The Institutional Landscape of Blockchain Governance. A Taxonomy for Incorporation at the Nation State

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Abstract - **Research on how to implement blockchain technology within governance has avoided to further explore on the possibilities of the technology to replace standard nation state architectures. This in turn has created a wave of technological questions directed to better enforce decentralization and security within the popular networks, rather than proposing normative possibilities to be implemented into the institutional framework of the state. This article addresses this issue by analyzing a set of functional areas with the aim of replacing processes, institutions and actors that are often considered as part of the modern bureaucratic nation state. It also drafts functional concepts and recommendations on security issues that should be addressed in any attempt to implement blockchain solutions at the national level.**

Keywords - **Blockchain, Nation-State, Democracy, Governance, Security.**

1. Introduction

Conventional contributions on how to implement blockchain technology within governance have consistently avoided to propose direct associations regarding the possibility of the technology in replacing standard nation state architectures.

This in turn has created a consistent wave of academic research that focuses on the disciplines of Business and Economics [1], concentrating on technological questions on "design and features". Moreover, most of the approaches that tend to relate governance with blockchain technology focus on technical recommendations of "white papers" directed to better enforce decentralization and security within the popular networks, rather than proposing normative possibilities to be implemented into the "social world" of the nation state [2]. This has in turn delayed an open discussion on the political landscape of blockchain governance over representative democracies and electoral politics, keeping the blockchain community hidden from a more upfront position on implementing and using readymade solutions which are able to be deployed into domestic politics.

The evolution of blockchain technology and its application has experienced a golden era with the adoption of Bitcoin, a decentralized digital asset that remains the leading cryptocurrency in the world. By January 2020th, the Bitcoin Market Cap at CoinMarketCap accounts more than 130 Billion dollars, becoming the world influential digital asset, only followed by Ethereum, an open source, public, blockchain-based distributed computing platform whose crypto currency market cap accounts up to 13.5 billion dollars. This evolution of blockchain technology and the rapid adoption of crypto assets have represented in fact, a fundamental transition for the global economic system, implying a functional change in the adoption of the upcoming "politico-economic" landscape [3]. This phenomenon has been characterized by two organizational features behind the technology, sovereign decentralization, and record keeping autonomy. On the one hand, sovereign decentralization ensures that, instead of banks or the state, cryptocurrencies do not require a centralized institution or regulation to ensure its stability over time. On this feature, assets created on the blockchain remain linked with the setting outlined in public white papers; a set of technological guidelines that pre-establish how the asset is created and will work as a monetary value once it is

launched. On the other hand, record keeping autonomy ensures a complete separation of public institutions of record keeping from the blockchain ecosystem. This promotes the development of organizations that keep their information relying strictly on their own interests, being absent, in many cases, from state interventionism, and overcoming technically an era of "state control" [4].

These two features have substantial implications over the political landscape of the nation state, cutting it into the interdependence between central banking with national political institutions and even "capitalism" [5]. This is because the modern nation state is developed upon institutional demands to set autonomous monetary policies, and thus, on the capacity of creating, distributing, ensuring and regulating the supply of money through a domestic centralized monetary authority. With the implementation of crypto assets and the rapid adoption of blockchain technology, this institutional dependency between centralized banking and formal institutions of governance is replaced by an autonomous civil organization and technology. As such, the development of blockchain solutions led to circulation new crypto assets, embracing governance guidelines that follow the original framework of the currency, instead of predefined judicial or institutional norms. This shift ensures not only the adoption of a new monetary system to become separated from the nation state, but also, the acceptance of a new set of digital governance rules for those that belong to the community such as a defined customized "cryptolaw for distributed ledger technology" [6]. Moreover, while research has analyzed how blockchain technology ensures alternative monetary schemes able to grow and to reach higher market capitalizations, customary publications on the use of the technology have avoided to foster dialogue on the opportunities for domestic governance while reducing "uncertainty, insecurity, and ambiguity in transactions" [7]. As such, the use of blockchain has been consistently associated to the economic landscape, leaving the political implications on governance unseen and unresearched. In this sense, the present paper aims to propose a set of potential applications of blockchain technology into the national governance framework. Therefore, the article drafts a defined set of possibilities to make use of the technology with the aim of replacing processes, institutions and actors that are often considered a part of the modern bureaucratic nation state.

An approach to the relation of governance and blockchain technology

From the outset, it is important to distinguish at least three trends of research directed to make use of blockchain technology into governmental and public governance spheres. The first one deals with the potential and technical applications of the technology to enhance and develop new forms of decentralized solutions with no direct relation with nation-state institutions or national politics [8]. This approach of research is aimed at improving the technical perspective of the technology, accounting up to 80% of the primary papers published in scientific databases [9]. The second one deals with the prospective and already built solutions to the economic and financial system, some of which have originally emerged from the private sector, contributing to the mass adoption of the technology. The third one, aims to provide and suggest upcoming forms of implementation of blockchain technology into domestic normative and legal organization through the implementation and adoption of smart contracts. These trends also couple with more recent research frameworks on the use of the application that reveal at least four main areas in a relationship with the above-mentioned hypothesis, "(blockchain) design and features, measurement and value, management and organization" [10].

The most popular applications of blockchain technology within governance research, deal primarily with the use of blockchain to boost up the implementation of private DAOS (Decentralized Autonomous Organizations). This approach has acquired spontaneous popularity since, in theory, any attempt to launch a new product or system based on blockchain technology aims to ensure both, programmable assets or access rights; and a defined smart contract that ensures self-governance. On this issue, programable assets are represented within the DAO by digital tokens, which are protected by different layers of standard cryptography and distributed within the organization following the conditions expressed on the digital contract that gave birth to the DAO. Overtime, *As of April 2019, and within less than a decade since the emergence of the Bitcoin white paper, an ecosystem of over 2200 publicly traded crypto assets are listed on Coinmarketcap and over a total of 175.000 Ethereum token contracts were found on the Ethereum main network* [11]. This incredibly fast adoption of the technology has been backed up by research and practical contributions that have rapidly popularized the technology along the private sector.

The most important contribution to research, directed to popularize the features of the technology into a single real-life proposal, is represented into the so called "Bitcoin Whitepaper", whose allegedly authorship belongs to a programmer called Satoshi Nakamoto. The Nakamoto proposal, symbolized a departure point to the hundreds of upcoming "White papers" that recommended new and each time more innovative methods in order to implement blockchain technology into DAO's. With the increasing adoption of the blockchain protocol, the different applications of the technology can be also considered as part of a research trend that often involves two fundamental features, 1) a blockchain based product or a service, and 2) a defined DAO structure. In this regard, it can be considered that any contribution originated within the private sector directed to develop and to launch a new product that runs within the blockchain, and at the same time, it is becoming a part of the research gathered and created from the community of adopters as well as from the academic environment with an interest on the technology.

From private DAOS to the Nation State Technical Advantages of Blockchain Technology

The existence of political intermediaries all over contemporary western institutional democracies, is bounded to a couple of historical variables discussed in social theory. On the one hand, the technological limitations that consistently preceded societies to lean towards the institutionalization of political relations, and the accepted political conventions entrenched within culture spread over the most of the western hemisphere through modern law and subsystems of administration and information, are formal and informal political institutions [12]. In contrast, technology determines the technical capabilities of society to define the processes and procedures from which citizens organize autonomously. Thus, in general, technological solutions and organizational protocols frame or enhance channels of communication, registration, systematization and, in general, coordination of citizens.

Civil culture, on the other hand, has extensively determined the practices and conceptions of society with respect to the democratic process. In theory, the first exercises of representative institutional democracy took place in the United States and France towards the end of the 18th century, limiting the participation of the electoral process to defined groups of people. Thus, for example, in the United States, with the incorporation of the first legislative senate elections and individual state legislature in 1776, only white men with proven properties were authorized to vote. According to the criteria of the time, this filter was determined by the "demands" required for the society to ensure minimum levels of organization on a political area with substantial legal, social and territorial problems. In practice, however, the measure excluded "most black men, native American men and all women" [13].

During the history of representativism, the notion of democracy has been, with almost no exception, represented by formal institutions. Therefore, without them, the well assumed legitimacy of western nation states would not be possible to be contextualized from historical perspective [14]. Each one of these representations, however, was based precisely on the intermediary role of the state, from which, to counteract the natural processes of social organizations, became the only legitimized superpower or super institution. The state, as an intermediary figure in the relationship between citizens, overtime, was not only constantly growing, but it was constantly developing practices that could have been considered superfluous, but nevertheless coexisted with previous models of political organization like monarchies which later were incorporated into the processes of industrialization of "liberal democracies" [15] [16]. Thus, a fundamental limitation of societies to achieve higher levels of political autonomy has been associated to technical limitations derived from the use of intermediaries, which, most of the time, are represented in the evolution of bureaucrats to professional politicians.

This situation changes radically with the possibilities offered by blockchain technology, and the political implications of solutions directed to develop DAOS at the level of the nation state. As such, the following section presents a set of technical features that can upgrade the current nation-state functional framework pointing to scenarios of institutional decentralization and complex citizen interaction.

2. Automation Directed to Provide Solutions on Self-Governance

Blockchain technology allows the creation of automated applications. These programs do not require any central agent to continue operating permanently according to the contracts original electronic signed or accepted by each one of the users that belong to them [17]. The most common cases are related to the expanding adoption of cryptocurrencies, and particularly the case of the BITCOIN - which is the most popular cryptocurrency up to date. Within the DAO, all users make use of the cryptocurrency according to the seigniorage rights defined along the processing power of encryption servers, the money supply defined once the system architecture was launched [18], and the conditions and transactional terms developed in the Bitcoin architecture.

This explains how the technology allows eliminating the possibility of exercising control over the decisions that are already made from a technical and political perspective . This is because the protocol protects its own organizational technical (institutional) structure, as well as the conditions set in the system in its political or ethical (deontological) nature [19]. The use of blockchain technology, then, can generate automated governance programs or architectures in which individuals benefit from a common agreement, stipulated in the original contract. As such, solutions can be developed to operate freely, being informationally nourished by transactions, or consensus mechanisms (DAOS voting processes) that are part of the distributed database.

3. Public Records Stored and Protected on a Distributed Database

The current political systems force states to store citizens' information within public intermediaries, most of which can be represented by private corporations or contractors funded by the state. In practice, however, this information belongs to the person or individual who has control over the technical apparatus or the state institution at a given time. The blockchain technology, and particularly the use of distributed databases which are secured by modern cryptography techniques, breaks into the limitation of the previous methods of centralized government. This is because it allows: 1) the protection of the data through the application of encrypting layers throughout high level security protocols established in the original contract (known by the users); 2) the compartmentation of the data in each of the users that are part of the network [20].

At this point, the distribution of the database on each of the users is really the main technical component that opens the doors to new scenarios involving technology. This peculiarity, moreover, can occur in scenarios as complex as the monetary system, in which the system itself can automate the increase of the monetary base in digital assets such as cryptocurrencies, while keeping low levels of vulnerability to break the anonymity of the adopters [21].

4. Decentralization of Administrative Political Power at the Nation State Level

The modern nation-state aims consistently to conceive and issue protocols (through laws) that are institutionally manifested in institutional bodies such as ministries, courts and bodies of execution of sentences, closing the cycle of power that derives from its existence. In an economic context, the state usually intervenes in private life by assigning public spending to different sectors of the economy, whose main objective is to rationalize the productive resources of society according to the demands and possibilities of taxpayers [22]. The contemporary nation state however relies in actors that operate within the system fulfilling requirements on competency and honesty demanded by the public. The contradiction of the system originates from the assumption of eliminating *agency* from actors that, by nature, have private interests. These mechanisms, however, can be replaced by administrative decentralization techniques, "creating public value" for citizen engagement [23], and self-governance in each one of the politically decentralized autonomous organizations.

5. Decentralization of Public and Private Contractual Agreements

Contemporary systems of government, including liberal democracies, are conditioned to inertially concentrate political and economic power in the figure of the state. The state, however, by its nature, is not an agent by itself, but a structure of social power occupied by people with private interests. Thus, the tendency towards ideological bipolarity, or two party systems in several representative democracies, instead of representing a process of social communication, represents a strategic dynamic between two groups of people interested in colonizing the institutions of the state [24]. This problem has been described as a natural dynamic of social interaction and public opinion, oscillating over time in flows of power along "two parties". However in multiparty systems were party dynamics follow a different logic [25], political competition would result in an increase of programmatic preferences [26] [27], which indeed could mean a higher level of participation in a less concentrated party system. Even though in general, private law (and particularly the contemporary evolution of bourgeois private law) manifests itself symmetrically to the actors of the system, in the case of the state, public law regulates the interactions of the state with the individual. This feature on the relation of the nation state with citizens, does not imply the permanent negotiation of two symmetric agents, but the inclusion in the equation of a third party of greater hierarchy, that is represented in the state and its bureaucracy.

Blockchain technology and the ability to generate common automatized interaction protocols, breaks the dependence on institutionalized public power. The programmed nature of the system, and its technical capacity in providing equal rules with each of the participants of an intelligent contract, replaces the current need for government intermediaries [28]. This feature of the system opens the capacity which

offers complete transparency of the processes of coordination and contractual agreements between agents of an institutionalized system, whether it is a private organization or a public body of a government.

6. Symmetry of Agents Without the Intervention of the State

The lack of intermediation of the state, or state agencies, establishes the elimination of political hierarchies between individuals, which facilitates symmetrical processes of interaction within decentralized solutions. Moreover, the possibilities derived from replacing state tasks with autonomous protocols eliminate the informational and political asymmetry between the state official (bureaucrat) and the citizen [29]. In particular, the intermediation work carried out by state agents or representatives is not defined by the bureaucrat's work activity, but rather, by the figure of the directors of state entities responsible for the regulation of civil relations. Block chain technology, therefore, can establish processes of coordination of economic agents, or private interests, through solutions that eliminate the figure of intermediation, retaining in each participant a symmetry that does not exist with the figure or the role state agents [30].

7. Self-Governed Privacy and Anonymity

The encryption mechanisms used in blockchain solutions allow, to those parts of the DAO, the implementation of privacy protocols superior to any solution offered by a centralized organization. This setting is ensured by two reasons. Firstly, each one of the users has an encrypted identification in the system, which can be administered completely by the user itself with no interference of third-party intermediaries. Secondly, since the mechanism is totally decentralized, there is not a supra agent in charge of regulating or defining the rights and roles of users within the system, or in the capacity to identify and affect the identity and the performance of an actor, unidirectionally within the system [31]. Moreover, this technical feature plays a substantive role in tackling unexpected phenomena of corruption, so massively accepted in countries with low levels of social control, no independent regulators, or highly unfunctional from an entirely administrative perspective due to briberies and criminal outsider profiteers.

8. Autonomous Public Procurement and Traceability Via Smart Contracts

The implementation of decentralized solutions for public administration, not only guarantees a distributed registry of the database where the State transactions are made, but the elimination of any form of intermediation. The distribution of the database where transactions are carried out by the state or the citizens, ensures that all types of economic agreements made between individuals with the state are indelibly written in a system to which they may have access as users, or open to access to any other external user if required. This protocol ensures immutability, transparency, secure storage, preservation of data and duties related to customary state's transactions such as tax collection, reporting, identity management, digital currency issuing, voting or land registry, among others [32]. Additionally, automated public procurement processes allow citizens to know precisely, regulate according to their own wishes, and define by vote projects and the investments whose budget emanates from their own taxes. This means an unconditional departure from the dependence of the citizen from the state, as well as a highly useful solution for territories or countries eager to increase the reliability and traceability of their information [33].

Concerns and Possibilities on the Issue of Security and Blockchain Governance

Surprisingly enough, the best advantages in blockchain technology and crypto currency; privacy, secrecy and decentralization, are its biggest weaknesses when it comes to security issues. From an economic standpoint, the decentralized nature of crypto currencies leads to many swings in the value of e.g. Bitcoin, which could cause instability in the future. Bitcoin had peaked in the past, with a value of more than US$10,000, only to see a value of less than US$6,000 a few weeks after that. Such an unstable value and shifts in the market would have severe effects on the prices and entire economies [34], since it could cause recessions and inflation due to the value of a Bitcoin being only determined by the demand and supply of the currency. The volatile movements in the value could cause severe issues for security, since economy and economic issues are a breeding ground for different security issues within a state or a region [35].

Crypto currencies and blockchain technology promise full anonymity and privacy when conducting transaction. The recipient's anonymity and the nature of the transactions remain protected, while the information regarding sender and recipient are customarily coded and cannot be traced. It is exactly this anonymity and the privacy that causes security concerns, and made crypto currency the preferred payment method in the funding of illegal activities through the internet. Combined with the encryption offered by unofficial websites in the so-called

"Darknet" or "Deep Web", which can only be accessed through special browsers –like.

Crypto currencies and blockchain technologies also offer terrorist organizations and organized crime groups a method of financing and funding against standard traceability protocols.

Another security concern regarding blockchain technology and crypto currency is the leaking of personal information and the exploitation of personal data due to computers being connected to a malicious network. Several trading places for crypto currencies and new crypto currencies emerged after the increase of value of Bitcoin, which brought new security issues, like e.g. Phishing. Phishing is the exploitation of personal data through websites or programs, by which the victims are often unaware that their data is being exploited. Phishing first started to occur through email, where victims were asked to register on certain websites or change their password on popular websites, which is how criminals obtain important data from the victim. False websites that look like social networks (e.g. Instagram, Facebook, Reddit or Twitter) trick victims into logging on the website. At the second stage, social engineering is conducted by criminals that use the password given on the website on all different real networks. What this could mean in a blockchain world is that people could be exploited through the data they need to log into the online marketplace or their crypto currency wallets, being stolen to fund illegal activities, or just for being transferred onto another accounts [36]. Moreover, the anonymity itself protects the perpetrator, since the transactions cannot be traced [37].

9. Conclusion

On a preliminary approach to the concept of blockchain governance, the implementation of decentralized technology and distributed databases offer a substantial technical architecture to the historical operation of the nation state. This article drafts at least seven technical features of the technology that can substantially change their role and structure, among them the potential for public automation, distributed records, decentralized power, smart contracts, agent's symmetry, self-governed privacy and autonomous public procurement. From a security standpoint, one has to consider the fact that new technologies become rapidly a reason to attract illegal activity or organizations eager to exploit flaws on innovation. As such, the boom of blockchain technology and crypto currencies can attract organizations looking for a way to take advantage of it for their own personal benefit and illegal activities. Hence, security experts have to be concerned with blockchain technology in order to find ways to make it safe and more transparent. Additionally, governance experts need to research this phenomenon and the technology in order to find proper responses to the security challenges within the nation-state. Finally, civil society, DAOS, economists and financial institutions should find a way to work together with blockchain and crypto currency authorities in order to reduce market volatilities, and to develop sustainable and safe blockchain solutions able to fit within upcoming scenarios of decentralized governance, all of which can replace the standard international political and democratic architecture.

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