

Smart Contracts: The Blockchain Revolution in Contract Law

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Abstract

Emerging technologies play pivotal role to accelerate the application of various developing sectors of the world. Automation and digitalization coupled with blazing fast networking have the potential to automate the execution of civil law. More precisely, smart execution and enforcement of contracts. With this notion in mind, this short article elaborates on the technical attributes of smart contracts and the technology that empowers it, the “Blockchain” and Distributed Ledger Technology or DLT. Moreover, the author of this article strived to emphasize the need for regulatory compliance of this evolving technology with reference to the adoption of smart contracts in various jurisdictions. Finally, the goal of this article is to extrapolate the exigencies of smart contract and how it can revolutionize the traditional contract law with automation and efficiency.

Keywords: Smart contracts, Blockchain technology, Distributed ledger technology (DLT), Regulatory compliance, Civil law automation.

Introduction

The advent of the Fourth Industrial Revolution (4IR) has brought a multitude of advancements in our contemporary development sectors. Technology has envisaged tremendous growth due to innovation in the internet. The 21st century has bestowed on us some ingenious technological tools. Among those tools, “blockchain technology” is the most prominent emerging technology. The emergence of this technology will act as a catalyst for 4IR by providing insurmountable opportunities for data integration, authenticity in various sectors of the world, such as: finance, banking, marketing, healthcare, and supply chain management. The world’s largest logistics and digital market platforms, for example, Amazon, Walmart, etc., have successfully integrated blockchain technology into their business models.¹

Research Aims and Objectives

The primary aim of this short article is to **investigate the potential of smart contracts and their impact on traditional contract law**. This explores how this technology, facilitated by blockchain, can automate contract execution and potentially revolutionize the legal landscape. In order to attain this distinct goal the author incorporated below referred research objectives:

- To investigate how blockchain technology works technically and how it helps to make smart contracts possible.
- To evaluate how standard and smart contract execution methods differ in terms of automation

¹ 1. See, e.g., Klaus Schwab, The Fourth Industrial Revolution (2016).

- To assess the possible advantages of smart contracts, including lower costs and higher efficiency.
- To investigate the legal issues surrounding the implementation of smart contracts, especially those pertaining to their enforceability in various legal systems
- To give a summary of the many kinds of smart contracts, such as auxiliary and code-only models.

Methodology

This article employs a literature review methodology. This article analyzes existing research on smart contracts and blockchain technology, including academic studies (e.g., Upadhyay et al., 2021), legal documents (e.g., Uniform Commercial Code - UCC, Uniform Electronic Transactions Act - UETA), and reports from credible institutions (e.g., Harvard Law School on Corporate Governance). By critically analyzing this body of research, I tried to draw conclusions and insights about smart contracts and their potential future.

Blockchain Technology and Smart Contracts

Blockchain technology emerged as a sophisticated technology that harnesses the power of “Distributed Ledger Technology,” or DLT, which is operated by cryptographic currencies such as: “Ethereum” or “Bitcoin.” This technology, once utilized, forms its credentials in decentralized, transferable, inoperable, and immutable blocks, which then transform into chains of information encrypted by state-of-the-art hashing algorithms that significantly ensure the blocks immutability and safety. Additionally, this technology runs on P2P (Peer to Peer) networking, which makes the transmission of the blocks swift and convenient, as well as the cryptography working in the backend of the smart contracts, which is powered by mining algorithms. The finalized result is the execution by if/then basis, which ensures that if a certain event A occurs, then the DLT will automatically initiate clause B. Apart from the technical ambiguities, one of the most widely adopted and highly debated utilities of blockchain technology is the inception of “Smart Contracts,” which rigorously abides by the technicalities of this emerging technology.²

Smart Contracts vs. Traditional Contracts

The advent of smart contracts has significantly automated the contract execution process between contracting parties, and the utilization of cryptographic technology such as: blockchain has made commercial transactions more fluid and promptly accessible to the parties. According to one study (Upadhyay et al., 2021), smart contracts are self-executing, self-generated with automated enforcing mechanisms, which has the potential to outpace conventional written contracts as they possess lexical ambiguities.³ Contemporary contracts rely on intermediaries such as: judiciary, lawyers, and 3rd party beneficiaries for enforcement purposes and solely dwell on the statutory common law principles of contract, which include the involvement of “offer,” “acceptance,” and “consideration.”

On the contrary, smart contracts automate those principles or at least expedite the fundamentals of contract law. A research paper written by the Harvard Law School on Corporate Governance in 2018 has

² See Don Tapscott & Alex Tapscott, *Blockchain Revolution: How the Technology Behind Bitcoin is Changing the World* (2016).

³ Upadhyay, A., Jain, S., & Singh, S. (2021). Smart contracts as a disruptive technology in supply chain management: A framework for research and applications. *International Journal of Production Economics*, 233, 107881. <https://ieeexplore.ieee.org/document/9994083>

extensively made some critical assumptions regarding the future implications of smart contract enforcement across multi- jurisdictions.⁴ The study has revealed that automation relies on two distinct functions. Firstly, swift payment mechanisms are based on coded functionalities; here, the conditionalities are pre-inserted into the blockchain algorithms via software programmers. Secondly, the imposition of penalties on the parties if the pertinent elements of the agreements incorporated in the smart contracts are not complied with, which consequently reduces costs associated with intermediaries such as: courts, escrow services, and third parties, who will no longer be involved in the enforcement procedures of smart contracts.

Practical Applications of Smart Contracts

When it comes to the utility of smart contracts in the financial and supply chain management sectors, two categories are mostly prevalent. The first iteration of such an automated contract is the “code-only smart contract,” where the parties to the agreement summarize their pre-contract negotiated agreements into executable code by the blockchain programmers. The second iteration involves a unique blended approach that consists of elements found in the code-only contract but additionally adds conventional text-based agreements or contracts along with the code for effectuating the enforceability of the contract itself. Such contracts are known as “ancillary smart contracts.”

One such insurance company that is successfully implementing two iterations of the aforementioned contracts is known as “AXA Insurance Company.” It is a French multinational company with various subsidiaries across the globe. This company, according to the study, uses a comprehensive flight insurance plan that incorporates the blended approach mentioned above. This insurance company provides coverage for inordinate delays in the flight schedule, and the insurer shall give a pay-out after analyzing the verifiable delay in the flights. The premium paid by the insured here shall act as consideration for the contract of insurance. Here, the insurer company is utilizing the code-only contract to automate the pay-out and executing the contract along with returning damages for verifiable- delays in flights . In order to assess the automated pay-outs code-only contract is utilized, and the latter is analyzed by an ancillary smart contract.

Need for Standardization of Smart Contract and Smart Legal Energy Contracts (SLEC)

Standardizing smart contracts plays a crucial role in facilitating secure and compliant cross-border payments. However, achieving granularity and regulatory compliance within standardized smart contracts presents a significant challenge. To address this gap, this research delves into the existing literature on smart contract standardization.

One prominent study by Cali et al. (2022) proposes a reference model for standardization in the context of smart legal energy contracts (SLEC). While focusing on the energy sector, this model offers valuable insights potentially adaptable to cross-border payments. The proposed holistic, language-agnostic model emphasizes interoperability across different systems by introducing device, syntactic, and semantic layers.

However, Cali et al. (2022) acknowledge the need for further research on integrating compliance mechanisms within the reference model. This highlights the research gap this study aims to address.

⁴ Levi, Stuart D., & Lipton, Alex B. "An Introduction to Smart Contracts and Their Potential and Inherent Limitations." Harvard Law School Forum on Corporate Governance, May 26, 2018, <https://corpgov.law.harvard.edu/2018/05/26/an-introduction-to-smart-contracts-and-their-potential-and-inherent-limitations/>.

Building upon existing work on standardization, this research will explore methods for standardizing smart contracts to ensure regulatory compliance in cross-border payments.⁵

Legal Considerations and Regulatory Landscape

So, the question arises what are the margins that will ensure the enforceability of such types of contracts? Likewise, different jurisdictions are considering the adoption of smart contracts into their legal systems. The United States, for instance, has adopted different legislative frameworks throughout the states for delineating the legal requirements for smart contracts. According to the Uniform Commercial Code (UCC)⁶ and state statutes of fraud, the USA has acknowledged the use of smart contracts. The acts confer that in order to be enforceable, contracts need not be wholly written, and moreover, code-only smart contracts, even though written digitally, are not prejudicing the principles of contract formation.

Another critical piece of civil legislation pertaining to digital transactions in the US, known as the Uniform Electronic Transactions Act (UETA) 1999⁷, is a federal statutory law that governs digital transactions across 47 states. It recognizes that “Electronic Agents” can act upon electronic records and interact with parties while, remaining within the parameters of programming delineated by the software developers, and the express acknowledgement of parties initiating the services of the electronic agents is mandatory. UETA has been modified by the states of Nevada and Arizona to incorporate smart contracts into their legal systems. So the state-specific application of different elements of smart contracts implies that the USA has acknowledged the utility of smart contracts and their enforceability.

On the contrary, the state of Belarus has explicitly incorporated smart contracts into its legal system, considering the application of smart contracts fully enforceable. Belarus has been at the forefront of smart contract adoption, with some sources indicating the legal recognition of smart contracts within its legal system. However, the specific legal framework governing their enforceability remains unclear. Moreover, the UK, on the other hand, has acknowledged the binding effect of a smart contract as long as it complies with the legal requirements of contract law applicable to England and Wales, and a valid agreement must exist before executing the smart contract in the UK.⁸ Australia also recognizes the enforcement of smart contracts and their legal impact, as long as such contracts follow the common law principles of contract formation.⁹

Likewise, Bangladesh, being a thriving economy and a harbinger for economic breakthroughs in South Asia, also understands the progressive power of smart contracts and blockchain technology. So, in order to facilitate this agenda, Bangladesh has drafted a “National Blockchain Strategy”¹⁰ that aims to expound on the disruptive capabilities of Blockchain based smart contracts.

According to the national strategy, Bangladesh prefers to implement both public and private blockchain technology by gradually mitigating security risks. Bangladesh has yet to harness the full power of

⁵ Standardization of Smart Contracts for Energy Markets and Operation." TechRxiv preprint (February 08, 2022), doi: 10.36227/techrxiv.19142081.v1.

⁶ Uniform Commercial Code (UCC) (1952)

⁷ Uniform Electronic Transactions Act (UETA), (1999)

⁸ see, e.g., Law Commission of England and Wales, "Smart Contracts: A Preliminary Mapping" (2018)

⁹ Spagnolo, Lisa, & Hayward, Benjamin. (2018). Smart Contracts – How smart are they?. Monash University Faculty of Law. <https://handbook.monash.edu/2020/units/FIT5224>

¹⁰ Bangladesh. National Blockchain Strategy. [2020],

https://bcc.portal.gov.bd/sites/default/files/files/bcc.portal.gov.bd/page/bdb0a706_e674_4a40_a8a8_7cfccf7e9d9b/2020-10-19-15-03-391a6d9d1eb062836b440256cee34935.pdf

blockchain enabled smart contracts but has national agendas to utilize this emerging technology for attaining Sustainable Development Goals (SDGs). Specifically, “SDG 7” that promotes resilient and inclusive infrastructure, sustainable industrialization, and the fostering of innovation.¹¹

The government of Bangladesh has envisioned a laudable roadmap in the aforementioned strategy that acknowledges various utilities of smart contracts such as: E-KYC , pension, payment, mutation, land record management, verification , employment, digital evidence, health , disaster management, supply chain management, etc. , which shall be systematically infused in the three primary organs of the government to transform the governance of the nation into “e-governance” so that the ambition of Smart Bangladesh and LDC graduation, followed by the pathway to a developed nation, will be an attainable dream for us.

Key Takeaways:

This article investigates the potential of smart contracts, a technology facilitated by blockchain, to revolutionize traditional contract law. Here are the key findings:

- **Blockchain technology offers a secure and transparent platform for smart contracts.** It utilizes distributed ledger technology (DLT) with cryptographic hashing and peer-to-peer networking to ensure data integrity and immutability.
- **Smart contracts automate contract execution.** Compared to conventional contracts reliant on intermediaries, smart contracts streamline enforcement through self-executing code based on pre-defined conditions ("if/then" logic) embedded in the blockchain.
- **Smart contracts can improve efficiency and reduce costs.** By automating tasks and eliminating the need for intermediaries, smart contracts have the potential to expedite transactions and save resources.
- **Smart contracts pose legal challenges related to enforceability across jurisdictions.** While the United States has taken initial steps towards recognizing smart contracts through state-level adoption of the Uniform Commercial Code (UCC) and the Uniform Electronic Transactions Act (UETA), a comprehensive legal framework for smart contracts across all jurisdictions is still lacking.
- **Two main types of smart contracts exist: code-only and ancillary.** Code-only contracts rely solely on computer code for execution, while ancillary contracts combine code with traditional written agreements.

Overall, the article suggests that smart contracts hold significant promise for automating contract execution and enhancing efficiency. However, legal frameworks need to evolve to address issues surrounding enforceability and ensure the secure and responsible implementation of this technology.

Concluding Remarks:

The development of blockchain technology has made it possible for smart contracts to arise, which has completely changed the way contract law is practiced. Smart contracts increase transparency, expedite procedures, and do away with the need for middlemen by automating the implementation and enforcement of agreements. But there are still difficulties. Jurisdiction-specific regulatory frameworks

¹¹ United Nations. (2015, September 25). Sustainable Development Goals. <https://sdgs.un.org/goals>

are currently developing to handle the special needs of smart contracts. Robust development processes are also required due to worries about potential code flaws and security risks.

The potential of smart contracts is evident despite these difficulties. Transactions in the digital era could be revolutionized by smart contracts as technology develops and legal systems adjust. In a variety of industries, including finance, supply chain management, healthcare, and intellectual property protection, they can promote increased effectiveness, trust, and security. Additional investigation and collaboration between legal and technological experts are crucial to ensure the responsible and secure implementation of smart contracts, paving the way for a future of automated and secure transactions.