Blockchain Innovation Technology for Corruption Decrease in Mexico

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Abstract　　This research is based on the scope that the disruptive technology known as Blockchain has to face corruption in different phases and spheres of government. This technological method is increasing its acceptance in various socio-economic aspects in recent years, the paper's emphasis is placed on Mexico, and nevertheless it practically can be used to reduce corruption in all countries around the world. The materials and method carried out for this research was a literature review in diverse databases with the most recent literature where some applications, uses and hypothetical cases of the implementation of Blockchain within the government framework in order to reduce corruption were highlighted. The results of this research suggest that the Mexican government can reduce some types of corruption, especially those related to money and collusions, such as biddings/government tenders, government procurement and acquisitions, audits in government agencies, in the embezzlement or diversion of funds, as well as in land registration.

Keywords　　Blockchain technology, reduce corruption, bidding, funds embezzlement, procurement.

I. Introduction

　　Corruption is a problem that has persisted for a long time around the world, however, recently technology has advanced with great steps, perhaps not imagined but that bring solutions to many social problems and resources for all economic sectors, including government management; many governments in general but especially in Latin America have been quite pointed out by alleged cases of corruption and theft of public money through increasingly sophisticated and innovative methods.

However, an analysis published by Atzori (2017) highlights that Blockchain technology potentially allows individuals and communities to redesign their interactions in politics, business and society in general, with an unprecedented process of disintermediation on a large scale, based on automated transactions.

With such technology the generation of bonds trust is not needed, it is no longer indispensable the transaction costs generated by contracts. Mohite & Acharya (2018) also point out that some of the most important characteristics of Blockchain include its decentralized nature, transparency, consistency and security of information, non-distortion, non-corruption, low cost and speed.

The course of data decentralization and transactions could quickly change even the standards supporting existing political frameworks and administration models, scrutinizing the customary job of the state and incorporated institutions. For sure, numerous Blockchain allies contend that common society could coordinate itself and ensure its own advantages all the more adequately, supplanting conventional state capacities with Blockchain-based administrations and decentralized open source stages (e.g., Bitcoin, Ethereum). This imaginative innovation simply urges people to be important for the "Blockchain revolution" and to self-make their own administration frameworks, where centralization, pressure and socio-political progressive systems are supplanted by components of the distributed agreement.

The main advantages of Blockchan to reduce corruption are mainly in two factors: (1) Decentralization of information (high visibility public information), and (2) Transparency of information flows; these elements will be explained in the development of this research.

Ghode et al. (2020) also mention that Blockchain has a significant impact on various sectors and industries such as banking, government, health, etc., as follows:

- Eliminate mediators, improving efficiency and speed.
- Streamlines operations by reducing the cost and time associated with settlements and disputes
- It boosts new business models by increasing income and savings.

Furthermore to broaden the perspective of the scope of these types of innovations, the results of the study done by Myeong & Jung (2019) suggest that the future Blockchain administration be used in the field of electronic voting to encourage citizen participation in the agenda-setting process, improve the level of security and transparency of taxes, increase the equity and efficiency of the provision of individually oriented social welfare services, as well as decrease the level of corruption in areas such as personnel management, contracting processes and procurement in public sector organizations.

Specifically, and without further ado, we seek to define whether this technology can help society in general to provide a solution and to reduce corruption and/or monetary looting, as well as generate better government management. It is not expected that corruption or inefficiencies will be completely eliminated, but it is important to take a first step in attempting to resolve them.

II. Types of corruption addressed with Blockchain and government regulation

Corruption covers a wide range of behaviors, and it is too broad a subject; Morris (2011) presumes that the models most normally used to set up differentiations are: the institutional area and capacity of the public authority included ("political corruption" versus "administrative corruption"), the direction of impact ("pay off" versus "coercion") and the size and recurrence of the transaction ("great corruption" versus "frivolous corruption") Surely corruption happens at all friendly levels just as in the three parts of the political construction.

It is very likely that corruption is still part of human nature, although there seems to be a growing awareness in societies of its impact and extent, but Aarvik (2020) comments on government corruption and highlights an article published in the World Economic Forum, which states that

"While the scalability of these solutions remains a challenge, Blockchain has emerged as the most promising disruptive technology in the fight against corruption."

The Blockchain also has important features that can help anchor integrity in bureaucracies by ensuring identity, tracking funds, recording assets and obtaining contracts. There are not many articles on these topics, but it is encouraging to know that some systems & Apps have already taken place and others are in the process of being developed. The findings of this document show in detail how this technology is being used to address the corruption.

On the other hand, in a study on perceptions of corruption in Mexican society by Bailey & Paras (2006), they found that the impact of "bribes" (perceptions based on forms of corruption) on other perceptions of corruption is very high. It can therefore be concluded that people who experience corruption are more likely to have higher perceptions of occupational and institutional perceptions of corruption. Likewise, the authors constructed a model with the variables represented within the circles (see Figure 1) where it can be seen that bribes are

a very large precept for private and public corruption and the number of corrupt acts; therefore, corruption in Mexico appears to be at high grades.
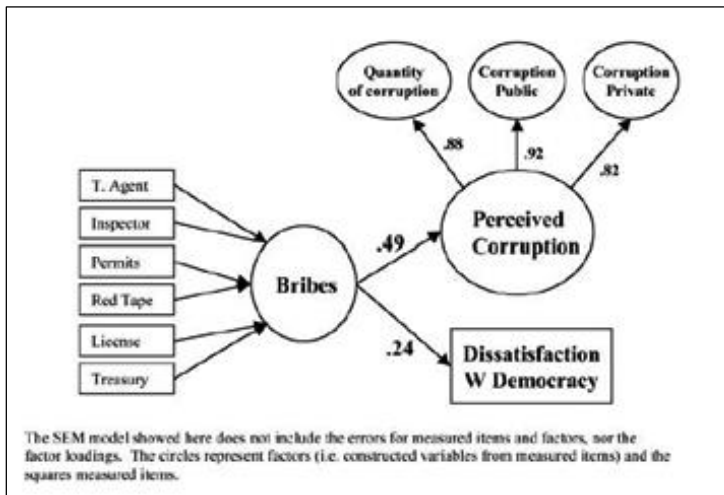

Figure 1 Perceptions of corruption in Mexico.

Moreover, we should consider the relevance that the accompaniment of these technologies should have in government management with a regulation that allows it to be carried out in an optimal way in its execution, and that the government agent responsible for corruption will be investigated. A robust rule of law should have a positive impact in the implementation of Blockchain and other technologies, since it would be useless to have a sophisticated system if the law is not complied with. Myeong & Jung (2019) mention that administrative organizations are rigid because they are fundamentally bureaucratic and hierarchical and produce many procedures and regulations.

Myeong and Jung (2019) additionally feature regulatory change with two ramifications. In the first place, change is the importance of "reality" that exists as a genuine immaterial sort. Managerial change in the meaningful sense incorporates specialized change, authoritative change, and political change. Second, change is a cycle that signifies "acting." Managerial change in the process sense is an idea that spotlights on the course of transformation and execution as opposed to the actual development.

III. Corruption in Mexico and the urgency to fight it.

To measure corruption in countries around the globe, there is an indicator, perhaps the most efficient due to its methodology; this indicator was developed by Global Risk Profile (2020), a leading company in the management of third party risks. The GCI "Global Corruption Index" considers a set of other indicators. Global Risk Profile (2020) pointed out this indicator places Mexico with a ratio of 51.6 on a scale that goes from 0 to 100, which means that it is a medium level of corruption, thus meaning that Mexico is ranked 114 out of a total of 198 countries. Below (see Figure 2), where the colors mostly in red are those countries that are most corrupt and in white those that are least.
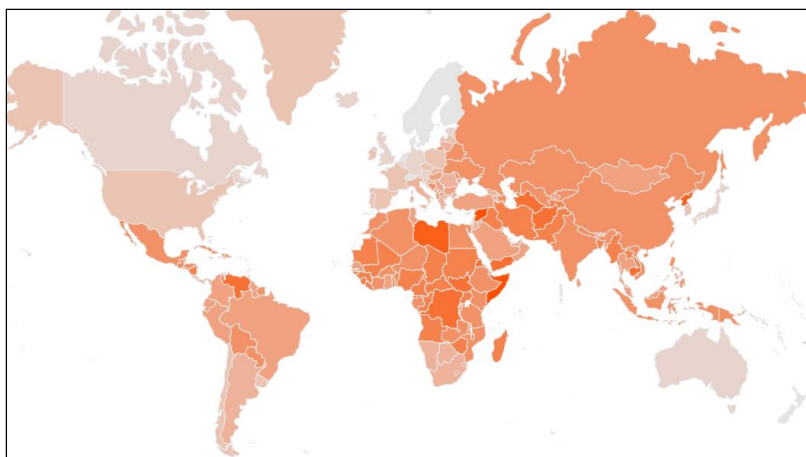

Figure 2 Corruption color rating by country.

In Defoe's National Panel Survey, Nares (2018) comments that 64% of Mexicans surveyed believe that the problem lies in the fact that the government is not doing enough to eliminate it; only 49% believe that it is the government that should fight it, together with political parties (10%), businesses (17%), and others, in contrast to the reduced 13% who believe that it is the responsibility of each.

Plascencia (2015) clarifies that in the year 2004, a video portraying Rene Bejarano, a closed collaborator of López Obrador, the actual political leader of Mexico, getting bribery from business person Carlos Ahumada. This situation had a solid effect in Mexico since notoriety and decency, even unreasonable, is a significant resource in the political world. So the bribery hit solid not for being deceptive, however, to become uncovered to general assessment.

Such type of corruption can be detected by Blockchain through independent user sources (any citizen can be involved). If there is any extra person present or hide camera who can record a photo/ video through any device such as phone, it can be detected immediately and uploaded to the platform, which in turn is published through Blockchain as a social network. This type of solution is described on by Fazziki, & Sadgal (2020).

It is worth mentioning that in Mexico it is constantly applied through bribes (citizens, drug cartels, companies, etc.), embezzlement of resources, and lack of transparency and theft of public money.

In order to combat against corruption, Mexico created new laws and reforms in the years 2015 and 2016 as mechanisms for the prevention of government fraud under the banner of the "National Anti-Corruption System" (SNA). This compendium of reforms covers constitutional articles 22; 28; 41; 73; 74; 76; 79; 104; 108; 109; 113; 114; 116 and 122, as well as the creation of:

- General Law of the National Anti-Corruption System (NAS). (NEW)
- General Law of Administrative Responsibilities. (NEW)
- Organic Law of the Federal Court of Administrative Justice (NEW)
- Federal Audit and Accountability Act. (NEW)
- Organic Law of the Attorney General's Office (REFORMED)
- Federal Criminal Code. (REFORMED)
- Organic Law of the Federal Public Administration (REFORMED)

Such reforms were born after the event known as "the Mexican white house," where the wife of former Mexican President Pena Nieto acquired a mansion in a very luxurious and expensive area of Mexico City. Within the new juridical framework, committees appear, the faculties of supervision are strengthened and the competent jurisdictional organs are given guidelines to impart sanctions. However, recently in various media including "La jornada" (2020), the current director of CONACYT (National Council of Science and Technology) reported a diversion of funds embezzled from private companies, transnational and foreign between 2013 and 2018 for a total of $ 41,624 million Mexican pesos.

This type of corruption can be addressed through a certain type of Blockchain solutions, such as the one proposed by Mohite & Acharya (2018), where they explain that all transactions can be verified and cannot be changed. Money released from the budget can be tracked, and anyone and everyone can find out how the money is being used. That is one of the main essential functions of Blockchain. If we can measure on real time combining Information, Digital Technology and Blockchain, there are less and less ways to make this kind of corruption.

Therefore, and despite the new legislation and the creation of the NAS, the technological mechanisms that will complement these institutions are still lacking; the present research provides that knowledge, applications and methods based on Blockchain that in the medium or long term will discourage and create locks for corrupt public officials to stop stealing from the public treasury. It is also important to note that the urgency of solving corruption is a priority. Although this will not completely eliminate corruption, at least it will diminish it.

IV. The function of Blockchain

In this section of the research, a brief passage will be made as a way of indirectly answering the first research question, however in the "Findings & discussion" of the document all the analysis for the implementation of this technology in Mexico and its consequences will be provided.

1. Blockchain transparency and immutability of information flows

Transparency is an essential element of both a Blockchain and any anti-corruption effort. Due to its transparent nature, this technology is quite promising. In crypto currencies when there is a transaction from user A to user B, there is a record for each of the blocks that contain the same information (Blockchain) that is updated in real time; it can be consulted publicly if this happens in a simple monetary transaction. Then what would happen with government financial transactions?

However, there are a lot of projections of this technology as a catalyst to protect all monetary transaction records; they have to be immutable, non-alterable, and therefore, public. Blockchain brings together these elements that can contribute to reducing the levels of corruption in Mexico.

Furthermore, Blockchain must be programmed to offer a certain level of transparency; the reader may ask how it could work on Blockchain. The data systems record all changes in the stored data. Everyone who has access to a Blockchain can verify the stored data in this context. In this way, transactions can be made more transparent.

Likewise, Kshetri & Voas (2018) comment that Blockchain creates a digital transaction book that is proof against corrupt manipulations and shares the book, thus offering transparency. Cryptography permits admittance to add to the record safely. It is amazingly troublesome, if certainly impossible, to change or erase information recorded in an overall record. With this element, Blockchain makes it conceivable to decrease or dispose of uprightness infringement, such

as fraud and corruption, while diminishing exchange costs.

Frick de Moura et al. (2020) reason that with regards to public administration, the rise of e-Government and the Open Government Partnership has elevated strategies that look to work on the connection between government and residents, trying to give more prominent straightforwardness and well known interest through the openness of government information and the improvement of electronic services and administration.

Likewise, below are some elements that the Blockchain must contain for efficient execution:

- Immutability: when the information is stored in Blockchain, it can't be modified. Accordingly, it is protected from control and illegal changes. This load of records could be put away under a similar code, being effectively available and solid, since the information has such changelessness that confirms the viewpoint of utilizing Blockchain for more productive and straightforward freely available records (Maza, 2019).
- Inclusiveness: the public Blockchains are open source and open to all. Along these lines, the frameworks can be opened to all residents, democratizing information stockpiling.
- Disintermediation: System based on this innovation wipe out an outsider expected to confirm exchanges. This diminishes exchange costs and makes them possibly less defenseless against corruption (Frick de Moura et al., 2020).

There is an example model depicted by Casallas (2020), he remarks that in Mexico, participants of Talent Land 2018 had the option to see the value in how a buying unit can settle on a decision for offers and how a business organization can apply to offer its items and services to the public authority, all through Blockchain, which makes transactions in an Alpha prototype. It is normal that it will permit a time of development until it arrives at a Beta form and afterward assesses the chance of applying it in a genuine case that goes with "Compranet," the Transactional System that permits public organizations in Mexico to perform contracting methods electronically, blended or face to face. The task has not been carried out because of administrative issues that emerge while bringing innovation into a government process.

2. Blockchain and decentralization

Decentralization will serve as a characteristic to avoid that the information of government transactions and government agencies is concentrated only in the

high government executives such as senators, state governors, mayors in Mexico; there must be a public Blockchain in which people can intervene and actively participate when avoiding any act of corruption, for example, the aforementioned where citizens can publish an obvious act of corruption in real time. The Blockchain network can be composed of citizens, government, private companies and NGOs, as well as the National Anti-Corruption Institute of Mexico.

Atzori (2017) inquired about decentralization through Blockchain technology and commented that it represents a "natural progression of humanity" and a "natural efficiency process." Technology can change the way political governance, authority, independence and participation can be conceptualized and implemented, forcing people to reach a new level of maturity and understanding.

Elisa et al. (2018) induce that Blockchain innovation permits the execution of exceptionally secure decentralized systems that protect privacy where exchanges are not heavily influenced by any outsider association; likewise, they feature that Blockchain innovation seems a decent answer for giving a safe, decentralized climate to data exchange. Ø lnes et al. (2017) comment that one of the main characteristics is the decentralization and integrity of the information, in which each node of the network has a complete copy of the transactions. It is essential Blockchain and its contribution to greater data integrity compared to current implementations in government. Data integrity means that the information stored in a system corresponds to what is represented in reality.

Ø lnes et al. (2017) highlighted that the distributed nature of Blockchain ensures that manipulating and changing data without having consensus becomes more difficult, resulting in better information integrity, although complete integrity can never be guaranteed. In fact, this originates from the very nature of distributed computing and source data entry, while many existing applications are based on a single database that is difficult to integrate with other sources. For example, if a group or person from the high-hierarchy of the Mexican government wants to change the records of monetary transactions (procurement), audits, any embezzlement, it will be very difficult because the consensus of citizens, the national anti-corruption agency, the private companies and NGO'S is required.

In another study made by Atzori (2017), he concludes that decentralization of government services properly managed through authorized Blockchain is possible and desirable since it can increase the functionality of public administration. The decentralization of administration through Blockchain appropriated as Bitcoin, notwithstanding, presents genuine dangers and detriments, which offset the advantages.

Finally, taking in context the decentralization and the implementation of a public Blockchain without access permission, Cai et al. (2018) state that system

participants do not need any permission before joining the network. In fact, the same citizens are the ones who could join within the Blockchain platform only with observer permits and not as someone who actively participates in the network, especially as a way to make a monitoring of financial movements, bids, land rights as well as the same government audits. This allows for the inference that transparency and decentralization are very much in hand.

V. Literature Review and Major Findings

The questions of this paper are two: what types of corruption can be reduced or eradicated in Mexico using Blockchain? And how can corruption be tackled with Blockchain? Therefore, the literature review is focused on these two questions.

Baranwal (2020) clarifies how should work the corruption elimination in government acquirement. The proposed arrangement gives absolute protection so 1) bidders don't get any data about offers with the exception of the greatest bid, 2) no subset of bidders can collude to discover the measure of a specific bidder's offered, and 3) there is no reliance on any outsider.

On the other hand, Balan et al. (2020) pointed out that the use of Blockchain-inspired an App that can be critical in ensuring that the above concerns are adequately, or at least to the maximum extent, addressed. Its structure is systematic, transparent and easy to use. It can become a useful stakeholder-oriented tool to support transactions in the public sector.

Additionally, the paper made by El Abdallaoui, El Fazziki, and Sadgal (2020) has fascinating discoveries, as are depicted as follows: Thanks to its free, secure and anonymous nature, the system urges reporting to the authorities by offering the chance of examinations, the seizure of justice, the exposing of offenders and the seizure and return to the state of stolen public assets. The different tests completed on the proposed framework exhibit its productivity and superiority. Regardless of whether this presentation debilitates at a specific limit (30 cases/min), the system remains reliable due to its agreements and low utilization of material assets.

Furthermore, Veeramani & Jaganathan (2020) found an advantage of this technology: Once the buyer and seller agree to register the property, the smart contract is automatically invoked and the registrar approves the draft deed of sale for further steps. The completed transaction is attached to the general ledger.

Moreover, Wang and Cheng (2020's) results show that the more prominent the force of state-possessed undertaking chiefs, the less straightforward the data is, the less strong the oversight component is, and the simpler it is to make hidden corruption from state-claimed endeavor leaders. Simply by utilizing

Blockchain innovation to further develop the review mode, guarantee information honesty, further develop review productivity and decline review hazard.

Additionally, Casallas et al. (2020) say that at this time, there are areas of action in government management in which the use of Blockchain is not allowed due to a lack of legal coverage. The authors emphasize that in most government applications, the aim is for any citizen to have unrestricted access to Blockchain and Smart Contracts, based precisely on transparency and as a guarantee of the fight against corruption.

Besides, the paper wrote by Joshi et al. (2019) developed eight desirable features based on Blockchain to prevent embezzlement. In addition, they mathematically modeled the characteristics of the transaction to formally ensure equity at all levels. This system can also be audited by ordinary people to track the cash flow of any scheme, making the system completely transparent and fair.

In addition, Kossow & Dykes (2018), Mohite & Acharya (2018) pointed out the general characteristics of the technology. All transactions are easy to locate and prevent public officials from spending money and manipulating the record. Thanks to the decentralized general ledger, all transactions can be verified and cannot be changed. Money released from the budget can be tracked; anyone and everyone can find out how the money is being used. Such a chain of blocks will surely reduce corruption (Mohite & Acharya, 2018).

Finally, Simoyama et al.'s (2017) points are as follows: 1) By having all the data in a public E-bookkeeping book, the inspector's work would be rearranged by permitting the person in question to analyze the uses of all agencies involved. 2) Auditors can screen and confirm accounts progressively, rather than waiting for the yearly reporting, which diminishes irregularity and ceaseless control observing. 3) Politician's impression of hazard should increment, since "the more data the financial plan reveals, the fewer government officials can utilize monetary shortfalls to accomplish sharp objectives."

VI. Blockchain discussion on types of corruption & research limitations

The first question of the investigation is explained and answered with the analysis findings and possible solutions described below (section 2). That analysis was made based on the literature and on the needs that Mexico has to combat such as the misappropriation of funds, the collusion of government auditors as well as the public tenders.

The second question of the investigation is answered too, taking into account that Blockchain technology through its elements such as information

transparency (this helps a lot so that several users of the network can visualize in real time the information of government expenses and budgets), the immutability of the data (above all in public tenders, procurement or corruption of public records) and finally the decentralization of the Blockchain, so that data cannot be centralized only by the government and that there is greater citizen participation to reduce corruption.

1. Blockchain limitations on solutions

Although it is difficult for all corruption cases to be reduced by a single technological method since the corruption scams are always more sophisticated every day, the corrupt always look for "discreet" ways to commit these illicit acts.

Blockchain is not perfect because it cannot be in the physical world measuring all the parameters or types of corruption since its scope is only in the digital or virtual world, that is why initiatives such as auctions, monetary transactions of government institutions, audits in real time by citizens and by government auditors, etc., must to be subject to electronic and digital methods, as these can be measured and registered with Blockchain in conjunction with other information technologies.

Now what if the government does not want to adopt Blockchain technology to reduce corruption? Then everything exposed in this research would be limited; in fact, it is a limitation of this research. About the authors cited in the literature review, there are some who have already presented real programmed and tested prototypes, others who simply base themselves on facts with what they have researched on the subject, but they pigeonhole themselves in non-technical or hypothetical cases. Nonetheless, it is recommended that future research be more specific detailed, such as the implementation process through empirical studies and real cases, until the scope of Blockchain's efforts to reduce corruption be clearer.

However, research centers or technological and R&D institutions must propose this type of method and make it possible for it to be carried out.

Furthermore, this technology can be adopted by any government around the world. It can even be promoted by institutions like OECD or The United Nations. In fact, there is a case of this, where the OECD has already discussed and analyzed a little on the subject, for example, the study by Aliyev & Safarov (2019) they published a paper that was submitted as part of a competitive call for papers on integrity and anti-corruption in the context of the 2019 OECD Global Anti-Corruption & Integrity Forum.

2. Theoretical discussion & possible Blockchain solutions in Mexico

In this study, which is the latest literature on this innovative and recent topic that brings with it a number of solutions to such a serious problem; Blockchain technology can help reduce the levels of corruption in Mexico and around the world, highlighting the following types of corruption:

In the administration of President Pena Nieto there were very important corruption cases in construction and public tenders. The cases of alleged bribery and corruption were the most notorious. Firms such as Higa Group, OHL and Odebrecht took the front pages. Through a system based on Blockchain and "Compranet System," Transactional System that allows public institutions in Mexico to perform contracting procedures electronically, mixed, or in person. This system can exhibit a non-trustworthy environment where all steps of the protocol, including the outcome of the auction, can be publicly verified, and a consortium as a distributed environment will bring security and competitive culture. Also, this system will prevent collusion by bidders in Mexico; if the bid is public, everyone can detect a corruption problem (Barnawal, 2020).

Balan et al. (2020) suggest an APP. This APP is a project similar to the previous one, where you can have greater control of public tenders and inhibit acts of corruption such as the one made by PEMEX, which is a private oil extraction and exploration company; now it is one of the companies with several cases of corruption in recent years. Emilio Lozoya, former ex-director of Pemex, was accused of receiving 5 million dollars to favor the Brazilian construction company with Pemex contracts. There was no public tender. This Blockchain APP can be an effective vehicle for addressing corruption in government procurement, focusing on urban public procurement and bidding systems. It presents the design of a new application (Self-Sovereign App or SSApp) to avoid the corrupt behavior of agents.

El Abdallaoui, El Fazziki, & Sadgal (2020)'s points can be the solution that had the greatest scope because it includes Citizen Participation. People in Mexico can be witnesses and publish at any time a recorded video or take photos to point out an act of corruption such as bribery, embezzlement, public bidding, etc. With this system, any public official at any level would be under pressure not to commit acts of corruption.

- This photo-video would be published on real time through Blockchain as a social media. The investigation of any case of corruption must be carried out within the framework of the law by the authorities.
- This solution could not be perfect because there are not always cameras or people-watching; corruption crimes are often quiet and in very private places where no one else will notice, nonetheless is the best way to address

corruption for now.

In Mexico, there are few high-profile or scandalous cases about theft or robbery of property rights to any real estate or land. But being a country with an intermediate corruption index (GCI index) means this can happen at any time. In fact, that is why this Blockchain and Smart Contracts application would be of great help; this would work anywhere in the world (Veeramani & Jaganathan, 2020). For example, in 2011, PEMEX paid $ 9 million to transport an oil platform. After an audit and investigation, it was discovered that said platform had the wrong equipment for the specified tasks and also had never been transported since it had always been in Mexico.

Wang and Cheng (2020) can delineate how to avoid that sort of corruption with data decentralization and high transparency and not control the data to dissect the level of data straightforwardness in state-claimed organizations. Subsequently, further developing the current reviewing mode and upgrading the proficiency of examining and further anticipating the pattern of hidden corruption to discover the qualities of corruption at the earliest opportunity and to convenient oversee inadequate behaviors.

Simply with a Blockchain-based system, the bank accounts owned by the government such as financial assets, expenditure budget, income budget of government institutions, can be traced and monitored after corruption cases such as that of CONACYT in Mexico, where funds were unjustifiably transferred to private national and foreign companies in the period from 2013 to 2018. More money and transactions control could become a corruption reduction; also this is another advantage against corruption provided by Blockchain (Mohite & Acharya, 2018).

The scope of Blockchain technology combined with smart contracts is, without any doubt, a perfect complement when tackling corruption; this is because these smart contracts can be executed automatically through a neural network, without the need for the human being to enter data manually or alter information. In Mexico, it can be used to enforce the agreements between the government and private companies through purchases; these contracts help neither party fail to comply with the agreement without the need to file a lawsuit (Casallas et al., 2020).

3. Types of corruption that must be resolved urgently in Mexico

As we have seen, in procurement through public tenders, this has been one of the most controversial methods of corruption for years in all countries but especially in Mexico because it is one of the most efficient methods of misappropriating state funds as follows:

- In the audits in agencies, public dependencies and government companies, unfortunately, in several countries and especially in emerging economies like Mexico, there is not much infrastructure to have so many auditors; also, these auditors can be colluded to omit accounting information and money spent. Nevertheless, as I pointed out before, independent audits can be done and can be registered through Blockchain in real time with high skilled and trained citizens. This, in turn, makes democracies more participatory.
- The project presented by the authors El Abdallaoui et al. (2020), whose objective is to fight corruption through a mechanism based on Blockchain with the help of civil society (first victims and first witnesses of the scourge of corruption) through photos and videos, is noteworthy. This is in real time and totally transparent in the information flows. In a country like Mexico, this would be of great help because massive monitoring of citizen participation can deal with any act of corruption; thus, politicians and public agents will be in a state of alert to exercise any improper act.
- In general, everything is related to the diversion of government funds within government agencies and departments. The misappropriated and diverted budget can be detected through a combination of the Big Data with the Blockchain in real time, and any citizen can be integrated to neural network technology and Blockchain, so they can actively participate in the audits or the detection of corruption. There are also several authors such as those studied by Elisa et al. (2018); Twizeyimana, & Andersson (2019), who emphasize the value of exercising an E-government, through a set of interlinked and decentralized subsystems and systems for managing budgets, expenditures and all kinds of movements made in government, although this represents a very big challenge for developing economies because there are not all the technological elements to carry it out.

VII. Final comments and conclusions

This technology has had a boom thanks to the push of the Fintech sector of crypto-currencies. However, it is already a reality that is providing multiple solutions in various economic and government sectors, such is the case to reduce corruption as has been observed in the course of this. Of all the elements and types of existing corruption, it is mainly perceived that it can be reduced or eliminated through good Blockchain management in Mexico such as public tenders or bids, government purchases and acquisitions (procurement), embezzlement of funds, as well as in audits of companies or government

agencies, For a successful implementation in government, it must be important that developers have independence and do not collude with government agents to avoid conflict of interest.

   Although Mexico is not precisely one of the most corrupt countries in the world due to the indicators already mentioned, it is important to recognize that there are some important cases that have arisen within the framework of various administrations, whether local, federal or state, as well as in the three levels of government. It is never too late to generate innovative ideas to stop one of the factors that have brought about the greatest social injustice and economic backwardness, which is why this research was motivated, as it seems that Blockchain is here to stay.

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