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Bitcoin Measurement in Accounting: A Theoretical Analysis

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Abstract— *Coins appeared many centuries ago with the goal of facilitating the exchange of objects between people, but this means of exchange fell out of the hands of states that had control over their currencies mid-2008, until a new type of currency appeared, the first safe and functional cryptocurrency that did not need to have any government intervening, Bitcoin, a decentralized cryptocurrency that has a manufacturing limit and is becoming increasingly relevant in the current scenario. Accounting in turn has a new challenge of measuring and identifying the new asset in a way that best fits its classification. This paper aims to make a comparison between other scientific papers related to the measurement of the Bitcoin cryptocurrency to obtain a better understanding of how the topic is being addressed. It was concluded that standardization for the registration of these assets is indispensable, and that the main difficulty concerns encountered the reference for quotation in reais and the comparability of information. It is possible to consider that financial operations with cryptocurrencies are similar to operations with foreign currency. The analysis is made assuming the need for classification of Bitcoin and similar assets.*

I. INTRODUCTION

The constant technological evolution has allowed that in recent years the methods of custody, settlement and transfer of currencies to be constantly improved. Year after year, the currency has been receiving updates in its use, going from a completely physical and manual use to a large part in electronic systems that are increasingly faster and safer.

Using fiat currencies that since 1971 have not been backed by gold, the world today is hostage to monetary policies that are imposed by states that regulate the market and guarantee the value of their currencies.

The monetary policies adopted can increase the amount of coins issued without worrying in return about increasing the country's wealth, which generates inflation, which, in other words, is the increase in the prices of goods and services.

With all this context in which the world has evolved towards a system that needs speed and security in currency transfers, and at the same time, all currencies continued to be controlled by the states and continued to lose their value through inflation, in 1998 the author Wei Dai creates a concept of currency that would not depend on the government to function in his article *"B-money"*. In it the author creates the idea of a fully digital currency but without success.

So in 2008, with the same intention as Dai, author Satoshi Nakamoto publishes his article "Bitcoin: A Peer-to-Peer Electronic Cash System", in which he created through mathematical calculations and a cryptographic system a network that transacts a currency one hundred per cent. digital center called Biticoin, which did not depend on a third-party controlling entity, its own users would keep the network up and running.

Due to all this technological revolution, accounting needs to update and closely monitor these changes to keep up to date in order to generate useful information in the decision-making process (CARMO; 2017).

Given this scenario and the fact that Bitcoin is the main cryptocurrency in terms of volume of transactions in the market and still creating a significant equity value, accounting needs to focus on the impact that these assets have on the equity of those involved and given that *International Accounting Standards Board* – IASB has not yet published any standard that makes the accounting of this asset a universal way, so it is necessary to discuss it as soon as possible (CARMO; 2017).

According to Exame magazine (2022), the volume of Bitcoin transactions surpassed the 3 trillion dollar mark in 2021, becoming the third position in the New York Digital Investment Group (NYDIG) ranking, behind only the MasterdCard and Visa companies in the world. which respectively holds the second and first place in terms of volume of market transactions.

In view of these cases, it is considered the objective of accounting to reliably monitor the equity and its changes and due to the lack of specific regulations issued by both the government and the IASB, we seek to understand through the theoretical framework how we can recognize and measure Bitcoins in financial statements. of a companies.

Searched for an alignment of concepts or scenarios related to the topic, as well as the relationship between similar assets considered.

The composition of the presentation of the content of the article in question involves the theoretical framework, methodology, data analysis and conclusion.

II. THEORETICAL REFERENCE

The class of virtual currencies known as Cryptocurrencies are gaining more space every year because they contain some intrinsic characteristics such as: independence from governments; become a store of value; not be degraded over time are scarce and difficult to obtain.

The Technical Pronouncement of the Accounting Pronouncements Committee - CPC 00 (R2), as the accounting information must be relevant, significant and represent the basis for its objectives. Thus, there is a need for the information provided to be understandable, verifiable, timely and comparable, so accounting needs to accept new challenges and constantly provide reliable and useful information to accounting users.

In view of all these notes, this essay aims to demonstrate how this new class of cryptocurrencies can affect a company's financial statements.

Therefore, as there is no accounting guidance issued by Organs regulatory bodies for the best treatment of these transactions with virtual currencies, there was a need to provide a basis for such measurements.

2.1. The Origin of Money

Humanity spent a good part of its history without knowing what a currency was, the medium of exchange in the beginning was a product for another product, this medium of exchange was called barter. However, this barter was not at all practical, because in order for the exchange to take place, the two parties involved had to come to a common agreement for the exchange to take place, in other words, the quantities of each product and the need for each product had to be agreed to that the agreement could happen (ARNOLD; JULIANA; 2014).

With the passage of time and with the immense difficulty for there to be a "fair" exchange, barter began to happen in another way, where people exchanged products almost universally for products that everyone would need, thus exercising the first function as currency, and later being exchanged for precious metals in which they aroused the interest of the population and which, despite being scarce, could be mined on almost all continents; they were relatively easy to carry and had high durability, but most importantly of all, people believed that these metals could

be exchanged at any time for the commodity they needed, giving real value to the metal they carried and facilitating the ancient method of bartering, because now the metal served as a universal medium of exchange (BAPTISTA; 2019).

With the beginning of the process to create what we know today as currency, the government had its participation as BAPTISTA says in his article in 2019: *"[...] The role of government in the monetary area began to facilitate the provision of uniform currencies and commonly accepted, governments have done the work of making this standardization".*

Finally, we can see the relationship between government and currency, and over time, due to scarcity and increased demand, metals of lower value and easier access began to be used, thus becoming an alternative to increase the amount of currency in circulation in countries and later paper money was created.

III. BITCOIN

This chapter addresses the origin of Bitcoin and its creation process and its ways of obtaining it, we will better understand its technological process to maintain its security and how they are mined, as well as what the Bitcoin mining process would be, the its uses and we will also understand the growth and development to become the largest Cryptocurrency in the world today.

After years of constant evolution in both currency and technology and its development linked to security through cryptography, in 2008, the article *"Bitcoin: A Peer-to-Peer Electronic Cash System"* by author Satoshi Nakamoto was published. of what Bitcoin would be in the future (BAPTISTA; 2019).

These ideas involving cryptography have evolved over the years and several groups that wanted privacy increasingly talked about cryptography and its importance, one of these groups was the Cypherpunks, in which according to Reis in his article " *Cryptocurrencies: An analysis if cryptocurrencies are the future of money"* 2017:

> "The Cypherpunks were a group of programmers in the 90's who were very concerned about privacy and therefore used cryptography to achieve such anonymity. The term cryptography comes from the Greek (Kryptós Graphién) which means hidden writing, in this case the cryptography used by the Cypherpunks was a way of sending information through the internet where only the recipient of the message obtained the formula that made it readable and understandable, thus allowing the privacy that the group so prized."

The first concrete concept of what we know today as cryptocurrency appeared in 1998 through the publication of author Wei Dai in his article *"B-money",* just like the other Cypherpunks had a great concern about privacy, Wei Dai was very excited about the idea. of creating a currency free from the government and that could not be traced, that is, in which no one could identify its origin or destination, remaining anonymous (REIS, 2017). However, this idea of decentralized virtual money, which did not depend on laws or government intervention, had a problem, as there was no solution for the duplication of currency, where the same person who owned the digital asset could make multiple transfers at the same time as the digital currency was duplicated (BAPTISTA; 2019).

Blockchain technology has solved the old problem that Bitcoin had, protecting information on a group of servers or computers against attacks by unauthorized people or systems, they can be understood as cloud storage databases. The technology linked to Bitcoin has a different security, in the words of author Reis in his 2017 work:

> "In Blockchain, your information is not stored on just one computer, but on a group of computers that receive your encrypted information and store it, allowing only those who have the key to obtain that information again. With this security model, it is much more difficult for a hacker to enter and modify some information, such as the amount of currency you have, this is because he will only be able to modify the information on a computer, but when it is confronted with the others. from the network it will not be approved."

However, the old idea of creating a decentralized currency with an unbacked encryption system finally became possible, and shortly after the publication of Nakamoto's article, Bitcoin entered the network.

3.1. Blockchain and Mining

Blockchain is a security protocol that makes Bitcoin authenticity happen, working like a large public ledger, but only numbers are recorded to preserve the identity of the owner, when a payer sends Bitcoins to a recipient, in a way, he is signing this large cash book, during this transaction the same user has two asymmetric keys where the other network user also has the same keys, one public and one private.

This key technology guarantees security between the parties, however they do not guarantee that the transaction will not be carried out several times with the same asset. In this sense, the Bitcoin protocol solved the problem by applying the protocol to all transfer information between the network being organized into blocks and each block is validated through the mining process. The blocks processed by miners are taken to the large blockchain that contains from the first Bitcoin transaction ever made to the most recent (SILVA; GUILHERME 2019).

The miner would be one of the fundamental pieces to create trust and give authenticity to cryptocurrency avoiding fraud, the mining process is done on the concept of *"Proof-of-work"* that in the words of authors Silva and Rodrigues in their work "Individual Mining of Bitcoins and Litecoins in the World" 2016:

> "Nakamoto (2008) defined that the mathematical process performed by the miner occurs through the SHA-256 cryptographic hash algorithm. This algorithm makes the miner need to discover a 4-byte integer, called a nonce, capable of satisfying an inequality (inequation) expressed as a function of this algorithm.
>
> "The discovery method used by the miner is based on multiple attempts, and the inequality condition is established considering a maximum value, called target difficulty, which is adjusted by the algorithm to ensure that, on average, only one block of transactions valid values is added to the blockchain every 10 minutes."

After performing the mining job the miner is rewarded for every block mined on the Blockchain and this reward decreases over time for all miners.

3.2. Acquisition, Investments and Uses

Currently, in order to own this digital asset, it is first necessary to have a digital wallet for storage, so the user can acquire the asset through mining or buy it from another user who has this investment (MONTEIRO; 2018).

Many companies specialize in Bitcoin mining and they sell to users who do not mine but want to get the asset. These companies can choose to mine the asset to keep it in stock and sell it when it is advantageous in the long term or to realize profits in the short term (MONTEIRO; 2018).

In this way of buying and selling Bitcoins, Exchanges emerged that act as an intermediary of transactions, providing more security for the buyer, reducing their chances of being harmed (MONTEIRO; 2018).

Another form of investment could be in companies that already have an investment in Bitcoin, in which the investor would indirectly have exposure to cryptocurrency (MONTEIRO; 2018).

It appears that Bitcoin has as its initial proposal to be a decentralized currency, so we can already see it as such, but because it is not linked to the government and is scarce, we can see it with another characteristic that metals also have, the store of value, since there is a maximum amount in which it can be mined and there is also a defined maximum amount per day to be put into circulation, however, unlike metals, it is easy to divide into fractional values and offers lower and faster costs to carry out transactions (BAPTISTA; 2019).

Commercial transactions can now be carried out through cryptocurrencies, and technology companies accept this means of payment.

IV. METHODOLOGY

The purpose of this research is intended to be characterized as exploratory and descriptive, carried out through a bibliographic study that is carried out on a problem scenario or research point that generally has insufficient content.

The objective of this type of essay is to seek an alignment of concepts or scenarios with regard to the theme, as well as the linear relationship and its level of value between similar assets considered.

The methodology of the test regarding the intended purposes is the descriptive exploratory, aiming to evaluate the accounting elements related to Bitcoin currency.

Observing the purpose of the bibliographic research, the possibilities of the area of knowledge to be researched were evaluated. In addition, relating the subject presented with those of other researchers, which will add other positions on the reason for the study.

Studies in this model are based on the investigation of already published materials which are able to compose the theoretical foundation from the analysis of the examined journals.

The main mechanisms applied to carry out the research were searches for scientific articles published in national journals and works arranged on the internet as sites that compose knowledge and elements associated with the theme.

Due to the demand to measure cryptocurrencies and the representative potentiality of Bitcoins for companies, research aimed at adapting the measurement of Bitcoins was indispensable.

In this way, as assets require timely accounting treatment and their specific measure, similar needs to occur with Bitcoins.

In fact, not being a government-issued currency, the number of transactions with Bitcoins has increased. This condition reveals the demand for standardization and/or accounting guidance regarding the correct procedure for cryptocurrencies.

V. RESULTS ANALYSIS

Bitcoin, as seen so far, was born with the intention of being a decentralized currency and that has some characteristics of a store of value and high liquidity and high transaction speed and according to CPC 00: *"[...] Asset is an economic resource present controlled by the entity as a result of past events".* Therefore Bitcoin is an asset and we need to measure it in the best way in view of the lack of a specific regulatory standard in Brazil for this asset.

The author Silva, deals with possible forms of measurement in Brazil in his article *"Accounting in the Digital Age: A Study on the Accounting Recognition of Transactions Made with Bitcoins in Brazil"* from 2017, however in that year there was still no country that accepted the cryptocurrency officially and large companies had not yet started to accept it as a form of payment.

In his work, Silva published the following table, which demonstrates the objective theme of this research, the measurement of Bitcoin:

Hypothesis / Situation	Classification	Theoretical - Legal Basis	Recognition	Measurement
Sale of goods and services with receipt in Bitcoins	Current Assets - Cash (Cash Equivalent)	CPC 03. Gross (2015).	At the time of carrying out the sale transaction, since it would be characterized as a cash sale	By the amount in Reais of the transaction (Invoice or Tax Document)
Investment intended for immediate sale (less than 12 months)	Current assets - Applications	CPC 26. Venter (2016).	At the time of acquisition, recognizing the eventual result for the realization in the sale	At the historical cost of the acquisition, converted into Reais according to the exchange extract
Buying and selling Bitcoins, acting as a currency resale entity, without being an official *Exchange*	Current assets - Inventories	CPC 16	At the time of acquisition, holding at historical value until realization	Cost value or net realizable value, whichever is lower, taking as a reference the value of the *exchange* that has a portfolio
Investment held for appreciation, with the intention to sell in a period longer than 12 months	Non-current assets - Investments	CPC 03 Law 6404/76. Venter (2016).	At the time of acquisition, holding at historical value until realization	Fair value practiced, with recognition of eventual results only on realization at the time of sale
Bitcoin mining, producing the virtual currency, with no intention to sell	Non-current assets - Intangible assets	CPC 26 Law 11,638/2007. Venter (2016).	At the time of confirmation of transactions on the Blockchain, recognizing by the exchange quote that it has a wallet	Value of the cost directly attributable to the preparation of the asset for the proposed purpose (proration of all costs involved by the bitcoins produced in mining)

Source: Accounting in the Digital Age: A study on the accounting recognition of transactions carried out with Bitcoins in Brazil

As for the resources that appear in the balance of each accounting account, it is intended to elect the same exchange rate that feeds cryptocurrency operations. It can affect precisely the property of the element regarding its correlation, since an equivalent transaction with the same amount in Bitcoins is capable of being registered with resources in varied reais, affecting the fundamental attribute of the accounting element that would be comparability, involving the lack of an authentic standardization so that it is a standard to be valid for accounting entities.

When examining the approach of financial instruments in CPC 39, which determines as *"any contract that gives rise to a financial asset for the entity and a financial liability or equity instrument for another entity"*, it is valid to infer that Bitcoin is not a contract, and for this reason this definition is not able to adjust itself as a financial instrument.

It appears that determining Bitcoin and/or cryptocurrencies as an intangible asset becomes plausible, since according to BDO, according to US GAAP, intangible assets are those that do not have physical substance. So we can understand that cryptocurrencies are not money, therefore they should not be classified as a financial asset (BDO UNITED STATES 2019).

VI. CONCLUSION

The development of the present research made it possible to achieve the proposed general objective of the study, which has the fundamental function of identifying how Bitcoins should be recognized from the perspective of accounting theory.

Therefore, the circumstances exposed allow us to conceptualize that Bitcoins can be classified as assets once they are capable of being validly measured and that it is possible that subsequent economic benefits associated with the item can be enjoyed by the entity, thus serving the indication established by the CPC. 00

In view of the observed situations, the possible classifications in the equity accounts plan, in the face of some possible hypothetical situations and taking into account the legal and theoretical bases verifiable in the Accounting Pronouncements Committees, it is observed that there is a possibility of classifying Bitcoins and other virtual currencies both in the current assets in cash equivalents, investments and/or inventories, and in non-current in investments and/or intangible assets.

Although with great progress, Bitcoin cannot fulfill its purpose of being a successor to the current monetary system, which would be the intention of the creator of Bitcoin, which aimed to create a currency and payment system that would replace the system. current. To achieve this end, the use of Bitcoin will have to evolve, increasing the liquidity available and mitigating volatility to a level where its use as a currency is factual.

Therefore, regarding the application of the Blockchain protocol, it is still too early to identify what changes it can offer for the development of other technologies in the context involved. Proposals that employ this technique are still in primitive stages, thus making it difficult to verify whether the technology will be able to cause major impacts as a disruptive technological innovation.

It is recommended, in future studies, to carry out research on Bitcoin applications in real companies using a sample of companies that disclose their balance sheets and also a research on other uses of blockchain.

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