

Smart Contracts: An Opportunity for Company Modernization in a Post-COVID-19 World

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Abstract

Although smart contracts already existed before COVID-19, some Ecuadorian companies still show delays in the modernization of their contractual processes, which goes in the opposite direction to the needs that a digital society demands. The need to promote the implementation of technologies that minimize physical contact of people and optimize resources has been evidenced. In addition, based on the effects of the pandemic, the contractual dynamics of Ecuadorian companies force us to make the definitive digital step in this field that still is not present at all, even though there is national and international legislation that allows it. In the national and international context, it becomes imperative to consider the use of smart contracts. This paper presents a descriptive methodology to use smart contracts as an alternative for improvement in digitization processes as a vision to eliminate distance barriers between the parties, automatic execution of the clauses and conditions, elimination of paper, optimization of resources, and improvements over time.

Keywords

Smart contracts, COVID-19, Optimization

1. Introduction

We live in a society where technology increasingly affects the way we relate and connect with others [1]. In addition, after the arrival of COVID-19, technology plays an important role in the world, and the case of Ecuador, is not exception, since many business practices had to change such as working at home, digitization of processes, communication, etc.

Now, in the post-COVID-19 era, the aforementioned business practices have come to stay and in the contractual dynamics, there have also been substantial changes in some Ecuadorian companies; however, certain relevant technologies to this issue still need to be consolidated. The influence that technology has had overtime on acts of commerce is very big, indeed it is currently, in most cases, unnecessary to physically approach some entities like banks, markets, etc, since there are applications that allow most procedures [2, 3].

Another example to highlight is the delivery service since some years ago, it was imperative to have a conventional telephone in which people had to wait for hours until the company

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managed to assist the customers. Currently, there are applications such as *Pedidos Ya*, *Uber Eats*, *Rappi* among others that allows customers to request food from the desired restaurant through their application.

However, in the world of contracts, technology has also played a fundamental role. For example, before the COVID-19 era, electronic contracts already existed. They are defined as a contract that is carried out through the use of some electronic element, when this has, or may have, a real and direct incidence on the formation of the will or the future development and interpretation of the contract i.e., it would be those contracts that, regardless of their legal nature –purchase, lease, commission, etc.– and irrelevance of their object –assets or rights–, are celebrated substituting the oral and written language, which presides over the contracting traditional private, due to the essential electronic language to implement the declarations of contractual will [4]

In this definition we can realize that the technology in the world of contracts already existed some years ago; however, these practices have evolved. They are going from simple digitization of contracts to the help of technology for the execution of these contracts automatically.

This automation of contract execution is thanks to the blockchain whose operation consists of the storage and collection of data called DLT or *Distributed Ledger Technology*, which has a similar operation to that of an accounting ledger, since it saves and details a record of all transactions that are carried out, disabling any modification of the contained data.

Technology in the world of law is already a reality and in the post-COVID-19 era, it has forced some Ecuadorian companies to change their contractual dynamics, leaving aside traditional contracts in which signatures are taken by hand in a physical way, paper spending is high, executions of the contracts are carried out by human teams, the legal cost is high both in terms of time and money, etc.

In this context, this paper has the general objective of analyzing the benefits that smart contracts provide to companies in the contractual dynamics, in order to reduce physical contact, optimize resources, and digitize processes as well as compile the different provisions related to smart contracts in the different contractual activities in Ecuador, determine the methodology to be used for the study of smart contracts, compare the conventional contractual dynamics in companies versus smart contracts to know the benefits of this new tool.

2. Background

2.1. Smart Contracts

In the 1990s, the expression *smart contract* began to sound through the lawyer and cryptographer Nick Szabo, who launched this term to the world to try to explain the evolution of common contracts with particularities such as automatic self-executing clauses through a programming code [5]. However, Szabo's idea was not as easy to implement at that time when technology had not advanced as it is today; therefore, it was still pending to build its operation mechanics.

Years later, the emergence of the fourth industrial revolution, which brought with it the blockchain, contributed significantly to crystallizing the idea of Nick Szabo.

According to Padilla Sánchez [1], a smart contract is a software that allows the automatic execution of codes that incorporate obligations between previously agreed-upon parties and

that are stored in a decentralized registry, upon verification of the codified conditions. Given this idea, technologies such as blockchain become essential for smart contracts to be able to carry out day-to-day operations.

To be more illustrative, we can compare smart contracts with a coffee vending machine, since this machine throws the requested product as long as the buyer meets the transaction requirements. Smart contracts work in the same way since they only come into legal life if the parties comply with all the enabling requirements [6].

Thus, smart contracts and blockchain technology are two different elements that complement each other, since although it is true that the smart contract comprises a self-executing computer program through the agreements previously established by the parties, all of this is possible thanks to the technology used in the blockchain [7, 8].

In the case of Ecuador, the smart contract is recognized as an intelligent contract and its definition can be found in the reformed Commercial Code published on May 29, 2019, states in article 77:

Smart contracts are those produced by computer programs used by two or more parties, who agree to clauses and sign electronically. The smart contract program facilitates the signing or expression of the will of the parties, as well as ensures compliance through provisions instructed by the parties, which can even be fulfilled automatically, either by the program itself, by a financial institution, or by another party, if at the signing of the contract the parties establish that provision. When a pre-programmed condition is triggered by the parties that are not subject to any human evaluation, the smart contract executes the corresponding contractual clause. In the absence of a contractual stipulation, the administrators of said program or those who have their control will be responsible for the contractual and non-contractual obligations that arise from the signed contracts and in any case, the provisions that protect the rights of the consumers will be applicable.

We can clearly see that Ecuador has taken a big step in Commercial Law by including this type of contract in its legislation. In this way, legal security is generated for companies with revolutionary practices in contractual matters.

2.2. Evolution of contracts

The Ecuadorian Civil Code in its article 1454 defines the contract as an act by which one party is obliged to another to give, do or not do something. Each party can be one or many people. In order to briefly understand how the contracts have evolved, we must take a starting point of reference. Analyzing the origin of the word contract, etymologically it comes from the Latin *contractus* which according to Ramirez Hernandez [9] means pact or agreement, oral or written, between parties that are bound on a specific matter or thing, and whose compliance can be complied. Thus, the concept of contract dates back to the early days of Rome, where it was not properly considered an agreement of wills; however, it was considered a bond or subjection of two or more parties. For classical law, contracts are those agreements that have a specific name and a particular regime. Justinian law considered contracts as an agreement of wills aimed at creating or transmitting rights and obligations [10].

Then, the concept of a contract is very old, and over time it has gone from being a simple *agreement* to being in modern times an act in which the parties agree to give, do or not do.

According to Hart et al., [11], in their work *The Theory of Contracts*, modern economies are held together by countless contracts. Hart, in his work on the theory of contracts, also says [11]

In order for a relationship be it labor with the state or between partners to be successful, it is necessary to eliminate asymmetries in information since these play against the good performance of society. As a result of this, contracts are created with the aim of eliminating these asymmetries and helping the proper functioning of both productive and institutional relationships.

Thus, we can realize that contracts in the economy are fundamental; as a result, there are no businesses in which contracts do not intervene, either to agree on transcendental points of the negotiation or to prevent certain details that become important at the time of a breach. Thanks to well-crafted contracts, resources are allocated more efficiently, higher production can be achieved, and trade barriers can be eliminated [11]. Thanks to globalization and technology, contracts have had to evolve and go from taking signatures between the parties using pen and paper to being able to use electronic contracts.

According to Davara Rodríguez et al. [4], an electronic contract is a contract that is carried out through the use of some electronic element when it has or may have a real and direct impact on the formation of the will or the future development or interpretation of the agreement.

With this definition, we can understand that an electronic contract is fundamentally a distance contract with particularities such as the electronic medium used for the formation of the will, and an electronic means of consent is used.

Electronic contracts are used mostly by companies engaged in electronic commerce. It is very common to see an agreement and conditions clause before performing the purchase of any product or service. As an example, Amazon before creating a new account notifies users of accepting its conditions of use and the privacy notice; that is, it is no longer necessary for the company to send each user the documents to their address in order to take the corresponding signatures; however, with just one click, users accept all conditions that the company considers pertinent. This, without a doubt, saves money on logistics and paper issues, since the transfer of contracts, or paper impressions increases the company's expenses and, in the framework of a pandemic such as COVID-19, change is forced.

Nevertheless; in such a modern world, smart contracts needed to evolve, since accepting policies and conditions or signing electronically helps a lot, but an issue as relevant as the execution of contracts was still left out. In the past, the execution of contracts was a job in which an intermediary was necessarily needed; thus, resorting to ordinary justice was imperative to enforce agreements that were not respected, and this caused additional expense for lawyers and delays in the nature of a trial. As a result of that, the *smart contract* was born as an alternative for companies that need their clauses to be executed automatically and instantly.

According to Raskin [12], the great advantage of smart contracts is that they are very difficult to be altered or revoked once they have been put into operation and even more when their automatic execution has occurred. This irreversibility and immutability guarantee the fulfillment and effectiveness of the obligations.

The functionality of smart contracts occurs due to conditional propositions that can be entrusted to software thanks to the possibility of entering into programming code some of the clauses or provisions of a contract, which the parties previously had to consent to.

This is why any agreement between the parties can be automated thanks to the existence of blockchain technology since this chain constitutes an ideal technological platform to program and register this type of smart contract whose self-execution depends on the verification of previously established conditions. between the parties and without the need for the intervention of any of them or an intermediary

Blockchain technology enters to solve possible difficulties in the execution of contracts, thanks to the fact that the generation and maintenance of information are carried out through an encrypted and decentralized registry that is supervised by each and every one of the members of the network. Therefore, since there is no central repository of the information with which the smart contract will operate, it would be necessary to violate the entire network to modify the terms of the contract or seize the assets that it may have, which is practically impossible. This provides a very high level of security and transparency that is in line with the objectives of operations carried out with smart contracts [13].

For this reason, the philosophy of smart contracts fits perfectly with the blockchain ecosystem. Once they are programmed by the will of the parties, the execution of the smart contract does not need a central authority or intermediary to carry them out. With this, many commercial exchanges are potentially more efficient by reducing the transaction costs associated with both the default of the counterparty and those derived from going to court to claim compensation [13].

The process of smart contracts has the following activities:

1. **Negotiation:** First approach in order to reach a future agreement.
2. **Consent:** Manifestation of the will of making a contract and authorization of the execution of the contract.
3. **Convention:** The arrangements from the parties are embodied in an agreement that is transformed into a source code.
4. **Blockchain:** The agreement is possible thanks to the inalterability of data, security by encryption, and reductions in costs.
5. **Autoexecution:** Through a platform that executes the agreements of the contract.
6. **Result:** Benefits satisfied.

3. Methodology

The methodology used in this work is descriptive methodology since it implies observing and describing the behavior of a subject without influencing it in any way. This methodology allows measuring the information collected in order to systematically describe, analyze, and interpret the characteristics of the studied phenomenon based on the reality of the proposed scenario.

This methodology is responsible for specifying the characteristics of the population under study. This methodology focuses more on the *what*, rather than the *why* of the research subject. In other words, its objective is to describe the nature of a demographic segment, without

focusing on the reasons why a certain phenomenon occurs. That is, it describes the research topic, without covering why it occurs [14].

There are some of the most important characteristics of descriptive methodology [15]:

- It is necessary to know in advance the variables that will be analyzed since this type of research is not dedicated to the search for variables, but to their study.
- It is possible to make forecasts, but these are not entirely reliable, since they are considered premature.
- It is possible to use descriptive research to classify the data collected in the study that is being carried out, separating them into different categories of description.
- There is no control over any of the variables that affect the event or problem under study.
- In most cases, descriptive research collects data on quantities.
- The data provided by descriptive research must be both accurate and reliable.

This method is used to obtain a general vision of the subject under study and to analyze the different literature and contractual practices that are carried out in several countries. In addition, this method allows for identifying updated content in different sources such as scientific articles with characteristics very similar to the objective of the proposed topic and relevant from a research perspective.

Since there is not much quantitative information, the descriptive methodology is useful for this work. This study describes and allows identifying the benefits of using technology in a traditional contract drafting process in the context of a post-COVID-19 world.

4. Contractual dynamics in a Post-COVID era: Ecuador as case study

Before the COVID-19 pandemic, each organization carried out digital transformation at its own pace; however, there is new normality with the arrival of the COVID-19 pandemic and this transformation has ceased to be a process or future objective to become a prevailing and unavoidable reality that will define how companies will survive in the current post-COVID-19 era.

This new normality in the post-COVID-19 era has made contract management tools essential for operational continuity, a trend that will surely endure over time. Ecuador is one of the countries hardest hit by the COVID-19 pandemic as reported by the WHO in 2020 [16]. It has had to stop seeing the virtual and electronic as something desirable or very distant in most companies and institutions, as a new reality, as something that has to be executed now to stay connected with the new challenges that the business world brings us.

Unfortunately, there is no data from institutions that collect information on how many companies still use the typical contractual process, in which the parties intervene, contracts are printed, contracts are gathered or sent through courier companies, signatures and files in an office with many folders.

For instance, in Ecuador, several companies request users to print, sign, scan, and send the contract as well as send a picture with an image of the acceptance of the service. As a

Table 1

Comparison between conventional and smart contracts

| Conventional Contract | Smart Contract |
|-----------------------------------------|--------------------------------------------------------------|
| Use of paper is essential | Remove use of paper |
| People are needed to execute a contract | Software is needed for the automatic execution of a contract |
| Inefficient storage | Optimized storage |
| High physic contact | Minimum physic contact |
| High operational cost | Low operational cost |

consequence of the pandemic, companies had to improvise a new way of contracting in order to continue offering their services, since the restrictions of COVID-19 were very tough. As a result, contracting processes in Ecuadorian companies have been using pen and paper and technology has been wasted.

Nevertheless, there is a group of Ecuadorian companies that have been venturing into electronic commerce and have opened this channel as a source of important income. These companies are promoted in an event organized by the Guayaquil Chamber of Commerce called *Cyber Monday*. This event consists of Ecuadorian companies that have an electronic channel available to make sales, participate in a kind of electronic fair and offer potential customers discounts that they will not find in physical stores. This virtual modality generated more than 2 trillion USD. Asia captured 44%, Europe 26%, North America 26%, and South America 2%. Based on this, electronic commerce exists in Ecuador, but at the regional level, the country does not reach a desirable level in this modality, as developed countries do.

Table 1 presents a comparison of the most relevant features between conventional and smart contracts.

4.1. Ecuadorian regulations

When applying for smart contracts in Ecuador, we must take into account what its legislation says about the validity of the current commercial code, since smart contracts are briefly conceptualized. In this sense, the Ecuadorian regulations are mentioned as follows in article 77 of the Commercial Code, which states [17]:

Smart contracts are those produced by computer programs used by two or more parties, who agree on clauses and subscribe electronically. The smart contract software facilitates the signing or expression of the will of the parties, as well as ensures compliance, through provisions instructed by the parties, which can even be fulfilled automatically, either by the program itself, by a financial institution, or by others, if at the signing of the contract the parties establish that provision. When a pre-programmed condition is triggered by the parties, not subject to any human evaluation, the smart contract executes the corresponding contractual clause. In the absence of a contractual stipulation, the administrators of said program or those who have their control will

be responsible for the contractual and non-contractual obligations that arise from the contracts entered into in this way, and in any case, the provisions that protect the rights of the users will be applicable.

In addition, the law of Electronic Commerce, Signatures, and Data Messages also regulates the computer or electronic contract in article 45 which says [18]:

Validity of electronic contracts. Contracts may be implemented through data messages. The validity or binding force of a contract will not be denied for the reason that one or more data messages have been used in its composition.

Article 45 of the Law on Electronic Commerce, Electronic Signatures, and Data Messages mentions something interesting about data messages. It gives the same legal validity as a contract. As an example of data messages, we can find emails, documents transmitted by fax, messages transmitted by telegraph, texts transmitted by a cell phone, etc.

Regarding this important characteristic, article 2 of the aforementioned law says [18]:

Legal recognition of data messages. Data messages will have the same legal value as written documents. Its effectiveness, assessment, and effects will be subject to compliance with the provisions of this law and its regulations

Everything mentioned about the Law on Electronic Commerce, Signatures, and Data Messages is in accordance with article 75 of the Commercial Code, which states [17]:

Regarding the provision of electronic services, requirements, and formalities for the validity of data messages, electronic and telematic contracting, the rights of users and consumers of electronic services and proofs will be regulated in accordance with the provisions of the Law on Electronic Commerce, Signatures, and Data Messages and other laws that regulate these matters. The formulation of the consent will be regulated in accordance with the provisions of the general rules contained in this Code. The activities regulated will be subject in their interpretation and application to the principles of technological neutrality, the autonomy of will, international compatibility, and functional equivalence of the data message in relation to the information documented in non-electronic means and of the electronic signature in relation to the autograph signing.

In addition to all the indicated legislation on the application of smart or electronic contracts, the following principles must be considered:

- Technological neutrality
- Autonomy of the will
- International compatibility
- Functional equivalence

5. Conclusions

The pandemic has been a key factor for companies to stop seeing transactions through electronic commerce as an ideal scenario and become a fact. In the context of a post-COVID-19 era, the contractual dynamics of companies have evolved significantly and smart contracts are clear evidence of this since their application requires a coordinated operation involving legal sciences and technology.

Smart contracts are legal tools with great application expectations, since they offer security in transactions and contracts, being capable of being executed automatically thanks to technologies such as blockchain.

In Ecuador, companies can take advantage of the use of these technologies since they are perfectly legal; that is, the validity of the contract cannot be discussed because the new Commerce Code and Law of Electronic Commerce, Signatures, and Data Messages accredit the use of these tools.

In the Ecuadorian context, the implementation of smart contracts dates from May 2019 when the new Commercial Code comes into force; therefore, information on the subject is still limited. However, thanks to globalization and technology, this is applied worldwide and there are more and more peculiarities in this regard in which the advantages of using these contracts are evident such as self-execution, reduction of costs in the use of paper and logistics, data security, less physical exposure, etc.

It is necessary to use smart contracts as a tool to improve contractual practices among Ecuadorian companies. Consequently, it is important to promote professional training in these issues since smart contracts are very useful for public and private institutions. In addition, it is necessary to promote the implementation of changes in the academic subjects of the Universities and Faculties of Law, in order to teach with a technological vision so that future professionals develop these very necessary skills for today's world.

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