

## **Bitcoin as an Instrument of Financial Support for the World Economy Sustainable Development**

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### **Abstract**

Structural changes in the world economy require a constant increase in investment flows. The main factor that determines the presence or absence of resources to finance investment processes is the amount of money in circulation. In this regard, in recent decades, the world financial system has been increasingly faced with the issue of the money supply increase. The process of increasing the currency in circulation should not get out of control; it has to satisfy the needs of world economy sustainable development and at the same time ensure the stability of the international financial markets functioning. Thus, today the issue of finding an international payment facility that would ensure the sustainable development of the world economy on the basis of a controlled growth of the money supply in circulation is an acute one. The way to solve the problem of the money in circulation optimization can be found in so-called cryptographic currencies, the leader among which nowadays is Bitcoin.

The purpose of this study is to find the answer to the question: "Can Bitcoin's usage as an international means of payment be a way to solve the issue of the money in circulation optimization in order to maintain sustainable development of the world economy?" The study is based on an analysis of the statistical data available at The World Bank, Blockchain Luxembourg SA, MS Brokers Europe Limited. The methodology of the analysis is based on the use of descriptive statistics, correlation analysis, comparative and trend analysis elements.

**Keywords:** world economy, financial system, Bitcoin, sustainable development.

### **Introduction**

The issue of the conditions for the sustainable development formation and maintenance of national social and economic systems as components of the world economy is, nowadays, one of the most essential for mankind. The essence of "sustainable development" is to maximize economic and social benefits from the process of national economies growth, provided that the environment is protected and the natural resources are constantly restored.

The matter has been actively studied by scientists since the second half of the last century. The most famous works in this area were reports to the Rome Club "The Limits to Growth" (Meadows et al., 1972), "Beyond the Limits: Confronting Global Collapse, Envisioning a Sustainable Future" (Meadows et al., 1992) and "The Limits to Growth: The 30-Year Update" (Meadows et al., 2004).

In the "The Limits to Growth" report dated 1972, scientists proposed models for the world economy system development, subject to the preservation of certain trends and the growth rates of the world economy. According to the study results, it was proved that economic growth is not infinite; in other words, there are boundaries to growth caused by the limited nature of various resources (primarily

natural and material). In this connection, the authors made conclusions about the need for the world economy to move from continuous material growth to sustainable development. Works of 1992 and 2004 continue the research of 1972 and constitute corrective scenarios for the world economy system development.

In a 2004 edition of "The Limits to Growth: The 30-Year Update", the authors point out that the sustainable development of the world economy system ought to be based on economic growth limitation, the high technologies widespread introduction, natural resources careful treatment and social alignment (equalizing the population average standard of living in the whole planet). At the same time, sustainable development must be accompanied by structural changes in the economic, technological, and social spheres at the global level.

In turn, structural changes in the world economy require a constant increase in investment flows. The main factor that determines the presence or absence of resources to finance investment processes is the amount of money in circulation. In this regard, in recent decades, the world financial system has been increasingly faced with the issue of the money supply increase.

It ought to be emphasized that the process of the currency in circulation increase is ambiguous. On the one hand, the currency in circulation increase contributes to the development of investment processes (the processes of transition from a raw, energy-consuming economy to a high-tech economy), which is an indispensable condition for sustainable development. On the other hand, an intensive increase in the money supply can lead to the initiation of inflationary processes, and thus to freezing the processes of investment and economic growth. In this regard, the process of increasing the currency in circulation should not get out of control; it has to satisfy the needs of world economy sustainable development and at the same time ensure the stability of the international financial markets functioning.

It ought to be remembered that the growth of money in circulation has its limits. These limits, since the abolition of the gold and foreign exchange standard, determine the value and growth rates of the GDP of the country emitting bank notes. It means that under conditions of low economic growth rates (or nonexistence at all), the economy will not be able to generate the required amount of money. At the same time (as noted above), a developed economy cannot afford high growth rates due to the limited natural and material resources.

The fact that in the struggle for international markets the world most developed countries actively use financial instruments of economic and political expansion has to be taken into account. It increases the possibility of uncontrolled growth in the money supply in circulation and international financial markets overstocking, and as a result there is the spread of the financial and economic crisis around the world.

Thus, today the issue of finding an international payment facility that would ensure the sustainable development of the world economy on the basis of a controlled growth of the money supply in circulation is an acute one. The way to solve the problem of the money in circulation optimization can be found in so-called cryptographic currencies, the leader among which nowadays is Bitcoin.

The purpose of this study is to find the answer to the question: "Can Bitcoin's usage as an international means of payment be a way to solve the issue of the money in circulation optimization in order to maintain sustainable development of the world economy?"

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## Literature Review

Modern scientists from different countries of the world have devoted their scientific works to the study of the essence of the Bitcoin use prospects, as the first and most popular crypto currency. The most interesting recent works in this field are the following.

In the work "Bitcoin: Economics, Technology, and Governance" (Bohme et al., 2015), scientists R. Bohme (University of Innsbruck, Austria), N. Christin (Carnegie Mellon University, Pennsylvania), B. Edelman (Harvard Business School, Massachusetts), and T. Moore (Southern Methodist University, Texas) explore the economic nature, principles and technology of Bitcoin creation, the issues of centralization and decentralization of the Bitcoin emission and functioning process, the possibility of use and risks associated with Bitcoin's circulation process, and regulation methods of this virtual currency.

I. Haq and M. Hassan from Wuhan University (China) in their study "Blockchain Expenses - Resources Need to Generate Cryptocurrency" (Haq & Hassan, 2017) describe the essence and principles of Bitcoin's operation based on the Blockchain system, and also examine the cost of the Bitcoin extraction process. The results obtained by the authors make it possible to assess the complexity degree of the crypto currency extraction and the real costs associated with this process.

The group of scientists D.G. Baur, K. Hong and A.D. Lee from Australia, in the paper "Bitcoin: Medium of Exchange or Speculative Assets?" (Baur et al., 2017), defines Bitcoin as digital money that is a hybrid between the fiat currency and commodity currency without an intrinsic independent value of any regulatory body. The article analyzes the issue of the Bitcoin possible usage at the present and future periods, taking into account its main characteristics. The analysis of transactions carried out by the authors has showed that Bitcoin is mainly used as an instrument of speculative operations, and not as an alternative currency in the course of commodity circulation.

Another study of Australian scientists led by D.G. Baur "Bitcoin, gold and the US dollar - A replication and extension" (Baur et al., 2017) is devoted to the interconnection between Bitcoin, gold and the US dollar identification. The result of this study is the conclusion about the possibility of expressing Bitcoin's value in gold and US dollars. At the same time Bitcoin differs from gold and the US dollar in such indicators as profitability, volatility and correlation with assets.

There is a study by A. Kajtazi, A. Moro of Cranfield University (United Kingdom) "Bitcoin, Portfolio Diversification and Chinese Financial Markets" (Kajtazi & Moro, 2017), where the authors explore the possibility of optimizing a long-term investment portfolio based on Bitcoin adding. The research was conducted by Chinese Financial Markets and the results showed that with long-term investment, when Bitcoin was added to the financial portfolio, the risk reward ratio significantly increased. In other words, Bitcoin can be used as an effective tool for diversifying financial risks in long-term investment portfolios.

Scientists N. Bakar, S. Rosbi from Malaysia, in their work "Identification of non-equilibrium growth for Bitcoin Exchange rate: Mathematical derivation method in Islamic Financial Engineering" (Bakar & Rosbi, 2017), investigate the cost of Bitcoin based on the mathematical model developed by the authors in order to estimate the growth of the exchange rate of the crypto currency. The conducted studies allowed the authors to conclude that Bitcoin's exchange rate would be steadily growing in 2017. The results of their research are aimed at forming an effective investment portfolio on the basis of clarifying the specificity of Bitcoin's exchange rate.

The issue of the cost, volatility and security of Bitcoin are investigated by British scientists J. G. Fraser and A. Bouridane from Northumbria University in Newcastle in the work "Have the security flaws surrounding Bitcoin effected the currency's value?" (Fraser et al., 2017). Scientists make a conclusion that Bitcoin is trusted by an increasing number of users with the passage of time, as a result of which the cost and volume of its use are constantly growing. At the same time, Bitcoin is a volatile currency and its high volatility is due to security concerns that lie in the digital virtual currency environment.

The Israeli-American group of scientists led by N. Gandal in the work "Price manipulation in the Bitcoin ecosystem" (Gandal et al., 2018) explored the possibility of conducting shadow currency transactions using Bitcoin. The result of the conducted studies was a conclusion about the high probability of the security and stability breach of the world monetary system as a result of Bitcoin's illegal circulation.

### **Research Methodology**

In order to achieve the goal set in this study, an analysis of the Bitcoin cryptographic currency industry has been conducted. The methodology of the analysis is based on the use of descriptive statistics, correlation analysis, comparative and trend analysis elements.

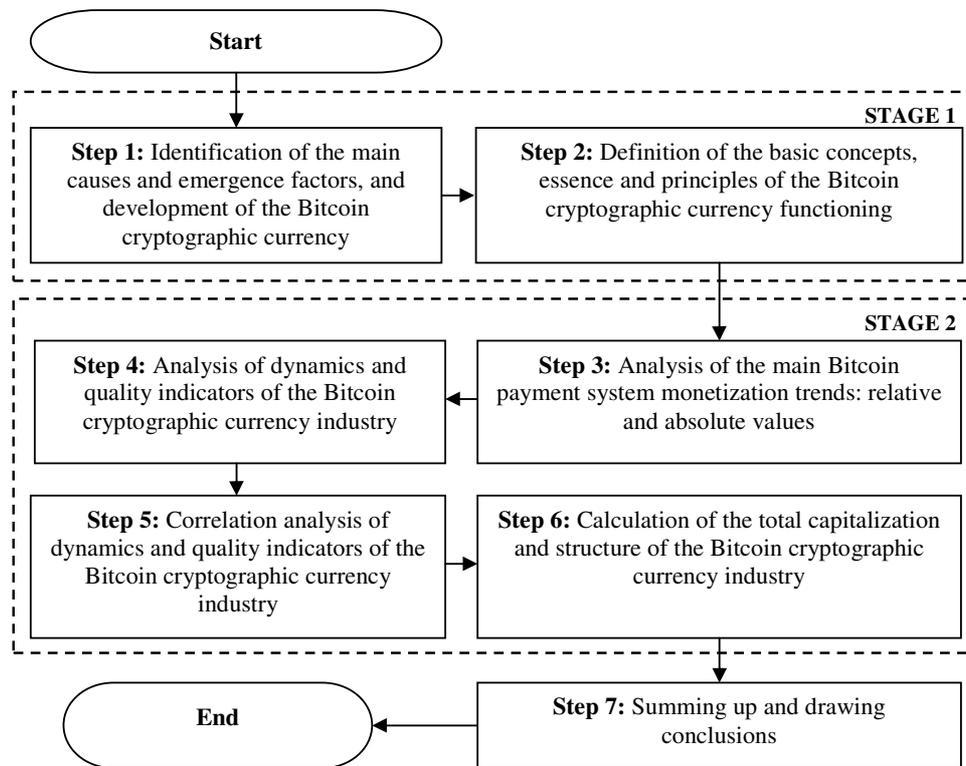
The analysis is based on the data available on MS Brokers Europe Limited, The World Bank, Blockchain Luxembourg SA. The study uses data from 2009 (the year when the Bitcoin's release began) until 2017, forecasting has been made until 2047 (the year when Bitcoin's release ends).

The stepwise procedure for the study is shown in Fig.1.

The first stage of the study is theoretical. At this stage, the prerequisites for the emergence and distribution of Bitcoin crypto currency are revealed, and the nature and specificity of Bitcoin emissions and functioning is determined.

The second stage is an analytical stage. At this stage, the analysis of the Bitcoin cryptographic currency industry, consisting of four consecutive sub-stages, is implemented: analysis of the main trends of Bitcoin payment system monetization; analysis of dynamics and quality indicators of the Bitcoin cryptographic currency industry; correlation analysis of dynamics and quality indicators of the Bitcoin industry; calculation of the total capitalization and structure of the Bitcoin industry.

The research process is finished by summing up the results, conducting the analysis, and drawing conclusions.



**Fig. 1: The scheme of the investigation methodology of the Bitcoin cryptographic currency industry**

## The Bitcoin Concept and Essence

It is necessary to clarify the concept of "Bitcoin" before starting its studying.

Bitcoin is a payment system of a new generation, representing virtual money signs or otherwise a digital currency created and functioning only on the Internet.

Bitcoin is a so-called crypto currency - a currency for providing a process of operation in which cryptographic methods are used: information transformation methods based on an algorithm that depends on the variable secret parameter (key), and has the property of not being able to restore the original information without knowing this key.

Bitcoin is based on a digital peer-to-peer network, which allows each user of the network to interact with other users without contacting the central administrator (Federal Council report, 2014).

At the core of the crypto currency is the "blockchain" technology that is a digital register, in which all transactions in the Bitcoin network (Chakonoto, 2008) are taken chronologically and publicly.

The process of Bitcoin issuing is called mining. "Mining" is the main way of purchasing cryptographic money, based on solving mathematical cases with the help of powerful computers (HashFlare, 2018). The concept of Bitcoin creation is based on two distinctive features of the virtual currency functioning.

The first distinctive feature of Bitcoin is that the process of its issuance and functioning is organized in a decentralized manner, and settlement and payment transactions are anonymous. Currency emission occurs through the work of millions of computers around the world using a program for calculating mathematical algorithms. The mathematical algorithm is based on cryptography, which makes it possible to clearly identify Bitcoins and to exclude the duplication possibility. Thus, decentralization and anonymity means that there are no national central banks and international financial institutions responsible for the issuance and regulation of Bitcoin in circulation, and the owner of the electronic Bitcoin wallet has the opportunity to pay for a variety of services on the Internet, including illegal ones, without identifying him/herself.

As for Bitcoin's decentralization and anonymity, the following should be noted. The fact that the Bitcoin operation process is based on a digital peer-to-peer network confirms the decentralization and anonymity of storing information about its owners. However, in relation to the decision to form a new block and, correspondingly, to increase the amount of currency in circulation, the question of observing the decentralization principle remains open. It is due to the peculiarities of Bitcoin's functioning. Namely, the system sets by itself the complexity level of the next block formation, for which a premium is assigned and this level of complexity should initially allow, with existing capacities, to produce each subsequent block within 10 minutes. It means that the system itself acts as a central bank and regulates the receipt speed of new coins into circulation by establishing the level and complexity of the algorithms. Moreover, Bitcoin's system of functioning does not set a certain amount of a wallet, which creates opportunities for the concentration of the bulk of the virtual currency in several large wallets and thereby violates the decentralization principle.

The second distinctive feature that characterizes the essence of Bitcoin is that Bitcoin has to represent the gold analog itself and take those gold properties that make it so-called ideal money. These properties of gold include: the mining complexity due to the copying impossibility (gold cannot be copied, it can only be obtained) and resource constraints (gold is a limited natural resource, the longer gold is mined, the harder and more costly it becomes to extract resources). These two properties ensure the reliability of gold as a means of payment, and theoretically guarantee its inflationary security.

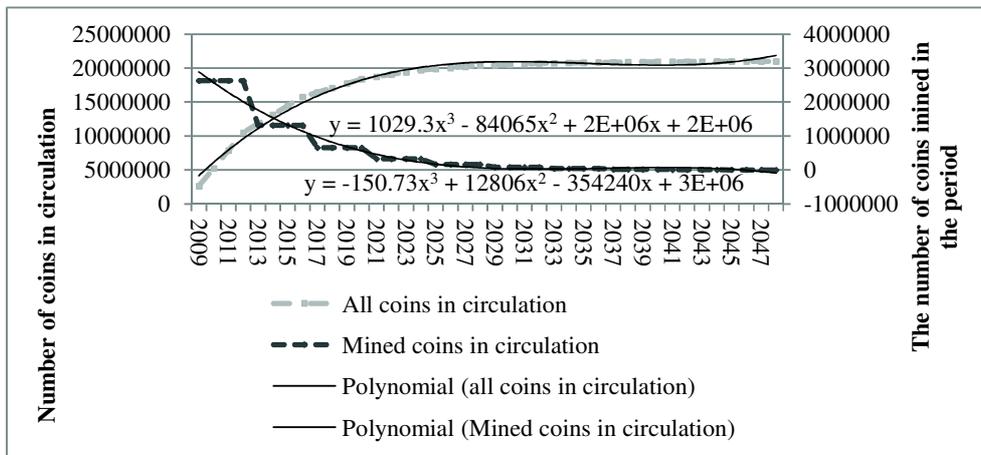
Indeed, Bitcoin has the complexity of mining (since the process of extracting coins requires a lot of computer resources and time) and resource limitations (since the speed of the total produced coins decreases with time and tends to zero). However, the explanation of the lack of the inflation probability of cryptographic currency by the complexity of its extraction and the fact that it cannot be faked, but only to be obtained, is quite absurd. Any useful mineral can only be obtained. Oil, gas, coal, salt, gold, silver can only be extracted. However, the price of minerals is not stable, but varies depending on supply and demand in the market. At the same time, one should keep in mind the process of forming currency pairs in financial markets, i.e. about the expression of the one currency value (or precious metal) in the another currency value. Thus, in relation to gold or silver, in most cases, the US dollar is used, which also has its own value and has the property to become more expensive or cheaper in the international currency market due to a combination of factors: economic, political, social, natural, both domestically and abroad. Therefore, the value of gold depends not only on its complexity extraction, but also on the another currency exchange rate (i.e. the factors that form this rate). At the same time, one should take into account the fact that Bitcoin is not provided with any material or financial guarantees; in its essence Bitcoin is the result of complex mathematical processes. Thus, there is no full inflationary security of this crypto currency. The Bitcoin exchange rate, like any other currency, is unstable and depends on a market factors combination.

### **Bitcoin Cryptographic Currency Industry Analysis**

The main question of this study is: "Can Bitcoin solve the problem of optimizing the amount of money in circulation?" In order to find the answer to this question, an analysis of Bitcoin's industry has been conducted, in accordance with the methodology proposed above.

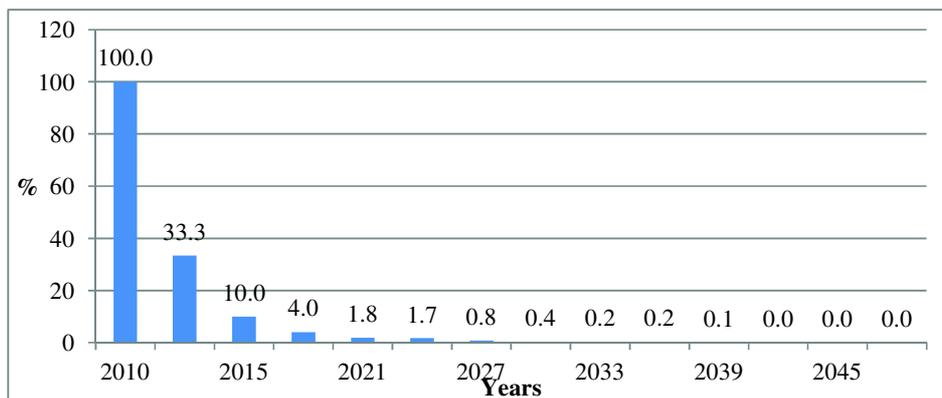
According to the official mathematical algorithm, Bitcoin is based on each new block formed within 10 minutes; each new block increases the number of coins in circulation. In 2009, the formation of one block was estimated at 50 coins, and this value is reduced every four years by half. According to the algorithm, the maximum possible number of coins in the payment system is 21 million Bitcoins and will be reached in 2047. A graphical interpretation of Bitcoin's trend is shown in Figure 2.

According to the preprogrammed mathematical algorithm, the growth rate of the next Bitcoin coins in the payment system will look like this: the largest amount of coins could be obtained in 2010; in 2012 the annual rates of coin production amounted to only 33% from the previous 2011; in 2015 there were even less ones (10% from 2014), after 2027 Bitcoin's mining will be less than 1% per year, and since the starting date until the date of the last Bitcoin issue (2047) the decrease in the growth rate of coins in the payment system will make up more than 96 % (Fig. 3).



**Fig.2: The trend of the Bitcoin payment system monetization, the number of coins**

Source: calculated by the authors on the basis of data from MS Brokers Europe Limited Bitcoin, Blockchain Luxembourg S.A.



**Fig. 3: Chain increase rates in the number of Bitcoin coins in the payment system, %**

Source: calculated by the authors on the basis of data from MS Brokers Europe Limited Bitcoin, Blockchain Luxembourg S.A.

In such a situation, to maintain the profitability of the coin production process, the permanent increase in the Bitcoin price on the market every four years until the moment of reaching the optimal volume, namely 21 million coins in the system, is natural.

The fact that the system initially fails in the process of mining, increasing the number of coins obtained for each block to a certain level of txn fees has to be emphasized. It means that the main formula of the system is violated, which increases the process speed of system saturation with Bitcoin coins. This is confirmed by statistical data. Thus, on December 21, 2017, the reward for the formed block of Bitcoin coins was 20.6 coins (equivalent to 320.065.19 USD) (Blockchain, 2017); however, according to the model initially put into the Bitcoin mining process (Figure 2), the reward for the block should be only 12.5 coins. Consequently, in the example under consideration, the additional mining premium was 8.1 Bitcoin.

Therefore, the process of Bitcoin functioning is one of the most profitable business ideas. The question is only how long this process will continue, and how Bitcoin's market is close to overheating.

Finding the answer to this question, the indicators of Bitcoin's industry will be analysed. Based on the data presented in Table 1, a correlation analysis that reveals the relationship between the dynamics and quality indicators of the Bitcoin industry will be conducted (Table 2).

**Table 1: The dynamics and quality indicators of the Bitcoin cryptographic currency industry**

Indicator		Year						
Name	Code	2011	2012	2013	2014	2015	2016	2017
The opening price of the period, \$	A	0.83	4.71	13.51	726.38	313.50	429.49	926.01
The maximum price in the period, \$	B	31.91	15.40	1090.00	990.00	460.49	945.71	19424.25
The minimum price in the period, \$	C	0.57	3.87	13.16	285.01	162.68	349.82	752.00
The closing price of the period, \$	D	4.72	13.52	726.38	313.50	429.50	926.01	14342.69
The price range in the period (the highest price is the lowest price), \$	E	31.34	11.53	1076.84	704.99	297.81	595.89	18672.25
The average price in the period, \$	F	9.51	9.38	460.76	578.72	341.54	662.76	8861.24
Extraction of coins, thousand pieces	G	2628	2628	1314	1314	1314	1314	657
Total coins in cumulative total, mln. pieces	H	7.88	10.51	11.83	13.14	14.45	15.77	16.425
Capitalization (at the closing price), bln. \$	J	0.04	0.14	8.59	4.12	6.21	14.60	235.58
Infrastructure revenue, bln.\$	K	0.01	0.04	0.95	0.41	0.56	1.22	9.42
Revenue per one Bitcoin, \$	L	4.72	13.52	726.38	313.50	429.50	926.01	14342.69

*Source: calculated by the authors on the basis of data from MS Brokers Europe Limited Bitcoin, Blockchain Luxembourg S.A.*

According to the data presented in Table 1 and the results of the correlation analysis presented in Table 2, the following factors affecting the Bitcoin rate can be distinguished:

- increase in the monetization algorithms complexity of Bitcoin payment system does not lead itself to a change in the exchange value of the crypto currency (the correlation between the average Bitcoin price in period (F) and the number of coins (G) is low and is -0.61);

- there is no clear correlation between the volume of coins with the cumulative total (H) and such indicators as: capitalization (J) and profitability (K) of the infrastructure; the level of profit per one Bitcoin (L). The correlation coefficient ranges from 0.56 to 0.60. It indicates a possible reassessment of the profitability of the infrastructure of this cryptographic currency in the long run and the discrepancy between Bitcoin 's existing exchange rate on the market and the invested capital;

- the main reason for the price change is a decrease in the compensation level for one unit creation. This trend appeared in 2013 (the cost of one Bitcoin increased from 13.52 to 726.38 USD, an increase of 5272.49 %) and in 2017 (the cost of one Bitcoin increased from 926.01 to 14342.69 USD, an increase of 1448.87 %), in the remaining years the increase was: in 2012 - 186.44 %; in 2014 - (-56.84 %); in 2015 - 37.00%; in 2016 - 115.60%;

- infrastructure capitalization index (J) increased from 0.04 billion USD in 2011 to the level of 235.58 billion USD. In 2017 (the increase was 5889.50 % for the analyzed period or 841.00 % on average per the year);

- the difference between the increase in the exchange rate of one Bitcoin (D) (303770.55 %) and the increase in the capitalization (J) (5889.50 %) over the whole study period is 297881.05 percentage points, which may indicate an overheating of the market.

According to the results of the analysis, it is possible to draw a general conclusion: the Bitcoin crypto currency, like any other currency, functions according to market laws, and its price fluctuates depending on demand and supply arising in speculative markets; the crypto currency is not protected against inflation and is at risk of overheating.

**Table 2: The correlation between the dynamics and quality of the Bitcoin cryptographic currency industry presented in Table 1**

	A	B	C	D	E	F	G	H	J	K	L
A	1.00										
B	0.71	1.00									
C	0.93	0.87	1.00								
D	0.70	1.00	0.87	1.00							
E	0.70	1.00	0.86	1.00	1.00						
F	0.73	1.00	0.89	1.00	1.00	1.00					
G	-0.77	-0.60	-0.76	-0.60	-0.59	-0.61	1.00				
H	0.77	0.55	0.81	0.56	0.54	0.57	-0.88	1.00			
J	0.70	1.00	0.87	1.00	1.00	1.00	-0.59	0.56	1.00		
K	0.71	1.00	0.89	1.00	1.00	1.00	-0.64	0.60	1.00	1.00	
L	0.70	1.00	0.87	1.00	1.00	1.00	-0.60	0.56	1.00	1.00	1.00

Source: calculated by the authors on the basis of data from MS Brokers Europe Limited Bitcoin, Blockchain Luxembourg S.A.

Next, the specificity of Bitcoin's market capitalization has to be studied. The main problem is that the industry of cryptographic currencies includes significant investors who form an artificial threshold for entering the industry and in fact, establish and have a real impact on the exchange value of this crypto currency.

According to the statistical data presented in Table 3, the following conclusions can be drawn:

- significant (private and corporate) investors (whose wallets are currently valued at more than \$ 1 million) as of December 23, 2012, make up 0.08% of the total number of market participants, and at the same time they have 76.32% of all coins issued;

- the minimum level of industry capitalization is 63882.11 million USD. It means that only 6.14% of coins are available to insignificant participants of this market at the moment, and the process of their production on conventional personal computers at the moment can bring income around \$1 a day. Thus, the significant investors who invested big resources in the development of special servers for mining in 2015-2017 will in the short term increase the number of coins produced in their wallets, while access to them by small participants will be even more limited.

**Table 3: The minimum critical value of total capitalization and the structure of the Bitcoin cryptographic currency industry market**

Indicator	Cost of wallet						
	> 1 \$	> 100 \$	> 1000 \$	> 10000 \$	> 100000 \$	> 1000000\$	> 10000000 \$
Number of wallet	20802122	8181554	3083066	929819	19069	24125	2463
Minimum level of total capitalization, mln. USD	20.80	818.16	3083.07	9298.19	1906.90	24125.00	24630.00
Minimal level of total capitalization in progressive terms, mln. USD	20.80	838.96	3922.02	13220.21	15127.11	39252.11	63882.11
Share of participation,% of total min. capitalization level	0.03	1.28	4.83	14.56	2.99	37.76	38.56
Share of participation,% of total wallet	62.96	24.76	9.33	2.81	0.06	0.07	0.01

Source: calculated by the authors on the basis of data from MS Brokers Europe Limited Bitcoin, Blockchain Luxembourg S.A.

Table 4 presents the official data of the actual distribution of Bitcoins on the market.

**Table 4: Table of the actual distribution of Bitcoins on the market**

Balance	Addresses	Addresses %/ (Addresses)	Coins, BTC	USD	% Coins (Addresses)
0 - 0.001	14445017	53.88% / (100%)	2.637	41.309.442	0.02% (100%)
0.001 - 0.01	5409485	20.18% / (46.12%)	22.436	351.476.642	0.13% (99.98%)
0.01 - 0.1	4386366	16.36% / (25.95%)	138.070	2.162.956.166	0.82% (99.85%)
0.1 - 1	1850580	6.9% / (9.59%)	596.933	9.351.377.146	3.56% (99.03%)
1 - 10	568816	2.12% / (2.68%)	1.495.978	23.435.540.508	8.93% (95.46%)
10 - 100	132974	0.5% / (0.56%)	4.375.862	68.550.931.361	26.13% (86.53%)
100 – 1.000	15887	0.06% / (0.07%)	3.701.635	57.988.697.012	22.1% (60.4%)
1.000 – 10.000	1541	0.01% / (0.01%)	3.348.500	52.456.589.745	19.99% (38.3%)
10.000 – 100.000	111	0% / (0%)	2.788.429	43.682.682.114	16.65% (18.3%)
100.000 – 1.000.000	2	0% / (0%)	276.263	4.327.859.598	1.65% (1.65%)

Source: calculated by the authors based on the data of Blockchain Luxembourg S.A.

According to the data of Table 4 the following can be concluded:

- more than 53.88% of Bitcoin owners have on their wallets from 0 to 0.001 Bitcoin, which is at the rate as of December 23, 2017, is equal to 41.309.442 USD and is 0.02% of all coins in the system;
- 2.12% of all market participants have more than 1 Bitcoin on their wallets, and the total number of coins in such wallets is 95.46% of all coins in the system;
- 0.56% of market participants own 86.53% of coins in the system.

Thus, the modern market of Bitcoin cryptographic currency is a monopolistic system, which means that the price formation in the market and the whole Bitcoin industry is carried out according to the laws of the manufacturer (the largest Bitcoin purse holders).

Conclusion on the monopolization of the Bitcoin market is also confirmed by data on the richest wallet in the Bitcoin system (3D2oetdNuZUqQHPJmcMDDHYoqkyNVsFk9r). The balance of this purse is equal to 155.951.560.814.366 Bitcoins, which, as of December 23, 2017, is 2 trillion 148 billion 075 thousand 962 dollars and 65 cents. Immediately, the wallet produced 3961 blocks with a total reward at the level of 1.393.533.826 Bitcoins. It ought to be noted that the first entry into the system of this wallet was made on May 1<sup>st</sup>, 2017; thus, many coins were collected in less than 1 year.

In order to understand the amount in question, it is proposed to compare the balance of this wallet with the balance of payments indicator of such countries as Czech Republic, Poland, Ukraine, Germany, the entire Eurozone, the United States of America (Table 5).

**Table 5: Comparative characteristics of the richest purse in the Bitcoin system with the balance of payment indicator of selected countries (regions)**

Characteristic	Wallet, country, region	Size, USD	% from wallet
№ of wallet	3D2oetdNuZUqQHPJmcMDDHYoqkyNVsFk9r	2148075962.7	100
Countries with a positive balance	Eurozone	397996954.4	18.53
	Germany	290290260.2	13.51
	Czech Republic	2138782.9	0.10
Countries with a negative balance	The USA	-451692000.0	21.03
	Ukraine	-3450000.0	0.16
	Greece	-1964347.4	0.09
	Poland	-1369000.0	0.06

Source: calculated by the authors on the basis of data from The World Bank, Blockchain Luxembourg S.A.

Based on the calculations, 21.03 % of the amount generated in this wallet will be enough to settle the balance of payments of the United States of America, and 0.32% will be enough to settle the balance of payments of Ukraine, Greece and Poland combined. 18.53% of the value of this wallet is equal to the positive balance received by all countries belonging to the Eurozone, and only 13.51% is equal to the earned amount of money for the whole year by the economy of Germany.

Thus, the conducted research allows drawing a conclusion that the market of Bitcoin cryptographic currency today is superheated and monopolized. This situation indicates the impossibility of solving the issue of optimizing the money supply in circulation on the basis of Bitcoin as an international means of payment.

## Conclusion

The conducted research allows drawing the following conclusions.

1. Due to the limited reproduction resources (primarily natural), humanity has to move from a system of constant increase in the rates of economic growth to a system of sustainable development. The sustainable development of any social and economic system is based on the widespread introduction of high technologies that require significant investment resources.

2. The availability of investment resources for financing sustainable development depends on many factors; the leading one among them is the amount of money in circulation. However, the process of increasing the money supply in circulation has its limits, conditioned by the political and economic strength of the state bank issuing notes, as well as the level of allowable inflation. Thus, sustainable development requires the optimization of the money supply in circulation.

3. The method of optimizing the amount of money in circulation can be crypto-currencies, the leader among them is Bitcoin. However, conducted studies have shown that Bitcoin, in spite of the declared decentralization, is monopolized currency, and Bitcoin market, notwithstanding the declared inflationary security and stability, is significantly overheated. This situation testifies to the instability and low reliability of this crypto currency, and therefore its inability to use it as an international means of payment capable of ensuring the process of sustainable development of the world social and economic systems.

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