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Strengthening the Government Procurement System through Blockchain-Based Smart Contracts as a Responsive Measure to Combat Corruption Practices

Dimas Aditya Ashari[1], Kadek Cahya Susila Wibawa[2], Solechan[3], Henny Juliani[4]
[1,2,3,4] *Faculty of Law, Universitas Diponegoro*
Corresponding Author: solechan.undip.1967@gmail.com

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ABSTRACT

Introduction: Government Procurement of Goods and Services (PBJ) plays a strategic role in national development yet remains plagued by issues such as corruption, collusion, and nepotism. To address these challenges, reform is necessary through the adoption of consortium blockchain-based smart contract technology. This approach is expected to enhance transparency, efficiency, and accountability in public procurement. This research proposes a model for an ideal digital-based procurement policy aimed at establishing cleaner and more trustworthy governance.

Objectives: This research explores the integration of blockchain-based smart contracts within the government procurement sector, focusing on legal aspects, regulatory strengthening, and policy reform prospects to establish a transparent and corruption-free procurement system.

Methods: The research adopted a doctrinal legal methodology, offering a law-technology approach through blockchain-based smart contracts to reform public procurement. It emphasized the urgency of regulatory development, the effectiveness of government contracts, and solutions to corruption practices, while also addressing the legal challenges of implementation.

Results: Indonesia, as a welfare state, is mandated to ensure good governance, including within the domain of government procurement. However, the findings indicated that the PBJ sector often becomes a hotspot for corruption. The implementation of consortium blockchain technology and smart contracts can enhance transparency, and accountability, and minimize deviations. This system facilitates secure and automated transaction records, monitored by institutions such as LKPP, APIP, BPK, and KPK. With periodic audits and a legal basis under the Electronic Information and Transactions Law (UU ITE), the system is expected to realize efficient, transparent, and integrity-driven procurement in line with the principles of good governance.

Conclusions: Government procurement continues to face challenges related to effectiveness, efficiency, and accountability, which foster corruption. To overcome these issues, comprehensive reform is essential through the implementation of consortium blockchain and smart contract technologies, ensuring data transparency and integrity. The success of this transformation requires strong collaboration among stakeholders and the integration of the system into the five procurement stages as outlined in the Draft Law on Procurement, in alignment with other regulations such as the PPSK Law regarding digital currency (digital rupiah).

Keywords: Blockchain, Corruption, Government Procurement, Smart Contracts

INTRODUCTION

Government Procurement of Goods and Services (PBJ) is one of the government's key programs with a strategic role in strengthening the economy and fostering development at both regional and national levels. Through PBJ, the government aims to achieve high-quality development by engaging various sectors that can drive economic growth. The primary objective of the PBJ program is to enhance development effectiveness and reinforce national

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economic resilience.[1] This program is designed to ensure the provision of improved public services and adequate facilities for the community, thereby supporting sustainable growth.

From a legal perspective, the implementation of PBJ is strictly regulated to ensure transparency and accountability throughout the process. These regulations aim to ensure that each stage of government procurement adheres to established standards and delivers optimal outcomes for national development.[2] The National Public Procurement Agency (LKPP) holds a crucial role in managing PBJ. LKPP is responsible for developing a procurement system that is effective, efficient, and aligned with public needs. In addition, the agency ensures that procurement processes are conducted with high levels of transparency and accountability.[3] Given this central role, LKPP is expected to ensure that government procurement in the public sector aligns with the broader goals of advancing national development. Good management of PBJ not only improves public service delivery but also reinforces the government's commitment to serving the interests of the wider society.

In 2022, LKPP initiated plans to implement a digital transformation program using blockchain technology in government procurement processes. This initiative aims to enhance the efficiency and effectiveness of public administration.[4] Blockchain technology is viewed as a promising solution to improve transparency and accountability at every stage of the procurement process, with the expectation of minimizing common obstacles within the system. However, the implementation of this blockchain-based transformation presents several significant challenges.

The first challenge arises from the regulatory framework, which is not yet fully equipped to accommodate emerging technologies. The government must ensure that the existing legal framework is capable of effectively governing the use of blockchain under the prevailing legal principles in Indonesia.[5] Moreover, the prevailing legal culture must also be considered. Technological change must be accepted by both PBJ stakeholders and the wider public in order to be implemented effectively. Additional challenges also stem from institutional aspects that require strengthening. Institutions involved in PBJ must be adequately prepared to adopt digital technologies optimally.[6] This consists of training and capacity-building for human resources, as well as developing the necessary infrastructure to support blockchain operations.

Beyond regulatory and institutional challenges, Indonesia still faces several fundamental issues in the implementation of government procurement. Among the most pressing are the lack of stakeholder trust in PBJ processes and the low levels of transparency among involved parties. These problems are exacerbated by the inadequacy of supporting systems and the presence of a convoluted bureaucracy, which impedes the procurement process and creates uncertainty for participants. One of the most entrenched and difficult problems to eradicate is the widespread practice of corruption, collusion, and nepotism (KKN), which has deep roots in Indonesia's political economy.

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[1] LKPP, "LKPP Dorong Peran Aktif Masyarakat dalam Pengadaan Barang/Jasa di Desa", 2024,https://www.lkpp.go.id/read/bu/lkpp-dorong-peran-aktif-masyarakat-dalam-pengadaan-barang-jasa-di-desa.

[2] Abu Samman Lubis,"Prinsip-Prinsip Pengadaan Barang/Jasa Apakah Harus Dipedomani?" 2014,https://bppk.kemenkeu.go.id/balai-diklat-keuangan-malang/artikel/artikelprinsipprinsip-pengadaan-barangjasa-apakah-harus-dipedomani-016149,

[3] Lembaga Kebijakan Pengadaan Barang/Jasa Pemerintah (LKPP), "Tugas dan Fungsi", 2024, https://www.lkpp.go.id/tentang/peran-dan-fungsi.

[4] Lembaga Kebijakan Pengadaan Barang/Jasa Pemerintah (LKPP), "LKPP Susun Roadmap IT untuk Perkuat Transformasi Digital Pengadaan" 2024, https://www.lkpp.go.id/read/bu/lkpp-susun-roadmap-it-untuk-perkuat-transformasi-digital-pengadaan.

[5] Satria Muhammad Nur Lase, et.al. "Kerangka Hukum Teknologi Berbasis Blockchain Berdasarkan Hukum Siber di Indonesia", Padjadjaran Law Review 9.no.1. (Agustus 12, 2021):1-3.

[6] Lembaga Kebijakan Pengadaan Barang/Jasa Pemerintah (LKPP), "Digitalisasi Sistem Pengadaan: Transformasi Pengadaan untuk Indonesia Maju", 2024, https://lkpp.go.id/index.php/read/bu/digitalisasi-sistem-pengadaan-transformasi-pengadaan-untuk-indonesia-maju.

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The practices of corruption, collusion, and nepotism (KKN) have created significant barriers to establishing a transparent and equitable procurement system.[7] The adoption of blockchain-based transformation is expected to help reduce such practices by offering a more transparent and accountable mechanism.[8] Nevertheless, considerable efforts are still required from various stakeholders to effectively eradicate KKN and restore public trust in the government procurement process.

During President Joko Widodo's administration, corruption has remained a key concern. This is reflected in various indicators showing that corruption levels in Indonesia remain troubling. One of the most critical indicators is the Corruption Perceptions Index (CPI), which provides an overview of public and international perceptions regarding corruption in a given country. According to the Transparency International report released on January 31, 2023, Indonesia's CPI score had a significant decline compared to previous years. In 2022, Indonesia scored only 34 out of 100, ranking 110th out of 180 countries.[9] This figure suggests that the public perception of corruption in Indonesia has worsened. The report also highlights that this decline is supported by various indicators reflecting the persistence of corrupt practices across the country. One such indicator is the IMD World Competitiveness Yearbook, which measures a range of national competitiveness factors, including corruption and bribery in the business sector. This index confirms that bribery and corruption remain prevalent, particularly within the private sector.

Corruption in the public sector has also drawn special attention. Numerous public officials have been implicated in corrupt activities, which ultimately undermine public service delivery. These issues not only tarnish the government's reputation but also degrade the quality of services provided to citizens, hinder developmental progress, and erode public trust in state institutions. Given these conditions, serious and comprehensive measures are necessary to address corruption in Indonesia. The government must pursue stronger systemic reforms, enhance oversight and law enforcement, and prioritize transparency in all administrative processes.

Data from the Corruption Eradication Commission (KPK) spanning the period from 2004 to 2023 recorded a total of 1,479 corruption cases successfully prosecuted. Of these cases, approximately 22.36%—or more than one-fifth—originated from the Government Procurement of Goods and Services (PBJ) sector. This indicates that procurement remains one of the most vulnerable sectors to corruption in Indonesia, considering the high proportion of cases related to procurement processes at various levels of government.[10] KPK's findings are further supported by its 2022 Integrity Assessment Survey (*Survei Penilaian Integritas*/SPIs), which provides a more detailed view of the issues within the PBJ sector. According to the survey, nepotism emerged as the most prominent issue affecting procurement processes, accounting for 37% of reported concerns. Other critical issues consist of the low quality of procured goods or services (36%), outcomes deemed ineffective or non-beneficial (33%), acceptance of gratuities (29%), and the pre-arrangement of vendor winners (28%). These figures underscore the high susceptibility of the procurement sector to various forms of irregularities and corruption.

The high prevalence of corruption within the government procurement sector reveals that Indonesia has not fully implemented the principles of transparent, accountable, and integrity-based governance.[11] If left unaddressed, this situation could result in the deterioration of governance quality and may even foster tendencies toward

[7] M. Gian Tantyo, "Prevention of Corruption, Collusion and Nepotism in Government Procurement of Goods and Services in Lampung Province". jurnal Corruptio 1, no.1, (Oktober 19,2020):120-121. https://doi.org/10.25041/corruptio.v1i2.2098.

[8] Alfredo Jim´enez, et.al. 'E-procurement and firm corruption to secure public contracts: The moderating role of governance institutions and supranational support', Journal of Business Research,149. (Oktober,2022):640-642, https://doi.org/10.1016/j.jbusres.2022.05.070.

[9] Alvin Nicola, Wawan Suyatmiko, "Indeks Persepsi Korupsi Indonesia 2022" 2023, https://ti.or.id/indeks-persepsi-korupsiindonesia2022mengalamipenurunanterburuksepanjang-sejarah-reformasi/

[10] Komisi Pemberantasan Korupsi (@official.kpk), "Hasil Survei Penilaian Integritas 2022: Risiko Permasalahan dalam Pengadaan Barang dan Jasa". 2024, https://www.instagram.com/p/CmtSH4fhTBn/?igsh=MWQ3a3pyYWIyY243NQ=

[11] Ahmad Rustan Syamsuddin, "Evidence of Abusing Authority in Criminal Procurement Corruption of Goods and Services". Jambura Law Review 2, no.2, (Juli,2020):163-164, https://doi.org/10.33756/jlr.v2i2.5942

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authoritarianism and weakened rule of law. The recurring patterns of misconduct in PBJ processes demonstrate that the existing accountability mechanisms are insufficient. A key concern is the manipulation of tender processes, which are often conducted unfairly and lack transparency. Such practices enable collusion, whereby actors can conspire to manipulate bids and unlawfully secure contracts. This injustice creates a system that disadvantages those who ought to benefit from a clean and competitive procurement environment.

The injustice observed in tender processes further indicates that existing mechanisms are insufficient in ensuring the necessary transparency of information. This lack of clarity in transparency enables perpetrators to conceal violations, thereby increasing the potential for manipulation. Consequently, the risk of maladministration in the Government Procurement of Goods and Services (PBJ) becomes increasingly severe. To address this issue, there is an urgent need for the implementation of more secure, immutable, traceable, and transparent methods at every stage of the procurement process. An improved system must enable each step of the contractual process to be monitored and verified by both the authorities and the public.

A form of technological adaptation involves the integration of artificial intelligence (AI), which plays a role in the development of blockchain systems. The use of blockchain and cryptographic technologies can be embedded within smart contract networks, which represent an advanced technological evolution of blockchain. Smart contracts based on blockchain are regarded as an ideal solution to the challenges of transparency, efficiency, and security currently faced in the procurement sector. In the Indonesian legal context, agreements, in general, are governed under Book III of the Indonesian Civil Code (KUHPer), which defines a contract as a legal interaction created between two or more parties, in which one party obligates the other to fulfill a particular obligation. A smart contract may be considered a valid agreement if it satisfies the conditions outlined in Article 1320 of the Civil Code. Beyond the Civil Code, the legal legitimacy of smart contract technology is also recognized in Law No. 1 of 2024, which amends Law No. 11 of 2008 on Electronic Information and Transactions (ITE Law), defining smart contracts as electronic contracts. This recognition is further elaborated in Government Regulation No. 71 of 2019 concerning the Implementation of Electronic Systems and Transactions (PSTE). Within judicial proceedings, smart contracts are accepted as electronic evidence under Article 5(1) of the ITE Law. However, these regulations do not constitute a specific legal framework governing the application of smart contracts in Indonesia, particularly within the public procurement sector. Therefore, based on the aforementioned background, this research proposes a renewed policy model for procurement that is more ideal and corruption-free through the use of consortium blockchain-based smart contract technology.

OBJECTIVES

The vital role of the public procurement sector in promoting Indonesia's economy and national development must be reinforced to establish a corruption-free system. The regulatory framework must be strengthened to ensure legal certainty regarding the application of consortium blockchain-based smart contracts in the Government Procurement of Goods and Services (PBJ) sector, and this task lies with the government as the sovereign authority. Resolving the issues that arise in contractual mechanisms between the government and vendors of goods/services must be a top priority. Previous studies support this direction. Sandi Pratama Hardiyan, in his journal article "*Perspektif Hukum dalam Keterbukaan, Transparansi, Proporsional, dan Penegakan Hukum pada Kontrak Pengadaan Barang dan jasa Pemerintah*" explains that contractual arrangements between the government and private parties can be categorized as government contracts. His research analyzed the relevance of legal principles, legal norms, and their implementation in practice. In addition, Temofe Isaac Akaba, in his research *"A Framework for the Adoption of Blockchain-Based e-Procurement Systems in the Public Sector: A Case Study of Nigeria," highlights the promising potential of blockchain-based procurement systems in public sector implementation. His research emphasizes issues such as corruption, tender collusion, and price mark-ups. Lastly, the study by Jecelyn Amanda Dethan and Yerica Evadne Giraldani Iriant, "*Analisis Keabsahan Smart Contract dalam Perjanjian Bisnis di Indonesia*," discusses the relevance of smart contracts and the obstacles hindering their implementation, including challenges related to legal validity and the principle of freedom of contract. Drawing upon these prior studies, the novelty of this research lies in its comprehensive legal perspective, which integrates legal and technological dimensions, proposes a framework for policy development, and explores the long-term implications of applying disruptive technologies in Government Procurement of Goods and Services (PBJ).

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METHODS

This research employed a doctrinal legal research method. It was conducted by examining the formulation and/or implementation of policies concerning the development of legal norms.[12] Doctrinal legal research—also known as normative juridical research—is, according to Peter Mahmud Marzuki, a process of identifying rules, principles, or legal doctrines to address legal issues and produce arguments, theories, or new legal concepts as prescriptive solutions.[13] This research used a qualitative approach, emphasizing deductive analysis of data. Several approaches were utilized in the research, including the statutory approach, comparative approach, conceptual approach, and analytical approach. The analysis focuses on discussing the urgency and projection of implementing smart contracts based on consortium blockchain technology through the establishment of procurement regulations, exploring their long-term prospects, and analyzing opportunities, challenges, and barriers through juridical analysis of legal frameworks such as the 1945 Constitution of the Republic of Indonesia, statutory laws, government regulations, ministerial regulations, and other related legal instruments. This research relied on secondary data obtained through literature studies, drawing upon various legal materials categorized as primary, secondary, and tertiary legal sources.

Several legal instruments are used as analytical tools in this study, including The 1945 Constitution of the Republic of Indonesia; Law No. 20 of 2001 concerning the Amendment to Law No. 31 of 1999 on the Eradication of Corruption; Law No. 10 of 2011 concerning the Amendment to Law No. 32 of 1997 on Commodity Futures Trading; Law No. 1 of 2024, the Second Amendment to Law No. 11 of 2008 on Electronic Information and Transactions (ITE); Presidential Regulation No. 16 of 2018 on the Procurement of Government Goods/Services.

Conclusion drawing in this research was essentially the process of interpreting the data that has been collected and organized by the researcher. A deductive reasoning approach was applied, beginning with the accumulation of general data and facts and culminating in specific conclusions based on logical principles. The main objective of this research was to propose a policy reform initiative in the area of Government Procurement of Goods and Services (PBJ) through the implementation of smart contracts based on consortium blockchain technology. This initiative aims to reduce corruption, price manipulation, and specification changes, while also enhancing public trust, particularly in terms of accountability and efficiency, in the broader effort to achieve good governance.

RESULTS

Indonesia adheres to the concept of a welfare state, as outlined in the fourth paragraph of the Preamble to the 1945 Constitution of the Republic of Indonesia (UUD NRI 1945). This concept aligns with Aristotle's philosophy of *telos*, which states that the ultimate purpose (*telos*) of the state as a political community is to attain the highest virtue or common good (*summum bonum*) for all its citizens.[14] This view underscores the importance of national resources and economic management as foundational to achieving the summum bonum. Its realization can only be accomplished through a process of iteration, wherein all members of society are enabled to fulfill their moral, intellectual, and social potential in harmony. Therefore, it is implied that the state holds the responsibility to initiate and ensure the realization of such iterations in pursuit of the summum bonum.

The government is therefore obliged to ensure the implementation of good governance, which reflects a responsible approach to development management grounded in democratic principles and efficient market mechanisms. In this context, the government must uphold the rule of law, prevent the misappropriation of investment funds, combat political and administrative corruption, enforce budget discipline, and establish policies that promote sustainable economic growth. One of the primary mechanisms for achieving these goals is through Government Procurement of Goods and Services (PBJ).[15] However, based on the current circumstances (a quo) of PBJ implementation, a major

[12] Soerjono Soekanto, Penelitian Hukum Normatif, (Jakarta: Penerbit Rajawali, 1990),14.
[13] Sigit Sapto Nugroho. et.al. Metodologi Riset Hukum, (Sukoharjo: Oase Pustaka,2020), 29.
[14] Lord, Carnes (ed.), Aristotle's "Politics": Second Edition. (University of Chicago Press:2013). Buku 1, Bab 1,1.
[15] Risca Rahayu, Tintin Sri Murtinah, "Pelaksanaan Pengadaan Barang/Jasa Secara Elektronik di Unit Layanan Pengadaan Biro Umum Sekretariat Presiden", Journal of Business Administration Economic & Entrepreneurship 4, no.2. (Oktober,2022):58.

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challenge remains in the widespread incidence of corruption and price manipulation, which directly impacts the contracting process. This situation has significant implications for public transparency and accountability, ultimately undermining the openness of the government in the procurement process. Left unresolved, this condition could further deteriorate the quality and effectiveness of governance.

Referring to Law of the Republic of Indonesia No. 31 of 1999 as amended by Law No. 20 of 2001 on the Eradication of Corruption, several classifications of criminal acts are recognized as acts of corruption. These consist of: state financial or economic loss, bribery, embezzlement in office, extortion, fraud, conflict of interest, and gratification. In practice, more than 87% of corruption cases occur within the Government Procurement of Goods and Services (PBJ) sector. This sector has proven to be fertile ground for corrupt practices that harm both the state and society.

Empirical data indicates that such corruption within government procurement commonly involves regional heads or officials who hold authority in the procurement process. Approximately 85% of regional heads involved in legal proceedings are linked to procurement-related issues. This phenomenon reveals that government procurement is highly vulnerable to abuse of power. As a response to this vulnerability, the Government Internal Supervisory Apparatus (*Aparat Pengawasan Intern Pemerintah* – APIP) plays a critical role in overseeing and ensuring that PBJ processes are conducted under applicable regulations.[16] The duties of APIP, as stipulated in Presidential Regulation No. 16 of 2018, encompass internal supervision over the management of government agency functions, including financial accountability and risk control related to procurement.

APIP also plays a preventive role by providing a sense of security for government leaders, helping to protect them from potential involvement in acts of corruption. To that end, APIP is authorized to analyze suspicious transaction patterns that could indicate irregularities detrimental to the state. These may include unreasonable price changes, repeated transactions with the same vendor, or accelerated procurement processes that bypass standard procedures. Such anomalies may then be further examined and followed up under the authority.

Contextually, the stages of the Government Procurement of Goods and Services (PBJ) begin with a comprehensive preparation phase. At this stage, the government identifies needs, allocates budgets, and prepares procurement documents. These documents specify the required goods or services, technical requirements, and implementation schedule.[17] Once preparation is complete, the next step is the announcement of the tender. The purpose of this announcement is to inform the public that a procurement project is available, allowing qualified vendors to participate fully. This process must be open and accessible, disseminated through both print media and electronic procurement platforms, to ensure equal opportunity for all stakeholders.

Following the announcement, the next stage involves vendor registration and retrieval of tender documents. During this phase, suppliers register and obtain documents containing detailed information about the project. Based on these documents, vendors prepare and submit their proposals in compliance with the specified requirements. This stage requires strict oversight to ensure that all participants adhere to the rules and that no fraudulent activity takes place. Finally, the procurement process culminates in the evaluation and selection of the winning bidder. Proposals submitted by bidders are assessed based on pre-established criteria. The evaluation must be carried out objectively and transparently by a competent evaluation team. The results of this evaluation form the basis for selecting the contractor who will execute the project. Through this structured mechanism, the government seeks to prevent irregularities or actions that could result in state financial losses while ensuring that government procurement is carried out professionally and responsibly.

Despite the existence of structured procedures, in practice, the implementation of Government Procurement of Goods and Services (PBJ) still reveals several gaps and records of fraudulent activities. The evaluation phase in government procurement is particularly vulnerable to irregularities. Such deviations may include alterations to

[16] Besse Herlina, et.al. "Analisis Kinerja Aparat Pengawas Internal Pemerintah (APIP) dalam Mewujudkan Good Governance di Kantor Inspektorat Daerah Kabupaten Wajo", Journal on Education 5, no.4. (September,2024):15922-15923, https://doi.org/10.47709/hukumbisnis.v12i05.2942.
[17] Musa Darwin Pane, "Aspek Hukum Pengadaan Barang Dan Jasa Pemerintah Suatu Tinjauan Yuridis Peraturan Pengadaan Barang Dan Jasa Pemerintah", Jurnal Media Hukum 24. no.2.(Desember,2017):149, https://doi.org/10.18196/jmh.2017.0090.147-155.

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tender documents or non-transparent decisions in determining the winning bidder. These practices often lead to the selection of predetermined suppliers.[18] Several corruption cases in government procurement, such as the Hambalang Sports Center development project—which caused state losses amounting to IDR 463.66 billion—demonstrate the substantial potential for state losses resulting from irregularities in PBJ.[19]

In addition to irregularities during the PJB selection process, various schemes also occur during the planning phase. At this stage, procurement executors often prioritize desires over actual needs. This can be attributed to interference or pressure from certain parties seeking to influence the procurement process for personal gain. Common irregularities in PBJ include procedural violations in provider selection, inappropriate bid evaluations, and unjustified changes to tender documents that are not based on inquiries from bidders.

To support efficient implementation, it is crucial to consider the type of blockchain used, the form of transactions conducted, and the prevailing structure of the government's PJB system in Indonesia. The use of consortium blockchain offers greater flexibility for the Indonesian government to tailor the procurement system to local needs. This model enables key stakeholders—such as government entities, contractors, and oversight bodies—to actively participate in managing and monitoring transactions. It addresses persistent challenges in public procurement in Indonesia, such as corruption and lack of transparency. With multiple parties involved in the management of the blockchain network, the transparency of transactional data can be better maintained, thereby enhancing public trust in the procurement system.

Although the implementation of smart contracts promises greater efficiency, its application in government procurement still requires strict oversight by relevant institutions. This oversight ensures that all processes comply with established regulations. Government procurement service providers are expected to report financial conditions transparently and document all requirements related to contract agreements.[20] Additionally, platform users must conduct audits and maintain detailed records of all agreement provisions. This process is essential to ensure that all parties involved understand and adhere to the agreed terms. Any data modification within the blockchain system requires the approval of all blockchain key holders. This mechanism guarantees that despite the system's transparency; data cannot be altered without the consensus of all authorized parties. The application of an integrated data encryption model further facilitates data traceability and management efficiency. This model enhances the security of information and ensures that every transaction is accurately recorded.

In implementing smart contract concepts based on a consortium blockchain, it is essential to clearly define and expand on the operational mechanisms to be applied in practice. This pertains to the stakeholders who will be granted access to the blockchain code. Such access is designed to facilitate the verification and monitoring of government procurement activities. Stakeholders include Budget Users/Officials (PA/KPA), supplier companies, and the National Public Procurement Agency (LKPP), which manages the Electronic Procurement Service (LPSE). Furthermore, the Government Internal Supervisory Apparatus (APIP), the Financial and Development Supervisory Agency (BPKP), the Audit Board of Indonesia (BPK), and the Corruption Eradication Commission (KPK) also play significant roles in this system.

The division of roles within the blockchain system is categorized into three main segments. First, the PA/KPA and supplier companies act as the primary executors of government procurement. They are responsible for implementing agreed contracts and ensuring that all activities comply with applicable regulations. The second segment comprises LKPP as the authority responsible for overseeing PBJ implementation, and APIP and BPKP as institutions tasked with conducting financial audits. LKPP is accountable for formulating procurement policies and guidelines, while APIP and BPKP are responsible for overseeing and evaluating budget execution. The third

[18] Murdian, 2016, "Tanggung Jawab Pidana Dalam Pelaksanaan Kontrak Pengadaan Barang dan Jasa Pemerintah", Jurnal IUS 4, no.1. (April, 2016):2-3

[19] Icha Rastika, BPK: Kerugian Negara karena Gagalnya Proyek Hambalang. 2013, https://nasional.kompas.com/read/2013/09/04/1704522/BPK.Kerugian.Negara.karena.Gagalnya.Proyek.Hambalang.

[20] Luqman Hakim, "Electronic Audit (E-Audit), Audit Judgement, Corruption Detection and Audit Quality: BPK RI" International Journal of Human Capital Management,7.no.1.(2023):6. https://doi.org/10.21009/IJHCM.07.01.1.

segment includes BPK and KPK. BPK functions as the institution authorized to oversee public finances by auditing budget use and ensuring compliance with existing regulations. Meanwhile, KPK is responsible for investigating and prosecuting alleged misconduct.

These three segments can contribute to a more secure implementation of the Government Procurement of Goods and Services (PBJ) system, even with the adoption of blockchain and smart contracts. Therefore, it is necessary to include specific provisions regarding consortium blockchain-based smart contracts in the Government Procurement Bill (RUU PBJ) and its implementing regulations. These provisions should contain the following substantive content and scope:

a. The PBJ process will begin with the Electronic Procurement Service (LPSE), which operates under the supervision of the National Public Procurement Agency (LKPP). At this stage, the LPSE will open tender registrations through the Electronic Procurement System (SPSE) application. Each bidder is required to upload the necessary documents, including technical and administrative qualifications, and other requirements as stipulated by the tender committee. These documents must be complete and comply with the established standards to pass the verification process.
b. Once the registration process is completed and all documents have been verified, the LPSE will grant access to a dedicated blockchain designed specifically for procurement activities. Each bidder will receive a unique access code to enter the blockchain system. This blockchain will function as a secure and transparent database where all activities and information related to the bidding process will be recorded.
c. After the registration and verification process, the LPSE will open access to the aforementioned blockchain system, ensuring that only verified participants may engage in the bidding phase. The security and traceability offered by this platform are expected to reduce fraud and manipulation during tender evaluations.
d. Upon the completion of the bidding process, the LPSE will initiate a new blockchain instance containing data on the Budget User (PA/KPA) and the winning contractor. This blockchain will serve as the platform for establishing agreements in the form of smart contracts, which are regulated and stored within the system. By using smart contracts, agreements between parties can be automated to ensure strict compliance with agreed-upon terms. Granting access to all authorized parties is expected to foster greater transparency in the procurement implementation. All activities and changes in the blockchain can be monitored by stakeholders with access rights, thereby creating an environment conducive to effective oversight.
e. After the administrative processes are completed, project implementation will proceed under the responsibility of the selected provider company and will involve two main entities: internal and external parties. The internal parties include the PA/KPA and the provider company, who are accountable for executing the project. The external parties consist of the Government Internal Supervisory Apparatus (APIP), working in collaboration with the Financial and Development Supervisory Agency (BPKP).
f. In practice, both internal and external parties are required to compile and submit audit reports containing uniform data. This is critical to ensure that all parties share a common understanding of the project implementation and to detect any inconsistencies or irregularities in the procurement process. If the audit uncovers data discrepancies or indications of fraudulent conduct, law enforcement measures will be initiated in the fifth phase of the procurement process.
g. If the audit process proceeds smoothly without any significant findings, the audit results will be used as a basis for ongoing evaluations throughout the project implementation until its completion. This evaluation process aims to ensure that the project proceeds as planned and fulfills all pre-established criteria.
h. The results of audits conducted during project implementation—both periodic and final audits—will be submitted to the Audit Board of Indonesia (BPK), the institution authorized to inspect public finances. This step is crucial to ensure that all expenditures and activities in the PBJ project are carried out transparently and accountable. If the audit findings reveal suspected irregularities or deviations from applicable regulations, the results will be forwarded to the Corruption Eradication Commission (KPK). As the institution responsible for handling corruption cases, the KPK will conduct further investigations to uncover potential violations. This measure is vital for maintaining integrity and public trust in state budget

management. Legal action for identified criminal corruption acts will refer to the Law on the Eradication of Corruption (UU Tipikor) and the Indonesian Criminal Code (KUHP).

i. In such cases, perpetrators involved in procurement-related misconduct may be subjected to sanctions under Article 2 of the Corruption Eradication Law, which outlines prohibitions and penalties for acts of corruption, as well as Article 603 of the Indonesian Criminal Code, which provides for imprisonment for criminal offenses. Furthermore, the agreement established between the PA/KPA and the provider company, governed by a smart contract, may serve as valid legal evidence in judicial proceedings. This is supported by Article 5 of the Electronic Information and Transactions Law (UU ITE), which recognizes the legal validity of electronic documents, and Article 1320 of the Indonesian Civil Code (KUHPer), which sets out the legal requirements for a valid agreement. At this stage, all parties involved in the procurement process will be granted access codes to the blockchain system, which serves as the third segment for oversight and investigation.
j. Providers of goods or services who commit a breach of contract (*wanprestasi*) during the auditing process in violation of the terms stipulated in the smart contract will receive warnings and administrative sanctions. These sanctions include compensation payments as regulated in Article 1239 of the Indonesian Civil Code (KUHPer), which states that a party failing to fulfill contractual obligations is liable for appropriate consequences. This provision emphasizes the importance of honoring commitments in any contract. If the breach occurs after the audit process has been completed, the provider may be deemed to have committed an unlawful act (Perbuatan Melawan Hukum), given that government procurement activities involve the use of state funds, according to Article 1365 of the Civil Code.

To ensure the long-term safety and effectiveness of consortium blockchain-based smart contract implementation, it is important to conduct regular audits of the blockchain network every 12 months. These audits should be carried out by a forensic IT team verified by the Digital Communication Committee (Komdigi). Through periodic audits, various potential risks and vulnerabilities in the system can be identified and mitigated before escalating into critical issues. This audit process aligns with the Regulation of the Minister of Communication and Information Technology No. 16 of 2022 concerning General Policies for the Implementation of Information and Communication Technology Audits. This regulation outlines the standards and guidelines that must be followed in conducting audits, including assessments of the security, integrity, and performance of the information technology systems used.

In the context of Indonesia's positive legal framework, the implementation of consortium blockchain-based smart contracts must still adhere to existing regulations. The Electronic Information and Transactions Law (UU ITE) provides a legal foundation for implementing this technology, as it already governs electronic transactions involving integrated electronic systems. Although smart contracts operate automatically, they must still comply with applicable legal provisions to avoid regulatory violations. Furthermore, blockchain technology used in smart contracts can be considered an "electronic agent" operating within an electronic system. This aligns with the definition in Article 1, Point 8 of the UU ITE, which states that an electronic agent is a device in an electronic system designed to perform actions on electronic information automatically. In this context, the smart contract functions as an electronic agent that executes agreements based on programmed computer code, without third-party intervention. This enhances efficiency and reduces the potential for human error in contract execution.

The application of smart contracts in the government procurement system can be implemented through two different models: the external model and the internal model.[21] The external model involves drafting a conventional or textual agreement among the parties involved in the procurement process, which is then converted into cryptographic code executable within the blockchain system. This model allows the existing agreement to be translated into computer code, enabling automatic execution of the contract when specific conditions are met. Thus, the external model is suitable for integrating existing procurement systems with blockchain technology while preserving flexibility in implementation.

[21] Korintus Wilson Horas Hutapea,Adi Sulistiyono. "Keabsahan Smart Contract Dengan Teknologi Blockchain Menurut Kitab Undang-Undang Hukum Perdata". Aliansi : Jurnal Hukum, Pendidikan dan Sosial Humaniora 1, no.3. (2024):88-89.

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The second model, known as the internal model, entails using cryptographic code directly as the contract execution mechanism, without involving any prior textual agreement. In this model, the smart contract executes the agreement automatically once the agreed-upon conditions are fulfilled. For instance, when an agreed budget or funds become available and the transaction is ready for payment, the smart contract verifies and executes the transaction without requiring manual approval from any party. This model is more appropriate for highly structured transaction processes that do not require significant adjustments, allowing for greater efficiency in contract execution.

In the context of government procurement, both models may be adopted as complementary options depending on the type of transaction and the complexity of the contract involved. For procurement involving multiple stakeholders or highly specific conditions, the external model is more suitable, as it provides greater flexibility in tailoring agreements to particular needs. Meanwhile, for more straightforward transactions with minimal variation, the internal model is more efficient due to its capacity for rapid and automated execution. Selecting the appropriate model will depend largely on the procurement type and the specific requirements involved.

The implementation of smart contracts in Government Procurement of Goods and Services (PBJ) must also take into account several technical and regulatory considerations that need to be adjusted. First, the Draft Law on Government Procurement (RUU PBJ) must accommodate the use of blockchain technology and allow for flexibility in its application. Second, existing regulations must be updated to accommodate this new technology without violating the fundamental principles of Indonesian law. These regulatory updates will enable the optimal and secure application of smart contracts, ultimately increasing efficiency and transparency within the government procurement system. To address the dilemma surrounding the use of cryptocurrencies in blockchain systems, a viable solution is the introduction of the Digital Rupiah, a Central Bank Digital Currency (CBDC) developed by Bank Indonesia (BI). As a state-issued digital currency, the Digital Rupiah offers a more secure and stable alternative to volatile cryptocurrencies. By adopting CBDC, Bank Indonesia can exercise greater control over the national financial system while also enhancing public trust in digital transactions. This CBDC can serve as a bridge connecting blockchain systems with a more formal and integrated financial sector.

DISCUSSION

Government Procurement of Goods and Services (PBJ) is a strategic instrument in supporting national development and inclusive economic growth. Nevertheless, the implementation of PBJ in Indonesia continues to face a range of complex challenges, including low effectiveness and efficiency in procurement processes, and a high potential for irregularities due to weak systems of accountability, transparency, and oversight. These conditions have made the procurement sector one of the primary contributors to corruption cases in Indonesia, ultimately hindering the realization of clean, transparent, and accountable governance. To address these issues, a comprehensive reform of the government procurement system is essential. One promising approach is the adoption of blockchain-based technology, particularly in the form of a blockchain consortium equipped with smart contract features. This technology ensures data integrity and transaction transparency through a distributed ledger system that is immutable and tamper-resistant. The success of this digital transformation depends heavily on strong collaboration among all stakeholders, including the government, private sector, academic institutions, and civil society. Furthermore, the blockchain-based system must be fully integrated into the five key stages of the PBJ workflow as stipulated in the Draft Law on Government Procurement (RUU PBJ). It must also be harmonized with other relevant regulations, including provisions related to the use of the Digital Rupiah within the framework of the Financial Sector Development and Strengthening Law (UU PPSK).

REFERENCES

[1] Abu Samman Lubis. “Prinsip-Prinsip Pengadaan Barang/Jasa Apakah Harus Dipedomani?” 2014. https://bppk.kemenkeu.go.id/balai-diklat-keuangan-malang/artikel/artikelprinsipprinsip-pengadaan-barangjasa-apakah-harus-dipedomani-016149

[2] Ahmad Rustan Syamsuddin. “Evidence of Abusing Authority in Criminal Procurement Corruption of Goods and Services.” Jambura Law Review 2, no.2 (Juli, 2020): 163–164. https://doi.org/10.33756/jlr.v2i2.5942

Research Article

[3] Alfredo Jiménez, et.al. "E-procurement and firm corruption to secure public contracts: The moderating role of governance institutions and supranational support." Journal of Business Research 149 (Oktober, 2022): 640–642. https://doi.org/10.1016/j.jbusres.2022.05.070
[4] Alvin Nicola, Wawan Suyatmiko. "Indeks Persepsi Korupsi Indonesia 2022." 2023. https://ti.or.id/indeks-persepsi-korupsiindonesia2022mengalamipenurunanterburuksepanjang-sejarah-reformasi/
[5] Besse Herlina, et.al. "Analisis Kinerja Aparat Pengawas Internal Pemerintah (APIP) dalam Mewujudkan Good Governance di Kantor Inspektorat Daerah Kabupaten Wajo." Journal on Education 5, no.4 (September, 2024): 15922–15923. https://doi.org/10.47709/hukumbisnis.v12i05.2942
[6] Icha Rastika. "BPK: Kerugian Negara karena Gagalnya Proyek Hambalang." 2013. https://nasional.kompas.com/read/2013/09/04/1704522/BPK.Kerugian.Negara.karena.Gagalnya.Proyek.Hambalang
[7] Komisi Pemberantasan Korupsi (@official.kpk). "Hasil Survei Penilaian Integritas 2022: Risiko Permasalahan dalam Pengadaan Barang dan Jasa." 2024. https://www.instagram.com/p/CmtSH4fhTBn/?igsh=MWQ3a3pyYWIyY243NQ==
[8] Korintus Wilson Horas Hutapea, Adi Sulistiyono. "Keabsahan Smart Contract Dengan Teknologi Blockchain Menurut Kitab Undang-Undang Hukum Perdata." Aliansi : Jurnal Hukum, Pendidikan dan Sosial Humaniora 1, no.3 (2024): 88–89.
[9] Lord, Carnes (ed.). Aristotle's "Politics": Second Edition. University of Chicago Press, 2013. Buku 1, Bab 1,1.
[10] Luqman Hakim. "Electronic Audit (E-Audit), Audit Judgement, Corruption Detection and Audit Quality: BPK RI." International Journal of Human Capital Management 7, no.1 (2023): 6. https://doi.org/10.21009/IJHCM.07.01.
[11] Lembaga Kebijakan Pengadaan Barang/Jasa Pemerintah (LKPP). "Digitalisasi Sistem Pengadaan: Transformasi Pengadaan untuk Indonesia Maju." 2024. https://lkpp.go.id/index.php/read/bu/digitalisasi-sistem-pengadaan-transformasi-pengadaan-untuk-indonesia-maju
[12] Lembaga Kebijakan Pengadaan Barang/Jasa Pemerintah (LKPP). "LKPP Dorong Peran Aktif Masyarakat dalam Pengadaan Barang/Jasa di Desa." 2024. https://www.lkpp.go.id/read/bu/lkpp-dorong-peran-aktif-masyarakat-dalam-pengadaan-barang-jasa-di-desa
[13] Lembaga Kebijakan Pengadaan Barang/Jasa Pemerintah (LKPP). "LKPP Susun Roadmap IT untuk Perkuat Transformasi Digital Pengadaan." 2024. https://www.lkpp.go.id/read/bu/lkpp-susun-roadmap-it-untuk-perkuat-transformasi-digital-pengadaan
[14] Lembaga Kebijakan Pengadaan Barang/Jasa Pemerintah (LKPP). "Tugas dan Fungsi." 2024. https://www.lkpp.go.id/tentang/peran-dan-fungsi
[15] M. Gian Tantyo. "Prevention of Corruption, Collusion and Nepotism in Government Procurement of Goods and Services in Lampung Province." Jurnal Corruptio 1, no.1 (Oktober 19, 2020): 120–121. https://doi.org/10.25041/corruptio.v1i2.2098
[16] Murdian. "Tanggung Jawab Pidana Dalam Pelaksanaan Kontrak Pengadaan Barang dan Jasa Pemerintah." Jurnal IUS 4, no.1 (April, 2016): 2–3.
[17] Musa Darwin Pane. "Aspek Hukum Pengadaan Barang Dan Jasa Pemerintah Suatu Tinjauan Yuridis Peraturan Pengadaan Barang Dan Jasa Pemerintah." Jurnal Media Hukum 24, no.2 (Desember, 2017): 149. https://doi.org/10.18196/jmh.2017.0090.147-155
[18] Risca Rahayu, Tintin Sri Murtinah. "Pelaksanaan Pengadaan Barang/Jasa Secara Elektronik di Unit Layanan Pengadaan Biro Umum Sekretariat Presiden." Journal of Business Administration Economic & Entrepreneurship 4, no.2 (Oktober, 2022): 58.
[19] Satria Muhammad Nur Lase, et.al. "Kerangka Hukum Teknologi Berbasis Blockchain Berdasarkan Hukum Siber di Indonesia." Padjadjaran Law Review 9, no.1 (Agustus 12, 2021): 1–3.
[20] Sigit Sapto Nugroho, et.al. Metodologi Riset Hukum. Sukoharjo: Oase Pustaka, 2020, hlm. 29.
[21] Soerjono Soekanto. Penelitian Hukum Normatif. Jakarta: Penerbit Rajawali, 1990, hlm. 14.