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Proposal: Public Registry of Property supported by non-fungible tokens (NFT)

Propuesta: Registro Público de la Propiedad soportado por tokens no fungibles (NFT)

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Abstract
In this work a guide is proposed, introducing the idea of alternative implementation of blockchain technology to the popularized use as a currency. As an axis of the guide, the use and support of non- fungible token technology (NFT) for the Public Property Registry (RPP) is presented, as an example, which allows us to conceive the different technological and non-technological aspects that the use of this technology would involve in contexts such as the one explained. The research of the technological fund, the institutional-legal fund, and the techno-institutional-legal is exposed, this to holistically foresee the implications that would have the use of the registry transactions of the RPP through a blockchain supported by NFT tokens. Subsequently, and based on the set of variables, the interdisciplinary research problem is externalized, while summarizing the proposal and discussing its derivations and findings. Finally, it concludes by giving an account of the main challenges and guidelines in which any organization or institution with characteristics analogous to the RPP that seeks a digital transformation and innovation in the near future will have to work.

Keywords:
technology; blockchain; public registry; registry function; registry principles.

Resumen
En este trabajo se plantea una guía, introduciendo la idea de implantación alterna de la tecnología blockchain al uso popularizado como moneda. Como eje de la guía se presenta, a manera de ejemplo, el uso y soporte de la tecnología de tokens no fungibles (NFT) para el Registro Público de la Propiedad (RPP), mismo que permite concebir los diferentes aspectos

Palabras clave:
tecnología; cadenas de bloques; blockchain; registro público; función registral; principios registrales.

tecnológicos y no tecnológicos que involucraría la utilización de esta tecnología en contextos como el explicado. Se expone la investigación del fondo tecnológico, el fondo institucional-jurídico, y lo tecno- institucional-jurídico, esto para holísticamente prever las implicaciones que tendría la utilización de las transacciones registrales del RPP a través de una blockchain soportada por tokens NFT. Posteriormente, y con fundamento en el conjunto de variables, se exterioriza el problema de investigación interdisciplinar, a la par que se resume lo propuesto y se discuten sus derivaciones y hallazgos. Finalmente, se concluye dando cuenta de los principales desafíos y directrices en las que habrá de trabajar cualquier organización o institución con características análogas al RPP que busque una transformación digital e innovación en el futuro cercano.

Introduction

Nowadays humans are immersed in the so-called information society, whose structure is being driven to be supported by environments designed to operate, as far as possible, in a totally digital way. In view of this, several disruptive technologies have emerged (Retamal et al., 2017), which are thought to help and accelerate the transformation towards the digital, i.e., the way in which human activities are currently carried out.

One of these technologies is related to planning, organization, management, coordination and control of cryptocurrencies: blockchain. Named blockchain (Velasco-Rico, 2022), a large part of society considers that this technology is synonymous with technology for cryptocurrencies (Romeo-Sánchez, 2022), without it being exclusively for that use. This idea has been widely spread as cryptocurrency has brought great attention within financial systems all over the world; however, cryptocurrencies should be considered only as one of the most important and famous applications that make use of blockchain technology.

Features that make up blockchain technology

When analyzing the situation of the technology behind cryptocurrencies (Pérez & Agudo, 2022), the first technological precept that stands out is peer-to-peer (P2P) transmission, as the system's interconnection scheme; followed by consensus algorithms and incentive mechanisms, which are what allow decentralized transactionality; and thirdly, the issuance and cryptoX transactions, which are used to keep track of the transaction record. It is worth mentioning that all this can be done without the need of a centralized authority, since the system is self-regulating, which is the main intention of any system of this nature.

From these technological precepts a sort of "basic prototype-scenario" emerges as a useful skeleton for other types of applications, which may be totally outside the scope of currencies or financial systems. For their use, the referred precepts have at their disposal the tokens: an electronic entry made by an intelligent transaction, in a blockchain enumeration and used to document. Of these there are fungible and non-fungible tokens (NFT), whose fundamental difference is that fungible tokens are identical and can be divided, while non- fungible tokens are completely unique and have only one owner.

Likewise, it is worth mentioning that, as part of the essence of the system (Pozo-Ruiz, 2022), there also are records made by using blockchain technology, these are transactions of the cryptoX, irreversible, which are recorded in the blocks that legitimately make up the blockchains; all are linked in chronological order, an unbreakable feature.

There are several elements that erect and provide the blockchain systems, as concepts of technological construction (Martín-Fernández, 2022), being the chains (components or chained units)

the central technological element that has been exploited and put into use to pair it with the classic concept of currency, which extrinsically has evolved towards the conceptualization of monetary delocalization of the cryptoX, with the particularity of being totally free and processed by only those interested in the system where it is given life.

It should not be lost sight of the fact that monetary offshoring is the form in which it has been technologically implemented, but only as a construct of technological characterization of what is currently in operation (Armijos, 2022). However, such offshoring can be implemented through corporate projects, in which by means of the possession and power of the blockchain operation infrastructure, the classic schemes are enabled and put into use: concentrated, dispersed and hybrid, both in public and private schemes, which are feasible in any network, blockchain networks being no exception. Undoubtedly, the choice of the type of implementation and the network infrastructure scheme in which it will operate (centralized, distributed or hybrid) will depend on the needs and private predilections that an entity or institution has for itself.

By cryptographic currency, cryptocurrency or cryptoX should be understood as the "determined economic value" that is in circulation in cryptographic networks of currencies (Sánchez-Terán, 2022), issued by decentralized systems that are responsible for recording transactions and issuing new units; i.e., they are not issued by any state or central bank, and neither is there a central regulatory authority, or legal, or issuing regulations, but are fully in operation by the rules of the network itself which is dispersed (in the case of cryptoX those of the market, a reason that possibly makes cryptoX so popular).

Due to the association of the extrinsic meaning of offshoring and operational room through blockchain technology, cryptoX-currencies are a conceptually revolutionary icon, since "their value" depends only on the speculation that is generated in the market system itself in the end. Taking this argument, the working hypothesis assures that it is possible to propose other applications of blockchain technology. This sustained with the conceptualization of such technology, and deepening in the technological background, in the institutional-legal background and in the techno-institutional-legal analysis.

Operating in the background, with the use of technology as a scaffolding, thanks to its remarkable characteristics of technological graphics, operation and decentralization, it is conceived how to adopt the techno-institutional-legal background of the blockchain for other purposes, efforts and inertias different from the cryptocurrencies that exist in the market. Thus, the challenge now is to determine the scope, which depends on where it is to be applied, the way in which other uses and value of this type of technology can be founded in the context of other systems outside the financial one.

Technology is available, it is the tool (Vega-Pineda, 2022), and in order to make use of it in different spheres, first off, the application in the area to be implemented must be contextualized, to visualize and make visible the techno- institutional-legal conception.

Technology background as precedent: breaking down the technology, what exactly is blockchain?

Blockchain, at the core of the technology (Vega-Pineda, 2022; Noriega, 2022), is a kind of book written in electronic stone, analogous even to the books used in accounting, and whose central feature is that they are ordered documents, which basically collect chronologically operations of different nature, relevant to the system in use, which are recorded in each of the accounts or listed in the system, and which are shared publicly as "the list of records" or "blocks". In this way, a chain is built that

preserves all its operation, as a self- historical record that is digitally signed with hash functions, occupying each block to store data.

It is worth mentioning that, to operate, as part of its design the system has defined and makes use of a well-established protocol to follow (Cárdenas- Chamaya, 2022), in which the list with the corresponding blocks that contain the information, constitute the systemic formality that make the blockchain operate, and are interpreted with the use of the protocol by whoever is interested, in addition to the singularity that everything is done publicly, that is, everything is given maximum publicity through the blockchain network. In such a way that a block-chronological order exists and is preserved, and all stakeholders, in a distributed manner, have real-time knowledge of what is happening with the blockchain, which they maintain as "unique" through individualized processing replicas in the entity of interest, in the strict sense of a single version of the information, through consensus.

All stakeholders or actors within the network have access to these blocks and have copies of them, that is, the information is distributed, everyone has the same version of the blockchain at a given instant t (t = time). Then, once "something" is registered, the new chain is recalculated by all stakeholders (Hernández-Chavarri, 2022), which will be the current blockchain at instant t + 1, competing to obtain the result as dictated by the protocol, and once "someone" within the network obtains it, publishes the result, which can be verifiable by any of the stakeholders in the network, who will have to obtain exactly the same result that was published from the previous chain they have.

This is so because it is a unique result exactly for that blockchain, although each chain works with a copy to produce a consensual result that will replace the previous one, and this is the moment when the result is obtained, the moment when the data of the "something" that was recorded, are recorded in the digital stone of that blockchain network, in the last chain obtained, and cannot be modified again in the blockchain network (it is worth introducing the term digital- stone-blockchain, blockchain in digital stone).

Therefore, so that the very transparency, inherent in the blockchain system, completely guarantees its security (Santos-Cabaleiro, 2022), every actor or stakeholder in the blockchain network sees and has the same thing, and at all times can and should get the same thing, without room for error. These are the benefits of blockchain technology, the chain that covers cryptographic currencies, and that clearly, beyond currencies, can be managed to obtain benefits and value in different sectors of economic activity, and different human activities. By understanding technology, it is possible to propose different applications of the blockchain tool.

Institutional-legal background: calculations

Within the institutional-legal field, some of blockchain technology applications so far include fungible tokens (FT) and non-fungible tokens (NFT). The former can be used to represent shares or securities (security tokens), while the latter are incipiently used to incorporate intellectual property rights (IPR) (Rodriguez, 2020). In this context, a proposed alternative application to the use of blockchain technology, in its variant of non-fungible tokens (NFT) (Agarwal et al., 2022), is found in the socially advantageous institution and legal figure of the Public Registry of Property.

In Mexico, the Public Registry of Property (RPP, by its acronym in Spanish) institution and legal figure, was created in 1869 by virtue of the Reform Laws (Pérez, 1999); from its beginnings, and in the course of its more than one hundred years of existence, the RPP has had a continual service, which has led to its consolidation as a State institution; in addition, adapting to each of the particularities and needs of the entities has allowed it to remain.

Although for the existence thereof, from the formal point of view of the executive branch and politics, this requires material execution, in practical reality, the standardization of the records used in the exercise of its fundamental attribution have provided it with a solid body; this is the role of the registry (García-Juan and Villavicencio, 2022), this is where the potential may be appreciated where value is given to blockchain technology.

Almost since the inception thereof, it has been sought that the existing records within the RPP be based on types, entries or patterns according to clearly defined guidelines, thus pursuing the standardization thereof (Mazuelos, 2022). Therefore, in each of the federal entities, these records can be identified as completely standard documentary series, that are consistent with their structure, organization and sections that make them up, which makes it feasible to take them, with relative simplicity, to blockchain technology, thanks to its high degree of standardization and conformity.

In the exercise of its registry function, the RPP has the task of providing certainty in the recognition and keeping of real estate records owned and held by individuals -individuals and corporations- and the government, as well as those legal acts involving them. To achieve its purpose, it enforces registry principles (ECLAC, 2022), to wit: consent, successive tract, rogation, priority (first in registration first in right), legality, legitimacy, publicity, registration, specialty, public attestation in the registry and third party registration. All this in order to give maximum publicity and guarantee legal certainty to the holders of rights on the real estate against third parties.

Complying with registry principles, as provisions or basic guiding principles of the registry system (Brizuela, 2022), is feasible through blockchain. This is due to the open and transparent nature of blockchain transaction records, analogous to those of the RPP, which in this case would relate to registry transactions, which will contain information and complete traces of the registry activities with respect to a real estate, and which due to the nature of the blockchain will be publicly accessible to all interested parties.

In addition, incidentally, through the analysis and mining of crypto-registry transaction records, it is possible to explore the commercial behavior, the distribution of wealth and the generative mechanism of the RPP system of registry transactions, as well as to infer the reasons for the fluctuations in the real estate market, which, although it is not a strictly financial market, can be analyzed and seen as a market supported by crypto-registers, fully analyzable for various legal and even economic purposes.

Techno-institutional-legal analysis

By following the principles of legitimacy, registration, priority, qualification, rogation, specialty, legality, successive tract and public attestation (Díaz-Díaz, 2022), and in attention to the objective, need and usefulness of the RPP, it is proposed that the Public Registry of Property be supported by non-fungible tokens (NFT) to comply with all the registry principles through this technology. Since the main objective of the RPP is to provide publicity of legal acts, not only in Mexico but also in other places (Pazos, 2022), it is proposed that blockchain technology be used based on NFT, to generate the records and put it into use for each property.

This would be achieved through the cryptographic token, which represents analogously to the deed taken to the digital world, where whoever owns it must be the sole owner of the property in the physical world. This as a unique digital assets (Guisao-Jaramillo, 2022), but now associated exclusively to each of the properties (which are also unique in their physical asset kind), in a one-to-one relationship: digital asset created by the RPP to be associated to a property with the relevant

physical real estate asset registered in the RPP, this in order to provide the necessary legal certainty vis-à-vis interested third parties.

The NFT-digital asset registry (Mendoza Bautista et al., 2022), as a replacement or substitute for title deeds or public deeds, would arise from the inadequacy of bringing these records to the digital world of blockchains, because although it is the way in which a holder is associated with its property today, the need for digitization of such documents is not essential, because they would be replaced by NFT records or digital assets, which would serve as the new title deeds or public deeds. In other words, with an NFT blockchain that would account for the NFT records or digital assets, the purely administrative need would be met for control of what is registered, has been registered, is required and must be registered. Secondly, the need for publicity with respect to third parties with the same NFT asset would be addressed.

The needs for the issuance of deeds and of publicity that are covered through the NFTs is evidenced in order to avoid the concealment of charges and encumbrances on the real estate. Then that NFT registry that has been created for an administrative reason, in order to keep an accounting of each holder, becomes an NFT registry with a view to publicity; thus, it can be said that the NFT registry of physical assets reconverted to digital is born as a means of security-legal traffic, as they are given use from the point of view of pure digital assets made by the RPP.

Having a Public Registry of Property supported by NFT would be of great use to society, since, in due course, it could provide certainty and legal security to persons interested in entering into legal acts on real estate, which would be reconverted to the relevant NFT asset. To ensure this, it is essential that neither the token nor the NFT can be copied, since if a capture of an NFT representing a physical real estate is made and uploaded to the RPP platform, regardless of how much it may appear to be the same NFT it represents, it will never be an identical copy, because NFTs are unique.

For example, if there is an existing NFT with a token called ‘A’, a screenshot is taken and with it another NFT is created, the token that will be assigned to this other NFT will be ‘B’ and so on for any other NFT that is created and added. Therefore, logically, through the token it can be validated that such NFT is different. Ultimately, the NFT only allows to exchange it identically. From the above, an NFT associated with a physical property and its token are unique, indivisible and transferable, as is the case with the current RPP records.

As noted above, the token refers to a digital asset, representing the physical real estate, and this representation has the properties of the digital area.

Powered by NFT-supported public land registries based on blockchain technology, all cryptoRPP transaction records would be irreversible and recorded in blocks. These transaction records of registry functions would contain enriched information and complete traces of registry activities, which, when assembled to operate the RPP blockchain network, would be publicly accessible. This would provide stakeholders with unprecedented opportunities for maximum publicity and knowledge of the status of any registered property.

Among the characteristics of blockchain systems is the anonymity and lack of authority characteristic; however, in the case of planned application, there would not be a lack of authority as such, nor would such anonymity be given in a strict sense, since the RPP and its representations are not anonymous. Thus, in reality, what is being proposed is the constitution of a healthier blockchain ecosystem, based on identified public entities, which in essence are the actors interested in maintaining the network, providing the concept of private blockchain, which

provides certainty as to who the interested parties are, evolving to the ecosystems that have been implemented for cryptocurrencies.

In the scenario posed for the RPP, transaction log information can help to track cryptocurrency transactions and identify illegal behavior. Given the characteristics of being closed or private, but clearly with public access, this stands as a system that, without regulation per se, is effective and healthy, with a view to the prevention of potential cybercrime in the proposed blockchain ecosystem for the RPP.

Within the particular blockchain system proposal for the RPP, several interactive activities between users are considered, such as registry transfer, registry creation and invocation of other legal figures, such as NFT smart contracts (these will be delved into in future research). Thus, it is considered that the proposal represents an evolution in terms of registration.

In fact, registry information in the blockchain can be used for a variety of analysis approaches, to study the properties of the registry function and the implications of this with respect to other activities, extract information from transactions and even detect both normal and illegal behaviors, because there is full traceability online, which cannot be achieved through physical queries, which can be slow and violent.

Blockchain networks, contextualized for use as proposed in this research, become and are the general language to describe a registry system that will interact in the existing state-of-the-art world, that is with the digital world, citizens and stakeholders.

Implications of RPP registration transactions through a blockchain.

It is possible to envision a future in which blockchain systems replace paper and even the cloud for all forms of record data and information for maximum publicity purposes, this founded on its particular and inherent characteristics of the technology and that all of these can be put to use through creative techno- institutional-legal partnership.

The blockchain technology underlying the proposal for the realization of RPP registry transactions provides a distributed and decentralized environment for the operations of the registry functions that emerge through the blockchain supported by NFT tokens, primarily via the generation and operation of RPP crypto-businesses (public crypto-writings) and all transactions surrounding it.

The RPP, as an institution that evolves with the blockchain, must be the State entity that will have to appropriate the registry system supported by NFT and which must have the steering role over it. This is so that, with this, derived from its inherent properties, it can have data that, when processed, can provide all kinds of information already referred to, with properties of not current, current, not updated, updated, not timely, timely, reliable and easily accessible, both for the fundamental tasks of the registry function (such as registration and consultation), and for the non-fundamental ones, among which can be found any other task that can be carried out with the data held by the RPP.

It is clear that the most notable implication beyond the ideation is in the first instance the implementation, and once this is established, then the operation, procurement, preservation-maintenance and evolution of the blockchain supported by NFT tokens. All as a process of registry modernization, which will involve the replacement of what is currently being operated by a single national blockchain platform, in a kind of general registry blockchain network system supported by NFT for the 32 federal entities.

It is worth mentioning that this technology would provide solidity to benefits already mandated by law to date, and which have not necessarily been implemented, and even less with the facilities and benefits proposed, such as a national database, not unique but strategically distributed among all the actors, always updated and available to the general public, organizations, companies, government agencies and entities.

If implemented, this proposal would represent an evolution for the State, which would be able to offer and provide, to whoever requires it, a very agile and immediate registry service, as well as transparent and efficient; this would result in the reduction of operating costs and time, to the benefit of society.

Among the implications of carrying out RPP registry transactions through a blockchain supported by NFT tokens, one aspect that should be assessed in the implementation is the reduction of the operational workload for the already organized registry offices, as it will require a redesign. This is because the transactions, in terms of registration of acts, will be carried out electronically and digitally in a semi-automatic way, immediately and with minimal involvement of the classic bureaucracy, which will have to evolve and qualify as far as this technology is concerned.

Another aspect to be considered is that of notaries, i.e., notaries with the well-known "public attestation"; although within the model their figure can be considered part of the system, this would have to be collective but no longer individual as it was traditionally done, which has great implications of operational background with respect to the current maneuvering. In this sense, it is considered complex for notaries to be able to carry out procedures electronically and immediately, because they would be given a simile to that which would be granted to public actors, prevailing what in practice operates for them, without such power being in fact supported by the regulatory framework.

The foregoing regulates the type of professional practice of law, as a profession and legal profession, consisting of the role of the Notary, as a professional entity that recommends and assists, and by virtue of his advice, ethics, impartial conformation and praxis, attesting the acts, through the issuance of the relevant documentation, in which the specific fairness for the case in question is recorded, always within the framework of equity, with reasonable observance, keeping the constitutional rule of law and legality derived therefrom. This with the intention that such, receives by legal force, that of the State through the public and social recognition of the notarial instruments of which it makes use and issues to attest, with the purpose of protecting the legal security of all those who act, that is, of the grantors and applicants of its activity in the exercise of its work as a professional legal documenter.

Conclusions

The underlying cryptocurrency technology attracted attention (but not acceptance) since Bitcoin's debut and since then it has been on everyone's radar, without necessarily visualizing the existence of blockchain technology for other purposes. This situation led us to investigate another use for such a tool.

As mentioned above, blockchain technology is much more than a technology at the service of cryptocurrencies, it is a technology that we must learn to master and take advantage of in order to improve public administration in the near future. If the proposal for the Public Registry of Property, supported by NFT tokens described herein, is implemented, most of the registry transactions will be traceable and publicly accessible, thanks to the transparency and openness of blockchain, which will represent a great innovation for the registry function.

As interdisciplinary research related to the fields of technology, public and institutional policies as models, in addition to the legal edge, the study of blockchain transaction-based systems is considered a promising area, where a lot of new findings, novel methods and disruptive innovations will be seen in the future. Considering the provisions it already has to guarantee monetary transactions, it looks at the potential that this technology can support other types of transactions, such as registry processes, this with a view to revolutionize any public or private management where value and application are found.

Among the main challenges of the implementation of the Public Registry of Property supported by NFT are the following:

- Compulsory recordation for any legal or administrative entity who owns a property.
- The creation of an electronic window, to be able to search the RPP, to find what prevails in all the registry offices in existence in the country.
- Availability of reliable information on RPP crypto-writings.
- Existence of RPP digital assets, as a single national entity for each property.
- Fully electronic operation, in which all tactical and operational processes will require to be issued and endorsed with electronic signature and digital time stamps in the blockchain environment.
- Enabling the infrastructure to implement the necessary high availability, i.e., to support unlimited schedules, the realization of queries, the request for certifications from any place with internet access, among other services that in some cases are secondary to the primary operation of the blockchain.

Likewise, looking at how digitization has gained ground in today's world, it is feasible to conclude that, in the near future, this strategic area will contributeto move forward in the information society:

- Moving away from reliance on paper-based workflows in an agile and fast way, that is, moving away in general from classic paper-centric systems, to transform them into digital stone-based flows.
- To integrate transactional services of any nature into the blockchain.
- Also, to integrate commercial services, not necessarily currency systems or payment systems, into the chain.
- Generally, to integrate any kind of high-value services.
- To put into use the features of blockchain technology, such as reading a distributed, transparent, immutable and secure ledger, to record and resolve any kind of manageable issues.

Thus, by mastering the blockchain, the blockchain can enable changing the rules of the game in any public or private activity. Given this, it is essential to be up to date on the concepts surrounding blockchain technology and to constantly enable oneself to be able to devise, raise, create and implement potential applications of one's own.

Eventually, we hope that this paper will serve as a reference in the analysis of systems that seek to use blockchain technology as a tool and give researchers a systematic understanding of the precepts, key concepts and fundamental steps in the analysis of systems that are sought to be supported with blockchain as a tool. Thus, this work remains as a starting point for study in this field and it has the potential that it be applied to various processes and systems, including property, contracts, supply chain, chain of custody, litigation, agreements, among many others.

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