced information asymmetry	Chang et al. (2025); Salehi & Molavi (2025); Sun et al. (2020)	Blockchain is associated with higher transparency, trust, and accountability, and external supervision can strengthen the effect.
Reporting quality and constraints on opportunism	Saeed (2025); Fang et al. (2023); Al-Shahamani et al. (2025); Salehi & Molavi (2025)	Blockchain is associated with improved accounting information and reporting quality and with lower earnings management in specific settings.
Investment efficiency and resource allocation	Du et al. (2023); Ezzi et al. (2023)	Blockchain is associated with improved investment efficiency through financing cost and agency conflict channels, with governance functioning as a mediator or strengthening condition.
Firm performance and firm value implications	Akhtar, Afridi, & Islam (2024); Fang et al. (2023); Du et al. (2023); Ben Salah & Kammoun (2025)	Blockchain is associated with better performance or value-related outcomes, while certain governance mechanisms change in effectiveness under a blockchain environment.
Ownership structure, boards, and monitoring functions	Akhtar, Chen, & Tareq (2024); Akhtar, Afridi, & Islam (2024); Chang et al. (2025)	Governance mechanisms related to ownership and boards display different patterns in blockchain contexts, and external monitoring can amplify transparency outcomes.
Compliance and risk outcomes	Chouaibi et al. (2024); Islam et al. (2025)	Blockchain is associated with lower tax evasion and may support risk control through governance-related internal dynamics.
Smart contracts as explicit mechanisms	Sun et al. (2020); Islam et al. (2025)	Empirical evidence explicitly isolating smart contracts is limited and often appears as mechanism-based discussion rather than as a separately measured construct.

Source: Authors' compilation.

Overall, Table 3 indicates that the evidence base concentrates on transparency and reporting-related themes, followed by investment efficiency and performance-related outcomes. By contrast, compliance and risk outcomes are covered by fewer studies, and smart contract-specific evidence remains limited and is rarely operationalised quantitatively. These patterns provide a concise bridge to the interpretive discussion that follows.

Building on the results, this discussion interprets the evidence through Agency Theory. Because most included studies rely on observational designs and adoption or intensity proxies, the evidence is predominantly association based, so mechanisms are discussed as plausible interpretations rather than confirmed causal channels. The discussion therefore emphasises boundary conditions and complementarity between blockchain or smart contracts and conventional governance and assurance arrangements (Jensen & Meckling, 1976).

Interpreting the Main Patterns Through Agency Theory and Corporate Governance Logic

Agency Theory frames corporate governance as a set of mechanisms intended to reduce agency costs that arise from incentive divergence and information asymmetry between principals and agents (Eisenhardt, 1989). Within this lens, blockchain's immutability, traceability, and shared verification can be interpreted as design attributes that may strengthen the corporate information environment by lowering verification frictions and making certain records more auditable. However, it is important to emphasize that most studies included in this review provide association-based evidence using adoption or intensity proxies. As a result, the discussion interprets the findings as consistent with agency-theoretic logic rather than as direct observation of monitoring, opportunism, or enforcement channels.

Across studies, the most frequently reported pattern concerns governance-relevant outcomes that reflect the quality of the information environment, especially transparency and reporting credibility. Empirical evidence links blockchain-related measures with higher corporate transparency and improved accounting or reporting quality in several settings (Chang et al., 2025). In agency terms, these associations are compatible with an interpretation that more verifiable records and better auditable trails can reduce information asymmetry and narrow managerial discretion in reporting. At the same time, the evidence points to meaningful boundary conditions that shape whether such transparency becomes effective governance. External monitoring and oversight capacity can amplify the governance relevance of transparency signals, while audit and assurance capability can determine whether recorded information is translated into credible assurance and board-level discipline (Fang et al., 2023). These contingencies reinforce that blockchain is more plausibly a complement to, rather than a substitute for, conventional governance mechanisms.

A second cross-study pattern relates to agency-relevant performance and discipline outcomes, particularly investment efficiency and compliance-related behavior. Studies report that blockchain measures are associated with improved investment efficiency and that corporate governance may mediate or condition this relationship, which is consistent with the view that governance quality shapes whether improved information translates into better resource allocation (Ezzi et al., 2023). Other evidence associates blockchain with outcomes such as reduced earnings management or

lower tax evasion in specific contexts, again suggesting that governance effects are not uniform and likely depend on institutional enforcement, internal controls, and monitoring arrangements. Taken together, these patterns support a cautious interpretation: blockchain-enabled traceability and auditability are most consistently linked to governance through the information environment, while the magnitude and direction of governance implications remain context-dependent and should not be overgeneralized beyond the measures and settings tested in the included studies.

Smart Contracts as a Governance and Contracting Layer: from Transparency to Rule Execution

While blockchain primarily strengthens the integrity of records and reduces verification frictions, smart contracts can be understood as a programmable control layer that executes pre-specified rules on a ledger. In corporate governance settings, a smart contract can embed authorisation rules, conditional transfers, and procedural compliance checks into code, thereby narrowing discretionary space for activities that are clearly specified and objectively verifiable. From an agency-theoretic perspective, this shifts part of monitoring and enforcement closer to the point of action because rule execution and the resulting logs can be inspected and audited within the system (Jensen & Meckling, 1976; Murray et al., 2021). Prior governance scholarship also notes that smart contracts may strengthen procedural aspects of shareholder rights and corporate control, for example by supporting voting integrity and participation, but only when identity, governance design, and legal enforceability are addressed (van der Elst & Lafarre, 2019).

To make the implications more operational, smart-contract relevance is most visible in governance use cases where obligations can be codified and where reliable inputs can be provided to the contract. Illustrative examples include automated shareholder voting and vote tabulation, dividend distribution conditional on verified records, escrow and milestone-based payments in procurement and project contracting, and rule-based compliance workflows that log approvals, thresholds, and exceptions. These use cases are measurable in principle through indicators such as the share of transactions or governance procedures executed via smart contracts, the volume and value of contract-triggered transfers, the frequency of exceptions or manual overrides, the extent of external assurance on contract code, and the incidence of contract upgrades. However, because current empirical research often measures blockchain adoption or intensity rather than smart-contract utilisation, these smart-contract pathways should be treated as mechanism-based expectations that require more direct operationalisation and stronger causal identification in future studies.

This caution is important because smart contracts can also introduce technology-mediated agency frictions. Coding errors, security vulnerabilities, and governance of upgrades can create new control problems, while reliance on external inputs or oracles can shift agency risk to data providers and system designers (Murray et al., 2021). Governance outcomes are also likely to differ across permissioned and permissionless architectures, and they depend on assurance capacity, internal controls, and regulatory alignment that determine whether automated execution is credible and enforceable (Lombardi et al., 2022). In this review, explicit empirical treatment of smart contracts is limited and appears primarily in case-based or mechanism-oriented discussion, rather

than as a separately measured construct in large-sample studies (Islam et al., 2025). Accordingly, smart contracts are best interpreted as complements to conventional governance mechanisms, with governance value that is contingent on organisational readiness, verifiable inputs, and robust oversight.

Key Preconditions, Challenges, and Contextual Enablers of Effectiveness

The effectiveness of blockchain and smart contracts in mitigating agency problems depends on organizational readiness, governance arrangements, and the regulatory environment. At the organizational level, blockchain improves verifiability but does not guarantee the truthfulness of inputs, so internal controls, authorization processes, and data governance remain foundational for preventing "garbage-in, immutable-out" problems (Lombardi et al., 2022). Regulatory and legal alignment is also decisive because governance operates within enforceable rights and responsibilities. Legal uncertainty surrounding smart contracts, data protection requirements, and dispute resolution can weaken governance value if code-based rules diverge from legal standards or if enforceability is ambiguous (Kanojia, 2023).

Internal governance characteristics, including ownership structure, board capacity, and incentive configurations, appear central in shaping whether blockchain operates as a governance enhancer or merely as symbolic innovation. Evidence that links firm-level financial policies and ownership characteristics to blockchain enterprise outcomes supports this contingency view and suggests that agency costs and governance benefits can vary systematically with control structures (Aromataris et al., 2024). Arguments about blockchain as a potential reforming force in governance similarly emphasize that outcomes hinge on how technology is integrated into governance mechanisms rather than on adoption alone (Akhtar, 2024). Finally, the ecosystem of assurance and professional competence matters. As reporting and control shift toward technology-enabled infrastructures, audit quality increasingly depends on digital expertise and the capacity to assess system controls and technology risks, which becomes a critical complement to any transparency gains (Rahman & Ziru, 2023).

Theoretical Implications: Extending Agency Theory Toward Governance by Design

The integration of blockchain and smart contracts motivates refinements to Agency Theory in at least three ways. First, blockchain can alter the structure of information and verification costs by embedding verifiability into the transaction infrastructure, which can reduce certain monitoring costs while leaving institutional governance needs intact due to access control, data governance, and organizational decision processes (Jensen & Meckling, 1976; Yermack, 2017). Second, smart contracts can shift part of governance from ex post enforcement toward ex ante constraints through automated rule execution, which changes how principals can discipline agents when obligations can be codified and monitored digitally.

Third, blockchain ecosystems introduce additional agency relationships that are not fully captured in the classical principal–manager dyad. Developers, validators, oracle providers, and protocol governance participants can influence rule design and outcomes, which can generate technology-

mediated conflicts of interest and new governance vulnerabilities. Work that proposes DAO-led corporate governance frameworks highlights that even code-based governance requires coordination, representation, and control over rule evolution, so agency frictions can migrate to the protocol and design layer (Murray et al., 2021; Saurabh et al., 2024). Relatedly, case-based evidence on peer-to-peer insurance suggests that blockchain can reshape transaction costs and agency costs simultaneously, which points to productive integration between Agency Theory and transaction cost logic when explaining organizational boundary and governance architecture changes (Sun et al., 2020).

Practical and Policy Implications for Firms, Regulators, and Assurance Providers

Firms should treat blockchain and smart contracts as part of an integrated governance architecture rather than isolated IT projects. Governance value is more likely when objectives are explicit and translated into auditable processes and controls (Salehi & Molavi, 2025). Firms should also invest in governance readiness, including board and audit committee oversight, access governance, and compliance routines, because governance quality can determine whether transparency becomes actionable rather than superficial (Chouaibi et al., 2024).

For regulators, the discussion underscores the importance of legal clarity on smart contracts, standards for auditability and reporting, and safeguards for data integrity and investor protection so that governance benefits are not undermined by uncertainty or fragmented enforcement. For the assurance profession, technology-enabled governance increases the demand for digital competencies and methodologies for evaluating system controls, cybersecurity risks, and the integrity of automated rule execution, since weak assurance capacity can erode trust even when systems appear technically transparent (Lombardi et al., 2022).

Comparative Relevance for Indonesia and Future Research Directions

Although the synthesis is global, it has comparative relevance for Indonesia. Local discussions position blockchain as a governance solution and motivate context-sensitive testing in markets with concentrated ownership and uneven governance maturity. Indonesian scholarship on technological disruption and corporate control further suggests that digital infrastructures increasingly shape governance, even though rigorous evidence on smart contracts and code-based governance remains limited (Fauzzia et al., 2025). Future work can strengthen evidence-based agenda setting using systematic review approaches (Wijaya et al., 2024) and examine how digital ecosystem diffusion in MSMEs relates to trust and control mechanisms that may complement blockchain-enabled governance in larger organisations (Suhardi et al., 2021).

Limitations of the Evidence Base and Implications for Future Studies

The evidence base remains limited and heterogeneous. Most studies operationalise blockchain using adoption or innovation-intensity proxies, while the smart contract layer is usually discussed as a mechanism rather than measured as a distinct construct, so conclusions about incremental

smart contract effects remain tentative (van der Elst & Lafarre, 2019; Murray et al., 2021). Endogeneity and cross-country institutional heterogeneity also constrain inference, highlighting the need for stronger causal identification and more granular measures of concrete use cases (Du et al., 2023). Future research should separate blockchain information-infrastructure effects from smart-contract contracting and enforcement effects, test interactions with boards, ownership, and audit quality, and extend comparative designs across regulatory regimes, including DAO-oriented governance that introduces new agency relationships (Kaal, 2020).

CONCLUSION

This systematic literature review synthesizes international empirical evidence on blockchain and smart contracts in relation to corporate governance and agency conflict mitigation through the lens of Agency Theory. Based on 13 eligible empirical studies, the most consistent pattern is that blockchain adoption, innovation, or use is associated with stronger governance-relevant outcomes through an improved information environment, including greater transparency, traceability, and reporting credibility. However, because most included studies rely on observational designs and proxy measures of blockchain adoption or intensity, the current evidence base should be interpreted primarily as association based rather than as confirmed causal effects. Smart contracts remain empirically underdeveloped in this literature. Only two of the 13 included studies explicitly discuss smart contracts, and the quantitative evidence generally does not operationalise smart contract utilisation as a distinct measurable construct. Accordingly, any incremental governance effect attributable specifically to smart contracts should be treated as tentative. Across contexts, governance benefits appear contingent on boundary conditions, including the integrity of inputs and internal controls, the availability of audit and assurance capability, effective external oversight, regulatory alignment, and system architecture choices and their governance of off-chain interfaces and code changes.

The review contributes theoretically by refining how Agency Theory can be applied to digital governance infrastructures. First, blockchain can be interpreted as a governance by system design mechanism that shifts parts of verification and monitoring costs into the transaction infrastructure through auditable and tamper resistant records. Second, smart contracts can shift some governance from ex post enforcement toward ex ante constraints for obligations that can be codified and verified, while also introducing technology mediated agency frictions related to code quality, cybersecurity, and upgrade governance. Third, blockchain-based ecosystems introduce additional agency relationships beyond the classical principal manager dyad, because developers, validators, oracle providers, and protocol governance participants can influence rule design, data integrity, and outcomes. These extensions clarify why technology is more plausibly a complement to conventional governance mechanisms than a substitute.

Practically, firms should treat blockchain and smart contracts as components of an integrated governance architecture and link implementation to explicit, measurable governance objectives. Operational smart contract use cases that can be monitored include shareholder voting and vote tabulation, dividend distribution based on verified records, escrow and milestone based payments

in procurement and project contracting, and rule based compliance workflows that log approvals, thresholds, and exceptions. These use cases can be evaluated through indicators such as the share of governance procedures executed via smart contracts, the volume and value of contract triggered transactions, the frequency of exceptions or manual overrides, the coverage of code audits and assurance, and the incidence of contract upgrades. Regulators and assurance providers can support governance value by clarifying legal enforceability, setting auditability and disclosure standards, and strengthening assurance practices for system controls and code. This review is limited by reliance on a single database, English language restrictions, and heterogeneity in blockchain proxies across the included studies, therefore generalisation should be made cautiously. Future research should develop direct measures of smart contract utilisation, strengthen causal identification, and test interactions between on-chain and off-chain governance mechanisms across institutional regimes, including more context sensitive evidence relevant to Indonesia.

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