THE NATURE OF ELECTRONIC CONTRACTS USING BLOCKCHAIN TECHNOLOGY – CURRENCY BITCOIN AS AN EXAMPLE

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ABSTRACT

Purpose: This study aimed to assess the extent of the use and the safety of dealing with Bitcoin through blockchain technology.

Method/approach: Bitcoin model applied for electronic contracts. The method of functional-cost analysis for technical and economic analysis of system development for NFT creation is used in work.

Theoretical framework: Bitcoin is a currency that depends on modern technological techniques with many advantages because they are used to send and receive money over the Internet and can be used in legitimate and illegal businesses. Therefore, quick international measures must be taken to regulate them legally through unified international conventions that regulate the ways of legal dealing with them.

Results and Conclusions: International laws must govern and regulate the use of Bitcoin, as it is a currency traded over the Internet and can be used in legitimate and illegal businesses. And that the smart contract, which is executable code that runs on top of the blockchain to facilitate, execute and enforce an agreement between untrusted parties without the involvement of a trusted third party, can be used, especially since the International legislation lacks a legal regulation of virtual currencies.

Research implications: The findings indicated the importance of stipulating special laws that regulate the use of Bitcoin.

Originality/value: This work can provide possible solutions to reduce the risks of using Bitcoin, such as stipulating laws and regulations to regulate their use internationally.

Keywords: Blockchain, Blockchain Tokens, Digital Asset, Smart Contract, Digital Transaction, NFT (Non-Fungible Token), Smart Contracts, Bitcoin Currency.

A NATUREZA DOS CONTRATOS ELETRÔNICOS QUE UTILIZAM A TECNOLOGIA BLOCKCHAIN - A MOEDA BITCOIN COMO EXEMPLO

RESUMO

Objetivo: Este estudo teve como objetivo avaliar a extensão do uso e a segurança de lidar com Bitcoin por meio da tecnologia blockchain.

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1 INTRODUCTION

The dynamic development and introduction of advanced technologies have led to the natural transformation of social relations and commerce. Thus, the rapid development of blockchain technology as a conceptually new type of resource accounting and ensuring the highest degree of transparency, security and trust, as well as the active integration of this technology into various fields of activity, served as the starting point for the formation of a new type of socio-economic relations, the regulation of which should be carried out in the legal plane. Bitcoin is a product of the blockchain that has become the main regulator of its trading. Bitcoin also depends in its monetary system on the peer-to-peer network and digital signature using complex mathematical algorithms between two parties directly without any intermediary as this money is sent from one account to another directly without any transfer fees or financial control and auditing, unlike traditional currencies that depend on a third party such as banks or online payment processing systems to verify the transaction. However, the only legal fact that can be asserted is that Bitcoin trading is a legal act that falls within the circle of commercial activities focused on dealing with intangible funds and providing financial services (Ali, 2022, p.66).

So, a blockchain is a distributed database that records all transactions in the blockchain network. This database is replicated and shared among the network's participants. The main feature of blockchain is that it allows untrusted participants to communicate and send transactions to each other securely without the need for a trusted third party. Blockchain is an ordered list of blocks, where each block is identified by its cryptographic hash. Each block references the block that came before it, resulting in a chain of blocks. Each block consists of a set of transactions. Once a block is created and appended to the blockchain, the transactions in that block cannot be changed or reverted. This is to ensure the transactions' integrity and prevent double-spending problems. Cryptocurrencies...
have emerged as the first generation of blockchain technology. Cryptocurrencies are digital currencies based on cryptographic techniques and peer-to-peer networks. The first and most popular example of cryptocurrencies is Bitcoin. Bitcoins as an electronic payment system that allows two untrusted parties to transact digital money with each other in a secure manner without going through a middle man. Other blockchains, such as Ethereum, have emerged as the second generation of blockchain to allow building complex distributed applications beyond the cryptocurrencies.

All of the above testifies to creating a legal and legislative framework to provide legal support for a new type of socio-economic relations and contracting. In this regard, there was a need to consider the mechanism of operation and the principles on which the blockchain technology is based for a deep and correct understanding of the essence and practical usefulness. Despite the active introduction of blockchain technology and blockchain tokens in various areas of public life, their capabilities and benefits have not been sufficiently studied yet. There are discussions among theorists and practitioners about the prospects for using blockchain technology in the financial, banking and social sectors and the public. Traditional payment systems by many companies and individuals worldwide was also approved in commercial and investment dealings. This development and the shift to communication technologies led to the beginning of the era of the digital economy, which is known as a series of economic, social and cultural activities that are performed on information networks and are linked to the use of information and communication technologies by banks and commercial transactions and benefit from education using the Internet and related devices.

The digital economy will lead to new models to accommodate access, new channels, tools and systems for financing and financial transactions, and new and alternative avenues for circling capital. Since the financial system of banks does not meet the growing demand of the digital commerce market, the need has become necessary to create a suitable medium for high-speed transactions via the Internet, which may go outside the limits of legal jurisdiction. Here comes the role of virtual currencies, the most important of which is Bitcoin. The ambiguity related to the anonymity and secrecy that plagues dealing with the Bitcoin currency, in addition to the instability of its value, constitutes an obsession and a source of great concern for its use. Its existence and circulation in its current concept and form have several financial, economic, social, security and legal implications (Al-Smadi, 2022, p. 10).

Bitcoin is traded through an account called Block Chain. Where the information is permanently saved and is not viewable by anyone, nor can it be modified or deleted. On the other hand, bitcoins are programmed not to be copied and replicated, which means that any double spending is excluded. The basis for adopting the Bitcoin currency is due to confidentiality, privacy and speed at the global level because it is not linked to a national currency or specific geographical borders but rather to highly advanced technological systems. Therefore, if there are genuine threats to dealing with Bitcoin in the local and global economy, it is that it is not under the control or oversight of central banks and official agencies, which facilitates the conduct of illegal transactions through it, such as money laundering, terrorism financing and tax collection, and also helps to smuggle money outside the country. And dealing with it is fraught with risks at the level of economic security, as there is no strong infrastructure for this currency and the lack of centralisation of its legal regulation for protection at various levels.

1.1 Objectives

Directly addressing the issue of dealing with the bitcoin currency using the blockchain in transactions to reach a specific vision that carries in-depth recommendations and is based on legal, scientific and realistic foundations by defining the legal nature of bitcoin and revealing
the risks that result from its spread without the existence of organised international legislation to deal with it in addition to its impact on the economy.

1.2 Research Importance

The importance of this research lies in expediting the regulation of the bitcoin currency and enacting international legislation to keep pace with the developments of the modern era and the accompanying technological development and establish the legal controls regulating dealing with this currency.

1.3 Research Problem

The problem of the research lies in defining the nature of the Bitcoin currency and stating its legal nature and the position of the various legislations to draw its legal and economic dimensions to the extent that they are dealt with in light of global changes and their challenges because it constitutes a virtual monetary system parallel to the international monetary system and also constitutes a challenge to the national economy. Therefore, this study aims to answer the following question: What is the extent of the use and safety of dealing in bitcoins through blockchain technology, and is there protection for dealers through legal monitoring?

Technological and technical progress requires us to keep pace with the developments in the modern era, so we must take steps forward in using modern technologies, such as the blockchain because it is one of the most important developments in modern technology. Therefore, the importance of this study lies in shedding light on the applications of the blockchain in electronic contracts and organising them legally to use the technology in all commercial and other transactions, as it has become an imperative necessity at present to contribute to achieving sustainable development and bringing about radical changes in all fields.

This study will be divided into two sections: Section 1 provides a complex analysis of blockchain technology and new social relations arising from using products and services based on this technology. The analysis results demonstrate the economic and legal nature of the blockchain token; they disclose the economic, technical and legal components of the balance sheet of digital assets, which allows for keeping records of any values using blockchain technology and calculating the main economic performance indicators. Unfortunately, the legal status of NFT tokens has not yet been determined, and it is unclear what will be proof of ownership of both the token and the corresponding object. Furthermore, the peculiarities of proving the rights to a purchased NFT work are largely determined by the impossibility of releasing and acquiring an NFT work outside art platforms that provide the necessary infrastructure.

So, section 2 of the research examines the relevance of the blockchain and the NFT (non-fungible token) trading platform, describing the various systems around this topic. The ability to work with cryptocurrency and the Ethereum blockchain is demonstrated, as it provides a great toolkit for developers. Describes the approach to solving this Problem: creating NFT captions for images using blockchain tools. Functional and cost analysis of the developed software product is carried out. Since the transfer of rights is most often regulated by agreements between the art platform or the right holder and the acquirer, these documents can serve as evidence of ownership of the rights to the tokenised object.

Since anyone who has access to it can issue an NFT token for work, a situation is possible in which a titleless tokeniser (a person who does not have the right to work) unfairly uses and commercialises other people's works. Therefore, regulatory mechanisms to limit such cases should focus on art platforms allowing tokenised NFT artwork generation.
Among these measures are the requirements for mandatory identification and verification of users, the introduction of additional tools for verifying the authenticity of tokenised content and proof of rights to it. In addition, of course, individual platforms for creating NFTs require user verification and verification of the purity of NFT content, which slightly relieves the issue.

The main task of the second section of the study is to create NFT captions for images. The program must be able to create such captions for any media files that can be stored on the server. It is not recommended to store a media file in the block itself because even 1 megabyte of data will be processed for a very long time in the chain, so that the transaction can take several days. Therefore, such a block stores metadata - information that reflects certain properties of the encoded message. In our case, keep a link to the media file and the NFT owner.

To do this, you need to implement a smart contract describing the behaviour of tokens. Let's take one of the existing standards as a basis for our system to work correctly within Ethereum.

One such standard is the ERC-721, a non-replaceable standard that implements an API for tokens under smart contracts.

It provides features such as transferring tokens from one account to another, obtaining the current token balance on the account, obtaining the owner of a specific token, and the total stock of the token available online. In addition, it has other functions, such as asserting that a third-party account can move the token amount from the account.

If the smart contract implements the following methods and events, it can be called the ERC-721 intangible token contract. Once deployed, it will track the tokens generated on Ethereum.

To implement the creation of a software product, we use a local copy of such a blockchain. This way, we will get an e-wallet with unlimited coins and different addresses.

2 MATERIALS AND METHODS

The first section of the research used theoretical research methods: deduction and induction, analysis and synthesis, comparison, generalisation, systematisation and interpretation of results. The second section of the study used functional-cost analysis technology, which allowed us to estimate the real cost of the software product to identify reserves to reduce costs due to a more efficient relationship between the consumer value of the product and the cost of its manufacture. Economic, technical and design information was used for the analysis.

2.1 Model

The method of functional-cost analysis for technical and economic analysis of system development for NFT creation is used in work. However, as decisions regarding the design and implementation of the components under development affect the whole system, each subsystem must satisfy it. Therefore, the actual analysis is an analysis of the functions of the software product.

The technical requirements for the software product are as follows:
• operation on personal computers with a standard set of components;
• convenience and clarity for the user;
• speed of data processing and access to real-time information;
• possibility of convenient scaling and service;
• minimum costs for the implementation of the software product.
Justification of software product functions.
The main function of $F_0$ is developing a software product that solves the Problem of creating NFT captions for images. Based on this feature, we can highlight the following:

- $F_1$ - choice of a programming language;
- $F_2$ - selection of ipfs service;
- $F_3$ - choice of the development environment.

Each of these functions has several implementation options:

Function $F_1$:
- a) Node.js;
- b) Python.

Function $F_2$:
- a) Pinata;
- b) Ipfs.io.

Function $F_3$:
- a) Visual Studio Code;
- b) Remix.

The morphological map systems give options for implementing the main functions (Figure 1).

![Morphological map](image)

**Figure 1.** Morphological map
**Source:** (Alazzam, 2023)

The morphological map shows the set of all possible variants of the main functions.

**Table 1.** Positive-negative matrix

<table>
<thead>
<tr>
<th>Options implementation</th>
<th>Benefits</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F_1$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$A$</td>
<td>Fast program development, library availability, cross-platform, a better community, more adaptationblockchain</td>
<td>A limited number of existing smart contracts are supported</td>
</tr>
<tr>
<td>$B$</td>
<td>Rapid program development, availability of libraries, cross-platform</td>
<td>Difficulties with connecting a local blockchain</td>
</tr>
<tr>
<td>$A$</td>
<td>Free, fast</td>
<td>Not very reliable</td>
</tr>
</tbody>
</table>
Based on this map, we build a positive-negative matrix of variants of the main functions. We conclude that when developing a software product, some options for implementing the functions should be rejected because they do not meet the objectives of the software product. These variants are marked in the morphological map.

2.1.1 Function \( F_1 \)

We prefer the speed of study, ease of use and the availability of standard libraries for computing. Adaptation for the blockchain is a big plus. Option B should be discarded to simplify code writing.

2.1.2 Function \( F_2 \)

Both options can be used in development. But it is more convenient to use a free service in the development.

2.1.3 Function \( F_3 \)

We prefer option A in case of choosing the programming language Node.js. Thus, we will consider the following options for the implementation of PP:

\[
F_{1a} - F_{2a} - F_{3a} \\
F_{1a} - F_{2b} - F_{3a}
\]

The system of parameters described below is selected to assess the quality of the considered functions.

2.2 Substantiation of the System of the Software Product Parameters

Based on the data discussed above, the main selection parameters that will be used to calculate the technical level factor are determined.

To characterise the software product, we will use the following parameters:

- \( X_1 \) - programming language speed;
- \( X_2 \) - the amount of memory for storing data on the IPFS service;
- \( X_3 \) - time for the transaction in the blockchain;
- \( X_4 \) is the potential amount of code.

Worse, the average and best values of parameters are selected based on the requirements of the customer and the conditions characterising the software's operation, as shown in Table 2.
Table 2. The main parameters of the software product

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>Conditional marking</th>
<th>Units of measurement</th>
<th>Parameter value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X1</td>
<td>op/ms</td>
<td>worse</td>
</tr>
<tr>
<td>Speech speed programming</td>
<td></td>
<td></td>
<td>10000</td>
</tr>
<tr>
<td>Memory capacity</td>
<td>X2</td>
<td>GB</td>
<td>1</td>
</tr>
<tr>
<td>Time to pass transactions</td>
<td>X3</td>
<td>ms</td>
<td>40</td>
</tr>
<tr>
<td>Potential volume program code</td>
<td>X4</td>
<td>number of lines code</td>
<td>4000</td>
</tr>
</tbody>
</table>

Source: (Alazzam, 2023)

According to Table 2, the graphical characteristics of the parameters are constructed - In Figures 2-5.

Figure 2. X1, programming language performance  
Source: (Alazzam 2023)

Figure 3. X2, memory capacity  
Source: (Alazzam 2023)
The Nature of Electronic Contracts Using Blockchain Technology – Currency Bitcoin as an Example

Figure 4. X3, time to complete the transaction
Source: (Alazzam 2023)

Figure 5. X4, the potential amount of program code
Source: (Alazzam 2023)

3 RESULTS

Our key results are propositions 1, 2. Proposal 1. Using digital assets will allow legal entities to keep track of any values using blockchain technology and calculate the main economic indicators, including output, cost of production, profit and profitability—proposal 2. A software product has been developed that allows you to create NFT for any media file and adds a token to the balance of the user's e-wallet. The transaction takes place in the local Ethereum blockchain when uploading an image. Researched smart contracts for the creation of NFT allow you to work in the network of most sites to provide services for the creation, sale and purchase of NFT.
Section 1. Economic and Legal Analysis of the Blockchain Token

Analysis of the blockchain token in terms of its technical nature allows us to conclude that the blockchain token is inherently a unique transaction identifier that can perform the function of access to an information resource. In turn, such an information resource contains information about this transaction. It may have an important feature - to provide access to a certain set of rights (rights of ownership, use and disposal) for value, which is understood as property, property and non-property rights, securities, services, works, digital assets and other values.

This feature of the blockchain token is key in terms of its economic and legal nature and classification. Thus, the pricing of a blockchain token that does not have this feature is determined solely by demand, which is formed on the factors of demand, faith and emotions caused by various news, which is not always reliable and affects the psycho-emotional perception of the information received in different ways. These factors contribute to sharp speculative growth and rapid depreciation of the analysed tokens. Therefore, such blockchain tokens can be classified as speculative assets.

In August 2018, specialists Yukun Liu and Aleh Tsyvinski from the National Bureau of Economic Research (referred to as NBER) published the results of the study of risks and returns of cryptocurrencies (Liu & Tsyvinski, 2018), which, in particular, studied the issue of correlation of cryptocurrencies with different asset classes (stocks, currencies, precious metals, etc.), as well as the impact of social networks, search services and the media on the pricing of cryptocurrencies. As a result, it was found that cryptocurrencies are practically not affected by currencies, commodities, the stock market or macroeconomic statistics, but at the same time, they are sensitive to informational influence, in particular, from Google search queries and Twitter posts; a high degree of volatility of cryptocurrencies was also stated, which is not common among traditional assets. Thus, we can conclude that cryptocurrencies as a category in their characteristics and properties are comparable to speculative assets.

It is important to note that calculating economic models based on speculative assets with real forecasts of their development and application in the legal field is impossible. Therefore, this questions the prospects for this category's global use and development.

Blockchain tokens that have the above property - provide the right to access a certain set of rights for value, can be compared with such a category as a digital asset - an information resource derived from the right for value and circulating in a distributed ledger in the form of a unique identifier (Kud, 2019 a).

Thus, a digital asset through an identifier provides its owner with the right to access an information resource containing a set of rights (rights of ownership, use and disposal) for value (property, property and non-property rights, securities, services, works, digital assets and other values). At the same time, unlike a speculative asset, the pricing of a digital asset will be based not on the hype and panic factor but on a specific value. Further use and integration of digital assets into the global economy should lead to a global market for information resources, goods and services based on distributed ledger technology (blockchain).

Thus, regarding their economic and legal nature, blockchain tokens can be classified as speculative or digital assets. This classification is reflected in Fig. 6.

Another important aspect of use is the issue of its accounting. Digital assets, in fact, use a complex combination of technological and economic and legal solutions; therefore, when accounting for the use of digital assets, it is worth proceeding from their nature, both technical and economic and legal.
In the Great Ukrainian Legal Encyclopedia, in part "Financial Law", the concept of balance sheet accounting of digital assets was defined as a method for determining the difference between receipts and expenditures of digital assets at a certain moment at their accounting address, which is based on the registration and accounting of blockchain token transactions and is implemented by software providing a node of the blockchain network. Thus, using a digital asset allows accounting for a set of rights for value (asset) through software solutions based on distributed ledger technology. The balance sheet of a digital asset is shown in Fig. 7.
Figure 7. Balance sheet of a digital asset

<table>
<thead>
<tr>
<th>Value</th>
<th>Transformation of the complex of rights to value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Information resource</td>
</tr>
<tr>
<td><strong>Legal component</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Distribution ledger (blockchain)</td>
</tr>
<tr>
<td><strong>Technological component</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Blockchain token transaction ID</td>
</tr>
<tr>
<td></td>
<td>Blockchain token balance sheet</td>
</tr>
<tr>
<td><strong>Economic component</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Information resource derived from the right to a value and circulating in the distribution register as a unique identifier</td>
</tr>
</tbody>
</table>

**Source:** (Alazzam 2023)

Considering the economic and technological components of the balance sheet of digital assets as blockchain tokens, it is necessary to proceed from the fact that the circulation of a digital asset in the blockchain network is carried out through the transaction identifier of the blockchain token, which is one of the key elements in accounting for blockchain tokens as accounting units of such a network. Therefore, to begin with, it is necessary to consider the issue related to the balance sheet of blockchain tokens. In the methodological manual "Methodology for diagnosing a blockchain token for compliance with a digital asset" (Kud, 2019b), the balance sheet accounting of blockchain tokens is defined as a method of registering and accounting for transactions implemented by the software of the blockchain network node, which allows determining the difference between income and expenses of accounting units at a certain moment at their accounting address. One of two accounting models for blockchain tokens is currently used in distributed ledger networks: UTXO or Account Based Model.

The UTXO (Unspent Transaction Output) model is based on accounting for unspent transaction outputs. In blockchain networks using this model (Bitcoin, Litecoin, Cardano etc.), each transaction spends the output of previous transactions and generates new output that transactions can spend in the future. Each transaction is assigned a unique identifier containing information about it and recorded in the blockchain. All unspent transactions are stored in each fully synchronised node, so this model is called UTXO. The user's account address keeps track of a list of unspent transactions associated with all addresses owned by the user. The balance is calculated as the sum of these unspent transactions (https://en.bitcoin.it/wiki/Protocol_documentation).

The Account Based Model (state accounting model) is based on the balance accounting of users' addresses of the blockchain network. This model, used in the Ethereum blockchain, provides that the state of the blockchain is stored locally on the network nodes and not...
transmitted with blocks. Network nodes agree on the state of the blockchain by comparing the State rootswith each other (Merkle root of the global state) (GitHub, 2018).

Transactions are interpreted as events for the final blockchain state machine. The Ethereum virtual machine calculates the result of the state transition of these events based on the previous state of the blockchain. In this model, inputs (transactions) that affect the state of the blockchain are separated from the result of transactions(outputs).

The Ethereum blockchain state accounting system allows one to determine the amount of a user's ownership share in a given system of tokens at any given time. The basis for changing the state at the accounting addresses of the completed transaction is its validity and compliance with the circulation rules (specified in the smart contract) (Curran, 2018).

Speaking about the legal component of the balance sheet of digital assets, it is important to understand that various models for splitting access rights can be used when creating a digital asset. Thus, a value owner can create a digital asset, which will be presented as a single access token containing 100% of the volume of access rights to an information resource containing a set of rights to such a value. Another option could be to create a digital asset that will be issued in the form of a certain fixed number of access token units without the possibility of further splitting, providing several access rights that are a multiple of the number of such units and their sum will be 100% of the number of rights. Finally, one more option for creating a digital asset can be an option similar to the previous one, but with the possibility of free splitting of units of an admission token of a given depth.

Section 2. Functional and Cost Analysis of the Software Product

This section assesses the key features of a software product designed to create NFT captions for images.

The following is an analysis of the various options for implementing the module to choose the best, considering economic factors and product characteristics that affect productivity and its compatibility with hardware.

For this purpose, the apparatus of functional-cost analysis was used.

This part of the research aims to develop a software product with the most accurate results in finding the parameters of adaptive forecasting models and calculating forecast values.

The significance of each parameter is determined by the method of pairwise equations. An expert group carries out the assessment. Determining the coefficients of significance involves:

1. determining the level of significance of the parameter by assigning different ranks;
2. checking the suitability of expert assessments for further use;
3. determining the assessment of the pairwise priority of parameters;
4. processing the results and determining the significance factor.

The results of the expert ranking are given in Table 3.

<table>
<thead>
<tr>
<th>Conditional marking</th>
<th>Parameter name</th>
<th>Units of measurement</th>
<th>Parameter rank for expert assessment</th>
<th>Total of ranks</th>
<th>Deviation Δi</th>
<th>Δi²</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1</td>
<td>Speech speed programming</td>
<td>op/ms</td>
<td>4  5  2  5  3  4  5</td>
<td>28</td>
<td>3,5</td>
<td>12,25</td>
</tr>
<tr>
<td>X2</td>
<td>Memory capacity</td>
<td>GB</td>
<td>2  1  3  1  2  1  2</td>
<td>12</td>
<td>-12,5</td>
<td>156,25</td>
</tr>
<tr>
<td>X3</td>
<td>Time to pass transactions</td>
<td>ms</td>
<td>5  3  5  5  4  5  3</td>
<td>30</td>
<td>5,5</td>
<td>30,25</td>
</tr>
<tr>
<td>X4</td>
<td>Potential volume program code</td>
<td>number of lines code</td>
<td>3  5  4  3  5  4  4</td>
<td>28</td>
<td>3,5</td>
<td>12,25</td>
</tr>
</tbody>
</table>
To check the reliability of expert assessments, define the following parameters:

a) a total of ranks of each of the parameters and the total sum of ranks:

\[R_i = \sum_{j=1}^{n} r_{ij}R_{ij} = \frac{N_n(n+1)}{2} = 98(1)\]

Where,

N is the number of experts,

n is the number of parameters;

b) the average amount of ranks:

\[T = \frac{1}{n}R_{ij} = 24.5 \quad (2)\]

c) the deviation of the sum of the ranks of each parameter from the average total of ranks:

\[\Delta_i = R_i - T \quad (3)\]

The sum of deviations in all parameters must be equal to 0;

d) the total sum of the squares of the deviation:

\[S = \sum_j^N \Delta_i^2 = 211 \quad (4)\]

Calculate the coefficient of consistency:

\[W = \frac{12S N^2(3-n)}{N^2(3-n)} = \frac{12 \times 211}{7^2(4^3-4)} = 0.86 > W_k = 0.67 \quad (5)\]

The ranking can be considered reliable because the found consistency coefficient exceeds the normative one, which equals 0.67.

Using the ranking results, we will conduct a pairwise equation of all parameters, and the results are entered in Table 4.

**Table 4.** Pairwise equation of parameters

<table>
<thead>
<tr>
<th>Conditional marking</th>
<th>Parameter name</th>
<th>Units of measurement</th>
<th>Parameter rank for expert assessment</th>
<th>Total of ranks (R_i)</th>
<th>Deviation (\Delta_i)</th>
<th>(\Delta_i^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1</td>
<td>Speech speed programming</td>
<td>op/ms</td>
<td>4 1 5 3 4 5</td>
<td>28</td>
<td>3.5</td>
<td>12.25</td>
</tr>
<tr>
<td>X2</td>
<td>Memory capacity</td>
<td>GB</td>
<td>2 1 3 1 2 1</td>
<td>12</td>
<td>-12.5</td>
<td>156.25</td>
</tr>
<tr>
<td>X3</td>
<td>Time to pass transactions</td>
<td>ms</td>
<td>5 3 5 4 5 3</td>
<td>30</td>
<td>5.5</td>
<td>30.25</td>
</tr>
<tr>
<td>X4</td>
<td>Potential volume program code</td>
<td>number of lines code</td>
<td>3 5 4 3 5 4</td>
<td>28</td>
<td>3.5</td>
<td>12.25</td>
</tr>
</tbody>
</table>
The numerical value that determines the degree of predominance of the $i$-th parameter over the $j$-th, $a_{ij}$ is determined by the formula:

$$a_{ij} = \begin{cases} 
1.5 & \text{if } a_{\text{tx}_i} > x_j \\
1.0 & \text{if } a_{\text{tx}_i} = x_j \\
0.5 & \text{if } a_{\text{tx}_i} < x_j 
\end{cases}$$ (6)

From the received numerical estimations of advantage, we will make a matrix $A=\|a_{ij}\|$.

For each parameter, we calculate the weight $K_{bi}$ according to the following formulas:

$$b_i = \sum_{i=1} a_{ij}$$ (8)

Relative estimates are calculated several times until the following values differ slightly from the previous ones (less than 2%). Then, in the second and subsequent steps, the relative estimates are calculated as follows:

$$K_{bi} = \frac{b_i'}{\sum_{i=1} b_i'}$$ (9)

$$b_i' = \sum_{i=1} a_{ij} b_j$$ (10)

As shown in Table 5, the difference between the values of the weights does not exceed 2%, so more iterations are not required.

**Table 5. Calculation of the weight of the parameters**

<table>
<thead>
<tr>
<th>Parameters $x_i$</th>
<th>Parameters $x_j$</th>
<th>First iteration</th>
<th>Second iteration</th>
<th>Third iteration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$b_i$</td>
<td>$K_{bi}$</td>
<td>$b_i'$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$K_{bi}$</td>
<td>$K_{bi}$</td>
</tr>
<tr>
<td>$X1$</td>
<td>$X2$</td>
<td>$X3$</td>
<td>$X4$</td>
<td>$b_i$</td>
</tr>
<tr>
<td>1.0</td>
<td>1.5</td>
<td>0.5</td>
<td>1.5</td>
<td>4.5</td>
</tr>
<tr>
<td>0.36</td>
<td>17.75</td>
<td>0.25</td>
<td>73.38</td>
<td>0.25</td>
</tr>
<tr>
<td>$X2$</td>
<td>0.5</td>
<td>1.0</td>
<td>0.5</td>
<td>3.5</td>
</tr>
<tr>
<td>0.28</td>
<td>15.75</td>
<td>0.22</td>
<td>65.63</td>
<td>0.23</td>
</tr>
<tr>
<td>$X3$</td>
<td>1.5</td>
<td>1.0</td>
<td>1.5</td>
<td>5.5</td>
</tr>
<tr>
<td>0.44</td>
<td>22.75</td>
<td>0.33</td>
<td>93.6</td>
<td>0.32</td>
</tr>
<tr>
<td>$X4$</td>
<td>0.5</td>
<td>1.5</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td>3.5</td>
<td>13.75</td>
<td>0.2</td>
<td>57.63</td>
<td>0.2</td>
</tr>
<tr>
<td>Amount:</td>
<td>12.5</td>
<td>1</td>
<td>70</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>290.25</td>
</tr>
</tbody>
</table>

Source: (Alazzam 2023)

Analysis of the Quality Level of Options for Implementing Functions

We determine the level of quality of each variant of performing the main functions separately. The absolute values of the parameters $X2$ (Memory capacity), $X3$ (transaction time) and $X4$ (potential amount of program code) meet the technical requirements of the operating conditions of this software. The absolute value of parameter $X1$ (speed of the programming language) is not the worst. The coefficient of the technical level for each variant of PP implementation is calculated as follows (Table 6):

<table>
<thead>
<tr>
<th>Parameters $x_i$</th>
<th>Parameters $x_j$</th>
<th>First iteration</th>
<th>Second iteration</th>
<th>Third iteration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$b_i$</td>
<td>$K_{bi}$</td>
<td>$b_i'$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$K_{bi}$</td>
<td>$K_{bi}$</td>
</tr>
<tr>
<td>$X1$</td>
<td>$X2$</td>
<td>$X3$</td>
<td>$X4$</td>
<td>$b_i$</td>
</tr>
<tr>
<td>1.0</td>
<td>1.5</td>
<td>0.5</td>
<td>1.5</td>
<td>4.5</td>
</tr>
<tr>
<td>0.36</td>
<td>17.75</td>
<td>0.25</td>
<td>73.38</td>
<td>0.25</td>
</tr>
<tr>
<td>$X2$</td>
<td>0.5</td>
<td>1.0</td>
<td>0.5</td>
<td>3.5</td>
</tr>
<tr>
<td>0.28</td>
<td>15.75</td>
<td>0.22</td>
<td>65.63</td>
<td>0.23</td>
</tr>
<tr>
<td>$X3$</td>
<td>1.5</td>
<td>1.0</td>
<td>1.5</td>
<td>5.5</td>
</tr>
<tr>
<td>0.44</td>
<td>22.75</td>
<td>0.33</td>
<td>93.6</td>
<td>0.32</td>
</tr>
<tr>
<td>$X4$</td>
<td>0.5</td>
<td>1.5</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td>3.5</td>
<td>13.75</td>
<td>0.2</td>
<td>57.63</td>
<td>0.2</td>
</tr>
<tr>
<td>Amount:</td>
<td>12.5</td>
<td>1</td>
<td>70</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>290.25</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: (Alazzam 2023)
\[ K_k(j) = \sum_{i=1}^{n} K_{bi,j} B_{i,j} \] (11)

Where,

\( n \) is the number of parameters;

\( K_{bi} \) - weighting factor of the \( i \)-th parameter;

\( V_i \) - the estimation of the \( i \)-th parameter in points.

Table 6. Calculation of indicators of the level of quality of options for the implementation of the main functions of the software product

<table>
<thead>
<tr>
<th>Basic functions</th>
<th>Option for implementing the function</th>
<th>Parameters</th>
<th>The absolute value of the parameter</th>
<th>Ball parameter estimation</th>
<th>Coefficient weight of the parameter</th>
<th>Quality level factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>A</td>
<td>X1</td>
<td>10000</td>
<td>7</td>
<td>0,15</td>
<td>1,05</td>
</tr>
<tr>
<td>F2</td>
<td>A</td>
<td>X2</td>
<td>64</td>
<td>4</td>
<td>0,3</td>
<td>1,2</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>X2</td>
<td>128</td>
<td>5</td>
<td>0,32</td>
<td>1,6</td>
</tr>
<tr>
<td>F3</td>
<td>A</td>
<td>X3</td>
<td>1000</td>
<td>3</td>
<td>0,23</td>
<td>0,69</td>
</tr>
</tbody>
</table>

Source: (Alazzam 2023)

According to Table 6, the formula:

\[ K_K = K_{TY}[F_{1k}] + K_{TY}[F_{2k}] + ... + K_{TY}[F_{zk}], \] (12)

Determine the quality level of each of the options:

\( K_{K1} = 1,05 + 1,2 + 0,69 = 3,2 \),

\( K_{K2} = 1,05 + 1,6 + 0,69 = 3,34 \)

Calculations show that the second option is the best, for which the technical level factor is most important.

After performing the functional-cost analysis of the developed software package, we can conclude that from the alternatives left after the first selection of the two options for implementing the software package, the second option for implementing the software product is optimal.

This version of the software product has the following parameters:

1. Programming language - Node.js;
2. Using Pinata;

### 4 RECOMMENDATIONS

1. Sufficient preparation of legal, economic and technical means to ensure the safe use of Bitcoin, if approved, so that it is safe and far from potential risks and expected threats, with the development of appropriate means to monitor dealing with it and its movement in a manner that achieves the national and economic interest.
2. The International Monetary Fund should set rules and controls to integrate this currency with the rules of the global monetary system.
3. Countries should conclude state agreements for coordination between international monetary institutions.
IMPLICATIONS

The study suggests conducting studies on benefiting from the experiences of smart contracts and their applications, spreading awareness about the use and dealing with the blockchain, and setting legal controls for electronic contracts when using it.

LIMITATION

This study was limited to clarifying how the blockchain works, how electronic contracts work using blockchain wallets and creating and transferring the smart contract using electronic wallets, and the extent of legal protection for dealing with bitcoins using the blockchain.

REFERENCES


Blockchain and GDPR. URL: https://www.eublockchainforum.eu/reports.


Blockchain for government and public services. URL: https://www.eublockchainforum.eu/reports.

Blockchain innovation in Europe. URL: https://www.eublockchainforum.eu/reports.


