THE ROLE OF ARTIFICIAL INTELLIGENCE SYSTEMS IN SMART ARBITRATION

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Abstract:
Smart contracts raise legal issues due to their automatic execution mechanism, and the situation becomes more complex when these contracts include an arbitration clause or provision. Furthermore, disputes that may arise in the future, using embedded codes and cryptographic symbols within the contract, lead to what is known as smart arbitration, which is issued by an autonomous arbitration panel that relies on smart and digital legal tools, integrated into the blockchain.
Artificial intelligence systems play an important role in smart arbitration, particularly through what is known as the trusted electronic mediator model. The integration of artificial intelligence into the arbitration system has created a new type of arbitration aimed at improving performance and efficiency in dispute resolution.
***Keywords**: Arbitration, Smart Contract, Trusted Electronic Mediator Model.*

INTRODUCTION:

Blockchain technology plays a prominent role in the development of commercial and investment transactions at the individual, institutional, and national levels. These so-called smart contracts are essentially computer programs that take the form of tokens to automatically execute obligations once a condition is met, without the need for human intervention or a third party, regardless of its role (Hadhad, 1998, p. 46).

Smart arbitration is considered the most advanced form, where the arbitration clause or agreement is embedded in the smart contract within the blockchain. In this process, an arbitral award is issued by a smart arbitrator, reflecting the intersection between technology and law.

The main issue at hand is the impact of the legal challenges raised in smart arbitration contracts on the integration of artificial intelligence systems into the arbitration system.

I. Smart Arbitration Compatible with the Smart Contract System and Its Legal Challenges

With the rise of the Fourth Industrial Revolution and blockchain technology, there has been a growing need to adapt this technology as a smart platform for executing transactions. This requires the development of an electronic arbitration system to incorporate smart arbitration into the blockchain itself, recognizing this technology as a whole, including its system for resolving disputes(El-Dessouki, 2020, pp. 120-124) .

The use of the Internet has permeated all sectors, leading to an alarming increase in disputes arising from its use. This has resulted in the conclusion of a large number of contracts of various types through the same network, necessitating the need for rapid solutions, free from the burden of judicial procedures and their complexities—especially when the parties involved belong to different countries. Electronic arbitration thus emerged as an effective means of resolving such disputes(Al-Barai, 2020, pp. 243-250).

However, this system has encountered many difficulties and legal challenges. In this chapter, we will first address the concept of smart arbitration in the first section, and in the second section, we will delve into the legal issues of smart arbitration in resolving disputes related to smart arbitration contracts(Al-Dabousi, 2020, pp. 376-380) .

1. The Concept of Smart Arbitration

Most Arab legislations have not provided a clear definition of smart arbitration as the most advanced form, except for mentioning that this type of arbitration involves technological means that distinguish it from the traditional arbitration format.

This has led to numerous calls to amend the New York Convention to explicitly include smart arbitration as a means of resolving international disputes. Therefore, in this section, we will first attempt to define smart arbitration and then differentiate it from electronic arbitration (Hassan, 2023, pp. 456-460).

1.1 Definition and Characteristics of Smart Arbitration

A. Definition:

Smart arbitration can initially be defined as self-executing arbitration integrated within smart contracts established via blockchain technology. It is presented in the form of a clause or provision aimed at resolving disputes related to those self-executing contracts. Thus, it is a unique form of arbitration that aligns with modern advancements and the technologies they impose, such as blockchain, which serves as a platform for digital transactions and smart contracts (Fath El-Bab, 2022, pp. 32-40) .

Some legal scholars define it as the self-execution of a traditional contract written in natural human language, which is specifically phrased in a way that can be translated by a computer. Others describe it as a program that links computer code between two or more parties based on the execution of predefined outcomes. It is a programmed application running on the blockchain platform to ensure the automatic execution of the smart contract, operating according to pre-established conditions applied to the blockchain-addressed assets.

Looking into the legal frameworks and regulations addressing this type of contract, we find that the United States has presented a legislative project defining the legal concept of a smart contract, notably in Arizona, where it is defined as a program for managing events that operates on a distributed, decentralized, shared, and replicated ledger capable of transferring assets within this ledger. It's also worth noting that the United States is not alone in this regard—Belarus was the first country to legislate on smart contracts in 2017, defining them as computer code designed to work within a distributed ledger for the automatic execution of transactions and legal procedures, with other countries following suit (Dubois & Schoenaers, 2019, pp. 678-680).

A. Characteristics:

Smart contracts have several distinct characteristics, which we will try to outline as follows:

a) Self-Execution:

Generally, the smart contract is executed automatically by computers, meaning that execution is replaced by algorithms, thus eliminating any human intervention from either the contracting parties or arbitrators. Even the parties themselves cannot interfere with or modify the code or the operating system of the smart contract. This is why smart contracts are often described as "performance-guaranteed" since they prevent any breach of contract, thereby reducing the likelihood of disputes (Gaillard, 2011, p. 261).

The essence of self-execution lies in computer programs independently changing their state according to predefined rules. However, the term "self-execution" remains somewhat ambiguous and requires further explanation and clarification.

b) Electronic and Technological Nature:

Traditional contracts are typically in written or oral form. However, the development of electronic commerce has led to a substantial increase in contracts executed electronically, with examples such as various types of click-wrap agreements (Ferreira, 2021, p. 32).

Despite this, some traditional paperwork remains essential, such as invoices, receipts, or delivery certificates, particularly when the contract involves the purchase of goods or services. These documents sometimes serve as the only proof or visible manifestation of an electronic contract (Ismail, 2005, p. 124). In contrast, smart contracts are entirely electronic and are usually associated with digital assets like cryptocurrencies or digital representations of assets registered on the blockchain. Smart contracts inherently require the use of electronic digital signatures, relying on encryption technology (Hassan, 2020, pp. 164-167).

It's important to note that there is a significant distinction between smart contracts and electronic contracts. In reality, smart contracts are not yet legal contracts in the traditional sense

and cannot be classified as electronic contracts either. They feature execution methods and characteristics that are highly complex and unique.

Additionally, these contracts are created entirely over the Internet, which determines the rights between service providers and users. The term "smart contract" stems from the fact that many online agreements require users to click a button or link to agree to the contract, illustrating the connection between the digital platform and the contract's formation(Issa, 2021, pp. 214-219).

c) Conditional Nature:

In the world of software, various conditions can be written into contracts, meaning that the performance and execution of the contract are fundamentally based on conditional data, which forms the core of computing. This means that a contract becomes valid from the moment it is formed, but the execution of certain terms is contingent upon specific events. As a result, smart contracts fall under the current classification of contract law.

1.2 Distinction from Electronic Arbitration

Electronic arbitration is defined as the means used to conclude an agreement and carry out arbitration procedures. It takes place in a virtual environment over the internet, and there is no need for traditional writing or the physical presence of individuals in this type of arbitration.

Others define it as a method of dispute resolution in which all procedures, including the arbitration request, are conducted online via email or chat rooms, without the need for the physical presence of the parties or the arbitrators in a specific location (Zamzam, 2011, p. 78).

However, some scholars argue that arbitration cannot be considered "electronic" merely due to the use of the internet in its procedures. For example, many messages are exchanged via email during arbitration and mediation procedures, so simply using email does not make arbitration electronic.

The generally agreed-upon definition is that electronic arbitration is arbitration conducted using modern technological means throughout all its procedures. It is considered a specific type of electronic contract, even though it follows special rules related to the laws of evidence for electronic transactions (Zamzam, 2011, p. 78)

Thus, the distinction between smart arbitration and electronic arbitration is clear: smart arbitration is a new concept aligned with new and modern technologies, designed to resolve potential disputes that may arise at any stage—whether during negotiation, contract formation, or final execution. This increases the credibility of this type of arbitration among its users, which positively impacts commercial transactions.

In the blockchain ecosystem, arbitration is used as one of the key elements in the smart transaction platform facilitated by this technology. This is achieved by embedding the smart arbitration clause as a self-executing mechanism for resolving disputes between parties. However, in practice, the use of smart arbitration has not reached its full potential. Current platforms for smart arbitration, in reality, use blockchain merely as a tool for arbitration, not for fully automating the entire arbitration process.

Although there have been experiments utilizing artificial intelligence within the smart contract system embedded in blockchain, challenges have emerged, making it necessary to carefully prepare these smart contracts. Additionally, concerns about security and the risk of hacking remain significant, especially regarding the confidentiality of the arbitration process on blockchain platforms.

Thus, the concept of smart arbitration differs fundamentally from electronic arbitration for the reasons explained above (Al-Hadithi, 2021, pp. 153-156).

2. A Review of Legal Issues in Smart Arbitration Contract Disputes

In this section of the research, we will examine the main principles typically associated with traditional or electronic arbitration systems and apply them to smart arbitration to determine whether they are in conflict. We will also explore whether these principles should be taken into account when resolving disputes through smart arbitration, particularly in light of the legislative gaps regarding smart arbitration that aligns with smart contract systems. This analysis will first

consider, in Section One, the legal capacity of the parties to enter into an arbitration agreement regarding a smart contract, with particular attention to the requirement of writing.

2.1 The Issue of Legal Capacity of the Parties to Conclude an Arbitration Agreement in a Smart Contract

For an arbitration agreement to be valid, the parties must have legal capacity according to the rules of the country where the contracting party is domiciled, not based on the law of the arbitration seat or any other jurisdiction. This requirement also applies to smart contracts, meaning that the contract and the arbitration agreement it contains will be invalid if the parties lack legal capacity. This legal capacity is a necessary condition for the existence and validity of both the contract and the arbitration agreement, according to arbitration laws, international treaties, and model rules that govern them(Mohamed, 2021, pp. 356-362) .

If one of the parties belongs to a jurisdiction that does not recognize or deal with smart contracts or blockchain technology, this will inevitably affect that party's ability to enter into the contract, thereby rendering the arbitration agreement void. This raises a significant challenge in smart arbitration, as it is tied to the recognition and legal framework of blockchain technology in the relevant jurisdiction.

Another key issue is the necessity for the parties to ensure that a traditional or hybrid version of the smart contract is available. This is important to address the requirement for a written agreement for the arbitration agreement to be valid, as stipulated by the New York Convention. The agreement must be signed, unless it is in the form of exchanged messages or telegrams.

The requirement of writing and the signature on the arbitration agreement are points of divergence in interpretation among jurisdictions, particularly because they may not align with the code structure of a smart contract. This poses a risk that smart contracts may not be enforceable under the New York Convention, unless a traditional contract signed by both parties is presented (Mekki, 2018, p. 2160).

2.2 The Issue of Selecting the Seat of Arbitration and the Composition of the Arbitral Panel

The selection of the arbitration seat in smart contracts is of utmost importance, as this decision determines the procedural law applicable to the arbitration. The country of the agreed seat will establish the legal framework governing the arbitration procedure. This is crucial, as the law of the arbitration seat dictates how the arbitration process is conducted.

The parties must also verify the arbitrability of the dispute, which must be in accordance with the law they have agreed to apply. Specific details of the arbitration agreement must be defined to assess the extent of judicial authority's involvement in the dispute and whether the arbitral award is subject to appeal under the law of the chosen seat(Bashir, 2014, p. 40).

Due to the lack of recognition of smart contracts and blockchain technology in many jurisdictions, as well as the relatively new nature of this technology, concerns and debates have arisen regarding the legal implications of using blockchain-based arbitration. This uncertainty makes it essential to address these issues, particularly in relation to the choice of the seat of arbitration and the writing requirement, to ensure the success of the arbitration process in such disputes.

Thus, the parties to a smart contract must select the jurisdiction for the seat of arbitration and the applicable law carefully to avoid legal issues in jurisdictions that do not recognize smart contracts, as seen in some U.S. states. This ensures that the arbitration process is legally valid and enforceable.

As for the composition of the arbitral panel, it is crucial that the number of arbitrators is odd, as stipulated by arbitration laws worldwide, including the law of the arbitration seat. Failure to comply with this requirement could result in a violation of applicable arbitration laws. Furthermore, the arbitrators must possess high technical and professional expertise to effectively handle smart contract disputes. Given that these disputes often involve encrypted programs and the integration of artificial intelligence within the smart contract itself, the arbitrators must have the knowledge to navigate these complex issues and ensure the confidentiality of arbitration proceedings. This requirement is even more critical in smart arbitration, as it involves automated

processes based on blockchain technology, which necessitates a specialized understanding of the digital and technological aspects of the contract (Ibrahim, 2009, p. 86).

2.3 The Issue of Determining the Competent Court and Applicable Law

This special arbitration system does not preclude resorting to regular courts. Therefore, the parties to a smart contract can agree on the jurisdictional court and determine the applicable law to their disputes, especially in light of the legislative gap regarding the regulation of such blockchain-based contracts, both at the national and international levels. In such cases, the legal rules related to electronic contracts can be utilized, provided they are adapted to the nature of smart contracts.

II. The Role of the Trusted Electronic Mediator in Smart Arbitration and Its Role in Dispute Resolution

As previously mentioned, the claim that disputes will never arise regarding contracts made via blockchain technology is exaggerated. This is due to the complexities inherent in the technology and its applications, and thus the complete removal of a trusted mediator in these transactions is currently untenable. This contradiction with modern legislative trends in contract theory, which have granted the judge a protective role, especially in granting discretion to define the content and subject matter of the contract and in ensuring the protection of the parties, underlines the need for such mediators.

1. The Role of the Trusted Electronic Mediator in Smart Arbitration

The involvement of a third party is practically necessary, particularly because this technology is still in its infancy. It requires sufficient time to evaluate its effectiveness and responsiveness to regulatory and technical requirements through the use of AI systems to predict and resolve disputes. These disputes may arise during the negotiation phase, during contract formation, or during its execution, all without the need for human mediators. This section is divided into two sub-sections, the first of which addresses the incompatibility of the idea of an electronic mediator with the framework of smart contracts.

1.1 Analyzing the Debate on the Nature of Smart Contracts

The nature of smart contracts has generated extensive academic debate. Many observers consider them to be mere informational protocols that rely on blockchain to enforce a result once the necessary conditions are met. In their view, a smart contract is essentially a program attached to the original contract in order to complete and implement certain stages of the agreement. This raises several issues, particularly concerning the content of the contract terms, the validity of offer and acceptance, and the integrity of the parties' intentions, free from defects of consent. These issues are challenging to examine in the case of smart contracts, especially in the absence of direct intervention by the contracting parties(Abdel-Ghaffar, 2017, p. 465) .

As such, smart contracts today are merely mechanisms for documenting the electronic signature of the contract or the document into which the contract is embedded. While they can reduce certain risks, they also introduce new risks that require a framework to address them. One of these issues is the automatic imposition of contractual penalties. Therefore, the automated nature of the smart contract will inevitably reduce the chances of it aligning with traditional contract principles, potentially preventing judicial intervention to assess whether the principles governing electronic commerce and transactions are met. This necessitates the involvement of a third party, such as an arbitrator, to handle such disputes, assess them in light of the applicable laws, and offer appropriate solutions in accordance with the parties' agreed terms and the prevailing legal norms(Rodrigues, 2017, p. 324).

1.2 The Issue of Relying on the Trusted Electronic Mediator Model as an Auxiliary Program for Arbitration

The possibility of relying on a trusted electronic mediator model as an auxiliary program for arbitration in resolving smart contract disputes is essential, as it provides the smart arbitrator with all the information needed to make transparent and fair judgments. This process would take place internally within the blockchain system and the contract, utilizing artificial intelligence systems to

fully automate the arbitration process. This occurs in light of the information and data embedded in the blockchain platform as an intelligent interface for transactions in various forms (Atiya, 2021, pp. 211-217).

To reach this stage, it is necessary to use a program or device operated by a natural or legal person, providing the blockchain platform with all the real-world information and facts directly or indirectly related to the transaction. From a technical standpoint, the information required to operate the smart contract within the blockchain is not inherently available. This necessitates the use of the electronic mediator program to document such information, thereby making it essential for recognizing the blockchain as a substitute for legal recognition, and as a tool to increase its reliability and transparency until it is officially recognized.

Furthermore, the smart contract must include an arbitration clause to address and manage risks and unforeseen events that the contract could not anticipate. This helps avoid the dangers and consequences arising from these events, especially when they cause an imbalance in the contractual obligations. If such unforeseen events occur when the smart contract is being formed, the integrated electronic mediator program functions as a smart arbitrator to halt its execution based on the conditions outlined within the contract. When an external emergency occurs outside the blockchain system, the contract will be disabled (Mansour, 2022, pp. 353-355) .

In a related context, force majeure becomes relevant—events that make fulfilling contractual obligations impossible or impractical, such as a sudden malfunction of the blockchain platform, data corruption, or exposure to cyber-attacks or hacking. These are realistic and foreseeable risks in the limitless virtual world.

In such cases, it is essential to address the consequences and problems arising from force majeure. This requires organizing and establishing conditions, controls, and consequences regarding the obligations of both parties. Crafting the contract with precision and clarity is crucial to ensure the contract is suitable under unexpected circumstances.

Currently, there is no available technology to manage these risks unless modern technologies, such as artificial intelligence systems or the Internet of Things (IoT), offer solutions for such emergencies. Until that happens, it is vital to provide full opportunities for the parties, through contractual stipulations based on the original agreement, to resolve their disputes through electronic or traditional arbitration, according to their will. This ensures fair resolution, adjusting obligations reasonably in light of exceptional or extraordinary circumstances (Majaji, 2023, pp. 144-146).

2. The Role of Artificial Intelligence in Dispute Resolution through Smart Arbitration

Artificial intelligence plays a significant role in the success of smart arbitration in resolving disputes related to smart contracts. According to the program developers' objectives, AI, when responding to queries, develops hypotheses and makes decisions based on evidence while considering a degree of confidence expressed as percentages, depending on the volume of the evidence. Therefore, AI is capable of reasoning, and over time, it will begin to produce logical lines similar to those of an expert or arbitrator. This development is undoubtedly welcomed by the international arbitration community.

2.1 The Integration of Artificial Intelligence into the Arbitration System

To successfully integrate AI into both international and domestic arbitration systems, it is necessary to define AI's role clearly and precisely. This will help regulate its use within a contemporary legal framework to resolve disputes through AI as an autonomous arbitrator within the smart transaction platform embedded in blockchain technology.

Secondly, existing arbitration legislation and relevant international agreements need to be amended to recognize the legality of AI arbitration and to frame its rules. This will allow for the introduction of AI systems to resolve disputes between conflicting parties.

AI can become a virtual arbitrator in certain specific disputes. To reach this stage, aside from preparing the legislative environment to accommodate this modern technology and recognizing its legality and enforceability, it is necessary to amend regional arbitration agreements, the rules of

arbitration institutions, and international conventions, particularly the 1958 New York Convention on the Recognition and Enforcement of Foreign Arbitral Awards, which has been signed by 160 countries (Bourgada, 2019, pp. 322-327).

Additionally, software developers must work closely with arbitration practitioners to identify potential issues and devise solutions. Over time, AI will be used in arbitration to resolve disputes at a minimal cost, serving as an assistant to human arbitrators. As technology continues to evolve, AI may eventually become a smart arbitrator, though this will take some time. Like any new technology, there will be initial doubts, but these will quickly dissipate as human thinking adapts to the digital transformation (Bin Turya, 2019, pp. 465-500) .

2.2 A Concept of Arbitration Procedures through Encrypted Blockchain - Models

Within this scope, several blockchain-based arbitration models can be discussed. For example, the Code Legit platform has established a set of blockchain arbitration rules, through which it envisions and assumes an arbitration panel that may appoint a winning arbitrator. Communication within the platform is conducted via email and even allows for a video hearing session through a video conference. Essentially, these procedures closely resemble electronic arbitration (Harvard Cyber Law.)

Additionally, the Open Law platform represents a new form of decentralization in arbitration. This platform sees obstacles as opportunities to activate global judicial systems that are available worldwide. Its vision aims to establish an online court accessible globally, providing people with equal opportunities to access affordable, advanced, and transparent justice.

Thus, this form of arbitration conducted on the blockchain is a type of smart arbitration and does not conflict with legal recognition by legal systems. It is simply an alternative route for dispute resolution.

In the same vein, and in line with these efforts, the CMS German company has developed blockchain arbitration rules. This is achieved by resorting to CMS's specialized lawyers in the field of information technology law and dispute resolution to conduct a comprehensive assessment of the legal aspects of arbitration in contract environments and smart environments. In this case, blockchain arbitration rules define the arbitration process used in the dispute, and these rules allow all parties to submit documents and summaries through the blockchain as an investigative tool. This work is carried out within what is known as the Arbitration Library found in smart contract law, which interacts with the arbitration panel. This setup allows these rules to maintain the advantages of smart contracts(CMS Law)

CONCLUSION

Through this study, we have been able to identify the impact of numerous issues, both legal and technological, and their actual transformation into obstacles affecting the fundamental pillars preventing arbitration from transitioning to this smart model.

Despite the remarkable advancements in the virtual world and the numerous claims from technology enthusiasts that smart contract arbitration is the promising future for dispute resolution, there remain significant obstacles, primarily legal in nature. There is still ambiguity surrounding the smart contract that includes an arbitration clause, in addition to various issues related to legal capacity and how it can be verified between parties who are unknown to each other in a boundless virtual world. Other issues include the formation of the tribunal, the need for odd-numbered arbitrators, the confidentiality of arbitration procedures and decisions, the law applicable to the dispute, and how the terms of the smart contract, including the encryption code, are drafted and executed.

There is ongoing debate about the feasibility of using these technologies for resolving smart disputes. This calls for either completing and addressing these issues in detail through the existing electronic legislation with necessary amendments or introducing new legislation that aligns with the current technological revolution and correctly addresses its legal problems.

From a legislative perspective, most laws around the world, including in Arab countries, have yet to recognize smart arbitration due to their failure to acknowledge smart contracts integrated with blockchain technology. As a result, these smart contracts, as informational programs and execution mechanisms, do not meet the basic requirements on which contract theory is based. Additionally, there are discrepancies when translating complex contracts into smart contract codes.

Another significant obstacle is of a technical nature. Smart arbitration platforms are still in their early stages, with few in number, and they require precise organization at both technical and legal levels. This will necessitate cooperative efforts from all stakeholders in the field to achieve the desired success in the future and avoid or significantly reduce third-party involveme nt by leveraging artificial intelligence, the Internet of Things, and machine or deep learning technologies.

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