



Blockchain Technology and Procurement Transparency in Public Sector Organizations

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Abstract

Public procurement is one of the largest points of contact between government and the private sector, and it remains the single most corruption-prone activity in public financial management, particularly in developing economies. This paper examines the potential of blockchain technology to enhance transparency in public sector procurement. Adopting a desk-review approach, the paper synthesises recent conceptual, theoretical and empirical literature (2019-2025) on blockchain-enabled procurement systems, drawing on studies from Africa, Asia, Europe and Latin America. The review shows that blockchain's core attributes immutability, decentralisation, cryptographic verification and smart-contract automation directly address the record-tampering, bid-rigging, and information-asymmetry problems that sustain procurement corruption. Evidence from pilot implementations in South Africa, Kenya, Estonia, Bosnia and the United Arab Emirates suggests measurable gains in audit efficiency, cycle-time reduction and stakeholder trust. However, the literature is equally consistent that blockchain is not a self-executing solution: weak digital infrastructure, the "garbage-in-garbage-out" problem of off-chain data entry, regulatory uncertainty, high implementation cost, and entrenched political resistance to transparency all constrain adoption in public administrations, especially across sub-Saharan Africa. The paper concludes that blockchain should be understood as a structural enabler of transparency rather than a substitute for procurement reform, and it offers recommendations for phased, risk-prioritised adoption by public sector organizations, using Nigeria as an illustrative case.

Keywords: blockchain technology, public procurement, transparency, smart contracts, e-government, corruption, public sector organizations

1. Introduction

Public procurement the process by which government ministries, departments and agencies acquire goods, works and services typically accounts for a substantial share of national budgets and gross domestic product in most economies. Because it involves large sums of public money moving through discretionary, multi-stage decision points, procurement is consistently identified as one of the government functions most exposed to corruption, collusion and record manipulation. In Nigeria specifically, recent commentary attributes trillions of naira in annual losses to inflate and fraudulently awarded procurement contracts, with the petroleum and infrastructure sectors especially implicated (NQLB, 2025) ^[11].

Conventional responses to procurement corruption competitive bidding rules, e-procurement portals, freedom-of-information disclosure and independent audit have reduced but not eliminated the problem, in part because the underlying records remain centrally held and therefore alterable by the same officials the rules are meant to constrain (Alves Batista, 2024) ^[4]. Blockchain technology, a distributed ledger architecture that makes records tamper-evident and independently verifiable without a central custodian, has therefore attracted growing scholarly and policy attention as a structural, rather than merely procedural, response to procurement opacity (Abdul Mateen, 2024; Govindan *et al.*, 2024) ^[1,9].

This paper reviews the current state of scholarship on blockchain-enabled public procurement, with particular attention to transparency outcomes in public sector organizations. It pursues three objectives: (i) to clarify the conceptual and theoretical basis for expecting blockchain to improve procurement transparency; (ii) to synthesise recent empirical and case evidence, including African and Nigerian experience; and (iii) to identify the practical barriers that condition adoption, in order to inform realistic recommendations for public sector organizations considering the technology.

2. Conceptual Clarifications

2.1. Blockchain Technology

Blockchain is a distributed, append-only ledger in which transactions are grouped into cryptographically linked blocks and replicated across a network of nodes, so that altering a past record would require simultaneously altering every subsequent block across a majority of nodes a practically infeasible task once a chain has grown (Adjorlolo *et al.*, 2025)^[2]. Three attributes recur across the literature as the properties most relevant to public administration: immutability (once written, a record cannot be quietly changed), decentralisation (no single administrator has unilateral custody of the record), and programmability through smart contracts self-executing code that automatically enforces agreed rules, such as releasing payment only when delivery conditions are independently verified (Badhusa *et al.*, 2025)^[5].

For procurement specifically, blockchain implementations distinguish between public (permissionless) chains and permissioned chains restricted to vetted participants the latter being the model most public sector pilots have adopted, since it allows regulators to retain oversight of who can write to the ledger while still distributing custody of the record away from any single procurement office (Adjorlolo *et al.*, 2025)^[2].

2.2. Procurement Transparency

Transparency in procurement is generally understood as the timely availability, to stakeholders and the public, of accurate and unaltered information about how a contract was specified, advertised, evaluated, awarded and executed. It is distinct from, but a precondition for, accountability: transparency supplies the verifiable record; accountability is the mechanism by which someone is answerable for what that record shows (Alves Batista, 2024)^[4]. Records management scholarship increasingly frames procurement fraud as fundamentally a records-integrity problem bids substituted after submission, evaluation scores altered retroactively, or award justifications fabricated after the fact which is precisely the class of problem blockchain's immutability property targets (Alves Batista, 2024)^[4].

3. Theoretical Framework

Two theoretical lenses are commonly combined in this literature. The first is Rogers' Diffusion of Innovation theory, which explains organizational uptake of a new technology as a function of its relative advantage, compatibility with existing practice, complexity, trialability and observability a framework several studies use to explain why blockchain procurement pilots remain small-scale and slow to diffuse across government agencies despite demonstrated advantages (Khalfan *et al.*, 2022)^[10]. The second is Principal-Agent Theory, applied to procurement to explain corruption

as an agency problem: procurement officials (agents) possess information the citizenry and oversight bodies (principals) cannot fully observe, creating room for self-interested deviation from the public interest. Adjorlolo *et al.* (2025)^[2] apply principal-agent theory explicitly to identify which stages of the procurement cycle carry the greatest information asymmetry, and therefore the greatest corruption risk, in order to prioritise where blockchain integration would have the largest transparency payoff. Together, the two theories explain both why blockchain should, in principle, reduce information asymmetry in procurement, and why its actual adoption by public sector organizations remains gradual and contested.

4. Empirical and Case Evidence

4.1. Global and Cross-Sectoral Evidence

A systematic thematic review of blockchain-enabled applications across supply chain, business and public-sector domains found procurement to be one of the most active application areas, with transparency, traceability and stakeholder trust identified as the most frequently reported benefits, though the review also noted that empirical validation still lags behind theoretical and conceptual proposals (Abdul Mateen, 2024)^[1]. In the European Union, blockchain has been proposed as the technical backbone for the forthcoming Digital Product Passport requirement, which will obligate suppliers to disclose verifiable sourcing and sustainability data across public and private supply chains from 2027 (Frontiers in Blockchain, 2026)^[8]. A comparative legal and records-management study of procurement fraud cases found that most fraud schemes exploited weaknesses in how records were created and stored, and proposed blockchain-based records architecture as a structural mitigant against the forgery and omission techniques most commonly used (Alves Batista, 2024)^[4].

Smart-contract-based procurement prototypes have also been demonstrated experimentally: an Ethereum-based model built around two linked smart contracts one governing access control and bidder eligibility, and the other governing bid evaluation and results publication was shown to remove several manual, discretionary steps from the tender process and make each stage independently auditable (IEEE, 2022, as cited in Adjorlolo *et al.*, 2025)^[2]. More recent local-government-focused work similarly concludes that smart-contract automation reduces the scope for human interference in award decisions and strengthens stakeholder trust in financial management processes (Badhusa *et al.*, 2025)^[5].

4.2. African and Nigerian Evidence

Evidence from Africa is smaller in volume but directly relevant to public sector organizations in developing economies. In South Africa, the Gauteng Provincial Government's adoption of an Open Tender Process built on blockchain-verifiable records has been associated with early reductions in fraudulent bidding and improved operational efficiency, while the Nigeria Customs Service has explored blockchain to make its own procurement transactions tamper-evident (Africa at LSE, 2023). Ghana-focused research using the Analytic Hierarchy Process identified tender evaluation as the single most corruption-prone stage of the procurement cycle and recommended it as the priority stage for blockchain integration, given the resource constraints developing-country agencies face in digitising an entire procurement system at once (Adjorlolo *et al.*, 2025)^[2].

Nigeria-specific studies reinforce this picture. A quantitative study of public infrastructure procurement in Nigeria, surveying procurement professionals, policymakers and blockchain experts, found that blockchain's transparency, immutability and decentralisation attributes were positively associated with respondents' assessment of its potential to reduce procurement malpractice (Sapub, 2025) ^[13]. Complementary legal and policy analysis has argued that blockchain-based anti-corruption measures are technically compatible with Nigeria's existing public administration structures, though their effectiveness depends heavily on accompanying regulatory and institutional reform rather than the technology alone (Olalekan, 2024) ^[12]. Earlier work focused narrowly on government financial processes similarly concluded that blockchain's decentralised, tamper-evident structure directly targets the centralisation and account manipulation that have historically undermined confidence in Nigerian public financial management (Enihe & Lawal, 2021) ^[6]. At a continental level, bureaucratic-inefficiency research across African public administrations found blockchain capable of shortening approval chains and reducing discretionary bottlenecks, but stressed that these gains materialise only where digital infrastructure and civil-service capacity are already reasonably developed (Shava & Mhlanga, 2023) ^[14].

5. How Blockchain Enhances Procurement Transparency: Synthesis

Drawing the reviewed literature together, blockchain is reported to support procurement transparency in public sector organizations through four mechanisms:

1. Tamper-evident record-keeping: because altering a written block requires altering every subsequent linked block across a distributed network, procurement records bid submissions, evaluation scores, award letters, payment releases become far more resistant to retroactive manipulation than records held in a single centralised database (Adjorlolo *et al.*, 2025; Alves Batista, 2024) ^[2, 4].
2. Automated, rules-based execution: smart contracts can be configured to release a stage of the procurement process such as payment only once independently verifiable conditions are met, reducing the number of discretionary human decision points available for manipulation (Badhusha *et al.*, 2025) ^[5].
3. Distributed custody and independent verification: because no single procurement office holds exclusive custody of the ledger, oversight bodies, auditors and, in permissioned designs, even citizens can independently verify that a record has not been altered, without depending on the goodwill of the office that created it (Abdul Mateen, 2024) ^[1].
4. Real-time auditability: because every transaction is time stamped and linked, audit bodies can trace a contract's full history continuously, rather than reconstructing it after the fact from paper or siloed digital files (Govindan *et al.*, 2024) ^[9].

6. Challenges and Barriers to Adoption

Despite this potential, the literature is consistent that blockchain adoption in public procurement faces material barriers, especially in developing-country public sector organizations:

1. Off-chain data integrity ("garbage-in-garbage-out"):

blockchain guarantees that a recorded transaction cannot be quietly altered after the fact, but it cannot guarantee that the data entered was accurate in the first place collusive actors can still manipulate the underlying information before it is written to the chain (Adjorlolo *et al.*, 2025) ^[2].

2. Weak digital infrastructure: unreliable connectivity, limited server capacity and low digital literacy among procurement staff constrain full-scale implementation across much of sub-Saharan Africa, where blockchain activity remains concentrated in fintech pilots rather than public administration (Extensia, 2025) ^[7].
3. Regulatory and legal uncertainty: the legal status of smart contracts, data-protection obligations, and cross-border data storage remain unsettled in many jurisdictions, complicating large-scale public sector deployment (Williams-Elegbe, 2019) ^[15].
4. Cost and technical capacity: designing, piloting and maintaining a permissioned blockchain system requires specialised technical capacity that many procurement departments do not currently possess in-house (Khalfan *et al.*, 2022) ^[10].
5. Political resistance: because transparency by design reduces the discretion available to procurement officials, entrenched interests that benefit from opacity have limited incentive to support adoption, and can resist it either directly or through slow, under-resourced implementation (Adjorlolo *et al.*, 2025) ^[2].

7. Conclusion and Recommendations

The reviewed literature supports the conclusion that blockchain technology offers a credible, structural mechanism for improving transparency in public sector procurement, primarily by making records tamper-evident, distributing custody of those records away from any single office, and automating rule-based stages of the procurement cycle through smart contracts. At the same time, the evidence is equally clear that blockchain is not a stand-alone remedy for procurement corruption: it depends on accurate initial data entry, adequate digital infrastructure, clear regulation, sufficient technical capacity, and perhaps most importantly genuine institutional will to reduce discretion, since the technology's core value proposition is precisely the removal of the informal flexibility that sustains corrupt practice.

On this basis, the paper recommends that public sector organizations, using Nigeria as an illustrative case, should: (i) begin with a risk-prioritised, phased rollout that targets the specific procurement stage identified as most corruption-prone typically tender evaluation rather than attempting a full-system migration at once, following the logic demonstrated by Adjorlolo *et al.* (2025) ^[2]; (ii) adopt permissioned blockchain architectures that keep regulatory oversight of ledger access intact while still distributing custody of records beyond a single procurement office; (iii) pair blockchain adoption with independent data-verification protocols at the point of entry, so that the immutability of the ledger is not undermined by inaccurate off-chain inputs; and (iv) invest concurrently in digital infrastructure, procurement-staff digital literacy, and a clear legal framework for smart contracts, without which the technology's transparency benefits cannot be realised at scale. Future research would benefit from longitudinal, quantitative evaluation of live public sector blockchain-procurement deployments in Nigeria and comparable developing

economies, since the present evidence base remains weighted toward conceptual proposals, small pilots and cross-sectional surveys rather than sustained post-implementation assessment.

References

1. Abdul Mateen S. Role of blockchain technology in public procurement enhancing transparency and efficiency. *SSRN Electron J.* 2024. doi:10.2139/ssrn.4742274.
2. Adjorlolo G, Tang Z, Wauk G, Sarfo PA, Braimah AB, N-yanyi B. Evaluating corruption-prone public procurement stages for blockchain integration using AHP approach. *Systems.* 2025;13(4):267. doi:10.3390/systems13040267.
3. Africa at LSE. Blockchain could revolutionise public procurement and combat corruption in Africa. *LSE Blogs.* 2023 Sep 27. Available from: <https://blogs.lse.ac.uk/africaatlse/2023/09/27/blockchain-could-revolutionise-public-procurement-and-combat-corruption-in-africa/>
4. Alves Batista D. Enhancing transparency and accountability in public procurement: exploring blockchain technology to mitigate records fraud. *Rec Manag J.* 2024;34(2-3):151-170. doi:10.1108/RMJ-10-2023-0054.
5. Badhusha MHN, Sathik SJ, Rajitha R, Bhosale YH. Blockchain for transparent public procurement: smart contracts in local government financial management. *Adv Consum Res.* 2025;2(6):2569-2575.
6. Enihe RO, Lawal T. Blockchain technology: a panacea for corruption in Nigerian government financial processes. *Br J Finance.* 2021;6(6):6-13.
7. Extensia. Blockchain in Africa: an underexploited potential in the face of governance challenges. 2025 Jul 16. Available from: <https://extensia.tech/blockchain-in-africa-an-underexploited-potential-in-the-face-of-governance-challenges/>
8. Frontiers in Blockchain. Blockchain technology in sustainable public procurement: a legal assessment. *Front Blockchain.* 2026. doi:10.3389/fbloc.2026.1812168.
9. Govindan K, Jain P, Singh RK, Mishra R. Blockchain technology as a strategic weapon to bring procurement 4.0 truly alive: literature review and future research agenda. *Transp Res E Logist Transp Rev.* 2024;181:103352.
10. Khalfan M, Azizi N, Haass O, Maqsood T, Ahmed I. Blockchain technology: potential applications for public sector e-procurement and project management. *Sustainability.* 2022;14(10):5791.
11. NQLB. How blockchain technology can help Nigeria in its fight against corruption. 2025 Oct 14. Available from: <https://www.nqlb.co/how-blockchain-can-help-nigeria-fight-corruption/>
12. Olalekan OA. Blockchain technology and anti-corruption measures in the setting of public administration in Nigeria. *Afr J Law Polit Res Admin.* 2024;7:69-79.
13. Sapub. Blockchain technology potentials for malpractices mitigation in Nigeria's public infrastructure procurement system. *Manage.* 2025;15(1). Available from: <http://article.sapub.org/10.5923.j.mm.20251501.03.html>
14. Shava E, Mhlanga D. Mitigating bureaucratic inefficiencies through blockchain technology in Africa. *Front Blockchain.* 2023;6:1053555. doi:10.3389/fbloc.2023.1053555.
15. Williams-Elegbe S. Public procurement, corruption and blockchain technology in South Africa: a preliminary legal inquiry. *SSRN.* 2019. Available from: <https://ssrn.com/abstract=3458877>

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