

Conceptual Framework for the Effectiveness of Virtual Economy and Virtual Currencies

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Abstract:- The study aims to explore virtual economies, their architecture, characteristics, production, distribution and consumption of virtual goods and objects, as well as currencies and exchange mechanisms in virtual economy. The study then moves on to developing a conceptual framework to show how and what functions virtual economies must perform in order to replace real economy.

Keywords:- Virtual Economy; Virtual Currency; Functions of Economy; Effectiveness of Virtual Economy;

I. INTRODUCTION

As a result of the increase in the scope of Internet access, a large number of real-time interaction videogames that involve both real and fictitious real estate transactions, such as simulation games for cities with the exchange of fictional resources such as cement and energy, electric, casino games, with exchange of currencies, or even virtual markets like Bitcoins in which a real parity is presented [25,2,16]. To the extent that the number of participants is increased, the need arises to perform the corresponding analysis to organize these interactions, so that they are self-regulated, easy to sustain over time and meet criteria of distributive justice and meritocracy [12,6,18]. With this, the so-called virtual economies arise, and this raises a question: Do the markets of these virtual economies behave in a similar way to the markets of the real economies? Since they are small economies in comparison, and are currently evolving, therefore, there is no general theory to explain the growth, development, and efficiency and effectiveness of virtual economies [17,4,3]. Ideas and theories, however, are being generated to assess and evaluate effectiveness of virtual economies and this article is one of such efforts. The main idea of this study is to develop a conceptual framework that can be used to assess effectiveness of virtual economies by assuming that they are to replace real economy and virtual currency is to replace real currency [8,1,21]. Within this context, this study aims to evaluate whether virtual economy and virtual currency are able to perform all functions of real economy and real currency. The conceptual framework is thus developed by analysing whether virtual economy and virtual currency can perform the same functions as their real counterparts are [5,14,1].

The study begins with exploration of virtual economies, their architecture, characteristics, production, distribution and consumption of virtual goods and objects, as well as currencies and exchange mechanisms in virtual economy. The study then moves on to developing a conceptual framework to show how and what functions virtual economies must perform in order to replace real economy.

II. VIRTUAL ECONOMIES

A. Economic Architecture

The meaning of economy in virtual world goes beyond a system of transactions, implies the set of rules of the game that determines what goods are marketed, what are their characteristics, how they are produced and obtained, in what quantity and under what distribution [7,10], the cost of its raw material and the freedom with respect to the process of the same, for example, if it can turn a final good into a raw material [2,20,10], the rules that determine the supply and demand [14,7], the nature of the exchange [15,19], the determination of prices [20,1,3], the number of agents involved [21,14], the feasibility of converting videogame currency into real currency [5,25], and so on. This will be detailed in the course of the work.

On the side of users, there are several reasons why there should be economy in a video game, and sufficiently well implemented:

➤ Character of the video game

They are fantasy characters that seek to achieve goals without failing in the attempt, and not to lose, it is necessary to be "better" equipped in front of the challenges [27,24]. The equipment for this is achieved by merit under an uncertain distribution system (ie, whose exact mechanism is unknown to the player) during the course of the game, or through the use of the internal market of the game [24,30].

➤ Correlation with entertainment

For a large part of the spectrum of players, the video game is more interesting if it is possible to exchange profits and surpluses [23,30]. And better yet, if it gives rise to commercial 'ability' and the possibility of taking advantage of the market to gain more time and status [24,28].

➤ Existence of a crafting system

Players can get intermediate goods and recipes, with which they manufacture equipment that they could not otherwise obtain [20,23], or they can obtain it cheaper if they manufacture it themselves, instead of buying it in the market [15,26].

➤ The value of use of the goods

Due to the structural characteristics of the avatars, not all can use absolutely all the goods of the economy [12,24]. This contributes to the existence of exchange interactions, informal or formal, that is, in a market, given that some value the goods equally at a certain time [12,2]. In return, those who develop the games take into account these characteristics and need to provide systems with the "generation of freedoms". An open market is undoubtedly more flexible than a fixed sales system [16,29].

➤ *Hold challenge with balance*

They must maintain the balance of the game, if everyone can get the best equipment in the game, at a very low price and beat the game easily, interest is lost [30,11]. This forces the existence of a control of the number of objects and currency available in the system. This is usually called in the jargon "drop ratio", that is, amount of average income that is obtained (in currency and objects) per unit of game time [29,11]. This same contributes to the need to generate a self-sustaining and rational economic system [29,13].

➤ *Dynamism in change*

Developers often want to introduce changes, arrangements or new content in video games, to attract new players and keep the old ones [27,16]. What easier to do this, than having a ready market, in which new virtual goods can be introduced for sale? [27,15].

If you combine the reasons of the users with the reasons of the developers to make one or more markets, then you have an economy [1,25]. To the extent that an MMORPG develops, it concentrates a large number of players, it is a greater task to establish an interaction market, and begins to influence, of course, the number of participants in a market [5,25].

According to Bailey [51] who is an active member of Virternity project, one of the main problems facing development of virtual reality or virtual eternity is the problem of confidence and trust of people regarding the effectiveness of virtual environment in entertaining their economic needs [51]. Although the virtual world offers established and well-researched virtual currencies such as Bitcoin [21], yet there is a need to show people that virtual environments offer virtual economies that in contrast to capitalist economies, offer a range of benefits [32,8]. Users are expected to wonder how an economy in virtual eternity is likely to work and would it be effective and efficient [51].

There are significant differences between real currency and virtual currency as well as between real economy and virtual economy [4,37]. Therefore, it is but natural for researchers to distinguish common and different characteristics and present comparisons [2]. There has been significant research comparing virtual environment, currency and economy as compared to their real counterparts. Within this context, this study presents how effectiveness of virtual currency and economy can be measured as real currency and economy have been [4,8]. This paper is thus set to develop a conceptual framework for virtual economy by considering how real economy functions. The aim is to show how economies will function in virtual environment as real economy function in current real environment.

According to Bailey [51] in the Virternity project a rather positive and benign outlook has been proposed for the future of the humanity in the virtual world which is in sharp contrast with negative and dystopian outlook presented in most fictional works such as novels and films. With the rise of virtual currencies and virtual world and increasing integration of digital transaction in daily routines of humans, the Virternity project present a sense of inevitability where

humans are ultimately likely to reach a future dominated by digital world transactions involving consumption of digital products and services.

Within this context, Smith, [52] critically examines challenges and opportunities faced by virtual currencies. The author concludes that there are significant economic advantages for users of virtual currencies in virtual world. It can be inferred that virtual economy and currencies have a critical role in realization of the Virternity project and underlying concept and vision.

This study is thus set to explore how virtual currencies and virtual economy can effectively play their role for their users. The aim is to accumulate sufficient trust among existing users that they promote and attract more and more users to participate in the virtual economy and increase community to a level that it dominates real economy as soon as possible.

B. *Characteristics of the chosen virtual economy*

Consider the example of a by the name of Guild Wars 2. It is an MMORPG of the company ArenaNet, users make a single initial payment and there is no monthly subscription (unlike the rest of the games of this style). Additionally, the developers promise a philosophy that is against the so-called 'pay to win'. That is, the existence of policies that imply that players who pay for special promotions have access to privileged advantages that differentiate them from the rest of the players). The economic system of the game, is administered by an economist (Employee of ArenaNet) called John Smith. It is responsible for analyzing the evolution of the indicators in order to keep the system in balance.

➤ *Types of avatar and professions*

When they enter the game, players choose a type of avatar, that is, the character they are going to control [1,24]. It has its own way of progressing and carrying out the game, they use a certain type of goods and they have restrictions to use other types, which generates that everyone has a demand for goods (those that use) and an offer (those that they are not useful), regardless of whether they are able to use the market to sell and buy any type of goods, regardless of the use they may be given [2,27]. Additionally, each can choose up to two professions among the following: armor smith, gunsmith, cook, hunter, jeweler, furrier, tailor and craftsman (Think that the environment is warlike and fantasy medieval). This establishes that the goods have a use value and an exchange value [8,19]. The first indicates that not all goods are useful for all avatars (although there are goods that can be used by all). And the second, indicates that all goods are interchangeable for money, which serves to equate a use value [7,14].

➤ *Production of goods*

Objects (or 'items') have value based on the materials with which they are manufactured, and this in turn depends on their rarity and quality. There are seven levels of rarity and value for each type of material. It must be said that, at first, an inexperienced avatar cannot work, for example, more sophisticated minerals or woods before progressing or starting with the most common materials [4,16]. Players invest time in

improving their skills associated with the profession they chose, and as they progress, they can make objects of more expensive and sophisticated materials. Players discover recipes and, with the mixture of different materials and components, manufacture finished objects, for example, an iron armor will be better than a copper armor, and at the same time, an avatar that has 5000 experience points in armor smithy, will make better iron armor than another avatar that has 3000 experience points in the same competition.

➤ *Obtaining goods*

Raw materials are obtained by working a natural resource, for example, by chopping stone or iron, cutting a tree, hunting a boar or collecting plants. For this, tools that vary in quality are required and depending on them depends the probability of obtaining larger quantities. Natural resources appear in the world in a random way, in limited quantities and depending on their rarity. So, they discover themselves traveling the world [3,30].

It is also possible to find final goods based on reward for fulfilling missions, or by a random and lucky factor, when shooting down enemies. For example, armor, weapons, food, etc. This follows a function we do not know, but intuitively, you are more likely to get cheap objects than expensive and rare objects, and it depends on the level of difficulty of the challenge you face [9,11]. Finally, there is the possibility of recycling. Recycled tools are acquired that also vary in quality, and this determines the quantity of materials that are reused successfully and the quality of them. This refers to the process of converting final goods into intermediate goods again [48,7].

➤ *Use and consumption of objects*

There are consumer goods and durable goods. The former disappear after use and the latter remain equipped until they are recycled or sold. We will see later how this influences the exchange value [50,10].

III. MARKETS OF GOODS AND MONEY

A. *Currencies and exchange*

Except for a specific set of goods, all can be sold and purchased, including raw materials, intermediates, ingredients. Broadly speaking there are two currencies, a local game, to perform all internal transactions and an open (gems), which has value in US dollars and a flexible exchange rate between that currency and the domestic currency [45,37]. The fluctuation occurs based on the amount of currency in the market and supply and demand, there being a purchase price and a sale price and a transaction cost between one and another, to avoid speculative arbitrage. There is usually a well-marked gap between the purchase and sale price, so speculating on this value is not very profitable [45,37]. With respect to the goods markets, there are three:

Infinitely liquid (vendors). They sell very specific objects that are not traded in the market (for example, tools for extracting natural resources) and automatically buy any type of objects at a minimum price [49,6]. Players who are not interested in participating in the market, or who want to get

things out of their way, do so here. They are paid the lowest possible price, but it is instantaneous and infinitely liquid. Secondary main market (trading post) to place supply and demand. Here the local currency is used, and two different taxes are charged, in addition to the presence of minimum prices [45,1].

Currency market (gems), that is, currency that has an exchange rate with the local market currency (and an implicit change for gold-sellers in US dollars). By establishing analogies, the first market is equivalent to the realization of retail sales [43,4]. The buyer will pay the less advantageous price, but will do so at the time [33,4]. In contrast, if you go to the market to place a sales order, the price at stake is that of supply and demand. Because the common currency abounds, prices are volatile, while hard currency (gems) are a store of value. Very similar to the situation of a Latin American market, with the existence of a reserve currency [4,9].

B. *Exchange mechanisms in the secondary market*

Players establish purchase and sale orders at a certain price. Those in a hurry will place sales orders at the price of the cheapest purchase orders, which means the highest price at which a buyer is willing to pay at any given time [48,9]. The most recurrent transactions occur in the middle range, the seller will place the sales order to match the lowest price, and the buyer will place purchase orders at the maximum price that the one that is most willing to pay is willing to pay. The speculators or the more patient will wait for more appropriate moments to place the goods in the market [39,46].

Once an offer and a demand are crossed, the transaction will be made automatically and the respective avatars must approach a trading post to remove the objects or money. The gap between the purchase price and the sale price with the highest concentration of placed orders determines the equilibrium price at a certain point in time [33,47]. Therefore, the price increase process occurs when an excess of demand is reflected, that is, that the lower price sales orders are exhausted (or purchase orders are incorporated at a higher price), and the of the next price. On the contrary, the process of price reduction occurs when an excess of supply is reflected, in which sales orders are incorporated at a lower price (or purchase orders are withdrawn at a high price) [39,41].

IV. CONCEPTUAL FRAMEWORK

➤ *Functions of Virtual Economy*

Virtual currency is understood as alternative economic systems that aim to return the citizen economic sovereignty, trying to create an economic system that does not make the mistakes that the capitalist system has committed [39,4]. For that reason, its configurative elements will be similar to those of any economy (i.e., to satisfy the needs of its members using the real wealth available in a given group), with the addition that it shows the importance of trust in the alternative currency, in opposition to the obligatory nature of the official currency imposed by official institutions [38,46], and by extension, the need for transparency in the economic system so that such trust is not an act of blind faith or obligation

[33,46]. It is assumed that an alternative economy will be a different way of keeping accounts as compared to how the capitalist system has made members carry them, and its use will always be voluntary [33,44].

That is why in economics it is convenient to distinguish between three essential concepts that interact in an economy to show its effectiveness: a) the needs of the group [8], b) the resources of the group [44], and c) the accounting system of the society [42]. The alternative economy tries to design a new accounting system that allows to manage the relationships between needs and resources in a different way to the one used by capitalism, using virtual currency [6,25]. The conceptual framework developed in this study thus shows how virtual economy and virtual currency may function to facilitate these essential concepts in a different and rather better way as compared to capitalist economy and paper currency.

- *The Trust*

An economy is based on the networks of trust that previously emerged from the barter routine, and later these networks started to use common currencies or exchange patterns, which in turn led to development of exchange patterns having better efficiency than barter system [14,6]. Then financial institutions evolved and gained control over the exchange pattern and the issuance of currencies [4, 12], building a financial economy in which the wealth was the currency, instead of the available resources [39,23].

In virtual currency, the driving principle will continue to be trust and the networks of people who rely on the alternative economic system, but wealth must remain with the available resources [19,8], understanding that currency is only a way of accounting for trust and wealth of its members [6,13], without actually constituting wealth, as it lacks value as a resource outside the trust network [4, 13], and even lacks value in itself as real wealth. Since Virtual Currency is no more than a type of memory or accounting note, or a unit used to quantify the confidence of the people [32,30].

The network of trust formed by all the members of the network should replace the financial institutions of capitalism [11, 8], allowing democracy and transparency to be the board on which the confidence of its members circulates as a tool for the quantification of the wealth of a group [39,24].

Subsequently, it will be possible to understand how a trust that is perfectly quantifiable will arise among the members of the network [21, 21], as well as between the network and each of its members [20,1,3], without the need for an institution that can control people or charge interest for using said units [15,19], in opposition to what the official economic system does when it charges interest each time it issues currency for its use by citizens [14, 7]. Trust will exist directly between the people who make up the Virtual Currency network, without the need for an intermediary to charge for managing or accounting for that trust, because it will be accounted for by those same people, horizontally, without paying anyone for it [21,23].

- *The Wealth*

Wealth will be understood as all the goods and services existing in the community, since these goods and services are the true energy of the community to meet their needs, understanding as goods all products available on the network [7, 23], and as services all the skills and knowledge possessed by the people assigned to the network. This is really the wealth of a group, with the peculiarity that the members of each group deliver their goods or provide their services to whom they deem appropriate, and do so preferably with people from their own group [5, 1], or with people they trust.

Currently, most people belong to the official economic system, so they usually produce and work for those who give them legal tender coins officially accepted by economic institutions [8,1,21]. Having placed their trust in that, obtaining such official money, any other person will trust them, using money as a tool to account for the trust that some people have in others, since they are all people belonging to the official economy of institutional currencies [17, 3]. This, evidently, is not perceived by those who are part of said system, since the current economic system has been in charge of all those people who believe that this money really constitutes some kind of wealth [12,6,18], in the way in which it was alluded to monetary wealth [12,22,10]. The emergence of other economic networks allows applying the same pattern of operation, but trying to ensure that nobody can create the trust of others without deserving it. As happens when an institution issues money without guaranteeing its support with any good or resource, or contribute anything to the community, and without having to know or have real confidence with anyone [17,4].

It also tries to prevent anyone from charging for trust, whether it is their own or that of others (as happens with the collection of interest when lending money), since in both cases the mistake is made thinking that the coins are wealth in themselves they are considered as a good or a useful object [6,1,25], and it is pretended that lending them supposes some type of delivery of goods that deserves to be paid over the value of said goods. In this sense, virtual currency should be clear that, in addition to the goods and services of a network [19,15], another part of the economy consists of the trust that people have for each other, understanding this confidence quantified in the form of Virtual Currency as simple "promises", without a promise being a real wealth, but, in the best of cases, it will be a potential wealth, since it will only become wealth when it is effectively converted into a good or service in front of the network [13,10].

This idea of considering trust as part of the economy may sound strange, but it is important to note that the capitalist system knows that trust is much more important than it may seem at first glance [3, 14]. But it should not be forgotten that the promises themselves are neither services nor goods, and their value will always depend on the trust one person has in the other person who has promised to deliver or do something [5,25], so in reality they are an accounting note that quantifies our confidence that the person who made the promise represented in the currency will end up fulfilling it [20,1].

Currently, the institutional money issued by the official economic system has not promised to deliver or do anything for those people who give them official money, except to return more official money, and thus the existing economy only promises to deliver more promises [15,11]. Therefore the people never gain any real wealth, while believing that the system delivers their goods and services in exchange for these promises [2, 10]. Furthermore, the institutions can issue the currencies at any time, in the amount they want, and without having to back them with any good or service [5, 1]. Therefore, it is not difficult to understand why those who control them can accumulate so much wealth and money. Although nobody believe that to receive any real wealth from said official institutions, except for the service that may involve being controlled and directed by them through its accounting system [17, 3].

- *The Needs*

By needs, this study understands all those consumption needs (both in goods and services) that the members of a network have, and that they need to be satisfied with the available resources [19,11]. The economy is nothing more than a way of quantifying what each person contributes to the network, and what an individual receives from it, in order to understand and know both the functioning, as the success or failure, of the economic system used [16,25]. It is important to note that the system of virtual currency is compatible with other economic systems that work simultaneously, such as barter, free or family economy, or even any other official or alternative currency [1,25].

Another function of the economy should be to know the needs of the group, to allow these needs to be met, and that everything necessary to satisfy them can be produced, made or acquired by the members of the network, and incorporated into it. [4, 12]. This takes into account that the needs have a qualitative factor, relative to what are the needs that must be met, and a quantitative factor, which attends to the necessary amount of a given resource to satisfy said need. This function of the economy has been totally forgotten by the capitalist system [19, 3].

Thus, for example, producing oranges is good to satisfy the need for food, but having thousands of tons of oranges is useless as they cannot be consumed to satisfy all food needs. It would be better to produce other types of food and to have a more varied diet. Knowing how many oranges are needed and who will be responsible for producing them, helps an economy not to produce a surplus that loses its real utility because it cannot be consumed [4, 13]. That is why an efficient accounting system must take these needs into account. It is clear that having a small surplus can be good for trading or exchange for other resources, but having an excessive surplus will force people to get rid of that surplus after having invested time and resources in producing it, and without recovering neither that time nor those resources, or any other good or service of the same value [11,1].

This requires that a new economic system does not focus solely on understanding the means of producing wealth, but must also address the means of distribution of all the wealth

produced, and for this it will be beneficial to be able to count the contributions of each person to the production of goods and services, as well as the consumption of goods and services that each person makes or wants to make [21,14].

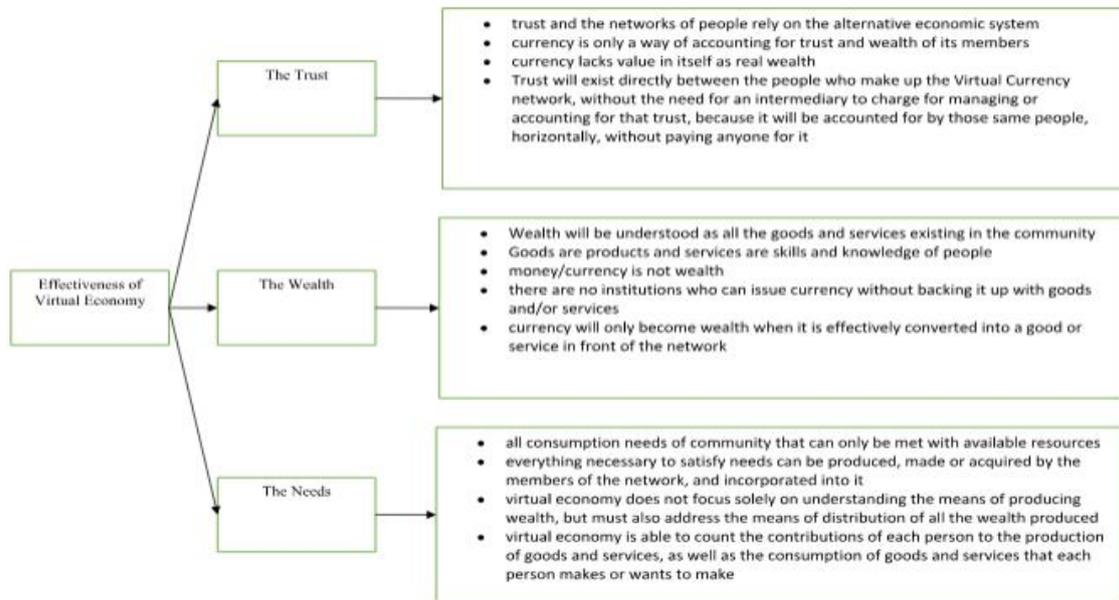


Fig 1 :- Conceptual Framework for Effectiveness of Virtual Economy

V. MINING: CREATION OF NEW BITCOINS

As the process described is so complex, the system offers an interesting reward to the miner: the possibility of 'mining' or 'extracting' new bitcoins for himself. This happens when he manages to add a new block to the chain. In this way [8,1], the miners are the ones who obtain the benefit of the "seigniorage" that, in the fiduciary money system, corresponds to the Central Bank for having the monopoly of issuing the currency [21,2]. The final profitability that the miners obtain depends on several factors, among them: the cost of the electricity, the number of bitcoins obtained and their quotation, and the cost of the equipment, their processing capacity and their rate of depreciation[5,9].

However, it must be borne in mind that the ability to obtain new bitcoins will not be extended indefinitely. This is due to the very design of Bitcoin that contemplates a constant block creation and decreasing rewards for the miners [2,10]. First, the system has a self-regulation mode so that a new block is produced every 10 minutes on average, that is, 210,000 blocks every 4 years. This is achieved by adjusting the target of difficulty every 2.016 blocks, according to the number of miners in the system. The greater the number of miners, the greater the probability of solving the blocks, so that the system raises the level of difficulty; and vice versa.

The following table and graphs illustrate this particularity:

Period	Years	Created blocks	Blocks at the beginning of the period	Blocks at the end of the period
1	2009-2012	210	0	210
2	2013-2016	210	210	420
3	2017-2020	210	420	630
4	2021-2024	210	630	840
5	2025-2028	210	840	1050

Table 1

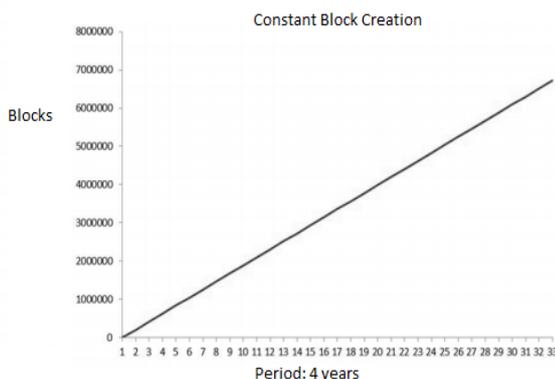


Fig 2 :- Source: Author's elaboration

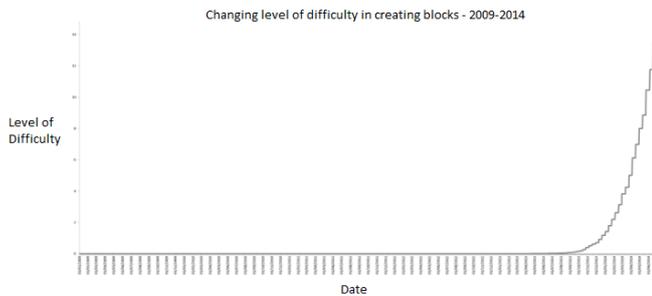


Fig 3 :- Source: Author’s elaboration

Second, the system has a diminishing rewards mechanism for the miners. Initially, the prize per block was 50 bitcoins, now it is 25 bitcoins, and the amount is reduced by 50% every 4 years or every 210,000 blocks. In the first years it is observed:

Period	Years	Reward per block
1	2009-2012	50
2	2013-2016	25
3	2017-2020	12.5
4	2021-2024	6.25
5	2025-2028	3.125

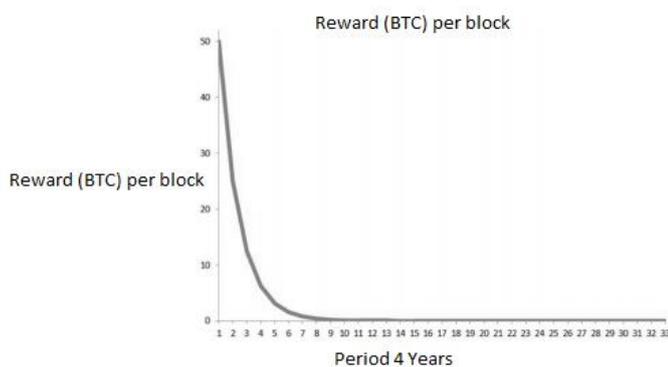


Fig 4 :- Source: Author’s elaboration

It seems that, as time passes, the incentive to mine becomes smaller and smaller. Will this mean the end of mining? The answer is no. When the reward is already very small, users can include a commission or fee for those who solve the block in which their transaction appears. The amount of these commissions will be determined by the interaction between the miners and the users. Therefore, there will continue to be an incentive for mining.

Taken together, these two factors - constant block creation and decreasing rewards - mean that the number of new bitcoins will be reduced more and more until reaching a ceiling of 21 million units, a limit that would be reached around the year 2140. Strictly As the creation of new bitcoins is reduced by half every 4 years, there is an asymptotic approach to that limit. What happens is that, when the increase in bitcoins is less than 1 satoshi (0.00000001 BTC), the minimum bitcoin subunit, it will no longer be possible to count the increases, so it is considered that it will have reached 21 million. Currently, there are about 13 million bitcoins in circulation.

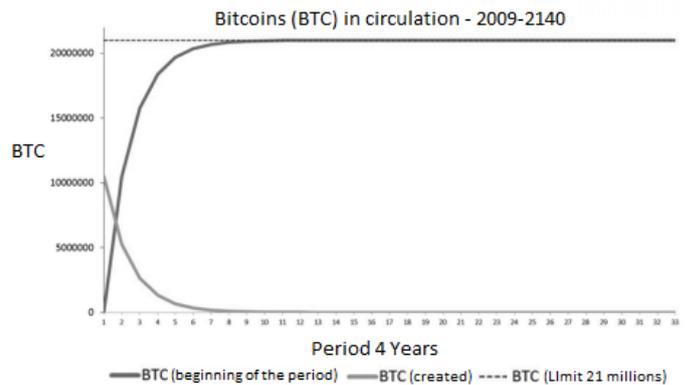


Fig 5

Focusing on the first years it is observed:

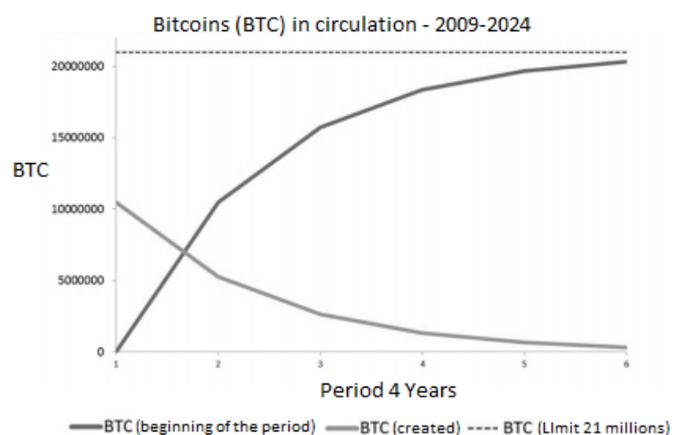


Fig 6 :- Source: Author’s elaboration

VI. THE EFFECTIVENESS OF VIRTUAL CURRENCY FOR ITS USERS

It must be taken into account that in these economic systems the existence of physical money is not necessary, since the real resource existing in them are precisely the people with their productive abilities, so that wealth does not depend on the existence of currency, but rather on the satisfaction of the needs of its members [15,11]. Any Virtual Currency that does not have people involved in making this currency a reality is likely to fail, since currency is a matter of reciprocal trust between the users of the network. The existence of currency only highlights the inability of individual people to meet their own needs, which is a remarkable consequence of the functioning of virtual currency the tendency to the disappearance of coins or the reduction of them to the smallest possible number [20,10]. Since whenever there are currencies, it means that someone has contributed more to the network than they have received, and that someone has received more than what they have contributed, so it will be a mission of the network to compensate to those who have contributed more to the network than they have received [5,14,1], as well as offering possibilities to provide those who have received more from the network than they have been able to provide in compensation. That is why people have a double prism from the moment they are involved [4,3]:

- They must be able to satisfy all their needs, and
- They should be able to contribute to the network what is within their reach so that others can also meet their needs.

The goal is that everyone can contribute what they have to access everything they need. Thus, the objective will not be the existence of many virtual currency, but precisely the presence of many people involved relating to each other [12,18], through exchanges. According to transparent rules that allow them to know the state of the economy at any time, which increases the probability that the needs of others can be met, as well as having more abundant possibilities to provide skills, services or goods that are demanded by anyone in the network [12,10].

For practical purposes, a Virtual Currency is more effective when more people are involved in it, but the existence of as few monetary units as possible is also a sign of effectiveness. In this sense, it is convenient to distinguish the person involved from the person enumerated [17,21], since not every person who registers or adheres to a Virtual Currency network, has the need to participate actively in it. For purposes of effectiveness, only those who, effectively, use the network, i.e. the users, should be counted as people involved [17,4].

In the official economic system it is impossible to measure this efficiency because it is not known exactly how much money has been issued, but if there was a way to do it, surely the efficiency ratio would be quite low [14,6], and it would be evident that the current system is extremely inefficient. This Ratio of effectiveness of virtual currency can be summarized with the following formula: Effectiveness ratio = Number of people involved / number of coins in circulation, in a given time [8,3].

➤ *Functioning of the Virtual Currency*

- *The Value of the Virtual Currency. Goods, Services and Trust*

As shown earlier that during the issuance of virtual currency different things could be used, such as money, goods or pure trust. Now it is worth mentioning another type of wealth that is halfway between being a good and being trustworthy, as would be the provision of services [18,13]. It is said that it is halfway because a service is not a product that can be stored, but, as it consists of a specific action that a person must develop. Therefore, it is important to understand how this type of wealth can be incorporated into virtual currency [1,8].

- *Service Provision*

Services may be perhaps the most important resource of a society, since it is really the action in which the work of people, their skills, their knowledge and, ultimately, all the human potential that exists in a society materializes. But it has the peculiarity that it is a type of wealth that is latent, and that cannot be appreciated until the action of providing the service is carried out [21,21]. For this reason, for example, a person can say that he contributes 200 kilos of oranges to the network by delivering the same, but it is not so easy to do so when a person decides to provide 20 technical vehicle repair services to the network, because those promises of providing repair

services are promises, and they are not products, so they need the confidence that these promises will be fulfilled in order to be accepted in the virtual currency network [15,19].

It is for this reason that many virtual currencies arise in the beginning as time banks, or networks of mutual support, in which the resource par excellence is time and support, and the way in which time and support is delivered is through the provision of services or promises to do so [2,10]. These networks usually have as countable units the hour, or the minute, or temporary units, so that whoever provides a service during certain time, has the right to be provided a service during the same time. These time banks require from the beginning the existence of trust, a confidence that has faith that the services offered by its members will be really provided when requested by other members [5,14].

In these groups it is essential, sooner or later, to provide a service trusting that the network will return the favor later, although there are many who try to exist demanding the immediate and direct exchange of services, but the time banks that try to function always like this, as a general rule they end up disappearing, either because those who offer something that another person needs do not need anything from that specific person [17,4], or because those who understand that it is necessary to move towards trust within the network, will end up separating from a network in the that there is no trust among its members [20,19].

Another problem that arises in the time banks is the need to incorporate products into the network to meet some of their needs, making it very difficult to assess all products in time, especially when they are not made by hand [16,25]. To incorporate products into a time bank and be able to value them, it is necessary to transform the unit of time into a more abstract value unit, and when this need arises, the unit of time tends to be equated with another type of unit of value that, with time, it will end up functioning as a virtual currency, or it will end up putting prices in official money and moving away from the alternative economy [1,25].

In this way, both products and services are really the wealth of a network, although it will be possible to include, in addition to these two, the other two elements mentioned above, such as "official money" and "trust" [1]. Once it is clear that these are the four elements that will represent the richness of a virtual currency network, it will be necessary to know how these four things are valued, in order to know how virtual currency will have a value or another [4,8].

- *The Valuation of the Goods*

Another important function that shows effectiveness is the valuation of goods. This section shows how paper currency or other forms of official money performs this, as it is the most understandable. Most people attribute to official money the value that economic institutions say must be attributed to it, so that this money, considered in the virtual currency network as an exchangeable good for other goods or services outside the network [21,15], has to society the value of official money, and for members of the network, may have the same value or have none. But it should be borne in mind

that said value is subject to arbitrary devaluations by those same institutions that control it, and it is possible that there are people within the virtual currency network who prefer not to use this money [19,3].

What must be clear is that the virtual currency will have to deal with the official currency sooner or later, and allow its existence within the network, allowing to influence its operation and use it to establish economic relations with people outside the network [6,13]. In the beginning, virtual currency usually establishes a conversion of 1 to 1, that is, that an official currency usually equals a virtual currency, with the exception that official currencies can always be exchanged for the virtual currency that the network emits, but virtual currency cannot be exchanged for official currencies, for the simple reason that not all virtual currency networks will always have official currencies as support for their virtual currency [4,13]. Also, because one of the objectives of Virtual Currency networks is to use the economy of virtual currency as an economic system, so they will encourage the use of their own currencies against the use of official currencies [3,14]. All this will evolve as the network grows, but for now it is enough to know that the virtual currency will have to interact with the official currency and, in this study the focus is virtual currency [11,1].

Now, it is important to understand how the value of products is established, and for this it is important to recall that the value of things is always subjective, so in trying to objectify the value of things it is likely to move away, from the subjectivity that characterizes the value [5,12]. To do this, it should be noted that in any economic transaction in which a good or service is delivered, said good or service is not the same for who makes the delivery as for who receives it. Therefore, they must have different valuations and both valuations must surrender in favor of a third valuation that can be accepted by both parties. It is often that third valuation, which does not coincide with the value that none of the parties really attributes, which is just considered as real value [14,21]. To deal with this issue it is convenient to distinguish first between what in economics is understood as "market value" and "use value", since they are concepts used in economics and that currently tend to confuse users [20,1].

To understand the market value of things, one must pay attention to the value that a good or service has in the market in which it is offered, that is, one has to pay attention to how much people, who can buy that good, pay for other similar or identical goods [11,19]. To understand the value of use, what must be taken into account is not how much others would pay for that good, but how useful that good is for the specific person to whom it is offered. In a valuation premium the price, while in the other premium the utility, so the second is a valuation further away from prices and money itself [14,13]. There is a third valuation, which would be the "cost of production", since there are those who consider that the value of things must be the cost that has incurred in producing them. To see the difference between these values, it is enough to imagine an artistic picture that can be sold in the market for a very high price, but many people would not be willing to pay for that picture as they do not have any use [2,20].

There is no objective value to this picture. For art lovers, the painting is priceless and even a very high price is acceptable. For some people the painting is useless and they will offer no price for them while there will be some people who would be willing to buy the painting against the cost of production [7,23]. In all these cases, who defines the price is the person who will acquire the painting, either because of its artistic value, or because of its useful value, or because of value put in the cost of producing it, and they are all completely understandable positions [5,14]. But these values have their origin in an unreal market, since it seems that the price is objective and is set according to the valuation that the buyer makes of the good, and then the seller will say whether he sells it or not, or if there is a large number of people willing to buy, decides to whom he would sell it [8,1].

The market sometimes becomes much more unreal, and the situation can be arrived at in which the seller unilaterally establishes a price, using any of those valuation systems, and the buyer accepts or rejects said price [4,3]. Although, it is important to note that there are goods that are necessary for all. For these goods, it will be a very dangerous social situation in which only the seller can set the price and the buyers have no choice but to accept and pay it. If a necessary good is offered by a monopolist, the buyers will have no choice but to pay the price that is asked, even though it is not at all a really fair price. Consequently it is possible that this need remains unfilled [6,18].

Although, in the alternative economy market, the value of things will depend more on how much that good is worth to the person who sells it, than on what it is worth to those who buy it [20,19,1]. As explained earlier, the goods are those things that are introduced in the market because they have no useful value for its holder, the most frequent example being the same money, since this only serves to be delivered in exchange for something, but it has almost no use by itself, except its destruction (burning bills to produce heat, using bills to write, melting coins to obtain metals, and a few other things that can usually be done with other goods much cheaper than the official money itself) [12,22].

This is the change of economic paradigm that underlies the alternative economy, because if people understand that people only sell what they do not need or need to get rid of, it must be understood that people will only voluntarily sell those things that they do not need at a certain time and to get rid of them, be they skills, knowledge, or assets that are surplus after meeting all needs [22,10]. The services will be valued exactly as the goods, taking into account how much the service is worth to the person who provides it, instead of how much the person who needs it would pay for said service [12,10]. Assuming that what people usually sell can be identified with the surplus wealth that is capable of generating, and although such wealth can be useful for other people, that person does not report any utility to conserve said wealth for himself [17,21]. However, there is a large amount of resources and skills that, in the current capitalist system, either are sold or lost, depending on whether or not there is official money to make the official economy work [6,5].

That is why, as a network of virtual currency grows, its members end up developing an economy in which they stop putting a price on things, and end up creating a network in which everyone participates in the production processes of the network trying to get all members to have what they need [4,2]. But long time is needed to reach that point, plus virtual economy has to overcome all the hurdles that the official economy puts in its growth. Furthermore, there are various goods and services that are necessary but are monopolized by the official economy [21,15]. While advancing towards the free economy, virtual currency plays a fundamental role, since they allow freeing productive sectors of the official economy, and as these sectors expand, the network will grow and gain ground [19,3].

If virtual currency follow the criterion of valuing things according to the laws of the market, based on use value, market value, or cost of production, it is very likely that they end up imitating the errors of capitalism, because the members will end up looking for the way to always obtain as many coins as possible in exchange for anything that is worthless to them, as they will when they offer a bicycle that they no longer use, or when they help someone to do some work for a time that they had not planned to take advantage of at all [6,10]. As an example, it will be good to mention those people who dedicate their time to produce things they do not need for the sole purpose of selling them. When they see that they have produced more than they can sell, they realize that a large part of their production has not only cost them a lot of time, energy and resources which cannot be recovered, but they also realize that these products will continue to cost them should in terms of storage and maintenance [18,13].

This mention is made to the simple effects of raising the possible errors that exist in the way in which capitalist societies have organized production processes. Many people limit ourselves to producing only surpluses, which could also be called "merchandise" [5,14], instead of producing things that they really need or others really need [1,8].

All those goods that producers do not need can reach the virtual currency network, where someone may need them, and all of them will be given a value in virtual currency as soon as they join the network because someone in the network needs them. It will be necessary to see what criteria each member of the network follows to put the price on those merchandise, since the success or failure of the network will depend on it [25,12]. When the network grows, people will have an economic space in which to contribute their personal surpluses to the network, and they will be able to personally dispose of the surpluses of the network, under the prism of this new economy [21,1].

VII. CONCLUSIONS

According to the analysis carried out, it can be affirmed that virtual goods have the ability to comply with the law of supply and demand, present extraordinary returns that are null in the progress of time, do not present problems of externalities, have no problems of trends or exchange rate, between other characteristics of a title belonging to an

efficient market. It can be said then that virtual goods are at least as efficient and effective as a real economy. Even so, it is not intended to reach definitive conclusions since only an introductory notion has been shown and the complexity of the components may exceed what is stated in this work. With respect to the virtual economy, the conceptual framework can be used to assert whether virtual economy and virtual currency may perform functions as real economy and real currency would in satisfying trust, needs, and wealth of its members. It is also probable that virtual economy may enhance equality in the proportion of buyers and sellers favors the existence of a competitive market, since neither side dominates the other when determining the returns of the goods.

In turn, the virtual object behaves similarly to commodities and international actions. It is concluded that virtual goods are an interesting object of study to contrast theoretical models and basic features of economic behavior. The virtual economy fulfils assumptions that do not happen in reality, as in the theoretical models in economics.

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