

An Appraisal of Dispute Resolution Systems in Blockchain

Fawaz Adediran

Law Graduate, Department of Public and International Law, Faculty of Law, Osun State, Nigeria

Email: fawazayomide26@gmail.com

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Abstract: The rise of blockchain technology has revolutionized industries by offering decentralized, transparent, and secure systems. However, these same characteristics pose unique challenges in resolving disputes that arise within blockchain networks. This article examines the effectiveness of existing dispute resolution mechanisms tailored for blockchain, such as on-chain arbitration and smart contract adjudication. It evaluates their strengths and limitations in providing fair, efficient, and enforceable resolutions compared to traditional legal frameworks. By analyzing case studies and current practices, this appraisal highlights the need for innovative legal strategies and technological advancements to address the evolving nature of conflicts in blockchain environments, ensuring that the promises of decentralization do not come at the cost of justice and accountability

Keywords: blockchain, dispute resolution, cryptography

1. Introduction

Often times, many people have heard about the term “Blockchain technology” and wonder what it is actually about. Think of Blockchain as a decentralized system of storage and complex operations. By this, it simply means that Blockchain is a digitized, distributed and decentralized manner of storage of records. Blockchain generally refers to a decentralized digital ledger technology that records transactions on a distributed network of computers [1]. With Blockchain, all forms of data are synchronized on a safe and secure ledger which cannot be altered.

Blockchain technology works in a manner in which it is consensus-based and agreed upon by the miners or the recorders. While there is the tendency to confuse cryptocurrency with Blockchain, it is imperative to note that cryptocurrency is a digital medium of exchange created to function within the Blockchain technology. Within a Blockchain, there are creations of blocks which are arranged chronologically as soon as they are completed in a transaction. Think of these blocks as bricks arranged to form a wall. The wall is the secure Blockchain system.

On the other hand, cryptocurrencies are created within the Blockchain system and rely upon cryptography (secret blocks in a wall) for these currencies to be created. In a bid to simplify it, this author shall make use of a “divide and explain system” in which the main words would be broken into root words and subsequently explained. In this context, “cryptography” is the main word, which consists of two root words—“crypto” and “graphy”. “Crypto” means “secret or hidden [2]”, while “graphy” means “in a specified

manner [3]¹. The combination of the two roots words would mean a secret system or a secret mannerism of operations. This article seeks to examine the adoption of Blockchain in various industries as well as examine means of solving Blockchain-related disputes.

2. Impacts of Blockchain in the Global Economy

The Blockchain technology works with a decentralized system, which ultimately removes the direct control of government or a central imposing authority. This feature has made it to be favoured among people in the world, providing the room and access to conduct large-scale transactions with ease. In addition, the Blockchain system is considerably fast and comes with low transaction fees compared to traditional financial systems. Under the Blockchain technology, multiple entities referred to as miners work under a coordinated network referred to as consensus mechanism. Through the consensus mechanism, transactions can easily be verified and more importantly, remain pseudonymous as no one is directly in control, thus preserving the trust and control of the system.

Owing to the several benefits attached to the Blockchain technology, various industries are adopting its technology in their work mechanisms. In the Figs. 1 and 2 below, you would see lucid examples of how various industries are incorporating Blockchain into their systems.

These adoptions have shown that indeed Blockchain is gaining ground. However, owing to the cryptographic nature of the systems, it leaves a lot to be discussed by government agencies, regulators, and even large financial institutions which might want to play big within the system. With the varying level of involvements, disputes appear to be a critical discourse as humans are indubitably involved already. It is common knowledge that within the gathering and interactions of various individuals, disputes are bound to exist, no matter how little. This leads to the subject matter of this article which is to discuss various dispute resolution mechanisms within the Blockchain technology.

Current Blockchain Implementations

- **Pharmaceuticals** - DHL worked with Accenture to establish a blockchain-based track-and-trace system in six areas worldwide. Currently, the system has 7 billion unique pharmaceutical serial numbers and handling more than 1,500 transactions per second.
- **Fashion** - CGS has developed a system for tracking garments and compliances on raw materials for many apparels and fashion clients.
- **Cross-Border Payments** - IBM has developed a new blockchain banking solution that allows financial institutions to move quickly and cost-effectively process payments globally.
- **Food Safety** - IBM has partnered up with Dole, Nestlé, and Walmart to set up a blockchain for better regulation of food.
- **United Nations** - United Nations is currently using Blockchain for 16 agencies including Human Trafficking and World Food Program.
- **Jewelry** - Brilliant Earth has partnered up with Everledger to use blockchain in tracking and tracing the provenance of diamonds and other gemstones. This will also ensure that they are conflict-free.

Fig. 1. Visual representation of Blockchain implementations and disruptions [4].

¹ Accessed from <<https://www.merriam-webster.com/dictionary/-graphy>> on June 20, 2024.

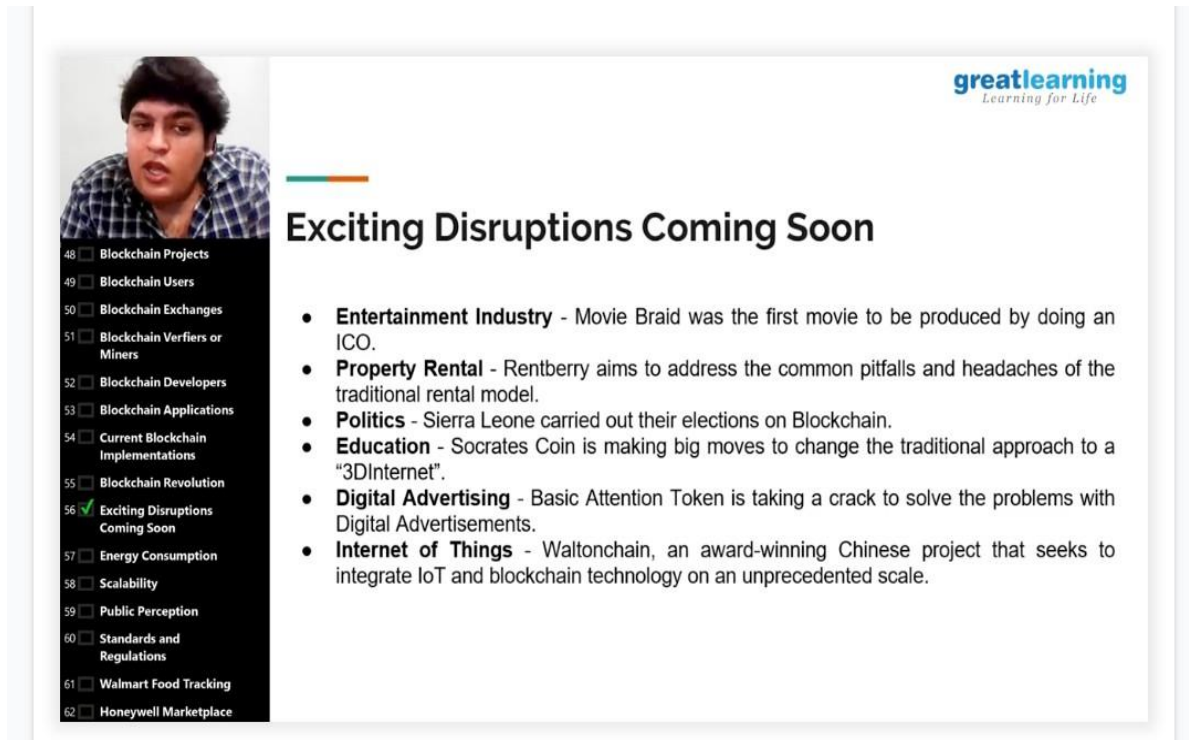


Fig. 2. Visual representation of Blockchain disruptions.

3. Judicialization of Blockchain Systems

The Blockchain system is regarded as a disruptive technology that would revolutionize various industries with its three core features; transparency, speed and privacy. For proper context of this subject matter, reference would be made to the smart contract built on the Blockchain. A smart contract is not to be taken by its literal wordings as a “contract”, rather it is a computer program built within the Blockchain system that allows users to self-execute their instructions [5]. This is in tandem with the security and transparency that Blockchain offers as a whole. With a smart contract, there is no need for a controlling body to enforce agreed terms between users, all that is needed to input instructions onto the program and effectuate it. A familiar example would be given in the instance of Ethereum as it is built on a smart contract technology. Two users within the Ethereum ecosystem can interact (i.e. buy and sell) by entering the private keys on their wallet and processing it. This is done at the speed of light and each party gets what's requested for. It should be noted that this is a basic illustration of how smart contract works—self-executing and without external control. In essence, smart contracts are not contracts, but a means by which a contract is executed [6].

The images attached above reflected the penetration of Blockchain into various industries, and the judicial system has not been left out in this radicalization. With the inevitability of disputes within the ecosystem, it has even been noted that Blockchain now has developed systems that are tilting towards an inherent tendency for judicialization [7]². This connotes that the Blockchain technology is now incorporating judicial functionalities into its system. These judicialized innovations are regarded as decentralized justice platforms. Decentralized justice platforms are applications built on the Blockchain

² Pietro Ortolani, 'The Impact of Blockchain Technologies and Smart Contracts on Dispute Resolution: Arbitration and Court Litigation at the Crossroads' (2019) 24 Uniform Law Review 430, 432

which helps to facilitate contract dispute resolution of smart implemented contracts, either through arbitration or mediation [8].

Flowing from the last sentence, mediation and arbitration are mentioned, signalling the usage of Alternative Dispute Resolution in Blockchain-related disputes. The rationality for the adoption of ADR in Blockchain related disputed is closely linked to the key features of Blockchain itself. ADR processes are reputed to be associated with privacy, speed and efficiency. This is a prototype of what the Blockchain technology is built upon; a decentralized system with mostly pseudonymous users making use of secure systems for fast transactions. With this, the traditional court system is avoided as it negates the decentralization and privacy tenets of Blockchain. The United States of America's Court of Appeals already established in the case of re Telingent Inc [9] that; "confidentiality is an important feature of mediation and other alternative dispute resolution processes".

Accordingly, this lays a strong premise for the inclusion of Alternative Dispute Resolution in Blockchain-related disputes.

4. The Usage of ADR in Blockchain-related Disputes

Alternative Dispute Resolution is an important mechanism in the resolution of Blockchain-related disputes. Recent applications of ADR in the Blockchain have generally adopted Arbitration as the go-to action and this often takes two forms to fully operate. These two are

- On-chain Arbitration.
- Off-chain Arbitration [10].

4.1. On-chain Arbitration

On-chain Arbitration can be depicted as the usage of ADR on the Blockchain system. The consequence of this is that filling, hearing, the final decision and arbitral awards are done through a decentralized smart contract system (also known as decentralized justice system platforms). Through these platforms, the arbitral awards would be enforced by the smart contract (being a self-executing program). Currently, on-chain Arbitration platforms like Kleros, Juris, Confideal, Mattereum, CodeLegit exist [11].

Since this article focuses on dispute resolution in the Blockchain ecosystem, it would be plausible to examine one of these on-chain arbitration and how it works. The platform to be analysed is Kleros. Kleros is a Decentralized Autonomous Organization (DAO) built upon the Ethereum Blockchain. It is one of the foremost decentralized justice system platforms that arbitrate on matters concerning e-commerce, insurance and finance. It has been reported that more than 500 disputes have been resolved through Kleros, with over 400 jurors taking part and over \$123,000 paid as arbitration fees as well [12].

Through an overview of Kleros' white paper, the following can be deduced.

- Two parties coming into agreement on a smart contract, agree to include Kleros as their dispute resolution mechanism.
- In the event of a dispute, they log on to the ecosystem requesting intervention and hearing.
- There's the Website Quality sub-court which list the requisite skills for an arbitrator or juror.
- Having confirmed that a arbitrator or juror meets up, he or she is required to invest Pinakion (which is the crypto token on Kleros) so as to be appointed.
- The higher you invest, the more your chances of getting selected as an arbitrator/juror.
- Once a juror is picked, he is sent the evidence and allotted three days to make a final decision along with other jurors. Most times, the jurors are three for a case and the available options for remedy are listed on the ecosystem.

- The remedy with the majority votes will be programmed onto the smart contract and the decision will be self-executed as appropriate.
- It should be noted that only a juror who has one of the majority votes will be paid. Kleros explains that this is to encourage honesty and ensure that only the right decision is rewarded.
- When an individual is not satisfied, he may appeal. For an appeal, the same process is repeated on Kleros, only that an individual would be added to the existing jurors.
- For reference purposes, here is a pictorial representation of the deductions from the Whitepaper.

Although, this seems like a ground-breaking innovation, there are visible lacunas in its operability. Due to the Blockchain being largely anonymous, an individual could create several accounts allowing for manipulation of the arbitral award³. Furthermore, it provides room for bias since only the jurors with the “correct votes are paid”. Even though, these challenges exist, Kleros is a strong foundation for on-chain arbitration platforms which seems to provide justice for the “unjustified” just as Bitcoin brought banking for the unbanked.

4.2. Off-chain Arbitration

On the other hand, off-chain arbitration follows the nomenclature—“arbitration conducted off the Blockchain technology”. Simply, it means that with off-chain arbitration, conventional ADR systems are incorporated to resolve disputes. This is because this method does not provide for automatic enforcement through the smart contract. A notable example can be seen in Poland where a special court has been set up for Blockchain-related disputes within the Chamber of Commerce for Blockchain and New Technologies. Since many countries have ratified the UNCITRAL Model Law on International Commercial Arbitration, many of these platforms have thus resorted to it, hinging jurisdiction on Article 20 of the UNCITRAL Model Law which provides that ‘*parties are free to agree on the place of arbitration*’.

5. Conclusion

As time passes, more disruptive technologies are expected to emerge. As such, there's a wave of positive wind surrounding improvements on decentralized justice platforms. While Kleros was extensively analyzed, there are many active platforms like Aragon which provides for court on its Blockchain, Sagewise and ECOS are also notable examples of growing on-chain arbitration platforms. Undoubtedly, not all forms of disputes can be solved through arbitration as it is considerably limited in scope for example, divorce or extreme criminal matters are not arbitrable. But matters of contract can be relatively secure to be taken to these platforms and be resolved. Above all, there is a cogent need for industry experts, investors and stakeholders to continue to work together to improve Blockchain technology.

Conflict of Interest

The author declares no conflict of interest.

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