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A. Sabyrzhan[1*], Ye.D.Orynbassarova[2], A.A. Zhakupov[3], D.M. Khamitova[4], N.N. Gelashvili[5]

[1,2,5]Karaganda Buketov University, Karaganda, Kazakhstan;
[3]L.N. Gumilyov Eurasian National University, Astana, Kazakhstan;
[4]Esil University, Astana, Kazakhstan

[1]alisher-aliev-79@mail.ru, [2]erke.08@mail.ru,[3]jakypov-at@mail.ru, [4]dariga1979@mail.ru,[5]denor19980@mail.ru

[1]https://orcid.org/0000-0002-8910-4572, [2]https://orcid.org/0000-0002-5577-6434,
[3]https:// orcid.org/0000-0002-0381-6799,[4]https://orcid.org/0000-0002-2903-9908,
[5]https:// orcid.org/0000-0002-7115-2007

[1]Scopus Author ID: 57190607215, [2]Scopus Author ID 57003462100,
[3]Scopus Author ID 57003462100,[4]Scopus Author ID: 57160225500,
[5]Scopus Author ID57215350667

[1]Researcher ID: B-5709-2019, [5]Researcher ID: AAF-1510-2020

The study of some issues of the application of cryptocurrency mining technology in Kazakhstan

Abstract

Object: Analyze the use of cryptocurrency mining technology in Kazakhstan and develop recommendations for improving its effective operation.

Methods: We have used scientific methodological and research approaches, such as comparison, grouping, analysis, classification, statistical data, induction, deduction, economic-mathematical methods, and modeling.

Findings: The study's practical significance is that these principles and approaches can be used to form a mining farm development strategy. The proposals presented will improve the digital efficiency of the company and stabilize and improve its financial and economic situation by making appropriate management decisions. The study results make it possible to solve problems related to the ability of enterprises to provide a medium and long-term stable position in the market and flexibly adapt to the environment.

Conclusions: Based on the study, the concept of "cryptocurrency", "mining", and "mining farm" was clarified as a particular form of a new information economy and society that combines its input stages of the technological chain or stages of its release in order to achieve significant competitive advantages compared to specialized types of digital money. The features of digital money, such as cryptocurrencies and their mining, which include various platforms, objects, and types but have common elements, technologies, development management, and risks, were identified. A methodology for analyzing the IT architecture of cryptocurrency and the volatility of the digital currency is proposed, which allows one to find out quantitative and qualitative indicators, assess the extensiveness, intensity, and efficiency of the use of cryptocurrency, and determine the reserves for its full use.

Keywords: information economy, digitalization, cryptocurrency, mining, digital tenge, bitcoin, electronic money.

Introduction

The global economy undergoes constant transformation: technological structures, material values, and regulatory mechanisms evolve. The emergence of new factors could accelerate this process and alter the fundamental principles of modern market economics.

One such factor is global digitalization, which has influenced the development of all economic sectors. Consequently, new markets, communication methods, and production management approaches have emerged. Active digitization has created a digital profile for individuals, encompassing various aspects of their lives, and also leads to specific ideological shifts as digital values, alongside material ones, have emerged.

These digital goods and services are produced, bought, and sold in a global digital market, which operates without geographical limitations. Notably, most transactions and product usage occur in the digital realm, facilitating faster communication between buyers and sellers and the delivery of digital products.

However, this digital environment has also introduced challenges such as slower and costlier transactions and the risk of compromised digital property and funds due to fraudulent activities. These challenges coincided with the global financial crisis of 2007–2009 and the subsequent destabilization of international economic relations.

* Corresponding authors e-mail: *alisher-aliev-79@mail.ru*

In response to these challenges, there has been a growing demand for alternative accumulation instruments that are independent of traditional financial markets and meet the requirements of the digital economy. Cryptocurrencies emerged as a technological response to these issues (Carstens, 2018).

Understanding the significance and popularity of cryptocurrencies requires examining the factors that led to their emergence and the motivations of economic actors who adopted them.

After the emergence of Bitcoin in 2009, the world's first cryptocurrency, the cryptocurrency market expanded rapidly, now offering various instruments based on distributed ledger technology. These instruments, collectively known as crypto assets, exist in digital form or represent other assets digitally (Qin, 2018).

As stated in Satoshi Nakamoto's article "Bitcoin: Peer-to-Peer Electronic Cash System", the purpose of creating cryptocurrency is to provide an alternative to fiat currency (Nakamoto, 2008). The meaning of cryptocurrency as a virtual currency or asset is still different, although there are many definitions often found on the websites of international or national financial institutions.

Cryptocurrency is a set of concepts and technologies that form the backbone of the digital money system. Monetary units such as bitcoins are used to store and transfer value between network members. There are several remarkable differences to consider (Sichinava, 2019):

1) Digital currency is entirely virtual and lacks backing, unlike the dollar initially tied to gold. Some experts argue that the cryptocurrencies' value is determined by the energy expended in mining them;

2) All operations are entirely hidden when the system is completely transparent. A third-party user can see a sequence of transactions with a coin at any time, but the people who make them are hidden behind secret public keys;

3) The payment cannot be reversed. This property of cryptocurrency is one of the keys. In this regard, S. Nakamoto wrote: "the absence of irreversible transactions increases the cost of services, the information of which cannot be canceled. Since the payment can be canceled, the seller must be careful when asking the buyer for more information than necessary";

4) The most important difference is that everything started and there is no regulatory authority for cryptocurrencies. This was done by transferring the main responsibility for managing records from the central financial institution to the personal computer network and excluding the installers' semi-commissions. Cryptocurrencies allow us to reduce the cost of doing business and prevent dishonest actions of intermediaries. The system supports the development of the infrastructure where foreigners can do business by eliminating the need for intermediaries.

Literature Review

The theoretical and methodological framework of the study is built upon the works of various authors in the field of cryptocurrencies, mining, and digital economics, as well as methodological guidelines outlined in legislative acts, government resolutions, and regulatory documents of the Republic of Kazakhstan. Additionally, insights from domestic and foreign authors on the topics under examination, along with program documents of Kazakhstan, inform the research. Among the notable foreign scholars contributing to developing the digital economy, blockchain, and cryptocurrency are S. Nakamoto, D. Sichinawa, N.T. Thuy, F. Calvao, A.A. Aljabr, A.D. Lee, S. Chimire, D.K. Sharma, and Y.K. Tomov.

It is worth noting that the concept of "Bitcoin" was the first to appear. A few years after its appearance, Forbes magazine published an article in which the term "Cryptocurrency", already familiar to society, was strengthened. Because Bitcoin and cryptocurrencies are often classified with each other, Bitcoin is the first failed cryptocurrency. The history of the emergence of the cryptocurrency phenomenon is considered from the moment of the creation of the electronic coin (Thuy, 2020).

As per F. Calvao (2019), there exist various methods for acquiring cryptocurrencies:

1. Mining: This involves the issuance of cryptocurrencies through resource-intensive computations, often as a reward for validating transactions.

2. Purchase on cryptocurrency exchanges: Cryptocurrencies can be bought and sold on specialized trading platforms known as cryptocurrency exchanges.

3. Direct Acquisition: Acquiring cryptocurrencies directly from the owner, bypassing intermediaries, is feasible. These digital assets can be procured via ATMs and online platforms providing services for exchanging fiat currency.

4. Capital investment: Another strategy involves investing in finance-related cryptocurrency. More importantly, there has been an increase in the number of commercial entities entering the cryptocurrency space, leading to the creation of digital assets-related products.

Users who generate cryptocurrency are called integrity. They provide the hardware to validate transactions, embed them in the blockchain, and maintain it online. Blockchain is a distributed ledger that records all transactions in a cryptocurrency such as Bitcoin. Blockchain data is the history of all transactions, partially or entirely, loaded on every device connected to the network. Therefore, the collection of all information about transactions and blocks takes place on many computers and is constantly synchronized. This process ensures system security, prevents tampering of individual devices, and ensures that transactions are immutable and non-transferable (you cannot send the same bitcoins twice). If your Bitcoin payment passes, it will be written to the blockchain and remain there forever. It would help if you did this simultaneously on all connected devices to change information about it somehow. Each computer on which a copy of the blockchain is stored is called a node. The code may be complete or incomplete, depending on the data uploaded. Incomplete codes are associated with full years since they do not include all the data of the blockchain; they save only block headers and confirm transactions only on them. The miners in this system act as a complete code — they download the entire blockchain to their computer. Additionally, Master Codes are comprehensive codes capable of distributing rewards obtained by miners for transactions. However, to activate such a code, a specific amount of cryptocurrency must be present in the account (Aljabr, 2019).

Lee A.D.'s research highlights that blockchain technology forms the foundation of every cryptocurrency, constituting a series of interconnected blocks. According to his findings, each block contains transaction details such as sender and recipient addresses, transaction amounts, and supplementary remarks. Miners are tasked with validating transactions, which is achieved through solving intricate algorithmic challenges (Lee, 2020).

Sharma D.K., in a research paper, outlined the basics of cryptocurrencies using blockchain technology and discussed existing conversations about the potential of this technology to simplify effective financial transaction mechanisms. The leading followers of technology are discussed in detail, as well as potential problems and conflicts related to technology (Sharma, 2020).

Blockchain technologies have garnered significant attention in academics and business in recent years. The emergence of the Bitcoin blockchain, mainly, has sparked numerous scientific inquiries into the technology's intricacies, security, and dependability. At its zenith, it catalyzed the formation of a novel economic landscape, boasting a market capitalization of roughly $300 billion. In his scholarly work, Tomov Y.K. extensively delved into the evolution of blockchain technologies, addressing fundamental challenges and proposing diverse solutions (Tomov, 2019).

Methods

The methodological basis of the research is based on the general scientific principles of the systematic research approach. In addition, this paper uses theoretical research methods, including the analysis and synthesis of information provided by the periodic business and scientific publications on cryptocurrencies and Blockchain technologies. At the same time, historical, logical, technical, comparative, and legal research methods were applied. Consequently, it became possible to classify cryptocurrency by substance and purpose and obtain the necessary information about the legal regulation of cryptocurrency. In turn, along with theoretical research, empirical research methods were used, the basis of which was statistical and analytical data published by rating agencies in the global information network Internet, the analysis of which allowed to identify the main trends and directions of development of the cryptocurrency market based on blockchain technologies.

Results

The current level of economic change is associated with the growth of virtual work, which is part of the global economy based on interactive business and information technology. Developing new forms of money is associated with activating and deepening the information sphere and society. Due to such conditions and the impact of technological innovations, the economy acquires a new meaning; significant changes occur in all spheres of economic activity, including the financial sector. The manifestation of such changes is the transfer of transactions into electronic format, the emergence of new means of payment, and the latest payment means and systems.

One of the first payment systems that primarily used cryptography to protect the privacy of payments was an equivalent version of the Bitcoin system. This system was developed in 2009 by a team of programmers under the pseudonym Satoshi Nakamoto. The primary purpose of creating cryptocurrency was to decentralize payments, that is, to avoid currency controls by financial institutions and avoid unnecessary fees.

The initial value of the cryptocurrency was the cost of electricity consumed, and the secondary value was the demand for the cryptocurrency.

Cryptocurrency is a new type of electronic money or financial obligations exchanged through information technology systems, and the confidentiality of their transactions is protected by complex mathematical calculations of encryption algorithms based on cryptography. The main distinction of cryptocurrency to electronic money is the lack of control, limited circulation, and the principle of complete anonymity (Li, 2017).

Cryptocurrency inflation protection can help to reduce the number of virtual currencies in circulation, reduce the limited number of bitcoins, increase the likelihood of reclaiming or spending that bitcoin, and increase the transparency and anonymity of the system, securely protecting electronic wallets. The first purchase of an actual Bitcoin cryptocurrency product was made by a US citizen in 2010. About a thousand cryptocurrencies are worldwide, but the most popular is Bitcoin. Its capitalization occupies almost 50% of the entire cryptocurrency market, and as of 13 April 2018, it is worth $136.7 billion.

In the second place by capitalization, cryptocurrency, Ethereum stands at a crypto value — of 50.4 billion. In third place is the cryptocurrency Ripple; its capitalization level is 25.14 billion dollars. The value and capitalization of the 20 largest cryptocurrencies are presented in Table 1.

Table 1. The value and capitalization of cryptocurrencies for 2021 (the 100 best by market capitalization).

№	Name	Market capitalization	Price	Sale price, for 24 hours	Number of revolutions
1	Bitcoin	$136, 726, 137, 857	$8 054.66	$9,501,840,000	16,974,787 BTC
2	Ethereum	$50,403,452,227	$510,21	$2,716,320,000	98,789,233 ETH
4	Bitcoin Cash	$12,887,467,922	$754,95	$437,130,000	17,070,738 BCH
5	Litecoin	$7,304,587,766	$130,30	$640,637,000	56,059,338 LTC
6	EOS	$7,234,809,131	$9,15	$1,312,070,000	790,689,523 EOS*
8	Stellar	$4,507,018,283	$0,242841	$90,295,200	18,559,554,243 XLM
9	NEO	$4,332,373,500	$66,65	$243,161,000	65,000,000 NEO*
13	TRON	$2,596,268,007	$0,039488	$419,802,000	65,748,111,645 TRX*
14	Tetcher	$2,556,594,000	$0,284066	$49,235,700	8,999,999,999 XEM*
15	NEM	$2,280,949,523	$0,997293	$3,846,750,000	2,287,140,814 USDT*
16	VeChain	$1,773,692,821	$3,38	$81,267,800	524,770,505 VEN*
17	Ethereum Classic	$1,637,901,917	$16,20	$238,199,000	101,135,647 ETC
18	Binance Coin	$1,529,107,496	$13,15	$137,054,000	116,261,604 BNB*
Note – based on the author's calculations					

Regarding Kazakhstan, the National Bank of the Republic of Kazakhstan has recently determined that the sole legal tender within the country is the tenge. Consequently, cryptocurrencies are not recognized as valid means of payment. The rationale behind these restrictions and potential uniformity in managing the virtual currency market stems from efforts to mitigate associated risks:

1) the potential misuse of virtual currencies for illicit activities like drug trafficking, arms trade, and other prohibited transactions;

2) concerns regarding the infiltration of foreign financial entities into the domestic market, leading to heightened competition and potential market share erosion for local financial institutions;

3) the risk of relinquishing the state's monopoly over currency issuance;

4) decline in central bank income;

5) a decrease in demand for the national currency, which causes its depreciation (or even refusal in favor of foreign currency) and a change in the velocity of circulation, which, in turn, complicates the process of determining the velocity of circulation of money and carrying out monetary regulation;

6) the impossibility of conducting an effective monetary policy since a large share of the money supply is beyond the control of the monetary regulator;

7) reducing the level of impact or eliminating financial intermediaries, etcetera.

All this is an essential basis for making decisions on the monopoly issue of cryptocurrencies only by central banks. Control over the development of virtual currencies, their circulation, regulation, and development of national payment systems under the auspices and control of the regulator confirms the previously stated hypothesis.

In conclusion, according to many analysts, the rate of Bitcoin and most cryptocurrencies is very high, and their cost increases only with the demand and interest of miners. Any negative information related to the cryptocurrency system, bitcoin, and other electronic currencies will immediately affect their value.

Officials in many countries around the world view the Bitcoin network as an enabling environment for illegal transactions and tax exemptions and, therefore, avoid the use of Bitcoin and other digital currencies, making it difficult to exchange them with other traditional currencies.

In addition, the advantages of Bitcoin and other cryptocurrency systems are the high speed of electronic currency transfer, high transaction security due to the high complexity of the Bitcoin network calculation, the emission process programmed to reduce the number of virtual currencies in circulation, the ability to bypass unallocated Bitcoins, limited number of Bitcoins, no commission in the payment system, the ability to return or spend the same bitcoin a second time, systems of transparency and anonymity, reliable protection of electronic wallets.

Thus, the use of cryptocurrency is only feasible for preventing the emergence of cryptocurrency pyramid investment schemes, enhancing the digital and financial literacy of the population, and tightening legislation in this area.

The electronic tenge, for which the National Bank of Kazakhstan is responsible, gets distributed in electronic format jointly with market participants within the framework of a two-tier financial structure. It is technically possible to present electronic tenge in the form of banknotes or tokens.

The primary objectives of the 2021 pilot initiative include assessing the feasibility of the digital tenge concept through a pilot test of the technological execution of a retail platform using distributed ledger technology. Additionally, the project aims to determine the key parameters of the digital currency model of the National Bank of Kazakhstan in collaboration with all relevant stakeholders.

The Central Bank of the Republic creates and develops payment systems in the region to provide fast, easy and secure payment solutions to everyone doing business across the country. The digital tenge system will serve as an additional tool for financial market participants to improve financial inclusion by supporting the creation of new services and expanding the adoption of electricity payments across the region.

In the long term, the introduction of digital tenge will improve the outcomes of international payments. The Digital Tenge platform enables transactions at the level of national currency tokens, offering many ways to increase the value, speed and transparency of country-related transactions. Digital KZT can help promote personal and large businesses. The electronic presentation of Tenge for the private sector was tested within the scope of a pilot project in 2021.

Central bank digital currencies serve digital payments and central bank reporting. A digital currency governed by central bank tokens that acts as a store of wealth and a medium of exchange represents a third vision of national money. It combines many of the properties of physical and digital currencies, providing new opportunities for businesses and government agencies. According to the Bank for International Settlements' Quarterly Thematic Review published in April 2021, central banks around the world have 65 ongoing research activities on digital currencies. An updated version of the survey conducted in October of the same year identified 84 projects, increasing the number of pilot projects from 9 to 26, as shown in Table 2.

Table 2. Examples of potential uses (pay-per-use, pay-as-you-go) payments in the supply chain

Targeted use	Payment-per-use (pay-per-use, pay-as-you-go)	Payments with government participation	Micropayments and debits on an ongoing basis	IoT and M2M payments	Payments in the supply chain
Watercolour special-purpose tokens allow you to control their use.	Through Smart Contracts, the central bank's digital currency enables payment for actual, actually consumed quantities of products, resources, and services, providing the necessary flexibility, savings, and control over spending.	Reducing the risks of error, abuse, and fraud, the ability to monitor intended use, and making quick changes to social care settings.	The payment properties of the Central Bank's digital currency allow additional payments in payment models with low growth, reducing the associated time costs.	Due to their autonomy and programmability, central bank digital currencies can become a convenient tool for making direct (without intermediaries) payments between Internet of Things devices.	Targeted Programmes and traceability of the Central Bank's digital currency enable automatic and transparent settlements for supply chain participants, reduce risks and costs, and increase the level of trust of chain participants.
Note – it is based on the author's calculation					

Prerequisites for launching the Digital Tenge Initiative. To ensure the success of the Digital Tenge initiative, several key factors need to be met: a wide range of modern digital payment options for individuals and businesses who do not have access to traditional payment services.

Improving payment performance: expanding offline payments through technological advancements, improving privacy and anonymity of transactions, allowing public access to digital currencies issued directly by central banks, and improving payment facilities in the country.

Optimize government payments: Improve the payment process with the cooperation of the government and recognize the important role in the development of the national economy and important work obligations in society.

Digitalization of payment systems: Adapting payment systems to the growth of personal cryptocurrencies and stable coins in the financial sector, strengthening the technological integration of payment infrastructure and intensifying international competition in the development of public funds.

These events led to a surge in the cryptocurrency market; It increased from $190 billion in 2019 to $570 billion in 2020 at the end of the same year.

Credit cards increased significantly from 232 million transactions in 2017 to 2.88 billion transactions in 2020. In the same period, the value of these transactions increased from 3 to 35.3 trillion. Despite the growth, the average transaction value decreased slightly from 13,100 manats in 2017 to 12,300 manats in 2020, showing that payment cards have increased due to the impact of economic growth.

According to data from COINSHARES, an online website that tracks investments in Bitcoin and other cryptocurrencies, total cryptocurrency assets managed by ETHEREUM reached $63 billion in December 2021. This is an increase from $37.6 billion recorded at the beginning of 2021. Of these assets, $40.1 billion was cryptocurrency insurance and $17.2 billion was Bitcoin-related insurance. GAYSCALE INVESTMENTS is a popular asset management company specializing in cryptocurrency investments, leading the industry with a total crypto asset value of $43.7 billion under management as of December 2021.

Based on data from the Cambridge Alternative Finance Centre's online platform, which tracks current electricity consumption associated with bitcoin operations, the United States (35.4%), Kazakhstan (18.1%), and Russia (11.23%) lead in terms of the most significant computing power allocated to bitcoin mining as of August 2021. The landscape underwent significant changes following China's ban on cryptocurrency mining and the export of mining equipment to other countries. China's share in cryptocurrency mining, which previously held the top spot with approximately 53% of the computing power, has now dropped to zero. As a result, Russia has risen to the fourth position, as depicted in Figure.

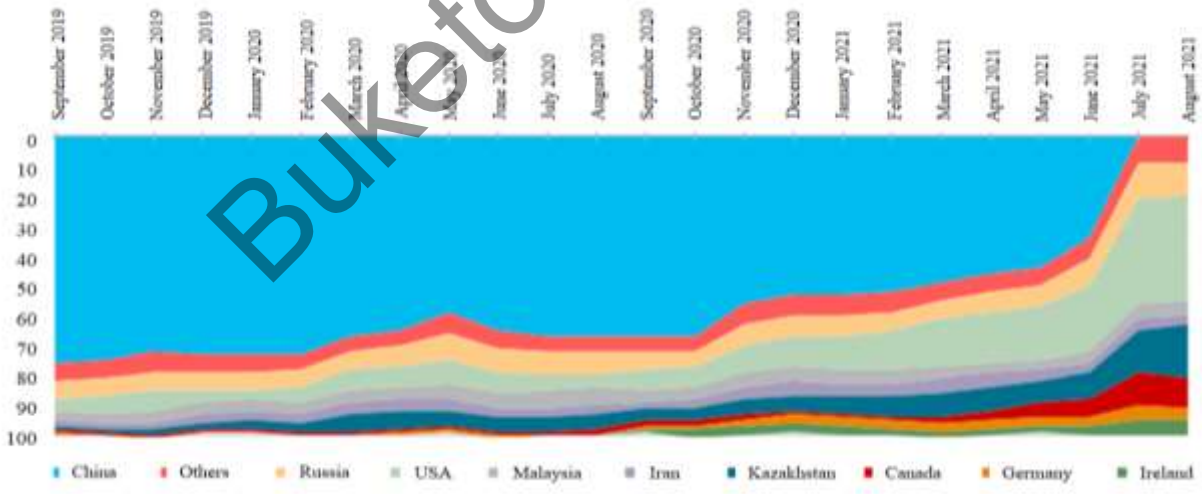

Figure. Share of countries in total computing power used for Bitcoin mining (%).

Note – based on the author's calculations

Cryptocurrency has high quality of use of anti-manipulation devices with high anonymity of participants, which allows deliberate manipulation of the market. In particular, it affects cultural concentration: a measly 0.1% of cultural power controls about 50% of cultural power, and 10% controls about 90% of power. This type of concentration poses a risk to the functioning of the Bitcoin blockchain, and it gives people exposure to the Bitcoin-value of the network.

Table 3 Kazakh closed banking network registration. The volume and speed of non-cash transactions on local machines have increased recently, rising from 27 billion tenge and 30,000 transactions in 2017 to 25.6 trillion tenge and 1.98 billion transactions in 2020. International card programs will double. In 2020 alone, the city bank processed 1.98 billion transactions and 25.6 trillion tenge on international cards, with a total value of 9.7 trillion tenge and 899 million transactions.

Table 3. Comparison of transaction volumes for international and local payment systems

		2019	2020	2021
Number of transactions, billion transactions	Through international payment systems	0,85	0,90	0,94
	Through local payment systems	0,35	1,98	4,1
The volume of transactions, trillion tenge	Through international payment systems	9,1	9,7	11,9
	Through local payment systems	4,9	25,6	45,8
Note – based on the author's calculations				

Creating a model with specific tools will provide insight into the potential use of distributed information technology for central bank accounts. The model will help to resolve important questions about future technology:

1) Transparency: Exchange participants can verify the validity of received tokens as transaction history associated with each token. This will help prevent token competition and comply with anti-money laundering (AML) and anti-financial crime (CFT) regulations.

2) Increase business confidence: Unlike traditional financial systems that store information centrally, distributed ledger systems provide distribution services. Each participant in the transaction keeps a copy of the transaction and the entire transaction history for a digital token (i.e. coin). This decentralized method reduces the risk of data loss or unauthorized access.

3) Programmable functionality: Distributed ledger supports the creation of smart contracts to facilitate transactions by applying specific payment methods and transactions. This feature increases the speed and efficiency of the operation.

Discussions

During this study, a comparative analysis of cryptocurrencies and traditional forms of money was conducted. There is currently no universally accepted definition of cryptocurrency; Some see it as a currency, while others see it as an asset. The analysis suggests that cryptocurrencies should be defined based on their similarities to paper money and their specific characteristics.

The real question is: Can cryptocurrencies function as a new form of money? This study shows that there are no theoretical limits to considering cryptocurrencies as a new form of currency. In order to evaluate the financial performance of crypto currencies, their effectiveness in the operation of the fund was evaluated. Using this approach the following conclusions were reached:

- Bitcoin works well in the economic and international market as a medium of exchange.
- However, due to the radical change it is experiencing, Bitcoin must evolve two important roles as it struggles to function effectively as a stable account and store of value.
- Investing in Bitcoin carries significant risk due to its volatility.
- Bitcoin operates autonomously, without the support of a central authority and therefore does not have any control.

These results suggest that Bitcoin is not currently doing all the work of traditional currencies, but this could change if its volatility is low. This change occurs when research identifies possible causes of differences and has the potential to cause less change. Therefore, when we witness the evolution of money, humans are moving from direct barter to the integration of technology in business transactions. If cryptocurrencies are fully accepted as currency by many countries, the development of these currencies is worth watching.

Conclusions

The blockchain system is the center of cryptocurrencies based on all their work. Even though this technology is currently used only in the financial sector, its nature is universal and can be implemented in any area of human activity.

In order to take advantage of the opportunities offered by globalization, it is necessary to establish solid foundations for building the capacity to acquire and shape knowledge and technology. Otherwise, the simple use of existing intelligence will lead to an inevitable lag in the country's economy without increasing it and developing past years' scientific, technical, and technological potential.

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А. Сабыржан, Е.Д. Орынбасарова, А.А. Жакупов, Д.М. Хамитова, Н.Н. Гелашвили

Қазақстанда криптавалюта майнингі технологиясын қолданудың кейбір мәселелерін зерттеу

Аңдатпа:

Мақсаты: Қазақстанда криптавалюта майнингі технологиясын қолдануды талдау және оның тиімді қызметін жетілдіру бойынша ұсынымдар әзірлеу.

Әдісі: Салыстыру, топтастыру, талдау, жіктеу, статистикалық әдістер, индукция, дедукция, экономикалық-математикалық әдістер және модельдеу сияқты ғылыми әдістемелік тәсілдер мен зерттеу әдістері алынды.

Қорытынды: Зерттеудің тәжірибелік маңыздылығы көрсетілген қағидалар мен тәсілдерді майнинг фермаларын дамыту стратегиясын қалыптастыруда қолдануға болатындығында. Ұсынылған ұсыныстар компанияның цифрлық тиімділігін арттыруға, тиісті басқару шешімдерін қабылдау арқылы олардың қаржылық-экономикалық жағдайын тұрақтандыруға және жақсартуға мүмкіндік береді. Зерттеу нәтижелері кәсіпорындардың нарықтағы орта мерзімді және ұзақ мерзімді орнықты позициясын қамтамасыз етуге және сыртқы орта жағдайларына икемді бейімделу қабілетіне байланысты мәселелерді шешуге мүмкіндік береді.

Тұжырымдама: Зерттеу негізінде цифрлық ақшаның мамандандырылған түрлерімен салыстырғанда айтарлықтай бәсекелестік артықшылықтарға қол жеткізу мақсатында технологиялық тізбектің өзіндік кіріс кезеңдерін немесе оның шығу кезеңдерін біріктіретін жаңа ақпараттық экономика мен қоғамның ерекше нысаны ретінде «криптовалюта», «майнинг», «майнинг фермасы» ұғымы нақтыланды. Сандық ақшаның криптовалюта және оларды өндіру сияқты ерекшеліктері анықталды, олар әртүрлі платформаларды, объектілерді және түрлерін қамтиды, бірақ жалпы элементтері, технологиялары, дамуды басқару және тәуекелдер бар. Сандық және сапалық көрсеткіштерді анықтауға, криптовалютаны пайдаланудың экстенсивтілігін, қарқындылығын және тиімділігін бағалауға және оны толық пайдалану резервтерін анықтауға мүмкіндік беретін криптовалютаның IT архитектурасын және цифрлық валютаның құбылмалылығын талдау әдістемесі ұсынылған.

Кілт сөздер: ақпараттық экономика, цифрландыру, криптовалюта, майнинг, цифрлық теңге, биткоин, электронды ақша.

А. Сабыржан, Е.Д. Орынбасарова, А.А. Жакупов, Д.М. Хамитова, Н.Н. Гелашвили

Исследование некоторых вопросов применения технологии майнинга криптовалюты в Казахстане

Аннотация:

Цель: Анализ применения технологии майнинга криптовалюты в Казахстане и выработка рекомендаций по совершенствованию ее эффективной деятельности.

Методы: Получены научные методологические подходы и методы исследования, такие как сравнение, группировка, анализ, классификация, статистические методы, индукция, дедукция, экономико-математические методы и моделирование**.**

Результаты: Практическая значимость исследования заключается в том, что указанные принципы и подходы могут быть использованы при формировании стратегии развития майнинговых ферм. Представленные предложения позволят повысить цифровую эффективность компании, стабилизировать и улучшить ее финансово-экономическое положение путем принятия соответствующих управленческих решений. Результаты исследования позволяют решать проблемы, связанные со способностью предприятий обеспечивать среднесрочную и долгосрочную устойчивую позицию на рынке и гибко адаптироваться к условиям внешней среды.

Выводы: На основе исследования были уточнены понятия «криптовалюта», «майнинг», «майнинговая ферма» как особые формы новой информационной экономики и общества, объединяющие собственные входные этапы технологической цепочки, или этапы ее выхода с целью достижения существенных конкурентных преимуществ, по сравнению со специализированными видами цифровых денег. Выявлены особенности цифровых денег, такие как криптовалюты и их майнинг, которые включают в себя различные платформы, объекты и типы, но имеют общие элементы, технологии, управление развитием, риски. Предложена методика анализа IT-архитектуры криптовалюты и волатильности цифровой валюты, позволяющая узнать количественные и качественные показатели, оценить экстенсивность, интенсивность и эффективность использования криптовалюты и определить резервы ее полного использования.

Ключевые слова: информационная экономика, цифровизация, криптовалюта, майнинг, цифровой тенге, биткойн, электронные деньги.