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Smart Contracts From A Civil Law Perspective: Validity And Implementation In Indonesia

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Abstract

This study examines the validity and application of smart contracts within the Indonesian civil law framework. Smart contracts are block chain-based agreements that are implemented autonomously, eliminating the necessity for intermediaries. Although it provides efficiency and openness, its integration into the Indonesian legal system continues to encounter obstacles, particularly concerning regulations and dispute resolution methods. The legitimacy of an agreement in civil law is governed by Article 1320 of the Civil Code, which stipulates the necessity of mutual consent, legal ability, definite objects, and justifiable grounds. Nonetheless, there exists no regulation that explicitly governs smart contracts, necessitating additional examination of their legal standing. This study employs a normative legal methodology utilizing both conceptual and legislative approaches. The utilized data sources comprise primary legal materials, including the Civil Code and the Indonesian ITE Law, alongside secondary legal materials from books, scholarly publications, and prior study. The investigation aimed to ascertain the validity and legal binding nature of smart contracts inside the Indonesian civil system. The study's findings indicate that while smart contracts theoretically satisfy the components of an agreement as outlined in the Civil Code, issues persist regarding regulation and dispute resolution. Consequently, it is essential to formulate specific legislation or amendments to the ITE Law and Civil Code to facilitate smart contracts. Furthermore, the function of notaries and legal entities in authenticating smart contracts need elucidation to prevent legal ambiguity. In conflict resolution, hybrid methods like block chain-based arbitration may serve as an alternate solution. Consequently, the adoption of smart contracts in Indonesia need enhanced legal certainty to facilitate widespread utilization and ensure protection for the involved parties.

Keywords: *Smart Contracts, Validity And Implementation In Indonesia*

A. INTRODUCTION

As a developing nation, Indonesia must adapt to contemporary technological advancements, a process that has commenced gradually through government initiatives aimed at establishing smart cities. Smart towns are being established in several parts of Indonesia, encompassing institutions from schools to universities. A smart city is characterized by the utilization of a computerized system for all

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operations. The government has commenced the establishment of rules pertaining to technology, and these regulations serve as a legal framework to govern these conditions and address all issues within the technological domain.[1]

Block chain technology in Indonesia is gaining traction across various sectors due to its purported advantages of data security, management transparency, and enhanced transaction efficiency. This technology was discovered and developed in the 21st century; however, human-created technology inherently possesses both advantages and disadvantages. Consequently, block chain technology continues to innovate in order to enhance and mitigate its shortcomings, offering numerous benefits that ensure user safety. This technology was developed by a programmer using the pseudonym Satoshi Nakamoto in 2008 and was presented in the white paper "Bitcoin: A Peer-to-Peer Electronic Cash System," which elucidates a digital payment system utilizing block chain to facilitate transactions in a more efficient, secure, and decentralized manner.[2]

Initially, the notion of smart contracts was predominantly theoretical rather than pragmatic. The technological infrastructure at that time was insufficiently developed to facilitate the execution of intricate smart contracts. Nonetheless, the advent of blockchain technology in 2008, initiated by an individual or collective known as Satoshi Nakamoto through the creation of bitcoin, laid the groundwork for the development of smart contracts. Blockchain offers a decentralized, secure, and transparent ledger system, serving as the foundation for the effective implementation of smart contracts. The initial notable execution of smart contracts transpired with the launch of Ethereum in 2015, a blockchain platform explicitly engineered to facilitate smart contracts. Vitalik Buterin, the architect of Ethereum, conceived this platform to facilitate the development of decentralized apps (dApps) operating on the Blockchain. Ethereum employs a Turing-complete programming language that facilitates the creation of intricate smart contract scripts and their automated execution on the blockchain. Smart contracts are fundamentally "programmable currency". "Programmable money" refers to the capability of cryptocurrency developers to create decentralized apps on the Ethereum network, wherein all transactions are governed by smart contracts. This facilitates the emergence of a decentralized system that is fundamentally unbiased and impartial.[3]

Szabo, recognized for his contributions to digital currencies, defines smart contracts as computer transaction protocols that autonomously implement the

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[1] Reza Yogaswara, Artificial Intelligence as a Driver of Industry 4.0 and its Challenges for the Government and Private Sectors, Masy. Telematika Dan Inf, vol. 10, no. 1 (2019). P. 68.

[2] Sigit, R. (2023). What is Blockchain: History, How it Works, Advantages and Disadvantages. Crypto Media Indonesia. https://www.cryptomedia.id/cryptopedia/mengenal-blockchain/#Sejarah_Blockchain

[3] Akademi Crypto, Crypto Trading Guide, (Tangerang , PT. Akademi Uang Digital,2023), P. 14

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stipulations of a contract. The concept emerged from the aspiration to minimize the necessity for intermediaries in transactions, hence lowering transaction costs and enhancing security. Examples encompass executing transactions on decentralized crypto currency exchanges, enabling games and the exchange of collectibles among participants on distributed ledgers, and operating online gambling platforms.[4]

The law evolves dynamically, necessitating adaptability to accommodate change, particularly in addressing significant concerns of the digital age. The advancement of legal frameworks and systems necessitates the promotion of information technology through e-government, e-procurement, e-business, and cyber law. This will promote the notion of developmental objectives in the industrial era 4.0.[5]

A technological advance of the industrial era 4.0 is the emergence of smart contracts. A Smart Contract represents an advanced application of blockchain technology following the advent of cryptocurrency. It is a computer program that functions as an electronic agreement within a blockchain database system, designed to facilitate a protocol for executing agreements between parties, enabling automatic enforcement of the contract's clauses.[6]

A Smart Contract represents an advanced application of blockchain technology following the advent of bitcoin technology. A smart contract is a computer software that operates as an electronic agreement within a blockchain database, designed to execute the terms of agreements between participants automaticlally. Smart contracts were initially conceived by Nick Szabo in 1994, intended to guarantee the security of transactions within the blockchain. The term "smart" in these contracts denotes automated procedures that enable these systems to make decisions autonomously with a significant level of automation.[7]

This technological breakthrough can be executed independently of a third party, yet remains intrinsically linked to the blockchain; transactions are traceable, immutable, and encompass information stipulated in the contract as per the contractual conditions.[8]

Nick Szabo defines a Smart Contract as a collection of programs that are saved and executed within a distributed ledger system (Distributed Ledger

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[4] Lord Chancellor and Secretary of State for Justice. Smart Legal Contracts Advice to Government. (UK, HH Associates, 2021), P. 1

[5] Benny Riyanto, National Law Development In The 4.0 Era, Rechvinding, vol. 9, no. 2 (2020), P. 162–163.

[6] Bima Danubrata Adhijoso, Legality of Smart Contract Implementation in Agricultural Insurance in Indonesi', Jurist-Diction 2, no. 2 (2019), P. 395–414.

[7] Eka P. Harahap, Qurotul Aini, dan Reza K. Anam, Utilization of Blockchain Technology on Crowdfunding Platforms, Technomedia Journal, Vol. 4, No. 2, 2020, P. 202

[8] Primavera Filippi, Wray Chris, Sileno De Giovanni. (2021). Smart Contracts. Internet Policy Review. Vol 10(2).

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Technology/DLT), configured to operate autonomously based on specific specified criteria. Nick elucidates that the objective of a smart contract is to guarantee the stipulations of a conventional contract or agreement (including payment terms, liens, secrecy, and legal enforcement), diminish exceptions both deliberately and inadvertently, and eliminate reliance on intermediaries. These attributes are anticipated to reduce losses attributable to fraud, arbitration, legal enforcement expenses, and other transactional costs.[9]

He believes that smart contracts constitute a compilation of codes disseminated via a decentralized computer network, which is effective for data storage and updates. This process occurs without reliance on central authorities, utilizing a system known as Distributed Ledger Technology (DLT). In this framework, data is autonomously processed according to pre-established conditions.[10]

A Smart Contract is a progression in the application of blockchain technology following the advent of crypto currencies. It is fundamentally a software application that functions as an electronic contract within a blockchain database, acting as a protocol for the execution of agreements between parties and facilitating the automatic implementation of the agreement's provisions. [11] This concept pertains to software applications designed to automate and implement contracts, hence obviating the necessity for conventional middlemen. [12]

According to this explanation, smart contracts can be executed autonomously, allowing transactions to be monitored and immutable, including the information provided in the contract and the conditions for its execution. Smart contracts enhance the efficiency of e-commerce transactions by eliminating the necessity for sellers and purchasers to engage in face-to-face interactions during the purchasing and selling process.[13]

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[9] Gabriella Mansula, Legal Protection for Legal Settlement of Malfunctioning Transaction Processes Through Smart Contracts on the Blockchain System, Al Qodiri: Jurnal Pendidikan, Sosial dan Keagamaan Vol. 21, No. 2, 2023, P. 792.

[10] Commision De Surveillance Du Secteur Financier. Distributed Ledger Technologies & Blockchain Technological Risks and Recommendations For The Financial Sector (Luksemburg, CSSF, 2022), P. 44.

[11] Adhijoso, Bima Danubrata. Legality of Smart Contract Implementation in Agricultural Insurance in Indonesia. Jurist-Diction 2, no. 2 (2019), P. 395-414

[12] Alexander Sugiharto and Muhammad Yusuf Musa, Blockchain & Cryptocurrency In Legal Perspective In Indonesia And The World, Indonesian Legal Study for Crypto Asset and Blockchain, Vol. 1, 2020.

[13] Giovanni Sileno De Filippi, Primavera, Chris Wray, 'Smart Contracts', Internet Policy Review vol. 10, no. 2 (2021), P. 122.

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The notion of smart contracts gained prominence with the advent of blockchain technology, invented by Satoshi Nakamoto, which evolved in 2014 with the emergence of blockchain version 2.0.[14]

Blockchain technology ensures that all transactional data is stored transparently, securely, historically, and immutably. The blockchain system represents the most sophisticated technology now available due to its distinctive reliability in facilitating human actions, including those within legal practice. Blockchain technology can be utilized for real estate transactions, the preservation of original deeds, and digital currency transfers.[15]

In the real estate sector, smart contracts can streamline the processes of purchasing, selling, and leasing properties. In the insurance industry, smart contracts can expedite the claims and payment processes. In logistics, smart contracts can enhance the tracking and management of the supply chain with greater efficiency. In the Blockchain system, parties can engage without requiring mutual knowledge or trust. Electronic transactions can be autonomously validated and documented by a computer network employing cryptographic techniques. This occurs without human involvement or oversight from entities such as governments, banks, or other financial organizations.[16]

The autonomy provided by smart contracts signifies a significant transformation in the realm of contracts and agreements. Smart contracts facilitate more autonomy for the involved parties by automating contract execution via computer code on blockchain technology. Primarily, smart contracts liberate the parties from the necessity of traditional intermediaries, including notaries and financial institutions. The elimination of intermediaries decreases the expenses and duration often linked to traditional contract procedures. Parties can engage in direct communication and transactions without the need for intermediaries, offering unparalleled flexibility and rapid implementation.[17]

Smart contracts have been utilized in electronic transaction operations across several countries, including Quube in Singapore, Elinext from France, Ethereum from Switzerland, and Stellar from the United States. The implementation of blockchain in smart contracts throughout these nations has generated numerous concerns surrounding accessibility and management of computer systems, as well

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[14] Fajarianto, E.R., Mulyadi, E., Dan Zulfikar, P. Legal Review of the Use of Blockchain-Smart Contract in Non-Fungible Token (NFT) Transactions at PT. Saga Riung Investama." Jurnal Pemandhu 3, No. 2, 2022, P. 85.

[15] Fikri,Effrida Ayni dan Anggoro, Teddy.2022. The Use of Smart Contracts in Blockchain Technology for Transactions on the Sale and Purchase of Immovable Property.Vol. 6, No. 3, P. 9966

[16] Khairil Faizal Khairi, Smart Contract In Zakat Collection Transactions Through The Development Of Newly-Developed Backend Demo Zakat Blockchain In Maiwp-Ppz, Jurnal AZJAF, Vol.3, No.1 Tahun 2022, P.. 103.

[17] Wisnu Panggah Setiyono and Detak Prapanca, Financial Technology Textbook, Umsida Press, 2021, P. 1–195.

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as the system's capacity to adapt to fluctuations in business conditions. These concerns inevitably precipitate complications, as demonstrated by the case of B2C2 Ltd. vs. Quoine Pte in Singapore. Ltd. has provided guidelines or settlement processes through legal applications for issues stemming from automated contracts devoid of human interaction (such as smart contracts) that are resolvable. It is essential to establish legal certainty over the application of smart contracts in blockchain technology, reflecting both foresight and governmental care for contemporary technical advancements. The absence of a guarantee of legal certainty for blockchain in smart contracts may result in non-compliance with the responsibilities established by the parties in the agreement.[18]

This technology is engineered to autonomously operate when specific circumstances are satisfied, subsequently generating requisite actions or occurrences during execution using programming code that will be converted into legal terminology without the necessity for middlemen.[19]

According to Bank Indonesia Regulation Number 19/12/PBI/2017, the utilization of blockchain is deemed legitimate and constitutes a method of applying financial technology within the payment system. Its functions encompass permission, clearing, final settlement, and payment settlement. This automated procedure enables smart contracts to utilize ordinary contracts or agreements.[20]

The implementation of smart contracts may lead to legal complications concerning the risks faced by parties in e-commerce transactions, particularly regarding the satisfaction of subjective and objective conditions stipulated in agreements, as all smart contracts are generated automatically and possess the characteristics of automatic execution or self-execution, facilitated by blockchain technology.[21]

Automatic execution is accomplished using computer code that converts legal terminology into executable programs. This automated execution enables smart contracts to utilize ordinary contracts or agreements. Standard agreements occasionally incorporate exemption provisions or exonerations. This clause

[18] Kadly, E. I., Rosadi, S. D., & Gultom, E. (2021). The Validity of Blockchain-Smart Contracts in Electronic Transactions: Indonesia, America and Singapore. Jurnal Sains Sosio Humaniora, 5(1), P. 199–212. https://doi.org/10.22437/jssh.v5i1.14128

[19] B, S., Sh, A. S., E, S. K., K, S. N., & S, N. (2022). Blockchain Industry 5.0: Next Generation Smart Contract and Decentralized Application Platform. 2022 International Conference on Innovative Computing, Intelligent Communication and Smart Electrical Systems (ICSES) ,P. 1 –8. https://doi.org/10.1109/ICSES55317.2022.9914151

[20] G. Mansula,. (2023). Legal Protection for Legal Settlement of Malfunctioning Transaction Process Through Smart Contracts on Blockchain Systems. Al Qodiri: Jurnal Pendidikan, Sosial dan Keagamaan, Vol 21(2).

[21] Ajib Susanto Teresa Enades Hari Setia, Smart Contract Blockchain On E-Voting, Jurnal Informatika Upgris 5, no. 2, 2019, P. 26.

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restricts or absolves the creditor of liability for future risks. The seller has the authority to unilaterally terminate the contract.[22]

In civil law, particularly smart contract agreements provide unique solutions; this technology facilitates the establishment of safe and transparent digital contracts. Transactions are monitored in real-time, immutable, encompass comprehensive details about the contract and its execution terms, and are self-executing, hence reducing the risk of default.[23]

Technological developments have brought significant changes to various sectors, including law and business. One innovation that emerged from blockchain technology is smart contracts, namely digital agreements that are executed automatically based on predetermined programming codes. Smart contracts eliminate the need for intermediaries in the execution of contracts, so that transactions can take place faster, more efficiently, and more safely.

However, in Indonesia, the implementation of smart contracts still faces various legal challenges. The Indonesian civil law system, which is based on the Civil Code (KUHPerdata), does not yet have regulations that explicitly regulate smart contracts. This raises questions about the validity and implementation of smart contracts in the Indonesian legal system. This article will analyze the basic concept of smart contracts, their validity in Indonesian civil law, as well as the challenges and solutions that can be applied in their implementation.

B. SMART CONTRACT VALIDITY IN INDONESIA

Per the stipulations outlined in Article 1313 of the Civil Code, an agreement constitutes an action wherein one or more individuals obligate themselves to one or more other individuals. Alongside the stipulations in Article 1313 of the Civil Code, the agreements between the parties are further governed by Article 1320 of the Civil Code, which specifies the requisite conditions: the mutual consent of the parties, the capacity to undertake obligations, the existence of a specific subject matter, and a lawful cause. The stipulations of the smart contract mirror those articulated in Indonesian civil law, albeit in a distinct format. The referenced form pertains to the existence of an electronic contract that does not necessitate the parties' physical presence to establish a sale and buy agreement.[24]

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[22] Hesti Ayu Wahyuni, Yuris Tri Naili, Maya Ruhtiani. The Use of Smart Contracts in E-Commerce Transactions
in the Perspective of Civil Law in Indonesia. Jurnal Hukum In Concreto Vol. 2, No. 1, 2023, P. 4.

[23] Rizqi Laila Alfina Mayasari dan Dedi Farera Prasetya, The Urgency of Using Smart Contracts in Buying and Selling Transactions in E-Commerce, Jurnal Hukum Lex Generalis, Vol. 3, No. 4, 2022, P. 334.

[24] Yayan Hanapi, Agreement on Internet Trading Contracts, Jurnal Surya Keadilan vol. 3, no. 1, 2019, P. 1–20.

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To draft a contract, one must comply with several essential principles, including the principle of freedom of contract, the principle of consensualism, the principle of legal certainty (pacta sunt servanda), the principle of good faith, the principle of personality, the principle of equal rights, the moral principle, the principle of propriety, the principle of habit, the principle of balance, and the principle of protection.[25]

While there is no explicit rule governing smart contracts, various sectors are beginning to investigate the application of this technology. The banking and financial sector in Indonesia is beginning to see the potential of smart contracts to enhance operational efficiency and transaction security.[26]

The swift advancement of the digital economy has fostered the adoption of blockchain-based smart contracts and their associated products, like Decentralized Finance and Fintech. Nonetheless, there are a limited number of legal evaluations of smart contracts.[27]

Smart contracts represent a technological advancement that arose from the evolution of Blockchain, particularly on platforms like Ethereum. Smart contracts are computer programs that operate on Blockchain and autonomously implement pre-established agreements without requiring a third-party mediator. They are intended to facilitate, verify, or enforce the negotiation or execution of contracts.[28]

A smart contract operates similarly to a vending machine. Smart contracts operate in a comparable manner. Upon the smart contract device ascertaining that both parties have fulfilled the stipulated criteria, the contract is performed automatically. The smart contract functions as an impartial intermediary that guarantees the equitable and transparent fulfillment of all contractual conditions.[29]

The implementation of smart contracts facilitates automatic contract execution by ensuring the enforcement of contractual commitments, hence minimizing overhead and administrative expenses. Moreover, by removing

[25] Sinaga, N. A. (2023). The Role of the Principles of Contract Law in Realizing the Goals of the Agreement. Bina mulia Hukum, 7(2), P. 107–120. https://doi.org/https://doi.org/10.37893/jbh.v7i2.318

[26] Marcelo Corrales, Legal Tech, Smart Contracts and Blockchain, (Singapore, Springer Nature Singapore, 2019), P. 5

[27] Munawar, The Legality of Smart Contract in the Perspectives of Indonesian Law and Islamic Law, Al-Istinbath: Jurnal Hukum Islam, Vol. 7, No. 1, 2022, P. 266.

[28] Sarwar Sayeed., Hector, M. G., & Tom Kaira, "Smart Contract: Attacks and Protections", IEEE, Vol.8, Tahun 2020, P. 24417

[29] Ioannis N. Vrachasotakis, Blockchain and Smart Contracts: Main Issues Arising from The Conclusion, Interpretation and Performance of Smart Contracts, Disertasi, National and Kapodistrian University of Athens, 2022, P. 13.

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intermediaries or third parties, this can enhance efficiency and mitigate associated risks.[30]

A smart contract is a representation of a digital agreement that facilitates the transaction process, particularly in bitcoin transfers. The presentation of this smart contract occurs without any physical manifestation. This agreement is comparatively more stringent than several other standard agreements.[31]

Smart contracts provide a solution because to their self-executing nature, ensuring the responsibilities and rights of the parties are upheld while minimizing the danger of default.

The legitimacy and legal efficacy of smart contracts are significant concerns within the legal framework. Conventional contracts are typically executed by the parties concerned and are enforceable in a court of law. Smart contracts, however, execute autonomously through computer programs.[32]

Foreseeing faults or defects in smart contract code is a crucial measure to prevent undesirable executions, which may lead to financial and reputational detriment. Despite being engineered to enhance security in contractual agreements, the automatic and irreversible characteristics of smart contracts render coding errors potentially catastrophic if deployed. to enable future exploitation by negligent entities.[33]

This agreement aims to address both the positive and negative aspects of implementation conducted independently of judicial intervention, where human discretion is absent or unilaterally dictated by the seller. In contrast, smart contracts, as defined by Mark Gates, are programming codes utilized as a contractual mechanism governed by blockchain technology, ensuring that the agreement is executed automatically and immediately in accordance with the pre-established clauses agreed upon by the involved parties.[34]

A smart contract is defined as an agreement that is self-executing, automatically executed, and immutable, meaning its clauses cannot be altered. The self-executing characteristic of smart contracts distinguishes them from traditional

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[30] Aejas, B., & Bouras, A. (2021). Effective Smart Contracts for Supply Chain Contracts. Building Resilience at Universities: Role of Innovation and Entrepreneurship , 160–160. https://doi.org/10.29117/quarfe.2021.0160

[31] Aprialim, Fiqar, Adnan Dan Paundu A.W. "Penerapan Blockchain Dengan Integrasi Smart Contract Pada Sistem Crowdfunding." Jurnal Resti 5, No. 3 (2021): P. 151.

[32] Munawar, "The Legality of smart contract in the Perspectives Indonesian Law and Islamic Law", Jurnal Hukum Islam, Vol.7, No.1, Tahun 2022, P. 270

[33] Izdehar M Aldyaflah, dkk "The Design and Implementation of a secure datastore based on ethereum smart contract", journal applied sciences, vol.13, no.9, Tahun 2023, P. 36

[34] Nugraheni, N., Mentari, N., Dan Shafira, Belgis. "The Study Of Smart Contract In The Hara Platform Under The Law Of Contract In Indonesia." Saudi Journal 5, No. 7 (2022), P. 275.

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agreements, ensuring the security of transactions within the smart contract program data.[35]

The nature of a smart contract is evidenced by its application, specifically as an agreement utilizing blockchain technology. Blockchain is a sequence of data directly governed by a computer program, devoid of any content.[36]

The smart contract comprises two models: the external model, wherein the parties involved must initially reach a conventional agreement. Subsequently, the operational elements for the parties will be encoded, with the code serving as a mechanism to govern the execution of the contract's stipulations, which will be enacted immediately following the agreement between the parties. The internal model is the second kind of the smart contract framework, wherein all elements of the previously established contract are explicitly encoded into programming language. Nonetheless, it is now feasible to create a contract executed in a traditional manner that is directly transcribed into code. Consequently, this second model can be characterized as a contract that obligates the involved parties and entails legal ramifications.[37]

The Financial Services Authority (OJK) and Bank Indonesia (BI) have promulgated various policies governing the utilization of cryptocurrencies and Financial Technology (Fintech) services. In 2018, BI prohibited the utilization of cryptocurrency as legal tender. Concurrently, OJK has promulgated several directives for the fintech sector, encompassing regulations pertaining to the utilization of emerging technology. Nonetheless, there are no explicit restrictions governing the utilization of smart contracts. Conversely, the Ministry of Communication and Information (Kominfo) has expressed apprehension regarding the advancement of this technology. Kominfo has implemented many measures to promote the adoption of digital technology, including Blockchain. Numerous activities entail the organization of seminars, workshops, and partnerships with educational institutions and industry stakeholders to enhance the comprehension and use of Blockchain technology in Indonesia.[38]

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[35] Oktaviani, S. Implementation of Smart Contracts on Blockchain Technology in Relation to Notaries as Public Officials. Jurnal Kertha Semaya vol. 9, No. 11 (2021), P. 2210-2211.

[36] Turesson, Hjalmar K., Kim, Henry, Laskowski Marek dan Roatis Alexandra. "Privacy Preserving Data Mining as Proof of Useful Work: Exploring an AI/Blockchain Design." Journal of database management 32, No. 1 (2021): P. 69-85

[37] Rizqi, L.A.M Dan Prasetya, D.F. "The Urgency of Using Smart Contracts in E-Commerce Buying and Selling Transactions. Jurnal Hukum Lex Generalis 3, No.4 (2022), P. 331.

[38] Willion Lim, Steven Angkasa, Alexander Danelo Putra Wibowo. Smart Contracts: Legal Validity and Challenges in Indonesia's Future. Jurnal KewarganegaraanVol. 8 No. 1 , 2024. P. 833

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Tirto Diningrat asserts that an agreement constitutes a legal act founded on the consensus of parties, which might engender legal consequences mandated directly by law.[39]

The parties' consent to utilize a smart contract in a digital transaction, subsequently recorded in the blockchain system. The contract, recorded on the blockchain, may only be altered or terminated with the approval of both parties or upon fulfillment of the stipulated terms and conditions, hence enhancing the security of the parties' agreement through this verifiable input. The stipulated terms, including payment, delivery, warranty or replacement, force majeure, and restrictions of liability, will be executed via the smart contract.[40]

The smart contract comprises a sequence of codes within the blockchain network that diverges from traditional agreements. This agreement also regulates the clauses of force majeure, payment, warranty, and delivery. The validity of a smart contract, in accordance with ITE law, is contingent upon its fulfillment of the legal criteria for an agreement. The provisions governing Smart contracts are primarily delineated in Law Number 19 of 2016 concerning Information and Electronic Transactions, specifically in Article 1, number 17, which states, "an electronic contract is an agreement between the parties made through an electronic system." Furthermore, an elucidation of the term "electronic system" is provided in Article 1, number 5 of the ITE law. "A collection of electronic devices and methodologies designed to prepare, collect, process, analyze, store, display, announce, transmit, and/or disseminate electronic information."[41]

In Indonesia, agreements utilizing digital signatures are explicitly governed by the ITE Law and PP PSTE. Article 1, number 12 of the ITE Law defines an electronic signature as a signature comprising Electronic Information that is affixed, associated, or linked to other Electronic Information, serving as a mechanism for verification and authentication. An electronic signature is deemed legitimate and legally binding if it satisfies the standards outlined in Article 59, paragraph (3) of the PP PSTE. The criteria are as follows:[42]

1. The data pertaining to the production of electronic signatures is exclusively associated with the signatory.

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[39] Saragih, Trinitaty. Legal Analysis of the Practice of Borrowing and Lending Money Without Collateral Among the Horas Traditional Market Community, Pematang Siantar City. Jurnal Perspektif Hukum 2, No. 1 (2021), P. 92

[40] Muhammad,Dzulfikar.2019.Karakteristik Perjanjian Jual Beli Dengan Smart Contract dalam E-Commerce. Jurist-Diction: Vol. 2 No.5 , P. 1662

[41] Tanumihardjo, K.G., dan Putra M.A.P "Penggunaan Smart Contract di Indonesia." Jurnal Kertha Wicara 11, No. 2 (2022). P. 439-440

[42] Korintus Wilson Horas Hutapea, Adi Sulistiyono, Validity of Smart Contracts with Blockchain Technology According to the Civil Code. Aliansi : Jurnal Hukum, Pendidikan dan Sosial Humaniora, Vol. 1, No.3 , 2024, P. 86-94, DOI:https://doi.org/10.62383/aliansi.v1i3.177

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2. The information required for generating an electronic signature during the electronic signing procedure is exclusively managed by the signatory.
3. Any modifications to the electronic signature occurring post-signature can be detected.
4. Any modifications to the electronic information pertaining to the electronic signature post-signing can be identified.
5. Certain procedures exist to ascertain the identity of the signing.
6. There are certain methods to demonstrate that the signatory has consented to the associated electronic information.

Concerning electronic contracts, this is affirmed in the Electronic ITE Law, Article 1, paragraph (17), which states, "an electronic contract is an agreement between parties established through an electronic system." A smart contract is an electronic contract created via an electronic system.[43]

According to an examination of positive Indonesian law, namely Article 1338 of the Civil Code, smart contracts possess binding legal certainty provided they do not contravene Article 1337 of the Civil Code and that the requisite conditions for a valid contract are met. The legitimate requisites of a contract are delineated in Article 1320 of the Civil Code and Government Regulation PSTE Article 46, paragraph (2). The essential elements of a contract are:[44]

1. Agreement refers to an individual who has committed themselves, specifically, as defined by Subekti, a party that has concurred, consented, and is in accord regarding comprising the principal elements consented to and the aspirations of the involved parties in executing a contract;
2. Subekti asserts that individuals who are adults or have attained puberty has the capacity to enter into agreements, and that all individuals of sound mind can be classified as legally competent. Article 1329 of the Civil Code stipulates, "Everyone is capable of making an agreement, unless deemed incompetent by law." Article 1330 delineates the criteria for incompetence in forming an agreement. An individual who is underage; Individuals who are under to guardianship; and Married women. The party competent to enter into an agreement. The transaction procedure demonstrates that an individual who registers has validated their capability and authorization to perform a legal act via the identity card submitted prior to entering into a contract or agreement.

[43] Muhammad, Dzulfikar. Characteristics of Sales and Purchase Agreements with Smart Contracts in E-Commerce. Jurist-Diction vol. 2, No.5 (2019), P. 1666.

[44] Arkiswan, dan Sari, D. Puspita. Valid Conditions for Agreement in Electronic Transaction Agreement on Lazada Online Buying and Selling Application. Jurnal Penelitian Bidang Hukum Universitas Gresik vol. 10, No. 1 (2021), P. 7.

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3. It is evident that the description of the object under agreement must be unequivocal, as it must delineate the obligations and rights of the parties involved in the contract.
4. Halal is significant. The issues in question are to the terms of the agreement presented for judicial examination, including whether the proposed aims comply with relevant regulations. Halal issues are governed by Articles 1335 to 1337 of the Civil Code. Article 1335, in conjunction with Article 1337 of the Civil Code, stipulates that "a cause is deemed prohibited if it contravenes applicable laws."[45]

Article 1320 of the Civil Code is elucidated in Article 46 paragraph (2) of the PMSE PP, which delineates the prerequisites for an electronic contract to be deemed valid: mutual consent from both parties, execution by a legal entity or competent individual, a lawful subject matter, and a transaction object that does not contravene legal statutes. Essentially, blockchain-based smart contracts, due to their autonomous attributes, can be classified as electronic agents as defined in Article 1, paragraph (8) of the ITE Law. This term delineates a system engineered to generate an electronic contract action predicated on electronic information via a device or system. If the parties contest the automated system in blockchain technology, it can be grounded in Article 47 of the PMSE PP, which underscores that, based on the outcomes of the interaction between the automated device and the validity of the electronic contract, any refutation must first establish whether the system is functioning improperly. Article 37 of the PP PSTE delineates the constraints on functionalities that must be incorporated within the application. These functionalities include the ability to make corrections, cancel orders, provide confirmation and reconfirmation, choose between proceeding or halting the process, access electronic contract information or advertisements, and verify transaction status as well as review agreements prior to executing transactions.[46]

The distinctions between electronic agreements and traditional agreements have garnered heightened scrutiny for both forms. In the study by Marcello Coralles et al., titled "Legal Technology, Smart Contracts, and Blockchain," computer code is a crucial distinction that differentiates smart contracts from traditional agreements. Distributed storage is essential for blockchain technology, and its distinctive capability for self-execution is fundamentally embedded in smart contracts.[47]

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[45] Azhara Afrihani, Putri Triari Dwijayanthi, Existence Of Smart Contract In Cryptocurrency: Legal Perspective In Indonesia . Jurnal Kertha Semaya, Vol. 12 No. 08, 2024, P. 1754

[46] Endrawan, R. (2023). The Use of Blockchain Smart Contracts in Security and Cryptocurrency. ResearchGate. https://doi.org/10.13140/RG.2.2.30771.50724

[47] Carona, N., & Shebubakar, A. N. (2023). Legal Status and Implications of Smart Contracts in Indonesia. Jurnal Pendidikan Tambusai, 7(2), P. 6938–6944. https://doi.org/https://doi.org/10.31004/jptam.v7i2.7314

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With technological advancements, the quality of human life has improved through the utilization of existing technologies. The emergence of advanced technology, coupled with human ingenuity, can facilitate a system enabling individuals to interact without direct, face-to-face contact. A smart contract is a product that resulted from the aforementioned combination. The smart contract is a result of blockchain technology that has evolved with the advent of cryptocurrencies. A smart contract is a computer software that encapsulates an electronic agreement within a blockchain database, designed to facilitate the automatic execution of the terms of an agreement between participants.[48]

The validity of smart contracts is essential, including the concepts of contractual freedom and the dependability of blockchain technology. Smart contracts, as autonomous executors of digital agreements on blockchain, offer independence for the contracting parties, removing the necessity for third-party intervention in the execution process. To uphold confidence and validity, it is essential to recognize that blockchain technology, as the underpinning of smart contracts, plays a significant role in assuring security and reliability. The notion of freedom of contract denotes the right of people or corporate entities to establish the terms and conditions of their contracts without unwarranted third-party interference. In this context, smart contracts adhere to this idea by enabling the automatic execution of contracts based on specified terms, eliminating the necessity for human or third-party involvement.[49]

Despite the legal clarity and convenience provided, smart contracts continue to encounter challenges in their execution. The implementation of smart contracts necessitates sufficient facilities and infrastructure, including at minimum an internet connection and compatible devices. Digital smart contracts are susceptible to cyber attacks, particularly due to the numerous hacking activities conducted by malicious hackers. Digital vulnerabilities, such as system faults, contribute to widespread skepticism regarding the security of smart contracts; hence, cyber security remains a significant problem in their deployment. The intricate nature of smart contracts, along with a limited comprehension of this technology, presents challenges for legislators in developing comprehensive rules to address issues related to smart contracts. The execution of a smart contract system necessitates a

[48] Tanumihardjo, K. G., & Putra, M. A. P. (2022). The Use of Smart Contracts in Indonesia.. Kertha Wicara: Journal Ilmu Hukum, vol. 11, No. 2, P. 437–447.https://doi.org/https://doi.org/10.24843/KW.2022.v11.i02.p019

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profound comprehension of computer programming technology, alongside detailed regulations that address the potential issues arising from its implementation.[50]

The ramifications of violating the terms and conditions of a smart contract can be substantial, and the resolution employed is contingent upon the design and dispute resolution processes delineated in the contract. In the realm of smart contracts, two primary facets must be considered: the automated sanctions delineated in the program code and the potential necessity for subsequent legal recourse. Initially, smart contracts can be engineered to incorporate automatic penalties for violations. If a condition is unmet, the smart contract can autonomously terminate the agreement, retain locked cash, or execute other actions in accordance with the programmed logic. These fines aim to create a deterrence impact and avert further violations.[51]

Nonetheless, these automatic sanctions include limitations, particularly in addressing intricate conflicts or those necessitating profound legal interpretation. Consequently, the ramifications of a smart contract violation may encompass additional judicial proceedings. Individuals who believe they have suffered injury may pursue restitution or address the conflict through conventional legal avenues. Legal ambiguity might significantly influence the repercussions of a smart contract violation. Regulations concerning this technology are still developing, and the enforcement of smart contract violations may entail differing interpretations and applications of the law across jurisdictions. Consequently, law enforcement officials must thoroughly comprehend the legal structure pertinent to their individual countries. The ramifications of a smart contract breach encompass automated responses delineated in the code and the possibility of further legal action. As an emerging technology, advancements in smart contract law and legal practice are ongoing, necessitating stakeholders to monitor these changes to comprehend the legal ramifications and obligations that may emerge.[52]

Smart contracts were first introduced by Nick Szabo in 1994 as a digital transaction protocol that can automatically execute contract provisions. In traditional contracts, the implementation of an agreement depends on trust between the parties or intermediaries such as notaries and financial institutions. In contrast, in smart contracts, agreements are implemented through programming code that

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[50] Farens Sebastian Fahlevi, Zuhda Mila Fitriana, The Validity Of Smart Contract As A Solution To Contract Manipulation Practices In Indonesia, Kabilah: Journal of Social Community, Vol. 9 No.2, 2024, P. 250

[51] Dwi Hidayatul Firdaus, Smart Contract Applications in E-Commerce from the Perspective of Sharia Contract Law, Qolamuna: Research Journal and Islamic Studies, vol. 6, no. 1 (2020), P. 37–53.

[52] Andini Eka Budiyanto, Legal Analysis Of The Use Of Smart Contract From The Perspective Of The Principle Of Freedom Of Contract, Jurnal Sains Student Research Vol.1, No.1 Oktober 2023, P. 815-827.

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runs on blockchain technology, which ensures transparency, security, and efficiency of transactions.

Characteristically, smart contracts have several main advantages. First, this contract is self-executing, which means that it automatically carries out the obligations of the parties based on the conditions that have been set. Second, smart contracts are immutable, which means that the contents of the contract cannot be changed after being stored in the blockchain, thereby reducing the risk of fraud. Third, this system is trustless, because it does not require an intermediary to ensure compliance with the contract, but only relies on the program code that has been created.

However, the uniqueness of smart contracts also raises legal challenges, especially in terms of validity and dispute resolution mechanisms. In Indonesian civil law, an agreement is considered valid if it meets the elements as stipulated in Article 1320 of the Civil Code, namely the existence of an agreement, legal capacity, a certain object, and a lawful cause. Therefore, an in-depth analysis is needed to determine whether smart contracts can be categorized as valid agreements in the Indonesian legal system.

C. CONCLUSION

This study's result underscores the potential for smart contracts to get recognition inside the Indonesian civil law framework, albeit among several regulatory difficulties. Smart contracts represent an innovation rooted on blockchain technology, enabling the automatic execution of agreements without the need for middlemen. While it ostensibly satisfies the criteria for an agreement as outlined in Article 1320 of the Civil Code, the facets of validity and execution necessitate greater legal clarity.

A primary difficulty is the lack of concrete legislation governing smart contracts in Indonesia. Consequently, it is imperative to formulate laws by either amending the ITE Law or modifying the Civil Code to recognize smart contracts as legally binding electronic agreements. Furthermore, the function of notaries and legal entities in authenticating smart contracts requires elucidation to guarantee legal protection for the parties concerned.

In dispute resolution, conventional mechanisms like courts may be less effective owing to the automated and decentralized characteristics of smart contracts. Consequently, a more flexible conflict resolution mechanism is required, such as blockchain-based arbitration or commercial courts with a profound comprehension of this technology.

Smart contracts promote efficiency and transparency in agreement execution; yet, their adoption in Indonesia necessitates enhanced legal certainty to facilitate widespread use and ensure protection for the concerned parties.

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