Financial Innovation Solutions from Blockchain Technology in the Perception of Financial Market Agents

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Abstract

The phenomenon of financial innovation (FI) found, in the fast-contemporary technological advance, the possibility of disseminating solutions that are intended to fill market gaps, promoting profound changes in the traditional financial structure. This finding can be explained by the perceptible movement of different agents interested in exploring the applications of blockchain technology in recent years. Considering this scenario of changes and expectations the present work aims to analyze perceptions of financial market agents about the possibility of blockchain technology influence in the creation of FI solutions. From the point of view of the research strategy, it constitutes a field research. We operated through interviews with the participation of twelve managers of institutions that operate in the financial environment. The results point to blockchain impacting the financial environment of organizations, whether in its technology platforms, investments, internal structures, people, governance, business conceptions. Likewise, by the existence of opportunities to solve market problems, affecting, through deeper changes in the financial system, from the disintermediation. It reveals the emergence of new business models and the possibility of consumers and managers less dependent on a centralized financial environment.

Keywords: Bitcoin; Financial Technologies; Disintermediation; Financial Environment; Business Models.

1. Introduction

The growing technological advance of the last century has caused the financial universe to experience innovations that produce ever faster and more impactful changes in the financial environment. Like other industries, the financial industry also experiences internal and external tensions that launch it in the search for innovative solutions, embedded in the field of financial innovation (FI).

This scenario of change that influences technological development and consumer needs (Yoo, 2017) makes the digital technology go from support to decisive role by allowing the creation of new organizations in place of those incapable of innovating (Scott, Looman, & Kumar, 2017). This point was signaled by the significant revolution in the way the financial industry started to conduct business with the international market. In this sense, we can exemplify the process of trading stocks and bonds that has been restructured from innovations in information technology (Lucarelli, Mazooli, & Rothfeld, 2009).

From the introduction of bitcoin to the world, disseminated by Satoshi Nakamoto (pseudonym), there has been contact with its base technology that would come to be known as blockchain technology (Cao, Cao, Wang, & Lu, 2017). Despite its emergence in 2008, the potential of blockchain beyond bitcoin transactions only began to be exploited a few years later, making the literature concerned with the application and influence of blockchain technology begin to appear around 2013 (White, 2017).

Thus, blockchain drew attention from organizations mainly because of their capacity to record, verify and control transactions from an anonymous network, distributed and secured by encryption. Considering the financial sector, the growing interest of organizations in this environment by blockchain technology is justified by the fact that this is an industry that globally serves billions of people, moves trillions of dollars daily and supports an economy worth more than one hundred trillion dollars (Tapscott & Tapscott, 2016), in addition to the fact that the financial market is the most sensitive to the technological innovations in this scenario of changes (Umarovich, Gennadyevna, Vladimirovna, & Alexandrovich, 2017).

Technological development has also brought change to payment systems, increasing the speed of transactions, reducing the operational risk from the digitization of records and ledgers and providing the development of new payment schemes, such as via mobile network (Bank of England, 2014).

Regarding the commercialization of assets, recent theoretical studies involving the development of blockchain technology point to the possibility of applying the technology to that end. Lee (2016) understands that this innovation may lead to the emergence of an alternative market to the traditional stock exchange from the creation of cryptosecurities, eliminating the need for intermediaries, such as brokerage firms and allowing direct sales of assets between people.

Faced with the challenges presented, financial institutions are making significant investments in research in search of solutions in blockchain. Proof of this are the millions that have been invested in blockchain, Fintechs and other innovations by banking industry giants such as Bank of America, Citicorp, Goldman Sachs, JP Morgan, Morgan Stanley and Wells Fargo (Dhillon, Metcalf, & Hopper, 2017). From blockchain technology, actions such as agreements, process logs, completed tasks, and made payments can have a virtual signature record that can be identified, validated, stored and shared. These characteristics make it clear that the existence of intermediaries such as brokers, banks and lawyers is no longer necessary (Iansiti & Lakhani, 2017). Thus, the scenario has demonstrated that today's organizations live a digital age that generates technologies capable of reinventing the value chain, in addition to offering strategic opportunities to reconfigure their business models (Scott *et al.*, 2017).

In this context, the present research aims to understand the influence of blockchain technology from the conception of financial innovation in the market. It is relevant to investigate the perceptions, desires, doubts, interests, possibilities and needs of the actors that compose the environment in the face of the new technological possibility. This is because, previous empirical studies have not been found with this field of

approach. Thus, the work was shaped by the following guiding question: What are the perceptions of financial market players regarding the possibilities of implementing this technology in institutions?

From the introduction, in the theoretical framework, we approach conceptual aspects of innovation and financial innovation; the genesis and implications of blockchain technology. Then, the methodology and procedures applied in the research, with analyzes and discussions of the results. In the end, we present the conclusions comprising the implications and suggestions of the research.

2. Theoretical Framework

2.1 Innovation and Financial Innovation

Innovation happens when an invention is effectively inserted into the market or at the organizational level, because when this does not happen, it has no economic relevance at all (Gaynor, 2002; Mansfield, Rapoport, Schnee, Wagner, & Hamburger, 1971; Organisation for Economic Co-Operation and Development [OECD], 2005; Schumpeter, 1934, 1939; Twiss, 1974; Utterback, 1971, 1977).

The phenomenon can happen in the areas of product, process, organizational or marketing (OECD, 2005), and there is a direct relationship between the degree of novelty of what is being proposed and the dimension of innovation (Tidd & Bessant, 2011). It is possible to generate an incremental improvement of something that is already on the market, propose something radically new or produce a breakthrough innovation (Gaynor, 2002).

Phenomena such as the struggle against obsolescence are directly related to the search for innovation (Holmstrom, 1989), as well as the competitiveness among firms, since this launches them in the search for solution that provide greater guarantees (Davenport, 1993). We see the financial sector, whose great part of the technologies directed to this area has generated products or services from small or big changes (Nicoletti, 2017). When mentioning the introduction of new practices in the field of finance, providing the FI, it is known that this has been happening since the times of Babylon, Assyria and Ancient Greece, where, as an example, we can mention the creation of banks, the expansion of commerce and the increase of the standard of living (Allen & Gale, 1994; Bernholz & Vaubel, 2014; Merton, 1992; Silber, 1983).

Amongst several, banks set up an example of an intermediary of relationships, where, while commercial banks provide credit from loans, mediating the relationship between savers and investors, investment banks help firms and government by mediating the sale of securities to finance their operations (Jacque, 2001; Merton, 1992; Rooney, Mandeville, & Kastelle, 2013).

Despite the importance of financial intermediation in the market since the mid-1970s, the financial environment has undergone a disintermediation process (Jacque, 2001). The phenomenon is related to the growth of the internet, but it is understood that at the same time that it can extinguish some intermediaries, it provides the emergence of electronic intermediaries that continue to integrate suppliers and consumers, in addition to providing confidence and integrity of the markets (Bakos, 1998).

With the Internet, digital banking and the digital trade of securities have emerged and, consequently, the redefinition of the functions of traditional intermediaries (Jacque, 2001). Thus, electronic brokerage companies appeared that brokered the purchase and sale of securities by performing the electronic processing of orders through a network of financial market systems linked to different stock exchanges

around the world (Yap & Synn, 2009). In this way, FI is a comprehensive theme that considers the models that provide the development of new services or products that contribute to the completeness of the system, considering the provision of opportunities for risk sharing or its intertemporal smoothing (Allen & Gale, 1994; Jacque, 2001; Levich, 1989; Llewellyn, 2009).

There are situations where new products are based on new processes, making innovations often linked (Tufano, 2003; White, 2000). As an example of product we can have new derivative contracts, new corporate titles (Tufano, 2003). Regarding the process, the FI in this area foresees reflections on the issues of clearing and settlement, such as SWIFT (Levich, 1989), new ways of distributing financial securities or new ways of processing and pricing transactions (Llewellyn, 2009). This issue of innovation in the service process rests on the individualization of the customer (Davenport, 1993), so much so that the banking industry was one of the pioneers in the adoption of computers with the intention of improving and accelerating existing processes (Nicoletti, 2017).

When discussing FI, we consider factors such as: *i)* reflections on the safety and soundness of the entire system (Levich, 1989); *ii)* increase the allocation efficiency of the financial intermediation process and reduce the cost or transaction risk in the primary markets in which the financial instruments are traded (Jacque, 2001); *iii)* creation and popularization of new instruments, technologies, institutions and financial markets (Tufano, 2003); *iv)* changes that alter or modify the role of financial institutions in general (Fasnacht, 2009).

Once introduced and disseminated, FI can provide new types of assets, new means to offer products and services to the public or new organizations (Blake, 1996). The fact that FI is a continuous phenomenon of a profit maximization economy (Tufano, 2003) allows firms from all industries to raise large amounts of capital at a lower cost (Lerner, 2006). Therefore, the decrease in transaction costs provided may be the key contribution generated by FI (Levich, 1989), since these costs also include the cost of risk management (Berger, 1990). So much is that the overall goal of process innovation in the financial field is precisely the increase in profit by reducing costs, improved efficiency and increased productivity (Fasnacht, 2009).

Another element that contributes to the reduction of transaction costs is technological innovation, which, through advances in the area of information technology (IT), has promoted reductions in the cost of processing and communicating information (Malone, Yates, & Benjamin, 1987; Niehans, 1983). This phenomenon is of great importance for any banking activity because information technology is the backbone of any banking activity (Fasnacht, 2009), since the media makes it possible to exchange information with the customer and connect them to the particular product they want to use (Kane, 1984).

Since its emergence in the financial world financial technology initiatives have spread rapidly affecting new areas and ramifications (Nicoletti, 2017). In 2008, Satoshi Nakamoto introduced a new type of currency called bitcoin, based on innovative blockchain technology (Cao *et al.*, 2017). Blockchain is a decentralized registry solution that facilitates the availability and exchange of data between various stakeholders in financial services (Nicoletti, 2017) whose adoption process is already being pursued by financial services companies such as Standard Chartered, UBS, Deutsche Bank and Citibank with a view to reducing costs and increasing speed and flexibility in transactions (Iansiti & Lakhani, 2017; Scott, Looman, & Kumar, 2017).

2.2 Blockchain

Blockchain is a "distributed ledger technology" (Oh & Shong, p. 338) composed of a chain of blocks whose concept was presented for the first time in the work "Bitcoin: a peer-to-peer electronic cash system", by Satoshi Nakamoto, in the year 2008 (Banco Central do Brasil, 2017; Cao *et al.*, 2017; Collomb & Sok, 2016; Dhillon *et al.*, 2017; Moyano & Ross, 2017; Nataragan, Krause, & Gradstein, 2017; Pinna & Ruttenberg, 2016; YERMACK, 2017).

In its genesis, the system provides for the replacement of mutual trust between the parties involved in an agreement from the registration of the information of a transaction in a database called public ledger which has its control distributed among the nodes that make up the blockchain network (Swan, 2015). Nodes are users of the blockchain system, all interconnected in a peer-to-peer network (P2P), that participate in the verification, validation and approval stages of the transactions and information registered in the public ledger of the network (Pinna & Ruttenberg, 2016; Tapscott & Tapscott, 2017).

It is a foundational technology that brings with it the potential to create new foundations of our economic and social systems (Iansiti & Lakhani, 2017) whose differential is in the use of cryptography and algorithms for the registration and synchronization of data, forming an unchanging chain and without the censorship of central authorities (Nataragan *et al.*, 2017; Pinna & Ruttenberg, 2016).

This feature allows direct negotiation between pairs and thereby eliminates the need for intermediaries responsible for the verification, security of the transaction or maintenance of system integrity (Tapscott & Tapscott, 2017) providing security and protection (Nataragan *et al.*, 2017). In this way, a virtual environment is created that serves to allocate value, of agreements, property rights and identity with the possibility of transparent monitoring of all transactions carried out in the system (Foerstl, Schleper, & Henke, 2017).

Among the characteristics of the blockchain are the complete traceability of information, the anonymity of network participants, the transparency of transactions, the elimination of centralization and the need for trust, and the creation of a tamper-resistant system whose maintenance of the network is done collectively (Cao *et al*. 2017). With this, anyone with access to the blockchain network could follow the activities of the organization, providing transparency and trust between the parties (Swan, 2015 and assist in reducing transaction costs (Nowinski & Kozma, 2017).

Consequently, from the reduction of transaction costs provided by the elimination of third parties it is possible to consider the induction of changes in different industries (Fanning & Centers, 2016). Among the industries that can benefit from the blockchain are those that make up the financial system. When applied in this environment it can influence issues such as customer records, asset management, in trade finance, in global payments, in payment systems, in collective financing, and in P2P loans (Bambara & Allen, 2018; Collomb & Sok, 2016).

In transactions blockchain technology has the potential to generate clearing and settlement benefits that occur in post-trade (Collomb & Sok, 2016), providing great savings on capital charges and taxes, as well as the possibility of eliminating recurring rates in the foreign exchange market, of commodities and derivatives traded in the over-the-counter market (Bambara & Allen, 2018). Thus, considering its application, the blockchain can provide major changes in the financial industry, including changing monopoly relations (Tapscott & Tapscott, 2016). This can be achieved because the technology in question

is composed of features that provide quick solutions at a reduced cost, making financial institutions that find a way to adopt blockchain gain competitive advantage (Bambara & Allen, 2018).

Despite the mentioned advantages, the firms that make up the financial universe, especially the banks, also understand that the nature of the system makes the risk of disintermediation, representing a potential threat to their activities, especially those that exercise central control (Collomb & Sok, 2016).

Part of the threat comes from the potential for crypto-coins and tokens from the blockchain. Tokens can represent any asset, be it physical or digital, as consumable and tradable goods. With this, innovation paved the way for the possibility of raising capital from the so-called initial coin offering (ICO), a variation of the initial public offering (IPO), so that a new project can be leveraged through collective financing of a blockchain based token. This innovation promotes a new financial ecosystem without central control or entry barrier from an ICO, allowing development and innovation (Bambara & Allen, 2018).

3. Methodology and Procedures

Based on the objective of this study to analyze the perceptions of financial market agents about the possibility of blockchain technology influence in the creation of financial innovation solutions, this research is classified as an applied nature based on the deductive method, using a qualitative approach and exploratory and descriptive objectives (Denzin & Lincoln, 2006; Kothari, 2004). From the point of view of the research strategy, it is a field research. As a technique, we conducted semi-structured interviews, analyzed through content analysis (Hernández Sampieri, Fernández Collado, & Baptista Lucio, 2013).

Due to the large number of agents that operate in the financial market, the present study chose to segment the research as follows: agents who hold a position of management in organization or agents of the organization that directly advise the managers in the decision making, all with operations in the financial segment in Brazil.

To select the sample we selected organizations whose activity was directly or indirectly linked to the financial area and/or blockchain directed to financial investments. Also, selected organizations had their primary and secondary National Code of Economic Activity (CNAE), as shown in the National Registry of Legal Entities (CNPJ) verified in order to ensure the relations of their business with financial, technological or research activity. We consider organizations that fit into at least one of the divisions of CNAE: section J – divisions 62, 63; section K - divisions 64, 65, 66; section M - divisions 72, 74 and section S – division 94 (Instituto Brasileiro de Geografia e Estatística, 2019).

A total of twenty-seven agents (managers) from different organizations were contacted, having in the end a total of twelve respondents. Two agents from multiple banks, a credit union agent, a digital bank agent, seven Fintechs agents and one Insurtech agent. Regarding the market experience in the financial environment, the interviewees range from seven months to 32 years of activity in the field.

The agents included in the research, during the presentation of the results, were named fictitiously and at random, being represented by the names E1, E2, E3, E4, E5, E6, E7, E8, E9, E10, E11 and 12, to ensure the identity preserved in relation to the reports presented.

The interviews that made up the research were carried out between February and March of 2019 and the data collection for analysis of this study had as main technique the application of semi-structured interview

addressing the following questions: *i)* effects of blockchain technology on organizational relationships; *ii)* novel or more effective solutions than other means and methods already existent from blockchain technology; *iii)* creation of new products or services for to the financial area from blockchain technology. As for the location for the interviews, they occurred in person in São Paulo (SP) and remotely, through telephone or electronic communication (software Microsoft Skype™ and cross-platform WhatsApp application), all recorded in audio – except for an asynchronous interview, carried out by e-mail at the request of the person interviewed – for later content analysis.

After the collection phase, the interviews were fully transcribed, interpreted, analyzed, organized and evaluated in the light of the theoretical framework of the research, in a qualitative way, with emphasis on the perception of the researched individual in their respective context.

4. Analysis and Discussion of Results

When asked about the effects of blockchain technology on financial relations in the organizational environment, the agents interviewed provided answers that when analyzed lead to the understanding of three central effects: i) disintermediation and its consequences, in reference to the elimination of service providers considered as intermediaries; ii) cost reduction and process improvement, considering transaction costs, back-office operations and agility in internal activities; iii) generation of new business models, based on the attributes of blockchain technology.

The question of an eminent disintermediation emerges from recent technological developments that are directly affecting the market. **E4** highlights: "We are in a moment of great technological disruption in the field of finance.". The assertion can be understood from the characteristics of the blockchain, since its core is decentralization. "The philosophy of blockchain is you do not need a centralizing agent which is just what financial institutions do most." (**E5**). **E12**: "[...] each time with fewer intermediaries. This is going to be the great differential of its implementation.".

The answers complement the statement by Jacque (2001), when it states that despite the importance of financial intermediation in the market, since the mid-1970s, the financial environment has undergone a disintermediation process. This phenomenon leads precisely to the risk of increased disintermediation due to the influence of the blockchain in the financial universe, especially the banks (Collomb & Sok, 2016).

As a consequence of the disintermediation caused by the blockchain, we infer, from the answers obtained, that results that directly impact the financial industry, benefiting are expected, "[...]taking away all the inefficiencies that exist in it." (**E1**), or going beyond, affecting the existing power relations, bringing advantages to customers. "I think the great potential of the blockchain is precisely to take power from large power detention centers, which are the major financial centers, the big banks. Take this out and put it to the same population." (**E9**), "[...]it can challenge the traditional role of banks." (**E5**). "[...]what happens is that we are free from being tied by the bank, and therefore from the political strength it gains by controlling finances." (**E1**).

The aforementioned possibility of resolution of inefficiency is provided by FI, since it considers the models that provide the development of new services or products that contribute to the completeness of the system (Allen & Gale, 1994; Jacque, 2001; Levich, 1989; Llewellyn, 2009). Moreover, regarding the power issue,

the interviewee's opinion confirms Tapscott (2016) when saying that the blockchain can proportionate major changes in the financial industry, including changing monopoly relations (Tapscott & Tapscott, 2016).

From the possibility of change described by the interviewees, where the big banks lose power and the influence they have, we can relate to Fasnacht (2009) when he states that changes that alter or modify the role of financial institutions in general are one of the factors of financial innovation.

When considering the scenario described by the interviewees and evaluating the emergence of financial solutions based on exchanges with cryptocurrencies as bitcoin, remembering that blockchain is its underlying technology, we note that the reported effects can be confirmed since virtual currency transactions are a reality that comes out of the margin of financial operations as they enter the main path of the system through applications for the exchange of encrypted fiduciary currency.

> Cashapp already allows bitcoin purchase [...]. The company already has 12 million or 15 million users, which is basically to transfer dollars, with a digital bank account already allowing the purchase of bitcoin. Therefore, they so entering the blockchain world, but entering the traditional way of the financial market. [...]I see that this decentralization and blockchain technology is increasing the dematerialization of financial services (**E4**) .

> If on the one hand the possibilities of disintermediation are reported, on the other there is the expectation of blockchain generate benefits for organizations. “At the same time that institutions can use it and save in costs, improve processes and bring more security, it also puts the role of the intermediary in question [...].” (**E5**).

The development of applications for buying and selling bitcoin goes back to Blake’s (1996) statement when he says that once introduced and diffused, FI can provide new asset types, new means for offering products and services to the public or new organizations. Just like Bakos (1998) who saw the possibility of extinction of intermediates but suggested the emergence of electronic intermediates.

When discussing benefits, cost reductions are seen from savings in fixed assets, as financial services become “Less based on physical infrastructure, bank branches, geographic location and increasingly migrating to the internet [...]” (**E4**). Just as there are fewer participants in the transaction chain, “[...] reducing the intermediary, you reduce the cost of operation in some way.” (**E12**). It is also understood that the organization and consumers can benefit from blockchain technology when combined with other instruments such as the Brazilian Positive Registry for consumer credit reporting, as this considers the credit history of the individual, as pointed out by **E7**: “So I believe you have a positive impact on transactions being resilient and simplifying the lives of those who are good payers, those who have credit. I think it can simplify customer life and banking management.”.

When put into perspective, as Niehans (1983) adds, the cost reduction that emerges from technological innovation comes from reducing the cost of interpersonal money transfers through electronic transfer systems; interpersonal transfer of interest-earning assets and transfer cost between banking units. Thus, it is understood that the mentioned cost reduction is one of the factors of FI (Jacque, 2001).

With a view to process optimization from blockchain, it is understood that there may be a significant impact on internal process issues considering that technology favors the transmission of information. "[...] blockchain could help in the consignment of communications, maybe pull out from some inefficient bureaucratic flows by bringing the whole chain of verification to everyone at once." (**E3**).

When considering the possibility of blockchain combined with other instruments, facilitating the life of the client and institution, it is understood that there is a scenario of process improvement from the referred technology, where, according to Fasnacht (2009), the overall goal of process innovation in the financial field is precisely to increase profit by reducing costs, improving efficiency and increasing productivity.

In addition to paving the way for changes in organizations, it is recognized that from the blockchain there is the possibility of a consequent change of balance in current business relations, since "[...] there really is a potential for it, for this technology to transform today's established business models, financial businesses." (**E8**).

In the main path of the planned changes are the cryptoassets that may supersede the use of fiduciary currency at some point, how much to enable investments or financial leverage from going public outside the current financial system. As an example, we glimpse the "[...] project financing through crowdfunding, P2P platform lending [...]" (**E8**).

> I know that today the market, for example, the stock market, B3 for me I see the market at risk too. Because nowadays coin creators are going for ICO. Instead of an IPO as usually the companies that issue shares in stocks, you launch an extremely simple ICO compared to an IPO. Today you enter such a market, and you can launch a company with ICO, without needing all this regulatory and bureaucracy that that there is in a B3 – which is a mega middleman who makes money. If you operate blockchain and do it indoors, you carry out your ICO, turn your business into virtual currency and make money. It will make big money for being a huge breakthrough. Then you enter international transactions, enter N possibilities, let's say (**E12**).

The foreseen scenario allows us to ponder the current role that money and banks play in trade relations, as crypto assets have different characteristics amongst them. "[...]money is no longer a commodity, the old commodity which is to take money from the saver and lend to the borrower. [...] the financial sector needs to learn to intermediate the relationship." (**E5**).

The aforementioned possibility of financing or leverage from novel blockchain applications is understood to be an FI that is part of a profit maximizing economy (Tufano, 2003) which allows firms from all industries to raise large amounts of capital at a lower cost (Lerner, 2006).

By directing attention to the problems or issues that blockchain technology can solve unprecedentedly or more effectively than existing means and methods, it is understood that it can bring incremental and novel alternatives to financial operations, as well as providing greater security in the recording of data and information in different areas. Specifically, according to the testimonials, the blockchain contributes to matters of: *i)* financial operations, streamlining and securing transactions, *ii)* secure data and information logging, offering a higher level of accuracy to the information recorded and curbing fraud.

In financial operations, solutions to time, cost and trust are speculated. The question of time presents itself as quite relevant, especially when considering all stakeholders involved in the clearing and settlement process of a financial transaction. The reduction of this time can be achieved from exchanges with cryptocurrencies. By being aware of this, there are institutions already concerned with exploring the potential of technology.

> We are also studying cryptocurrencies a bit at the bank. The Central Bank issuing BRL currency, only in a digital form. The consequence of this for the financial system is... We can't see what the proportions are. As you might imagine, all the payment part of credit card companies, that wouldn't even be necessary anymore, because, for example, you no longer need a debit transaction if I have digital money here on my cell phone (**E8**).

The benefit may be extended to cross-border business where, "In transactions between individuals, example of international remittances, example of insurance, in settling a contract in real time, hiring companies, we make everything more fluid [...]." (**E1**). In addition to the gain in time, there is also the possibility of reducing costs incurred for interbank transactions or transfers.

> When you make a credit card transaction it goes through the issuer [...], acquirer [...],middle bank halfway through. When you make an international transfer we call remittances, you go through a bank here [...],Central Bank [...], you go through an intermediary bank in another country [...], Central Bank of another country [...], correspondent bank, to reach your account costing 15-20% of the transaction amount. Like, the transaction costs can fall dramatically, and money can reach those who need it on time (**E11**).

Interviewee **E5** completes**:** "Buy, sell, trade transactions where you need fiduciary, a transaction guarantee, I think his concept applies very well to that. For cost reduction where you still have a lot of transaction cost". Fiduciary trust can also be observed in the matter of intermediaries customarily involved in financial transactions. "Today for you to make any financial transaction you need to have a third party halfway through. The problem is that this third party can be corruptible [...].So financial situations where you eliminate this third party and use blockchain technology, it makes perfect sense." (**E6**).

The issues of time, process, cost and reliability are directly linked to the solutions blockchain can provide from its application in FI, considering the increase of allocation efficiency of the financial intermediation process and the reduction of transaction cost or risk in the primary markets where financial instruments are traded (Jacque, 2001), as well as the creation and popularization of new financial instruments, technologies, institutions and markets (Tufano, 2003) are factors that make up FI. Regarding transaction cost, its decrease may be the key contribution generated by FI (Levich, 1989).

When we mention the considerations that address the issues in the data and information logging, we have answers that aim to increase security, veracity, assertiveness, as well as a reduction in fraud. When considering asset registration, blockchain technology brings with it the ability to generate network records that are auditable and unchanging. "If there is a technology today that allows you to make things happen, to give power to the truth [...]I think this blockchain comes to solve it. It gives truth to everything and

nobody else moves, it's unchanging, any blockchain data is unchanging [...]" (**E2**). "[...]digital natarization is unheard of because for the first time in history we have a place where it is possible to make a digital record. Where it is computationally impracticable to tamper with or remove this information from there." (**E4**).

As information security is increased, it is understood that unknown agents involved in a transaction can act with greater confidence. With unchanging information available to everyone involved, bureaucracy can be reduced, favoring business operations. "There is a bit of a bureaucracy reduction for all services as it can connect dots very easily. [...] real time and everything with this issue of trust. For me these are the biggest gains" (**E3**). "So in a world where we have a high risk of document forgery [...] you will give much more assurance to the institution that will do business with you [...]" (**E12**). "[...] greatly increases the reliability of transactions, which brings us greater security for doing business as a whole" (**E2**).

As a result, negotiations gain in time and security, thereby reducing fraud and cost savings. "When you start using this in international flows to settle payments, you will bring even more dynamism to the process. It will accelerate because of both the risk reduction in transactions as well as cost savings" (**E5**). Briefly, the blockchain "Increasing security by eliminating fraud" (**E11**). The mentioned fraud solution can also be applied to banks, since manager E7 understands that: "Bank is fraud. If you have a blockchain, it is very difficult to commit an accounting fraud. [...] the American crisis of 2008 [...].If you had a blockchain system of those subprime derivatives, no one would have done what they did".

On the issue of raised information, it is understood that information technology is the backbone of any banking activity (Fasnacht, 2009), since the media enable the exchange of information with the customer and connect him to the particular product he wants to use (Kane, 1984). Thus, FI provides reflections on the safety and soundness of the entire system (Levich, 1989) reducing transaction costs through advances in information technology (IT), from reductions in the cost of information processing and communication (MALONE *et al.*, 1987; Niehans, 1983).

Turning specifically to the financial area, one wonders about the possibility of creating products or services with application in this environment using blockchain technology. Response analysis recognizes the possibility of innovative solutions from the blockchain, however, there was no consensus among respondents regarding the innovative, radical, disruptive or incremental character. From these considerations, it can be inferred that there is the possibility of creating products and services with emphasis on the areas of: *i)* asset digitization, corresponding to tokens; *ii)* transfers and payments.

The key feature of asset digitization is the increased degree of agility that this cryptoasset is able to achieve in cash conversions or other cryptoassets in investment operations, conserving its value. "If you tokenize the asset, for me, this is a leverage you have from the blockchain business in the financial industry or the financial aspect of business [...].Then you generate massive market liquidity" (**E2**).

When considering the innovative character of this issue, the market can benefit from the digitization of assets, whether tangible or intangible.

> For example, if you have a building and you tokenize the building [...] you can commercialize parts of this building in ICOs that would be a utility currency. If you have a building that costs 20 million and have 1 million tokens, technically each token is worth 20 BRL. In the future, if there is a valorization of this building as an asset, will it be worth

> 40 million and will our token be more expensive? If I have a company that went there and secured a certain value through a token, or created a token, a new currency, a new token that will be used for that... Part of this value that it is raising it is putting forward as being technology enhancement to the product or service it will provide. So in reality it is applying management efforts... To leverage a product or service that benefits those who own a stake in this company in the form of dividends, or in the form of results. Then it becomes a transferable security (**E11**).

> The product we are making, this securitization currency and environmental finance, we have no news that there is anything like it around the world. [...]a currency based on decarbonization and depollution environmental transactions. The coin would reflect this environmental transaction. The application we are developing in the environmental area that would need the blockchain. But of course, it would create a blockchain independent of pre-planned structures. Our system naturally already generates in its own blockchain (**E7**).

The possibility of creating a digital asset, a token, which can be traded is a description of the creation of FI towards new products, as stated by Llewellyn (2009) new forms of distribution of financial securities, or new derivative contracts, new corporate securities (Tufano, 2003), enabling a new project to be leveraged through crowdfunding a blockchain token (Bambara & Allen, 2018).

In addition to considering asset digitalization, there is also the issue of transfers and payments that occur in the financial system that still have gaps that can be filled by using blockchain technology. At this point the blockchain can bring improvements to current models as in the case of value transfers. "Maybe if you say a new product is a remittance that can be made anytime, even on Saturday, Sunday and holidays, yes. But I see that the same product will only have greater availability, will have some different features" (**E12**).

Considering an innovative concept for the financial environment, it is envisaged the possibility of creating a micropayment system that, respecting the right proportions, resembles Spotify's digital music distribution service. However, unlike the music platform that accumulates values and then distributes them, micropayments happen in real time.

> There is a concept that I think works. Still little explored, by theorists especially, that is the concept of money streaming. It's about micropayments, it's about instant payments. Salaries are paid monthly or biweekly, or for work, or for a longer period. And with bitcoin technology, we can have perhaps a much more recurring payment of money, is what he talks about streaming, this is a concept he brings about streaming of money. Instead of receiving from my company at the end of the month, I can start receiving at the end of the day, I can start receiving hourly for work done for micro tasking achieved. I think this has absurd potential, and now we see with the growing development and adoption of the lightning network, which allows micro payments. [...] maybe there are a lot of services, tasks, micro tasks, that could be paid and that today's financial infrastructure is unable to cope. With blockchain it would be possible, and then we have

> this concept of money streaming, which I think can be technologically transformative (**E4**).

By considering the characteristics related to the recording and storage of available information, it is possible to consider the creation of a digitized system that allows the business to be done in an innovative way. "I can do it by putting everyone on a blockchain network and I can have all the information I need in digital media. I can transact a property in the digital medium. For our Brazilian reality this is something unheard of" (**E8**). When this possibility arises in the context of policyholders, it is possible to consider an insurance purchase system that is consumed on time, different from the current system that charges for annual subscriptions.

> We were looking at the scooter, bike, motorcycle, delivery, car sharing, taxi... This is where we're going to do the IoT On Demand Insurance, a Netflix subscription plan. You buy an umbrella from your subscription plan and you consume on demand just like you do bike rides. You go there and unlock and consume. Your insurance will be per trip, per use. So the trip started, the insurance started, the trip ended, the insurance ended (**E1**).

Financing and lending issues can also find blockchain-based solutions from class actions that can connect savers and borrowers from anywhere in the world. "[...]a loan relationship, P2P can take place. A person in Japan may be interested in financing their personal loan here, at an interest rate of 2% per year when they have negative interest there. What do you need the bank for?" (**E1**).

Considering the need for banks, they may have the blockchain as a tool for developing new services. "[...]Banks can offer a new service that maps this whole process of food chain and interconnects these urban and rural customers, so technology may be offering a new service that is not basically financial intermediation" (**E5**).

Thinking about blockchain technology influencing possibilities of FIs focused on money transfers, payments, contracting of services or realizations of financing and loans, it becomes possible to see solutions that correspond to the creation and popularization of new instruments and financial markets (Tufano, 2003), new types of assets, new means of offering products and services to the public (Blake, 1996). Thus, confirming the potential to generate post-trade clearing and settlement benefits from the blockchain influence of transactions (Collomb & Sok, 2016).

As also defend Bambara and Allen (2018) and Collomb and Sok (2016), when applied in this environment it can influence issues such as customer registration, asset management, trade finance, global payments, payment systems, in crowdfunding and P2P loans.

5. Conclusions

From the interviews we can understand that blockchain technology is already influencing some changes in the financial sector. An example of this is the emergence of applications for the exchange of fiat currency and cryptocurrency, causing the possibility of changes in the power relations and control of the financial market, as it is currently still under the control of a few institutions, from the disintermediation of some

financial service providers and the emergence of new digital intermediaries.

With the application of technology in institutions we also infer the possibility of greater agility in transactions and service delivery by reducing bureaucracy provided by customer and organization information records on the blockchain network. As a result, economic benefits are expected from cost savings, increased operating efficiencies and increased organizational productivity.

It is recognized that organizations can also benefit from blockchain from the possibilities it provides for financial leverage by financing operations via initial coin offering (ICO), setting up a new business model, now faster and less bureaucratic than the usual IPO. Through technology we study the possibility of creating federal cryptocurrencies, that is, guaranteed by the government, with a view to increasing the speed of clearing and settlement processes for local or transnational financial transactions, without the need for an intermediary and, consequently, greater security and lower cost of operation by reducing fraud in operations.

When considering the possibility of elaborating unpublished products and services, the great potential of the blockchain is in its ability to scan virtually any type of asset, materializing the Token concept. This digital asset is seen as an element that brings agility in conversions in fiduciary currency or other crypto assets in investment operations, with greater liquidity. We understand that the concept opens the way to the possibility of instant micropayments, inaugurating the concept of money flow or money streaming. In addition, the possibility of a major change in the way some financial services, such as insurance companies, is contracted and consumed, besides the possibility of loans via P2P, benefiting unknown individuals from any part of the planet.

With the objective of analyzing perceptions of financial market agents about the influence of blockchain technology in the creation of financial innovation solutions, we understand that this technology is already influencing the financial environment of the organizations from financial innovations that contribute to the increase of the security, increase of the speed and reduction of the costs of the operations. Such verification has important implications for the financial environment of organizations, whether in its technology platforms, investments, internal structures, people, governance, business conceptions. In addition, we identify opportunities to solve existing market problems, as well as potential for deeper changes in the financial system, such as the elimination of intermediates, the emergence of new business models and the possibility of greater autonomy for consumers and managers of organizations from being less dependent on a centralized financial environment.

This study reveals some limitations in research, among which: the difficulty of establishing contact with a larger number of managers, especially representatives of large banking institutions; the market knowledge about blockchain technology, given that it is still, in the market investigation and validation phase; therefore, few managers of large financial institutions who are already operating the technology; and lack of a robust theoretical empirical framework on blockchain technology in the context of business organizations.

Finally, we recommend future studies including the application of blockchain in financial organizations, especially those with international transactions, aiming to understand alternatives and strategies of implementation. Finally, from the findings of the present investigation, divergent opinions emerged among the interviewees about whether or not the blockchain was a Distributed Ledger Technology (DLT).

Therefore, theoretical studies that contribute to the advancement and clarification of this conceptual divergence prove to be important.

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