Legal Validity of Smart Contracts as a Digital Contract Mechanism in Online Buying and Selling Transactions (E-Commerce) on the Opensea Application

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Abstract

The rapid development of information technology has revolutionized conventional contract practices toward decentralized and transparent digital contracts. This phenomenon has given rise to new forms of contracting, such as smart contracts. Smart contracts are digital contracts designed to facilitate automatic (self-executing) contract execution. This research focuses on the legal validity of smart contracts as a digital contract mechanism in online (e-commerce) transactions, as well as the legal liability of the parties arising from their automated execution. The research method used is a normative legal research method with a statute approach, case approach, and analytical approach by analyzing in depth Article 1320 of the Civil Code, Law Number 1 of 2024 concerning Electronic Information and Transactions, the second amendment to Law Number 11 of 2008, Government Regulation Number 71 of 2019 concerning Electronic System Administration and Transactions, Government Regulation Number 80 of 2019 concerning Trade Through Electronic Systems, regarding the requirements for the validity of an agreement, by highlighting the implementation of smart contracts, especially the issue of the competence of the smart contract system. The results of the study show that smart contracts can be implemented technically, but legally based on the requirements for the validity of an agreement in Article 1320 of the Civil Code, smart contracts do not meet the requirements for the validity of an agreement and cannot be implemented perfectly in smart contract agreements and the legal responsibilities of the parties can still be applied in accordance with applicable regulations. Therefore, this study confirms that current smart contract regulations still have a legal vacuum and only rely on conventional legal frameworks such as Article 1320 The Civil Code and Law Number 1 of 2024 concerning Information and Electronic Transactions serve as the primary legal basis for smart contracts.

Keywords: *Smart Contracts; Legal Validity; Digital Contracts and Electronic Commerce.*

I. INTRODUCTION

The increasingly evolving transformation of civilization has created information and communication technology through advancements that have changed lifestyles within society. Legal flexibility is key to addressing the transformations occurring in the field of information and communication technology, which is constantly undergoing significant development. This rapid development in lifestyle patterns has resulted in changes in the birth of a new form of agreement called a smart contract. Smart contracts emerged due to the rapid increase in the number of internet users, accompanied by the emergence of several e-commerce platforms (Benedicta Chrestella Haryono, Very Yuan Antoni Bunyamin, 2022).A smart contract is a digital contract that automatically executes its terms through computerized code on a blockchain network, enabling transactions to be carried out without the need for a third party (self-executing). Smart contracts contain all information about the terms of the contract, which are executed automatically and in an automated manner, creating a transparent and manipulation-resistant system. Furthermore, the emergence of this innovation in electronic digital contracts has also led to innovations in the application of smart contracts, such as the use of smart contracts in online (e-commerce) transactions. Smart contracts are analogous to vending machines.

The vending machine will offer goods or products at a specific price according to the terms offered by inserting cash for the selected product, and the machine will automatically dispense the selected item. Once the money is inserted and the button is pressed, the machine cannot reverse the action and the transaction is automated. Therefore, smart contracts are executed entirely on-chain through the blockchain and use smart contract code as the contract language (Kurniawan et al., 2025).One application of smart contract-based digital contracts as a digital contract mechanism is a marketplace platform, such as that implemented in the OpenSea e-commerce platform. OpenSea e-commerce is the largest and most popular

peer-to-peer Non-Fungible Token (NFT) e-marketplace in the United States, allowing the trading of unique digital assets such as digital artwork, collectibles, and game items, facilitated by smart contracts within a blockchain network. However, in its implementation, the use of smart contracts in the OpenSea application raises legal issues regarding the legal validity of smart contracts which do not verify age explicitly and only set age limits for e-commerce users without explicitly setting regulated age verification until 2025.

Although smart contracts inherently do not explicitly verify age due to their anonymous and decentralized nature, in their implementation, age verification is absolutely necessary to ensure the legal capacity of the parties based on Article 1320 of the Civil Code and minimize problems that have the potential to create legal ambiguity regarding the status of digital contracts if they involve incompetent parties in the creation of smart contract-based digital contracts.The author sees the existence of smart contracts as a digital contract mechanism creating new obstacles for law enforcement regarding its characteristics which are automatically executed, cannot be modified and are decentralized in a digital contract which is very important in developing the legal validity of smart contracts, so the author describes two problem formulations, namely how the validity of smart contracts as a digital contract mechanism is based on the legal terms of the agreement and what is the form of legal responsibility of the parties in a smart contract from the automatic execution of the use of smart contracts as the basis for digital evidence in court.

II. METHODS

In conducting this scientific research, the author uses a normative legal research method with a statute approach, a case approach, and an analytical approach, which aims to analyze in depth the written legal norms while obtaining new interpretations contained in legal regulations related to the context of the validity of smart contracts as a digital contract mechanism in e-commerce transactions regulated by the Civil Code, Law Number 1 of 2024, the second amendment to Law Number 11 of 2008 which regulates Electronic Information and Transactions. In addition, this research also refers to the regulations contained in Government Regulation Number 71 of 2019 concerning the Implementation of Electronic Systems and Transactions, and Government Regulation Number 80 of 2019 concerning Trade Through Electronic Systems. (Marzuki, 2017).

The theoretical review in this research is the Theory of Agreement and the Theory of Legal Certainty as the analytical basis in answering the problems contained in the formulation of problem 1 (one) and the formulation of problem 2 (two) in comprehensively examining the legal validity of smart contracts as a digital contract mechanism in online buying and selling transaction activities (e-commerce). Therefore, the author will conduct further development on the research entitled "Legal Validity in Smart Contracts as a Digital Contract Mechanism in Online Buying and Selling Transactions (e-commerce) on the OpenSea Application" which creates new obstacles for law enforcement regarding its characteristics which are executed automatically, cannot be modified and are decentralized in a digital contract to ensure that smart contracts can function properly and minimize dispute gaps while ensuring that the principles of justice and certainty for parties in the application of smart contract law are maintained amidst the acceleration of digital technology transformation as the efficiency of digital contracts in the smart contract system (Fakhriah et al., 2025).

III. RESULT AND DISCUSSION

Validity of Smart Contracts in Applications OpenSea As a Digital Contract Mechanism.

In an increasingly advanced society, law and the business world are progressing and facing various challenges. Various types of agreements are made between individuals and other individuals, as well as between individuals and legal organizations. These agreements can be made directly through face-to-face meetings, or through internet platforms such as e-commerce or the new internet network within e-commerce, namely smart contract technology (Hazilina & Soedagoeng, 2021).One of the most significant developments to emerge from smart contract technology is the OpenSea e-commerce platform. OpenSea is a Non-Fungible Token (NFT) e-marketplace platform that features unique digital assets whose ownership is publicly verified and recorded on the blockchain. NFTs are now a popular commodity in e-commerce transactions,

particularly for digital artwork, collectibles, and other virtual assets. OpenSea is often described as an e-commerce equivalent of Amazon or eBay.A smart contract is a form of digital contract that automatically executes contract clauses through a computerized code program within a blockchain network to carry out transactions (self-executing) stored within a blockchain network. This concept was first introduced by cryptographer Nick Zhabo in 1994, who defined it as a set of promises between parties expressed in digital form or a protocol to be executed automatically (Indahcantika Mazalio, 2023).

Smart contracts function as code that implements the terms of the contract, transformed into programming code that will automatically execute the contract when certain conditions are met (Hutapea & Sulistiyono, 2024).In the context of OpenSea and NFT transactions, smart contracts serve as the primary instrument that defines and transfers ownership of digital assets in e-commerce transactions through platforms such as OpenSea. However, in its implementation, smart contracts do not perform explicit age verification and only set age limits for e-commerce users without explicitly establishing regulated age verification, which creates ambiguity regarding the validity of smart contracts as a digital contract mechanism based on provisions regarding the validity of an agreement regulated through the main legal framework in Article 1320 of the Civil Code. Therefore, in the digital contract mechanism based on the validity of an agreement, it will be analyzed using the agreement theory according to Prof. Subekti because an agreement is the most vital part of civil law in Indonesia as one of the efforts of society to bind itself to others in order to fulfill its needs and reach an agreement for the parties (Martha, 2017).Seeing that OpenSea's verification procedure is only a self-declaration that occurs on the front-end layer operated by the OpenSea company, such as the OpenSea user terms of service (ToS) which only stipulates minimal user rules without any direct and explicit age verification in strict smart contract interactions such as ID checks or Know Your Customer (KYC) to ensure the legal capacity of users in e-commerce transactions.

The provisions regarding the validity of an agreement as regulated in Article 1320 of the Civil Code also apply to information technology, especially electronic contracts, as stated in the provisions of Article 46 paragraph (2) of Government Regulation No. 71 of 2019 concerning the Implementation of Electronic Systems and Transactions. This regulation discusses an electronic contract that obtains valid legal force if a valid form of agreement has been fulfilled, which includes conditions such as: (Az, 2019) agreement for the parties involved in making an agreement; competent or legally capable of making an agreement; a certain thing is a clear object of the agreement; and a halal clause.This contrasts with Government Regulation (PP) Number 71 of 2019 and Government Regulation (PP) Number 80 of 2019 concerning the standardization of digital contracts. PP Number 71 of 2019 explicitly affirms the requirements for the validity of electronic contracts, as stipulated in Article 1320 of the Civil Code, as the parameters for the validity of electronic agreements. Conversely, PP Number 80 of 2019 concerning Trade Through Electronic Systems, the implementing regulation of the Trade Law, does not explicitly specify the qualifications for contract validity as stipulated in the previous regulation (Kadly et al., 2021).

The existence of Article 1313 of the Civil Code has stated "An act by which one or more people bind themselves to one or more other people," which has a definitive meaning that it can be substantially applied to the smart contract system mechanism, especially on the OpenSea platform which is used as an electronic trading platform in carrying out online buying and selling transactions (Dr. Abdul Atrsar, SH, 2018). Smart Contracts theoretically fulfill the criteria as a form of agreement because in its implementation, two or more parties involved in a smart contract, especially on the OpenSea platform, have implicitly entered into a valid agreement that is implemented.Through pem codesThe program containing the clauses of the agreement functions to be legally binding.However, if a smart contract system run by the OpenSea platform is legally valid, it must therefore fulfill the legal requirements in an agreement contained in Article 1320 of the Civil Code, especially in the aspect of verifying the legal capacity of the parties who stipulate the four of the valid conditions of the agreement which can be described in each clause contained in Article 1320 of the Civil Code, as follows: (Hendri Dewarto Silitonga, Ratna Artha Windari, 2024).

A. Agreement of the parties

Agreement is a statement of will between legal subjects, where the process always begins with an offer and acceptanceacceptance as a meeting point for the wishes of the parties. In the implementation of the

smart contract system, the aspect of agreement becomes the initial form in underpinning every form of electronic contract carried out with the existence of conformity or agreement of will between the parties at the time the agreement is carried out, as implemented in the operational mechanism of the OpenSea platform regulated in the provisions of Article 49 numbers (1), (2), and (3) of Government Regulation No. 71 of 2019 concerning the Implementation of Electronic Systems and Transactions that "Electronic Transactions occur when an agreement is reached between the parties". So, to obtain and reach an agreement can be realized by means of acceptance which shows agreement. In other words, the OpenSea platform in obtaining an agreement, then OpenSea is run through a digital expression of will that occurs when the parties consciously carry out their agreement to send a transaction (transaction trigger) that triggers the execution of the smart contract code on the blockchain, this activity is considered a form of valid agreement and is in line with the concept of agreement.

The form of agreement in digital transactions is very dependent on the information system and software used, some use digital expressions of will to carry out transactions and some use digital signatures, but in the OpenSea platform, agreement is carried out through digital expressions of will which occur when the parties consciously carry out their agreement for a transaction (transaction trigger) which triggers the execution of the smart contract code in blockchain, and the validity of his skills is determined by the reliability of the technology (Muhammad Kandriana, Sri Atika, Muslimin, Muhammad Wildan, 2025). Therefore, the Civil Code and other regulatory frameworks such as Law No. 1 of 2024, which is the second amendment to Law No. 11 of 2008 concerning Electronic Information and Transactions and Government Regulations concerning the Implementation of Electronic Systems and Transactions play a very important role in recognizing the validity of electronic transactions that are able to complete the gap that has equal legal force that can be used to agree on the provisions in smart contracts as the validity of smart contracts as a digital contract mechanism based on the valid terms of the agreement in Point 1 of Article 1320 of the Civil Code (Sukmaningsih et al., 2025).

B. Proficient in making agreements

The parties' ability to control smart contract systems is increasingly difficult and ambiguous due to their anonymous nature and inability to perform explicit age verification. They only set age limits for e-commerce users without explicitly establishing regulated age verification. This problem arises because the smart contract system, as a digital contract mechanism, lacks verification. Legal capacity in digital transactions tends to be ignored, as the system does not verify age or require documents such as an ID card to verify a user's age and capacity to conduct transactions.E-commerce platforms such as OpenSea are crucial in considering the issue of competence that occurs in making an agreement to fulfill the legal requirements of an agreement through a smart contract system because of its anonymous, unmodifiable and identifiable nature.E-commerce platforms that implement smart contracts typically only implement terms of service such as "Users must be at least 18 years old to use the Platform. If you are between 13 and 18 years old, you may only use e-commerce with a parent or guardian's account, provided they approve and oversee your use. E-commerce strictly prohibits access by users under 13 years old" without direct and strict age verification (OpenSea Marketplace, n.d.).In this legal capacity, there may be potential risks if minors unknowingly commit legal action in the form of electronic agreements simply because of the internet anonymity implemented by the smart contract system.

However, if the platform implementing the smart contract can implement age verification, the system will detect the smart contract system's transactions in verifying digital contracts, and the smart contract meets the criteria in point 2 of Article 1320 of the Indonesian Civil Code. If age verification is not implemented, then the subjective requirements are not met, and an agreement can only be filed for cancellation. Conversely, if there is a violation of the objective elements, the agreement is considered null and void (Lubis, 2022).This legal capacity is difficult to determine without a very strict user age verification by the smart contract system which creates ambiguity of the capacity contained in the smart contract system. However, this legal capacity can be overcome by e-commerce platforms by providing smart contract services by requiring users to complete the KYC (Know Your Customer) process which includes verification of identity documents, age, and legal status that establishes legal capacity and a strict verification process by

attaching documents such as an ID card to prove that the user is over 18 years old in conducting transactions that implement the smart contract system.

C. Something specific

The existence of Article 1333 of the Civil Code explains that "An agreement must have a principal in the form of goods whose type has been determined, although the number of goods does not need to be specific, as long as the number can be determined or calculated later as long as the type can be identified." It is clear that the objects of agreements on the OpenSea platform can relate to unique digital assets such as artwork, collectibles, and game items. In other e-commerce platforms that implement smart contracts, they can be conventional products such as Business-to-Consumer products, which can be physical or non-physical, such as cell phones, clothing, digital artwork, or collectibles, which have more complex physical and non-physical objects. Therefore, a contract requires a tradable object, be it goods or objects, as well as an achievement. The achievement in question is something to be achieved in an agreement (Premita Permatasari, Sukindar, 2024).

D. Halal cause

That the next important condition for an agreement to be considered valid is the existence of a lawful cause as stated in Article 1335 of the Civil Code "If the object of the agreement is illegal, or contrary to morality or public order, the agreement is void". In line with this principle, Article 1337 of the Civil Code emphasizes the prohibited cause that "A cause will be prohibited if it is contrary to law, morality or public order".Platforms such as OpenSea in the smart contract system in e-commerce have created a positive space in digital contracts, because smart contracts in e-commerce are used to sell legal goods such as unique digital assets, namely works of art, collectibles, and game items or in other e-commerce that implements the smart contract system can be conventional products such as B2C (Business- to-Consumer), whose objects are physical or non-physical goods, for example, cell phones, clothing, digital artwork.Therefore, it is crucial for all parties to carefully review the contents of an agreement before entering it into an e-commerce platform that uses a smart contract system.

This is because the agreement reached by the parties has the potential to conflict with applicable laws. As long as the agreement meets the applicable requirements and does not conflict with laws, moral norms, or public order, and does not harm any party, then point 4 regarding a lawful cause is valid.Regulations related to the technology sector for electronic transactions, particularly those governing the smart contract system in Indonesia, still face many problems related to the use of the smart contract system (Oktaviani, 2021).In Indonesian legal practice, the validity of a smart contract system is highly dependent on applicable regulations, such as the Civil Code, Law No. 1 of 2024, the second amendment to Law No. 11 of 2008 concerning Electronic Information and Transactions, and Government Regulation (PP) No. 71 of 2019, which regulates Electronic Systems and Transactions. The implementation of a smart contract system in Indonesia is considered valid if it meets the standards set out in the relevant regulations, although there are still shortcomings and weaknesses, such as the existence of automatic execution (self-execution) that appears to be created by only one party (Wahyuni et al., 2023).

Legal Liability of Parties in Smart Contracts for Automatic Execution of Smart Contracts as a Basis for Digital Evidence in Court

The development of smart contracts has triggered a disruption in electronic transaction technology in digital contracts. Smart contracts are digital contracts designed to automatically execute and verify the implementation of a contract in e-commerce transactions, translated into code and stored in a distributed and immutable manner on a blockchain system. This situation requires special attention to the legal accountability and legal certainty aspects of smart contract use. Accountability is defined as the ability to be responsible from various perspectives. The ability to be legally responsible must possess the following elements: the actor's ability to think, enabling them to control their thoughts to carry out and choose actions, the ability to determine the outcomes of their actions, and the ability to determine desires or hopes so that they can be realized (Edward Timoty Lasut & Grace H. Tamponggangoy, 2021).Therefore, to examine this research, the theory of legal certainty according to Gustav Radbruch is needed, which functions as legal protection in preventing unfair actions, which means that a person has the right to obtain their interests under

certain conditions (Abdul Aziz Nasihuddin, 2024). E-commerce platforms such as OpenSea are platforms from the United States that operate in Indonesia and are popular as digital markets that facilitate smart contract-based transactions. With its position as an electronic system organizer operating within the jurisdiction of Indonesia, OpenSea is obliged to comply with Law Number 1 of 2024 as the second amendment to Law Number 11 of 2008 concerning Information and Electronic Transactions, as well as other implementing regulations such as Government Regulation Number 71 of 2019 concerning the Implementation of Electronic Systems and Transactions and Government Regulation Number 80 of 2019 concerning Trade Through Electronic Systems.The absolute obligation of electronic system organizers is emphasized in Article 13 paragraph (1) of Government Regulation Number 71 of 2019, which states that electronic system organizers are responsible for all systems they manage.

Although smart contracts are executed automatically on the blockchain, OpenSea, as an interface and marketplace provider, still has a legal responsibility to ensure its system runs safely and complies with regulations. In e-commerce transactions, there are two main legal subjects, namely the parties bound by the smart contract (buyer and seller) and the electronic system organizer as the party that provides and manages the smart contract-based system. Responsibility lies not only in the failure of the smart contract code, but also in administrative failures of the system, such as user verification.In situations where an agreement is made by a legally incompetent party, for example because they have not reached the age of majority, the agreement can be canceled. The incompetent party or their representative has the right to file for cancellation due to failure to fulfill the subjective requirements for the validity of the agreement. Legal incompetence as regulated in Article 1329 of the Civil Code includes individuals who are not of age or under guardianship, which is further clarified in Article 330 of the Civil Code that those who are not yet 21 years old and not married are classified as minors (Basani et al., 2025). The absence of an adequate age verification mechanism and only setting the user age limit above 18 years by e-commerce platforms creates legal vulnerability to violations of legal capacity as referred to in Article 1320 of the Civil Code, so that smart contract-based digital contracts have the potential to be canceled (vernietigbaar).Age verification failure can be classified as a violation of the administrative and security obligations of electronic system providers, as stipulated in Government Regulation Number 71 of 2019 and reinforced by Law Number 1 of 2024 concerning Electronic Information and Transactions.

The responsibilities of electronic system providers include securing personal data and preventing system misuse. Therefore, fulfilling legal capacity requirements, including the age of majority, is a crucial element in ensuring legal certainty in e-commerce transactions (Raphaellee Peters Putra Usman & Moody Rizqy Syailendra Putra, 2024).As an electronic system provider, OpenSea is required to provide a reliable and secure system and is responsible for any losses arising from system failures as stipulated in Article 3 of Government Regulation Number 71 of 2019. This provision is reinforced by Government Regulation Number 80 of 2019, which requires electronic system providers to provide communication facilities that ensure that the information conveyed does not violate statutory provisions and prohibits minors from conducting transactions without parental consent. If a transaction occurs with a party who is not legally competent, the electronic system provider can be held responsible for any losses incurred.In this context, the parties' responsibility focuses not only on the failure of the smart contract code but also on the failure of the platform's age verification system. If losses occur due to transactions with parties who are not legally competent, the electronic system operator can be held liable for violating administrative obligations. The parties are also technically responsible for ensuring that the smart contract can be executed properly, does not violate administrative provisions, and can be accessed and verified as valid evidence in court. Furthermore, the parties are required to maintain the confidentiality and security of the private key used to authenticate transactions.

The private key serves as proof that a particular party actually initiated or approved a smart contract transaction. The parties are also responsible for storing the transaction hash that indicates the location of the smart contract in the blockchain explorer. This information is needed to trace the chain of custody or audit trail to ensure the protection of the rights of the parties in smart contract-based digital transactions (Amajihono, 2022). Article 5 paragraph (2) of Law Number 1 of 2024 emphasizes that electronic

information, electronic documents, and printouts are valid legal evidence, so smart contracts can be used as evidence in the evidentiary process in court (Rum, 2025).

IV. CONCLUSION

The validity of the smart contract in the OpenSea application as a digital contract mechanism does not fulfill the elements of a valid agreement, especially those contained in Article 1320 point (2) of the Civil Code, because it does not carry out explicit age verification and only sets the age limit for e-commerce users. E-commerce platforms that implement a smart contract system are still vulnerable to age verification carried out by platform providers who have included agreements through transaction triggers.Legal liability for parties resulting from automated execution may arise if losses arise from transactions conducted by parties lacking legal capacity, resulting in the electronic system provider being held legally liable for violating administrative obligations by failing to screen ineligible legal entities through a rigorous and reliable verification process. Therefore, the parties are technically responsible for ensuring that smart contracts can be executed properly without violating administrative obligations and can be accessed and validated as credible evidence in court.

V. SUGGESTION

The validity of smart contracts poses legal vulnerabilities in their implementation, creating ambiguity. The government is obliged to establish smart contract regulations to ensure their implementation follows established procedures, and Electronic System Providers, such as OpenSea, must immediately take proactive steps to address the legal ambiguities surrounding smart contracts arising from their automated and anonymous nature.The legal liability of the parties to the smart contract system, especially platform organizers such as OpenSea, has a significant legal liability burden if losses occur due to transactions by incompetent parties. The smart contract system integrates identity verification protocols to ensure subjective conditions are met.

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