MAPAN-JOURNAL ,
Publisher: METROLOGY SOC INDIA , NPL PREMISES,
Address: DR K S KRISHNAN MARG, NEW DELHI, INDIA,
ISSN / eISSN:0970-3950 / 0974-9853
Volume 25-Issue 1- (2025)

Enhancing Smart Contracts for Contractual Security

Boulassel Mohamed

Academic Rank: PhD – Contract Lecturer at the University of Continuing Education – Didouche Mourad

Affiliation: Center for Continuing Education – Skikda

Email: boulassel41@gmail.com

Submitted: 12.03.2025. Accepted: 15.09.2025. Published: 31.12.2025

Abstract:

One of the most significant outcomes of scientific and technological progress in our contemporary era, in the field of law in general and contract theory in particular, is the use of advanced technological methods and means to conclude, prove, and execute contracts and legal transactions. This technological progress did not stop at this point; rather, with the beginning of the current century, it has produced greater mechanization and automation in concluding, proving, and executing contracts and legal transactions through the use of artificial intelligence, which is based on endowing inanimate devices and machines with human intelligence, thereby enabling them to conclude contracts, legal transactions, and various legal acts through what is known as the smart contract.

The idea of this research paper is summarized in examining an issue that has raised jurisprudential and legislative debate and posed major challenges to the legal system, namely smart contracts, due to the novelty of this new legal act. Through this paper, we have attempted to clarify the nature of smart contracts concluded through digital technology, namely "blockchain," which represents a digital solution to the problems associated with contracting in general, and which has contributed to the stability of contractual relationships and consequently to the protection of contractual security.

Keywords: Smart contracts, contractual security, contract theory, blockchain, contract automation.

Introduction:

The smart digital revolution has recently had a profound impact, reaching almost all aspects of human life. It has left no field untouched, as this digital revolution has been harnessed to play its role in the advancement, progress, and well-being of human life. As a result, electronic contracts have become a present reality in the contemporary world as an alternative to traditional contracts. This is evident in the

fact that this revolution has caused a real transformation in traditional written concepts, with the emergence of applications and computer programs through which smart contracts can be concluded.

These contracts are considered among the newly developed types of contracts that are still in the stages of experimentation and implementation. Their designations have multiplied and varied; they are referred to as digital contracts, blockchain contracts, self-executing contracts, automated contracts, and encrypted contracts, as they represent a computer protocol used to facilitate and automate transactions, among other newly coined terms derived from the nature of their operation and their electronic environment.

There is no doubt that contract theory has been greatly influenced by modern technology, leading to a change in the traditional perception of contracts. This influence and transformation have resulted in the emergence of new concepts, beginning with what is known as the electronic contract, followed by the development of these contracts and the emergence of many forms of remote transactions. Recently, however, a new and more advanced type of contract has emerged, namely the smart contract, in reference to the current technological era, which is described as the era of artificial intelligence.

The difference between the electronic contract and the smart contract lies in the fact that the latter is concluded through the execution of predefined information in the form of codes in an automated manner, without resorting to a third party or intermediary. The smart contract is an ordinary contract, but it acquires its electronic or smart character from the means or method through which it is concluded.

Among the most important emerging technologies is blockchain technology, which initially appeared as the technical basis for virtual currencies, then emerged as a technology in its own right. It is viewed as a pioneering development capable of reducing friction costs in current transaction systems and enabling new models of social and commercial participation that were previously impossible to apply.

Blockchain, as the name suggests, is in its simplest terms a chain of pre-defined blocks of information that constitute an immutable digital ledger and a distributed, flexible foundation for transferring value. The decisive feature of blockchain technology is its ability to enable transactions to occur in an environment where parties do not trust one another and do not wish to rely on an intermediary. New technical developments in blockchain technology have also enabled the transition from automatic contracts to truly autonomous smart contracts capable of self-execution and self-enforcement. This transition has created an interesting research environment, namely the issue of the relationship between blockchain-based smart contracts and contract law, where the traditional definition of contracts has been subjected to review. On the one hand, encrypted programs begin to manage transactions, and on the other hand, smart contracts acquire a new role through their integration with blockchain.

From here, the following issue arises: What is meant by smart contracts, and how can this technology support and enhance trust in contractual relationships?

Importance of the Study:

This study is of great importance due to the significant economic importance of digital technology worldwide as a newly emerging subject, particularly blockchain technology. It examines the relationship between the growth of these modern technologies and the reality of their application.

This study also aims to:

- Introduce blockchain technology and its most important features.
- Identify the nature of smart contracts.
- Examine the impact of blockchain–smart contracts on contracts.

To address the above issue, we relied on the analytical and descriptive approach. This research paper is divided into three main sections as follows:

First: The nature of blockchain technology.

Second: Smart contracts and their characteristics.

Third: The extent of the impact of blockchain on contracts.

Chapter One: The Nature of Blockchain Technology

To address the concept of blockchain technology, it is necessary to define it, provide a historical overview of its emergence, and then address its characteristics.

First: The Concept of Blockchain Technology

The term "blockchain" is a non-Arabic term, a literal translation from the English "Block chain," meaning the protection of data and information. Some use it as is, "blockchain," just as terms such as computer or telephone are used, while others refer to it in Arabic as "chain of blocks" or "blockchains." Due to the novelty and recent emergence of this term, definitions have not settled on a single specific meaning; rather, definitions have multiplied to clarify its nature and reality.

It is similar to a massive database that records financial transaction movements on a network of computers. Copies of this database are continuously and automatically updated, and all participants share the same distributed database, which is immutable, non-modifiable, and resistant to hacking.

Some consider blockchain to be an open, distributed ledger capable of recording transactions between two parties in an efficient, verifiable, permanent, and detailed manner. Blockchain is a next-generation technology for conducting transactions or deals based on trust, responsibility, and transparency, thanks to the public consensus mechanism combined with the use of the "public ledger." This definition includes the elements of trust and transparency, which are among the most important advantages guaranteed by the use of blockchain, and which are highly sought after by all local and international institutions and bodies.

Blockchain is a general term for a prominent subclass of distributed ledger technologies. These are systems operating in an electronic environment without a central operator or authority.

It has also been defined as an open and shared database via the internet in the form of an electronic ledger with data arranged chronologically, secure, and immune to modification or tampering. It has also been defined as a distributed ledger that is owned by no one and trusted by everyone, allowing the

exchange of information and the transfer of ownership electronically without the need for a trusted intermediary.

Blockchain is defined as a distributed database based on encrypted mathematical equations that maintains a shared and continuously growing list of data records or transactions called blocks. These blocks together form a distributed chain of data across a global network of internet-connected devices (nodes). Each block in the chain contains data from the previous block, thus forming a record of all transactions and automatically verifying the authenticity of that data. Blockchain is designed in a way that preserves the data stored within it and prevents its modification.

From the above definitions, it becomes clear that blockchain technology seeks to document all electronic steps, verify data and transactions, authenticate them, and preserve them in an encrypted manner on private networks. It relies on the principle of direct interaction between parties without the need for third-party intervention.

Second: The Emergence of Blockchain Technology

The roots of this technology date back to 1998, with the emergence of the concept of blockchain alongside the emergence of cryptocurrencies in 2008, followed by the appearance of Bitcoin as the first cryptocurrency by the Japanese Satoshi Nakamoto. Since the emergence of blockchain coincided with the emergence of Bitcoin, some failed to distinguish between them and considered them two sides of the same coin. In reality, however, they are different: blockchain allows the storage of transactions in Bitcoin, while Bitcoin represents the first application of blockchain. Blockchain goes beyond the field of transactions, enabling users to write more advanced smart contracts and contributing to solving the problem of social inequality through wealth redistribution.

Third: Characteristics and Types of Blockchain Technology

Blockchain technology is characterized by a set of features, including:

- **Decentralization:** Unlike the traditional system that relies on centralization and requires third-party intervention to verify transaction authenticity—resulting in costs and pressure on central servers—blockchain technology relies on decentralization and no longer requires third-party intervention, as consensus algorithms are used. This maintains data consistency and reduces the risk of hacking or data loss. This feature is among the most important characteristics of blockchain, as it eliminates reliance on a central authority for data storage, verification, and processing, thereby enhancing transparency and trust. For this reason, it is sometimes referred to as “chains of trust.”
- **Open Source:** This feature allows anyone to join the blockchain at any time and leave it at will. Members can view it at any time, as it is accessible via the internet, which enhances transparency.
- **Immutability:** This feature allows for the rapid verification of transactions, as valid transactions are accepted and invalid ones are rejected and detected immediately.

- **Anonymity (Confidentiality):** Each user can interact with the blockchain through an address (public key) that does not reveal the user's true identity.
- **Distributed Ledger:** Since blockchain is an open ledger accessible to the public, it allows all participants to view it at any time and from anywhere. The chain is distributed across many points on the network called nodes. This means that all members possess a copy of the blockchain data, and any modification or transaction is synchronously added to all members of the blockchain network.
- **Transparency and Trust:** Unlike current records that lack disclosure of transactions and thus raise doubts about trust, blockchain technology has established a high level of transparency and trust, as all transactions are visible to everyone and any modification or update is accessible.
- **Peer-to-Peer Ledger (P2P):** Blockchain technology operates as a peer-to-peer network, allowing all relevant network participants to access the system at any time to document transaction assets, record their data, and reach collective consensus according to the network's purpose. Transactions are then confirmed through a process known as mining. Once consensus is reached, a new block is created and added to the chain of blocks directly, without central authority intervention.
- **Information Security:** Data in this technology is immutable, as it is attached to a block and organized into the chain, allowing traceability and historical verification, which facilitates auditing and makes tampering with records virtually impossible.
- **Chronologically Sequential Ledger:** Since blockchain consists of a series of blocks that must be sequentially and temporally linked, each block contains a timestamp indicating when it was added to the chain. This cannot be altered due to the encryption features of blockchain technology.

2. Types of Blockchain Technology:

Blockchain technology can be divided according to different criteria into the following types:

In terms of users: public, private, and hybrid.

- **Public Blockchain:** In this type, usage is open to everyone, and anyone can participate. An example is Bitcoin, which is available to all for trading.
- **Private Blockchain:** Unlike public blockchain, this type operates with clearly identified, authorized, and preselected participants who are granted access to the network and validation authority. No one can access it without permission from its administrators. Institutions and economic and financial entities rely on this type to share their internal databases to improve execution speed and reduce costs. One of its most important features is its compatibility with legal responsibility due to its centralized nature. Examples include blockchain systems used in banks and insurance companies.

- **Hybrid Blockchain:** This type combines features of both public and private blockchains. It is an open network, but not fully open, as access is limited to a specific number of entities. Some devices connected to this network may be public or private.

Blockchain technology can also be classified according to the degree of participation in the consensus process as follows:

- **Permissioned Blockchain:** In this type, validation of new blocks is carried out only by authorized owners or users. Consensus is conducted by a limited number of trusted users.
- **Permissionless Blockchain:** All users participate in the consensus process. Since participants are anonymous, proof mechanisms are required to ensure the validity of new blocks.

Second Section: Smart Contracts

At the outset, it should be noted that a smart contract is not necessarily linked to blockchain; it can operate independently. However, blockchain technology has the advantage of storing data and facilitating the effects and consequences of contracts, reducing fraud and errors, and obliging each party to fulfill its contractual obligations.

Contract analysis is no longer merely a meeting of wills, but has acquired an economic dimension. Smart contracts based on digital currency protocols have thus constituted a revolution in the world of contracts and agreements, becoming the focus of attention at international, regional, and local levels. Consumers and public authorities alike are drawn to them because they provide secure, immutable data transfer and storage without intermediaries. This necessitates an analysis of the nature of smart contracts, followed by their legal nature.

First: The Nature of Smart Contracts

Smart contracts are newly developed contracts based on artificial intelligence and represent one of the applications of distributed ledger technology (blockchain). Their origins date back to 1994, when they were invented by the economist and cryptographer Nick Szabo, who also invented a cryptocurrency called “bit gold” in 1998. Smart contracts did not enter into actual use until the creation of the Ethereum network and its cryptocurrency Ether in 2013 by Vitalik Buterin, which began operation in 2015. Studying the nature of smart contracts requires first examining their definition and then their characteristics.

1. **Definition of the Smart Contract:**

In the absence of clear legal texts defining smart contracts, numerous definitions have emerged. Although they share similarities in terms of operational mechanisms, they differ in terms of their fundamental nature. One of the most complex definitions comes from the founder of Ethereum, Vitalik Buterin, who defined a smart contract as a mechanism involving digital assets and two or more parties, whereby some or all parties deposit assets that are automatically redistributed among them according to a formula based on certain data unknown at the time of contract formation.

Smart contracts have also been defined as decentralized encrypted computer programs that automatically execute contractual terms.

They have also been described as contracts between two or more parties that are self-executing through a protocol based on mathematical symbols known as algorithms. These contracts include all information regarding the rights and obligations of the parties and the execution of all contractual provisions. They rely on blockchain technology, and the software evaluates the terms or conditions of the contract. When any condition is met, periodic reports are sent to organizers and auditors to verify data authenticity. Once conditions are fulfilled, a specific process is automatically executed, and updated reports are sent to verify new data. This definition emphasizes that a smart contract is a contract like traditional contracts, with terms embedded in distributed ledger technology and executed automatically once conditions are met.

Smart contracts have also been defined as agreements between two or more persons aimed at creating, modifying, transferring, or terminating obligations, executed through smart programs on digital platforms based on user-provided conditions and instructions, without any human intervention and without the possibility of modification or revocation once binding force is acquired. Alternatively, they are voluntary agreements executed wholly or partially by smart programs on distributed database platforms for the benefit of the user.

This definition highlights that a smart contract is a contract like other contracts, differing only in the medium through which it is concluded. While some contracts are oral and others electronic, concluded via phone or email, smart contracts are concluded through distributed ledger technology in a programmatic form and executed automatically once their conditions are met.

It was defined by the company **PWC** as a contract that brings together two or more parties, which can be electronically programmed and whose provisions are then executed automatically once specific events occur or pre-defined conditions are met. It relies on **blockchain** technology through the use of the decentralized **Ethereum** platform for storing smart contracts. These contracts enable transactions to be carried out and obligations to be executed using digital currencies via computers, through which contracting operations are conducted without the intervention of a third party.

It was also defined by the American computer scientist **Nick Szabo**, who was the first to speak about smart contracts in 1994, as:

"...computerized transaction protocols that execute the terms of a contract...".

From the foregoing, it becomes clear that smart contracts are contracts based on self-executing operating programs that automatically and efficiently execute the provisions of the contract. They rely on **Blockchain** technology to ensure transparency and security, and consist of pre-programmed conditions and rules that determine the procedures to be executed when specific conditions are met. The execution of these contracts takes place without the need for a traditional intermediary.

2- Characteristics of Smart Contracts and Their Mechanism of Operation:

As previously mentioned, the operation of smart contracts requires blockchain technology, and they are composed of a series of codes that express the conditions and clauses written by agreement between two or more parties participating in the contract. Smart contracts rely on mathematics, known as encryption protocols, to build the basic structures that implement optimized preferences between observation, verification, privacy, and execution in smart contracts. This is carried out through the following stages:

a- Coding stage:

When drafting the contract by the contracting party, the smart contract translates the objectives of the contracting parties through programming operations.

b- Transmission stage:

After drafting the contract, it is encrypted and converted into symbols, then sent to the computer of the second party to the contract through distributed ledgers. The encryption process can be carried out via the blockchain, just as with Bitcoin transactions, or through an external hybrid platform.

c- Execution and processing stage:

The receiving computer receives the instructions, reaches an individual agreement, monitors and accepts the contract conditions, and processes the execution automatically. Thus, no other party can intervene to modify or tamper with the contract.

When one of the parties wishes to execute or record new transactions, a request is sent to the network, where it is received for processing by the contract. The consensus algorithm, or the responsible entity or subgroup of participants, determines whether the received request is authentic or not. If so, the ledger is automatically updated using new "blocks" of data. Identical copies of the ledger database are shared among a community of participating computers called nodes.

Characteristics of Smart Contracts:

Some of the characteristics of smart contracts can be summarized as follows:

- **In terms of the contract environment:** A smart contract has no tangible physical medium; rather, it exists in the electronic environment on one of the blockchain platforms such as Ethereum.
- **Consideration of the contract:** It is characterized by privacy and is represented by one of the cryptocurrencies.
- **Greater efficiency in terms of time:** Smart contracts are characterized by the speed of completing transactions and saving time, as it takes auditors from different countries only a few hours to document the transaction and a few minutes to execute it, unlike the time required for ordinary contracts.
- **Greater accuracy:** Smart contracts automate operations in a decentralized manner through writing conditions, verifying them, and executing them electronically without the presence of

any intermediary or third party. There are no limits to smart contracts, as everything can be exchanged, including money, shares, and property, in a transparent and secure manner.

The clauses and conditions of the contract are conditional statements; once the conditions of the contract are met, it is executed automatically. For example, if Ahmed wants to sell digital or paper books, electronic applications, or tangible items, the smart contract is formulated as follows: if Ahmed delivers the books or the electronic application to Ali, then a certain amount of Ether, Bitcoin, Tether, or other agreed-upon cryptocurrency is transferred as stipulated in the contract clauses.

- **A decentralized contract:** That is, there is no third party such as a broker, lawyer, or agent representing the parties who intervenes in the life of the contract from the moment it is recorded on the blockchain until its execution.
- **Security:** Privacy and security are among the greatest concerns in traditional contracts due to the presence of many intermediaries, and security can be breached at any stage of the traditional process. In smart contracts, security is maintained through encryption and identification via public and private keys.

When using smart contracts, data is stored in a decentralized system and it is almost impossible to modify, delete, or retract the data and transactions saved through blockchain technology. Smart contracts are digitally signed using private keys and cannot be decrypted except by the public key shared among the concerned parties.

- **A consensual contract in principle.**
- **A bilateral binding contract that imposes obligations on both parties.**
- **Drafting the smart contract using a programming language and formulating its clauses in the form of conditional statements.**
- **Automatic execution:** The smart contract is executed automatically through computers, meaning that judicial execution is replaced by algorithms. In theory, no one can intervene to change the code or operate the smart contract, as its performance is guaranteed. Thus, automatic execution is associated with preventing breach of contract and reducing the likelihood of disputes, which eliminates the need for judicial assistance to enforce the contract.
- **Justice and impartiality:** Contracts are executed based on programmed conditions without the influence of personal factors or bias.
- **The smart contract is considered an unnamed contract**, as it has not been regulated by the legislator.

Second: The Legal Nature of Smart Contracts:

At the legislative level, the Algerian legislator has not yet regulated this transaction, although it permitted electronic contracting under the provisions of Law No. 18-05 dated May 10, 2018, relating to electronic commerce. Article 6, paragraph 2 thereof states that the electronic contract, within the meaning of this law and Law No. 04-02 dated June 23, 2004, which sets the rules applicable to

commercial practices, is concluded remotely without the physical and simultaneous presence of its parties, by exclusively resorting to electronic communication technology.

At the international legislative level, for example, the American legislator has regulated these contracts in several states and granted them legal validity similar to traditional contracts, including the State of Illinois, which enacted a law in 2020 known as the Blockchain Technology Law. This law obliges that the legal effect and evidentiary value of smart contracts not be denied, just like traditional contracts. Moreover, it considers distributed ledger technology as an official and recognized means of proof for documents, contracts, or electronic signatures recorded therein. The legal effect or enforceability of a contract or document recorded in the distributed ledger may not be denied. Paragraph A of Article 10 of Section 250-725 of the aforementioned law provides that:

"It may not be denied legal effect or enforceability of a smart contract, document, or signature, or its storage or verification."

Pursuant to this paragraph, the contract, document, or signature recorded in the ledger has the same effect as its counterpart in a traditional contract, creating obligations on both parties and serving as evidence against third parties.

Based on the foregoing, it is clear that the American legislator has explicitly granted smart contracts legal probative value equivalent to that of traditional contracts, leading to the conclusion that a smart contract is indeed a contract in the legal sense of the term.

At the doctrinal level, due to the novelty of these contracts and the absence of comprehensive legal regulation, researchers and legal scholars have differed regarding their legal nature. Accordingly, two approaches can be identified: one that considers smart contracts to be contracts in the proper legal sense, and another that views them merely as computer software programs.

1- The smart contract is a contract in the legal sense:

Some French legal scholars argue that smart contracts are contracts in the legal sense, integrated into the blockchain platform and subject to the same rules governing contract formation and proof, as they contain contractual conditions. A smart contract arises only through the concurrence of two wills: the offer is made on the blockchain digital platform with its conditions and clauses and is then stored, and the same applies to acceptance, which is also stored. Once the two wills coincide, the contract is automatically executed. This process constitutes offer and acceptance, thus forming a contract in the legal sense of the term. In the same direction, the U.S. State of Nevada has legislatively recognized the contractual nature of smart contracts by defining them as contracts stored in the form of an electronic record in accordance with the law. However, other opinions deny smart contracts an independent legal personality.

2- The smart contract cannot be considered a contract:

Most American and French scholars question the applicability of the concept of a contract to smart contracts, considering them merely informational software accompanying a previously concluded contract, or information technology, or an informational medium and mechanism for executing what the parties had previously agreed upon.

This approach seeks to modernize the classical concept of the contract through the inevitable presence of pre-set conditions. It entails integrating the traditional contract into an information system, transforming the language in which the contract was written into a fixed and rigid digital language. Creation, modification, transfer, and termination are considered results of the contract rather than the contract itself, as the contract precedes execution in existence and essence. Even the inventor of the smart contract concept, **Nick Szabo**, denied its contractual nature, stating that it is merely an electronic medium aimed at modernizing the classical concept of the contract, and thus a program accompanying the traditional contract that includes the previously agreed-upon terms and conditions, formulated according to the known approach: "if this occurs… then that follows."

Chapter Three: Manifestations of Protecting Contractual Security in Smart Contracts:

Contractual security refers to the process of anticipating contractual risks and avoiding them by following specific procedures at the time of contracting, particularly with regard to execution and contractual liability. Security in this sense is a feeling and a social value derived from law. Accordingly, contractual security aims at ensuring proper performance of obligations and securing them, as achieving and guaranteeing contractual security constitutes the primary gateway to ensuring social and economic security and stabilizing contractual relations, which are fundamental to the principle of legal security. Smart contracts contribute to strengthening trust in contractual dealings by automating the performance of contractual obligations for both parties and automating the conclusion of contracts, thereby achieving contractual security.

First: Automating the Performance of Contractual Obligations for Both Parties:

The smart contract provides numerous contributions by facilitating the contract, implementing a non-retraction policy, and strengthening the sanctions resulting from non-performance of contract clauses.

1- Automation of immediate execution procedures:

Through blockchain technology, the smart contract seeks to transfer due funds after verifying the delivery of documents or the completion of facts or acts, with the verification of these conditions documented through the platform. Smart contracts using blockchain also provide the feature of progressive or installment execution for certain contracts, particularly off-plan real estate sales. In such cases, the price is paid in installments according to the progress of construction. The smart contract intervenes to verify the percentage of construction completion using an informational program (Oracle) and automatically transfers the due amounts using cryptocurrency or automatic payment to a traditional bank account.

2- Execution of contractual sanctions:

One of the notable advantages of smart contracts is their ability to implement contractual sanctions in the event of breach of obligations. They can terminate the contract automatically without resorting to the judiciary, apply the defense of non-performance, recover unjustly paid amounts, reduce the price unilaterally in the case of partial performance, and apply other sanctions related to breach of contract clauses.

3- Non-retraction policy:

Unlike traditional contracts, where parties may choose whether or not to fulfill their obligations, smart contracts cannot be breached. Once the contracting parties agree to specific obligations, the smart contract code binds them firmly to those obligations without allowing the possibility of breach.

4- Execution of special privileges and preferential rights:

The capabilities of smart contracts are not limited to implementing ordinary contractual conditions but also extend to executing special conditions such as preferential or priority rights granted to certain parties.

5- Enhancing trust and security among contracting parties:

The conclusion and execution of smart contracts take place automatically according to a logical sequential system, where no step is executed before verifying the completion of the previous one. For example, in a sale contract, the smart contract will not pay the sale price to the seller until all pre-agreed conditions and provisions are fulfilled, through the blockchain platform on which it is recorded.

Second: Automating the Contract Formation Process and Achieving Contractual Security:

1- Tracking and monitoring the contracting process:

Through blockchain technology and the data it contains regarding various types of contracts, smart contracts can track contracting operations and related transactions to ensure the regularity and flow of procedures.

They can monitor the preparation and submission of contractual documents from the stage of contemplating the contract until its completion, track the emergence of rights and obligations and their deadlines, prevent their lapse, and prepare relevant information and data in advance. Smart contracts can also predict potential difficulties in contracting and provide appropriate solutions to avoid them.

2- Accuracy and rigor of smart contracts:

One of the great advantages of smart contracts is their accuracy and precision, due to the fact that many of their terms and provisions are pre-existing on the blockchain platform that organizes them via the internet. The role of the contracting parties is limited to selecting what suits their transactions and meets their needs and desires, resulting in clear, detailed, and mutually agreed-upon provisions. This accuracy and clarity greatly reduce disputes compared to traditional contracts.

3- Cost reduction:

Executing smart contracts through blockchain technology reduces the need for intermediaries such as employees, which in turn helps reduce overall organizational costs and increases profit margins for companies that deal with large numbers of contracts on a daily or weekly basis.

With smart contracts, contracting parties can be provided with a code or number that replaces registration and documentation procedures. This code serves as primary evidence of the completion and documentation of the contract and the subsequent transfer of ownership of the subject matter.

Conclusion:

It appears that smart contracts have brought about a revolution in contract theory, enhancing contract stability and protecting contractual security. With their digital features, smart contracts preserve the rights of parties, prevent tampering with contractual data and conditions, and do not allow retraction from the execution of obligations, thus providing solutions to many legal problems based on the principles of decentralization and open networks, where trust is based on computer programs rather than reputation and law.

The absence of clear legislative accompaniment and recognition of this digital technology, as well as its regulation covering all aspects and legal mechanisms for resolving potential disputes through linking all distributed data and records in the blockchain, has not prevented the spread of smart contracts. Their self-regulation has made them more practical than legal in nature.

Findings:

- Blockchain-based smart contracts provide security, flexibility, immutable transaction records, and the ability to enable micro-payments, transactions, and automation in an efficient and profitable manner.
- The execution of a smart contract is determined correctly by the proper execution of its underlying algorithms, not by the intent of the parties.
- Despite the limited use of smart contracts in their modern form compared to traditional contracts, given their numerous advantages and benefits, they are expected to become more widespread and compete to some extent with traditional contracts, depending on technological advancement and the use of its devices and applications.

Recommendations:

- Strengthening the technical and technological infrastructure underlying smart contracts, particularly blockchain technology and electronic payment using virtual currencies.
- Reconsidering the regulation of the role of intermediaries in concluding contracts and legal transactions, especially registration and documentation authorities, in a manner that allows the adoption of blockchain platforms under specific conditions and constraints.
- Although contracting through smart contracts does not require legislative instruments for approval based on the principle of freedom of will in contracting and choosing lawful means of contracting—as already applied in many countries—we hope for legislative intervention not to

approve smart contracts, but to frame and regulate them, address obstacles and difficulties, and establish systems to avoid and mitigate the shortcomings of this technology.

Sources and References:

First: Sources

- Law No. 18-05 dated May 10, 2018, relating to electronic commerce, Official Gazette No. 28, issued May 16, 2018.

Second: References

First: Books

- Ahmed Haitham Issa Al-Sayyid, *The Emergence of Smart Contracts in the Blockchain Era*, Dar Al-Nahda Al-Arabiya, Egypt, 2021.
- Fatima Al-Subaihi, *Trends in the Application of Blockchain Technology in Gulf Countries*, Bahrain Center for Strategic, International, and Energy Studies, Bahrain, 2019.

Second: Theses and Dissertations

- Fatima Thaer Mahdi, *The Legal Regulation of Cryptocurrencies and Their Impact on Civil Transactions: A Comparative Study*, Thesis submitted to the Faculty of Law Council, Al-Mustansiriya University, Baghdad, 2023.

Third: Articles

- Ahmed Abdel Hamid Ibrahim, Blockchain Technology and Its Impact on Smart Contract Provisions: A Comparative Jurisprudential Study, *Journal of Sharia and Law Sector*, Issue 11, Egypt, 2019.
- Anas bin Abdullah Ibrahim Al-Nazel, Blockchain Technology and Its Impact on Contemporary Financial Transactions: A Jurisprudential Study, *Journal of Usul Al-Sharia Specialized Research and the Malaysian Institute for Science and Development*, Vol. 6, Issue 3, 2020.
- Ashraf Jaber, Blockchain and Digital Evidence in Copyright Law, *International Journal of Jurisprudence, Judiciary and Legislation*, Issue 1, Egypt, 2020.
- Ibrahim Al-Dusuqi Abu Al-Leil, Smart Contracts and Artificial Intelligence and Their Role in Automating Contracts and Legal Transactions, *Journal of Rights*, Issue 4, Part 1, 2020.
- Ben Taria Muammar, Smart Contracts Integrated into Blockchain, *Kuwait International Law School Journal*, Issue 4, Part 1, 2019.
- Ben Halima Faisal et al., Blockchain Technology and Companies, *Abhath Journal*, Vol. 7, Issue 2, 2022.
- Hossam El-Din Mahmoud, Smart Contracts Concluded via Blockchain Technology, *Journal of the Faculty of Law, Cairo University*, Vol. 16, Issue 1, 2023.
- Daoud Mansour, Smart Contracts and Their Role in Enhancing Trust in Contractual Relations, *Journal of Legal and Economic Research*, Vol. 4, Issue 2, 2021.

- Daoud Mansour & Abdelkader Zerghine, Smart Contracts Integrated into Blockchain: The Beginning of the End of Traditional Contracts, *Algerian Journal of Legal and Touristic Sciences*, Vol. 59, Issue 1, 2022.
- Said Boutchkousht, Achieving Contractual Security through Smart Contracts, *Electronic Journal of Legal Research*, Issue 10, 2022.
- Samir Imad Shaaban et al., The Impact of Blockchain Technology on Activating the Skills of Accountants and Auditors, *Al-Muthanna Journal of Administrative and Economic Sciences*, Tikrit University, Vol. 11, Issue 2, 2021.
- Shaimaa Mohamed, The Legal System of Blockchain Technology, *International Journal of Jurisprudence, Judiciary and Legislation*, Vol. 5, Issue 1, 2024.
- Trouabia Nadhir, Blockchain Technology and Its Impact on the Digital Future of Economic Transactions: Opportunities and Challenges, *Contemporary Economic Research Journal*, Algeria, 2020.
- Abdelrazzaq Wahba Sayed Ahmed, The Concept of the Smart Contract from the Perspective of Civil Law: An Analytical Study, *Journal of Economic, Administrative and Legal Sciences*, Vol. 5, Issue 8, 2021.
- Abdelkarim Zerdali & Amina Ben Jedou, Green Smart Sukuk Using Blockchain Technology, *Ab'ad Iqtisadiyya Journal*, Algeria, Vol. 11, Issue 1, 2021.
- Abdelmajid Lakhdari & Fatima Ben Jedou, Legal Security and Judicial Security, *Al-Shihab Journal*, Faculty of Law, Institute of Islamic Sciences, University of El Oued, Algeria, Vol. 4, Issue 2, June 2018.
- Al-Ayashi Al-Sadiq Faddad, Smart Contracts, *Al-Salam Journal of Islamic Economics*, Issue 1, 2020.
- Mohamed Yahya Ahmed Atiya, Arbitration as a Mechanism for Resolving Disputes of Contracts Concluded via Blockchain Technology, *Journal of Jurisprudential and Legal Research*, Issue 36, 2021.
- Mustafa Mohammed Al-Hasban, The Legal System of Blockchain Technology under Electronic Commerce Legislation, *Journal of Rights and Human Sciences*, Issue 3, November 2019.
- Huda Ben Mohammed & Ibtissam Toubal, Blockchain Technology and Its Possible Applications in the Business Sector, *Economic Studies Journal*, Algeria, Vol. 7, Issue 1, June 2020.
- Waqas Abdel Khaleq, The Legal Nature of Smart Contracts, *Al-Shara'i Journal for Legal Studies*, Vol. 4, Issue 2, 2024.

Fourth: Meetings and Conferences

- Abdelmajid Ghmija, Dimensions of Contractual Security and Its Connections, International Meeting on Contractual Security and Development Challenges, organized by the National Authority of Notaries, Skhirat, Morocco, April 9–11, 2014.
- Qutb Mustafa Sano, Smart Contracts in Light of Principles, Objectives, and Consequences: An Analytical Vision, Conference of the International Islamic Fiqh Academy, 24th Session, Dubai, 2019, Department of Islamic Affairs and Charitable Activities, Dubai, 2019.
- Hanaa Mohammed Hilal Al-Haniti, The Nature of Smart Contracts, Conference of the International Islamic Fiqh Academy, 24th Session, Dubai, 2019.

Fifth: References in Foreign Languages

- Aurelie Bayle, *Prospective Analysis of Smart Contracts in French Law*, Master's Thesis, Consumer Law and Competition Law 2, Faculty of Law and Political Science, University of Montpellier, France, 2016–2017.
- Chris Berg and Darcy Weallen, *Blockchain Governance: What We Can Learn from the Economics of Corporate Governance*, January 2020, SSRN Electronic Journal, DOI:10.2139/SSRN.3519564.
- Mustapha Mekki, *Le Contrat, objet des smart contracts*, article dated 04-07-2018, Dalloz Reviews, visited on 05-11-2025 at 16:00, p. 410; and Jean-Christophe Roda, *Smart Contracts; Dumb Contracts*, in DA 1102, IP No. 7–8, 2018.
- Nzuva S., *Smart Contracts: Implementation, Application, Benefits and Limitations*, *Journal of Information Engineering and Application*, 9(5).