Blockchain technology using for automation of business processes of the enterprise

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Abstract

The paper examines the content and process of using blockchain technology to automate business processes of an enterprise. The author presents an interpretation of automation, which involves the use of digital technologies to improve, optimize and simplify operational processes, allowing enterprises to increase efficiency and minimize costs. The main advantages of using blockchain technology to automate business processes of an enterprise are determined. It is established that the blockchain demonstrates its versatility and efficiency in a number of key areas, including the financial sector, supply chain, e-commerce, and identity management. The possibilities of using blockchain technology in certain business processes of an enterprise are formed. A general algorithm for the phased automation of business processes using blockchain technology at an enterprise has been developed. A model for determining the level of enterprise profit from the introduction of blockchain technology is suggested.

Keywords

business processes, business process automation, digitalization, blockchain technology, business systems

1. Introduction

Modern business is undergoing a profound transformation, where digitalization is a key factor for success in the competitive struggle. The introduction of advanced business process automation technologies allows enterprises to significantly increase their efficiency and competitiveness.

Digital solutions offer faster and more accurate data processing, allowing managers to make informed decisions. By implementing automation, businesses can optimize their operations, reduce costs, minimize the need for manual labor, and prevent key errors in their operations. The introduction of modern digitalization technologies improves communication and cooperation between different departments within the company, which leads to more coherent and efficient work. In addition, the integration of digital technologies allows businesses to adapt more effectively to market demands and meet the most diverse customer requirements.

The digitalization process also opens up new opportunities for creating innovative products and services, which leads to an increase in added value. In today's fast-paced world, where the ability to quickly adapt to changes is crucial, the use of digital technologies is no longer just a reasonable choice, but a real necessity. Digitalization is not only a survival strategy for businesses, but also a key factor in their ability to thrive in a constantly evolving world. Blockchain is most often associated as a technology related to cryptocurrencies, but over time it has gained greater potential in other areas of use [1].

Blockchain technology is rapidly gaining popularity as one of the leading tools for automating business processes at enterprises. Its importance lies in the ability to guarantee a high level of data

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security and transparency. Due to its decentralized nature, the blockchain significantly reduces the likelihood of fraud and external interference in information processing. This is especially important for financial transactions, where accuracy and reliability are of utmost importance. Blockchain technology allows to optimize various routine processes, which saves time and money during their implementation.

The potential of this technology goes beyond its own capabilities, as it can be effectively integrated with other advanced solutions, such as smart contracts and the Internet of Things (IoT). By using blockchain technology, businesses can optimize supply chain management, allowing them to control the movement of goods from the point of origin to the end consumer. Blockchain is an innovative technology that promises to change the decision-making process and can provide innovative organizational practices for the development of digitalization in enterprises [2]. Thus, in the era of digital transformation, blockchain is becoming a crucial component of a company's growth strategy, increasing its competitiveness and stability in the market.

The rest of the article is structured as follows: The section II is focused on existing research on the application of blockchain technology in enterprises and the state of analysis of the latest research in this regard. Section III is devoted to the identification of advantages and opportunities from the use of blockchain technology, which contributes to the automation of business processes of the enterprise. Section IV presents a model for determining the optimal level of profit from the implementation of blockchain technology. Section V presents and discusses research results from the proposed model. The last section contains the conclusions and highlights the next steps of the research.

2. State-of-the-art

The scientific problem of implementing blockchain technology in certain areas of economic activity, business and certain business processes of enterprises is becoming particularly relevant.

Paper [3] investigated the possibilities of using blockchain technology in the accounting and audit system of an enterprise. The author identifies the key areas of blockchain application in accounting and auditing, which include settlements with counterparties, operational accounting and reporting in the online mode, settlements on taxes and payments, document flow and storage of documents, turnover of assets within the enterprise, settlements on accounts receivable and payable.

Paper [4] focuses on the study of the prospects for the use of blockchain technology in audit activities. In particular, the researcher noted that blockchain technology opens up wide opportunities for automating audit procedures and improving audit efficiency: reducing the time and effort required for audit; increasing the accuracy and reliability of the audit; automating the verification of transactions; instant access to data, etc.

Article [5] analyzes the scope of blockchain technology in the modern business environment. The authors note that among the most promising areas of blockchain implementation in Ukraine and the world are business processes such as accounting for receivables and payables and their repayment, tax calculation and payment, operational accounting and reporting, as well as document management and storage.

Article [6] investigated the prospects for the use of blockchain technology in the process of results-based budgeting (RBB). In particular, the article shows that the introduction of blockchain technology into the management process of the RBB system, on the one hand, allows to control and ensure the security of the system against data loss or fraud, will increase the efficiency of internal and external document flow, and on the other hand, blockchain technology requires the development of technologies, research and technical support of the enterprise information system, which leads to an increase in the requirements for employee qualifications; raises problems related to tax, legal and regulatory issues.

Paper [7] explores the possibilities of using innovative blockchain technologies in the commercial activities of airlines. In particular, the author investigates the possibilities of using,

analyzes the benefits of using blockchain technologies to optimize the processes of mutual settlements, the implementation of air transportation, and increase the effectiveness of marketing impact on air passengers through the use of complete and reliable personal information.

Paper [8] investigated modern aspects of blockchain technology in the innovative development of enterprises. In particular, it is noted that the banking system remains the flagship in the implementation of blockchain technologies, as blockchain can be particularly important in solving the most prominent problems faced by the banking industry.

Blockchain technology is gaining considerable attention in the field of modern science, but its application in the automation of business processes in enterprises is still in the early stages of development.

Although blockchain technology offers numerous benefits, including increased security, transparency, and efficiency, research in this area is often scattered and does not cover all potential applications. Most previous studies have primarily examined the technical aspects and potential economic benefits of adopting new technologies, often overlooking the practical challenges of integrating and managing these changes in organizations. In addition, there are several aspects that need to be carefully considered in terms of regulation, legal implications, and socio-economic impacts.

The lack of a structured plan and thorough research makes it difficult to implement blockchain technology on a large scale in business processes. It is crucial to take into account the unique characteristics of different industries and types of business, as they may affect the effectiveness of blockchain technology implementation.

Therefore, to successfully implement blockchain in the business environment, interdisciplinary research is needed that combines technical, economic, and managerial knowledge. Only by taking into account the full range of opportunities and limitations can a comprehensive understanding of the technology's capabilities and limitations be achieved. Additional research in this area will lead to innovative solutions and increase business competitiveness.

The purpose of the study is to generalize the theoretical foundations and develop methodological approaches to the use of blockchain technology to automate business processes of an enterprise.

3. Advantages and possibilities of using blockchain technology to automate the business processes of enterprises

Automation of business processes in the digitalization era is an important aspect of managing a modern enterprise. It helps to streamline document management, ensure transparency of key business processes, thereby reducing the time required to exchange information between business process participants and increasing the speed of access to information [9].

This process involves the use of digital technologies to improve, optimize, and simplify operational processes, which allows businesses to increase efficiency and minimize costs. Business process automation encompasses a combination of different technologies, including resource management software, customer relationship management (CRM) systems, and business process automation (BPA) platforms. This allows automated tasks that were previously performed manually to be performed automatically, which helps minimize errors and speed up data processing.

In the digitalization era, companies have a chance to introduce innovative business models, adapt to evolving market dynamics, and increase customer engagement.

The use of innovative technologies and processes, development and implementation of innovative types of products allows an enterprise to take a leading position in the market. This will provide products with a high degree of scientific content and novelty, thereby making them competitive in the global market [10].

The introduction of automation technologies allows for faster response to market demands and increases the organization's adaptability.

It also minimizes administrative costs and allows efficient allocation of resources for important strategic activities. Implementing advanced analytical tools that help make informed decisions based on big data is a key component of automation. Overall, business process automation in the digital era offers businesses a competitive advantage and plays a crucial role in their long-term sustainability.

There is a two-way relationship between innovation and sustainable development. On the one hand, economic, social and environmental factors improve as a result of intensified innovation. On the other hand, these changes lead to the accumulation of funds, knowledge and skills to spread innovation processes in the country [11].

In today's environment, blockchain technology is a distributed database or registry that ensures the security, transparency, and immutability of records. It consists of consecutive blocks of data, each of which contains a cryptographic hash of the previous block, a timestamp, and transaction data [12].

This technology operates in a decentralized network of computers where each participant has a copy of the entire registry, making it impossible to change data without the consent of the majority of network participants. Blockchain provides high resistance to hacking and fraud thanks to cryptographic security methods. Its main advantages are increased security, transparency, reduced costs for intermediaries, and process automation through the use of smart contracts. Blockchain technology is widely used in various industries, including finance, logistics, healthcare, real estate, and many others. Due to its properties, blockchain is becoming the basis for the development of new business models and increasing the efficiency of existing processes [13].

The process of automating business processes using blockchain technology is an innovative approach to improving the efficiency and security of modern enterprises. Blockchain, as a decentralized database, ensures transparency and immutability of records, which are key to establishing trust between participants in business processes.

Smart contracts allow automating the execution of transactions and operations, minimizing the involvement of intermediaries and reducing costs. Smart contracts, which are launched automatically when certain conditions are met, ensure the accuracy and efficiency of data processing [14].

Blockchain increases the security of information by using cryptographic data protection methods. This is especially important for sectors where data confidentiality and integrity are extremely important, such as finance, logistics, and healthcare [15].

By implementing blockchain technology in business processes, it is possible to create a single information platform that will allow tracking and controlling all activities in real time. In addition, blockchain technology can significantly optimize supply chain management, providing transparency from the manufacturer to the end consumer. Blockchain automation minimizes human errors and increases overall business productivity.

The introduction of this technology creates new opportunities for innovation and growth, giving businesses a competitive advantage in the market. Due to its distinctive characteristics, blockchain technology can have a significant impact on the automation of business processes in an enterprise.

The main advantages of using blockchain technology to automate business processes are summarized in Table 1.

In general, the implementation of blockchain technology can help businesses improve operational efficiency, reduce costs, and gain better control over their business processes.

Blockchain technology is used in a variety of industries due to its distinctive characteristics, including transparency, immutability, and decentralization. Here are a few key areas where blockchain is most widely used:

1. Financial sector. Blockchain has the potential to transform the financial services system with the emergence of cryptocurrencies such as Bitcoin and Ethereum, as well as decentralized finance (DeFi). It offers fast, secure and affordable transactions, and encourages the creation of innovative financial products such as smart contracts and digital assets.

2. Supply chain logistics. Using blockchain technology, supply chains can effectively track goods and components, ensuring transparency and reliability of information about their origin. This reduces the likelihood of fraud and increases the efficiency of supply chain management.

3. Healthcare. Blockchain technology is used to store medical records and patient histories, providing secure access and facilitating data exchange between healthcare institutions. It also helps to control medicines and fight counterfeiting.

4. The real estate sector can benefit from blockchain technology by simplifying buying and selling processes, automating transactions, and ensuring transparency of ownership. Smart contracts allow for automatic fulfillment of the terms and conditions set forth in the agreements.

5. The sphere of expression of will and political elections. The introduction of blockchain technology in electronic voting guarantees transparency and prevents any attempts to manipulate the vote. This allows to increase confidence in the electoral process and guarantees its fairness.

6. Trade and e-commerce. Blockchain technology helps to control trade and e-commerce by ensuring the authenticity of products and protecting against counterfeiting. It also encourages the creation of new business models, such as decentralized markets.

7. Copyright and intellectual property protection. Blockchain technology ensures the protection of copyright and intellectual property rights, allowing to track and manage content rights, which protects authors from piracy and unauthorized use.

8. Creation of identification and access control systems. Blockchain can be used to create decentralized identity and access management systems that offer private access to personal data.

Table 1
The main advantages of using blockchain technology for automation of business processes of the enterprise

Advantages	Characteristics
Transparency and immutability	Blockchain provides a high level of transparency by storing all transactions in an open ledger that cannot be changed after recording. This reduces the risk of fraud and errors, as the data in the ledger is immutable and accessible to all network participants.
Automation through smart contracts	Smart contracts are computer programs that automatically fulfill the terms of the agreement without intermediaries. This can greatly simplify and automate complex business processes, such as payment processing, compliance checks, and contract execution.
Reduced costs	By automating processes and eliminating the need for intermediaries (such as banks or law firms), blockchain can reduce the cost of managing transactions and documents.
Increased security	The security of data stored on a blockchain is enhanced by cryptographic protection, minimizing the likelihood of unauthorized access or modification. This is crucial for protecting sensitive information such as financial records or proprietary ideas.
Enabling Interoperability and Integration	Blockchain can easily connect different systems and platforms, offering a unified source of information for all parties involved in the process. This optimizes communication and collaboration between different departments within an organization or even between different companies.
Monitoring and verification	Due to the ability to monitor and verify each stage of the process, blockchain provides comprehensive audit and control. This is especially useful for supply chain management and product quality assurance.

Thus, blockchain technology, due to its basic properties of transparency, immutability and decentralization, has a wide range of applications in the modern world. It demonstrates its

versatility and effectiveness in a number of key areas, including the financial sector, supply chains, healthcare, real estate, elections, e-commerce, copyright, and identity management [14].

The above examples demonstrate how blockchain technology can be applied in various sectors to improve operations, increase security, and guarantee transparency.

It can be argued that blockchain technology provides significant benefits for each of these business processes, increasing the efficiency, security, and transparency of business operations.

The creation of a universal algorithm for automating business processes using blockchain technology is an important step for modern organizations seeking to achieve optimal efficiency and gain a competitive advantage. Blockchain makes it possible to create a transparent and unchanging system for solving various tasks, which helps to minimize the likelihood of fraud and errors. By implementing blockchain technologies in business processes, companies can optimize routine tasks, ensuring efficiency and accuracy in the execution of transactions and operations.

To study the efficiency of systems, methods of increasing accuracy using segmented regression are commonly used to determine the optimal frequency of operation processes [16].

A generalized automation algorithm allows you to standardize and optimize processes, simplifying their management and increasing efficiency. This approach encourages better communication and collaboration between different departments within an organization, allowing for faster response to market changes. The possibilities of using blockchain technology in certain business processes of an enterprise are summarized in Table 2.

Table 2
Possibilities of using blockchain technology in certain business processes of an enterprise

Business process	Possibilities of using blockchain
Supply logistics	- transparent tracking of goods at all stages of the supply chain; - prevention of counterfeiting and fraud due to the immutability of records; - supply automation through smart contracts.
Production	- traceability of raw materials and components; - management of production processes with quality control; - optimization of inventory accounting through decentralized registers.
Accounting and auditing	- storing unalterable records of financial transactions; - conducting automated audits through transparent and accessible data; - improving the accuracy of accounting through decentralized systems.
Financial management	- managing and automating financial transactions through smart contracts; - improving the security of financial transactions; - real-time tracking and control of expenses and investments.
Quality management	- storage and verification of quality inspection and testing records; - increasing confidence in product quality data; - transparency and control of quality assurance processes.
Marketing and sales	- managing advertising campaigns and loyalty programs; - increasing transparency in interaction with partners and consumers; - tracking and checking the effectiveness of marketing campaigns.
Customer service	- storing the history of interaction with customers in a secure register; - automation of returns and dispute resolution processes; - personalization of service through access to decentralized data.

The algorithm of step-by-step automation of business processes using blockchain technology at an enterprise is shown in Figure 1.

Thus, the process of implementing blockchain technology to automate business operations at an enterprise begins with the definition of goals and requirements, which includes the identification of specific processes that require automation and the definition of the desired results of blockchain implementation.

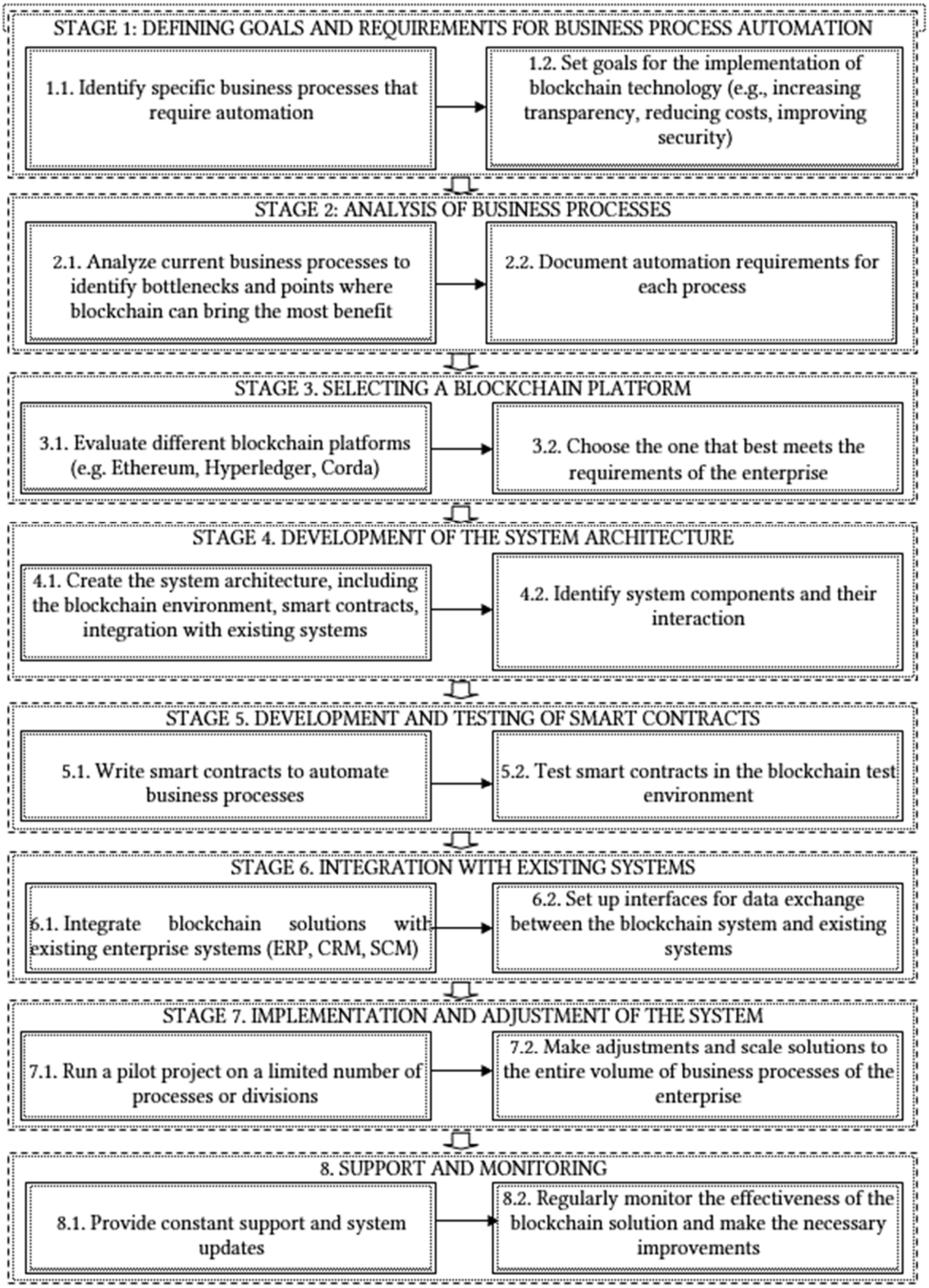

Figure 1: Algorithm for step-by-step automation of business processes using blockchain technology at the enterprise.

This is followed by an assessment of existing business processes to pinpoint bottlenecks and potential areas of impact, as well as documentation of automation requirements. After a thorough assessment, the most suitable blockchain platform is selected to meet the needs of the enterprise. Once the system architecture is developed, it includes the blockchain environment, smart contracts, and integration with current systems. Smart contracts are then compiled and tested in a

simulated environment. The blockchain solution easily integrates with existing corporate systems, including Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM), and sets up data exchange interfaces. After the pilot phase, which allows you to test the system on a limited number of processes, the necessary changes are made, and the solution is expanded to cover all business processes in the organization.

Evaluating the effectiveness of implementing blockchain technology in the course of business process automation is crucial to ensure optimal results and a favorable return on investment.

Blockchain technology has the potential to create significant benefits, including increased transparency, lower costs and improved security, but these benefits can only be realized if properly implemented and integrated. A systematic assessment allows you to recognize the strengths and weaknesses of the implemented system, as well as to understand its impact on business processes. This includes evaluating the effectiveness of smart contracts, the speed of transaction processing, and improvements in data management [12, 13]. The assessment also helps identify potential problems and change strategies to achieve the best possible results. Ultimately, a comprehensive assessment ensures that automation goals are met and contributes to the long-term growth and success of the organization.

Key evaluation indicators help determine how successfully blockchain has been implemented into processes and whether it is achieving the set goals. Data transparency and accuracy indicators reflect how well the blockchain does at ensuring the authenticity of information. Information about quantitative indicators of the quality of operational processes performance is important from the point of view of analyzing their influence on the reliability of equipment functioning of enterprise [17]. Operational Performance Evaluation reveals how blockchain has impacted transaction processing speed and cost reduction. Data security and protection are critical to ensuring system trust, and improving supply chain management is showing real results in tracking goods. The adaptability and flexibility of the system allow us to assess its ability to change and scale. Customer and partner satisfaction, as well as the impact on profitability, provide insight into the overall benefits of implementing blockchain technology.

4. The model for determining the optimal level of profit from the implementation of blockchain technology

The main business processes of modern companies are the basis of their activity and competitiveness in a rapidly changing market environment. These processes include supply chain management, manufacturing, quality management, sales and customer service. Effective supply chain management guarantees prompt delivery of raw materials and components, which is important for a smooth production process. Manufacturing processes encompass not only the creation of products, but also the implementation of advanced technologies to increase productivity and minimize costs. Quality management ensures that products meet consumer standards and requirements, resulting in greater customer satisfaction. Sales and marketing aim to attract and retain customers by implementing successful product promotion and sales strategies. Providing an exceptional level of customer service is critical to building lasting relationships and cultivating customer loyalty. The implementation of modern technologies and procedures in these business processes allows organizations to adapt to the evolving market dynamics and achieve long-term growth [18].

In modern conditions, enterprises implementing blockchain technologies must have qualified specialists with a certain level of knowledge and skills. It has been established that the costs of the enterprise can also be minimized by the implementation of blockchain technologies, because one of the examples of improving sales is e-commerce, which makes it possible to reduce the costs of the enterprise and simplify the terms of sales.

The main goal of the enterprise is to make a profit, therefore, to determine the optimal level of profit that the enterprise will receive from the implementation of blockchain technology, a model is proposed, which consists of the main components: x_1 – specialists with skills in the field of

information and communication technologies (ICT) at the enterprise (%); x_2 – volume of products sold through electronic commerce (billion UAH); x_3 – the number of enterprises using electronic commerce (pieces); x_4 – expenses of enterprises (billion UAH).

$$y(x) = w_1 f_1\left(A^{(1)}, x1\right) + w_2 f_2\left(A^{(2)}, x2\right) + w_3 f_3\left(A^{(3)}, x3\right) + w_4 f_4\left(A^{(4)}, x4\right), \quad (1)$$

where $A^{(1)}, \dots, A^{(4)}$ are model coefficients; $w_1, \dots, w_4$– weighting factors; $f_1, \dots, f_4$ – mathematical models; $y(x)$ is the profit function of the coefficients of the model; n is the number of measurements.

First stage. The relationship between the number of specialists with skills in the field of information and communication technologies (ICT) at the enterprise (x_1) and the level of profit (Y) is determined by applying the formula:

$$f_1(x) = A_1 + A_2 x + A_3 x^2. \quad (2)$$

$$A^{(1)} = \begin{bmatrix} n & \sum_{i=1}^{n} x1_i & \sum_{i=1}^{n} (x1_i)^2 \\ \sum_{i=1}^{n} x1_i & \sum_{i=1}^{n} (x1_i)^2 & \sum_{i=1}^{n} (x1_i)^3 \\ \sum_{i=1}^{n} (x1_i)^2 & \sum_{i=1}^{n} (x1_i)^3 & \sum_{i=1}^{n} (x1_i)^4 \end{bmatrix}^{-1} \begin{bmatrix} \sum_{i=1}^{n} Y_i \\ \sum_{i=1}^{n} (x1_i Y_i) \\ \sum_{i=1}^{n} [(x1_i)^2 Y_i] \end{bmatrix}. \quad (3)$$

Second stage. The relationship between the volume of products sold through e-commerce (x_2) and the level of profit (Y) is determined by applying the formula:

$$f_2(x) = A_1 + A_2 x + A_3 x^2. \quad (4)$$

$$A^{(2)} = \begin{bmatrix} n & \sum_{i=1}^{n} x2_i & \sum_{i=1}^{n} (x2_i)^2 \\ \sum_{i=1}^{n} x2_i & \sum_{i=1}^{n} (x2_i)^2 & \sum_{i=1}^{n} (x2_i)^3 \\ \sum_{i=1}^{n} (x2_i)^2 & \sum_{i=1}^{n} (x2_i)^3 & \sum_{i=1}^{n} (x2_i)^4 \end{bmatrix}^{-1} \begin{bmatrix} \sum_{i=1}^{n} Y_i \\ \sum_{i=1}^{n} (x2_i Y_i) \\ \sum_{i=1}^{n} [(x2_i)^2 Y_i] \end{bmatrix}. \quad (5)$$

Third stage. The relationship between the number of enterprises using e-commerce (x_3) and the level of profit (Y) is determined by applying the formula:

$$f_3(x) = A_1 + A_2 x + A_2 (x - x_{br}) F(x - x_{br}). \quad (6)$$

$$A^{(3)} = \begin{pmatrix} A_{11} & A_{12} & A_{13} \\ A_{21} & A_{22} & A_{23} \\ A_{31} & A_{32} & A_{33} \end{pmatrix}^{-1} \begin{pmatrix} U_1 \\ U_2 \\ U_3 \end{pmatrix}, \quad (7)$$

where

$$A_{11} = n, \qquad A_{12} = A_{21} = \sum_{i=1}^{n} x3_i, \qquad A_{22} = \sum_{i=1}^{n} (x3_i)^2,$$

$$A_{13} = A_{31} = \sum_{i=1}^{n} \left[\left(x3_i - \frac{x3_5^{(s)} + x3_6^{(s)}}{2} \right) F\left(x3_i - \frac{x3_5^{(s)} + x3_6^{(s)}}{2} \right) \right],$$

$$A_{23} = A_{32} = \sum_{i=1}^{n} \left(x3_i \left(x3_i - \frac{x3_5^{(s)} + x3_6^{(s)}}{2} \right) F\left(x3_i - \frac{x3_5^{(s)} + x3_6^{(s)}}{2} \right) \right),$$

$$A_{33} = \sum_{i=1}^{n} \left[\left(x3_i - \frac{x3_5^{(s)} + x3_6^{(s)}}{2} \right)^2 F\left(x3_i - \frac{x3_5^{(s)} + x3_6^{(s)}}{2} \right) \right],$$

$$U_1 = \sum_{i=1}^{n} Y_i, \qquad U_2 = \sum_{i=1}^{n} (x3_i Y_i),$$

$$U_3 = \sum_{i=1}^{n} \left[\left(x3_i - \frac{x3_5^{(s)} + x3_6^{(s)}}{2} \right) F\left(x3_i - \frac{x3_5^{(s)} + x3_6^{(s)}}{2} \right) \right].$$

where $F(\ldots)$ is the Heaviside function; x_{br} – point of connection of linear segments of the model; $x_n^{(s)}$ is the ordinal statistic of the sample (x_n).

Fourth stage. Formulas (6) and (7) are used to determine the relationship between enterprise costs (x_4) and profit level (Y).

This model makes it possible to determine the profit for arbitrary values of the indicators: specialists with skills in the field of information and communication technologies (ICT) at the enterprise (x_1), the volume of products sold through electronic commerce (x_2), the number of enterprises using e-commerce (x_3), enterprise costs (x_4) and shows that the first two indicators have a quadratic effect on profit, and the third and fourth are related to profit in a piecewise linear relationship.

5. Results and discussions

This section presents the research results of the suggested model and characterizes the level of income from the main components. For the practical implementation of the suggested model, statistical data [19] were used, which made it possible to determine the optimal number of specialists with skills in the field of information and communication technologies (ICT) at the enterprise (x_1) and the level of profit (Y). The results are shown in Figure 2.

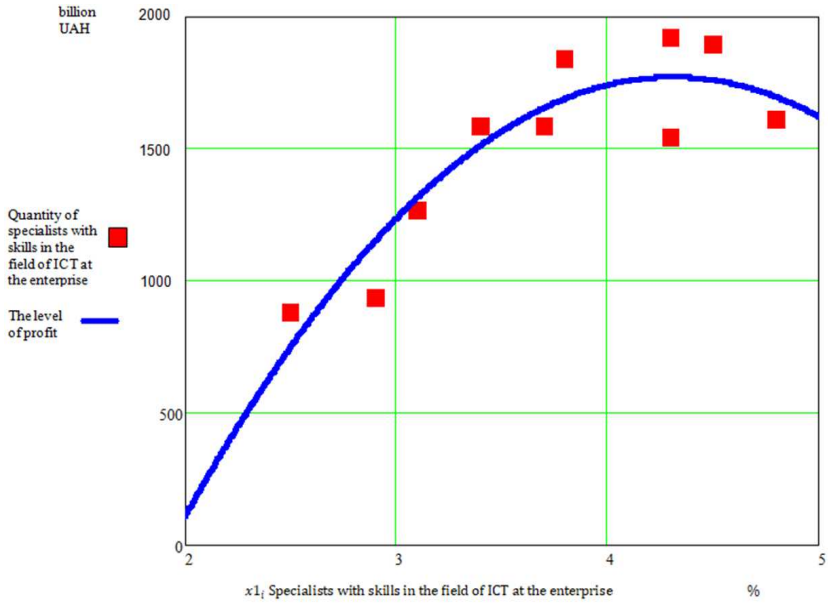

Figure 2: Specialists with skills in the field of ICT at the enterprise and level of profit.

Figure 2 shows that the sufficient level of the number of specialists with skills in the field of information and communication technologies (ICT) at the enterprise (x_1) is 4.3%, which makes it possible to obtain a profit (Y) - 1,800 billion hryvnias, this is the optimal number of specialists.

The results of the study of the relationship between the volume of products sold through electronic commerce (x_2) and the level of profit (Y) are shown in Figure 3.

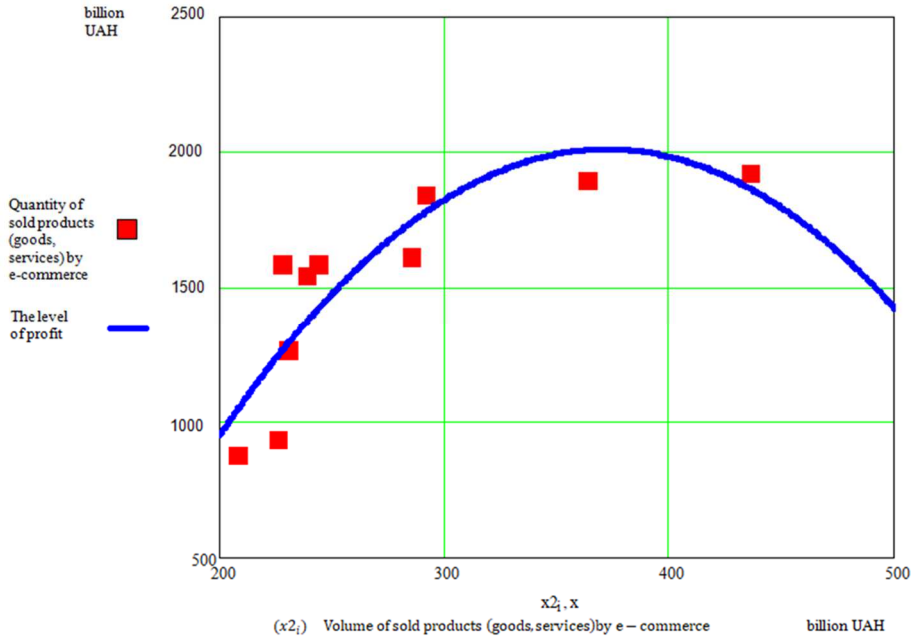

Figure 3: Volume of sold products (goods, services) by e-commerce and level of profit.

Figure 3 shows that the volume of 380 billion is a sufficient level of the amount of sold products, because even with the growth of volumes, the level of profit does not increase, but remains at the same level, or even decreases. The results of the relationship between the number of enterprises using e-commerce (x_3) and the level of profit (Y) show that the number of enterprises less than 2375 pieces does not affect the level of profit in general, it is constant. And when the number of enterprises is more than 2375 pieces, it stimulates profit growth (Figure 4).

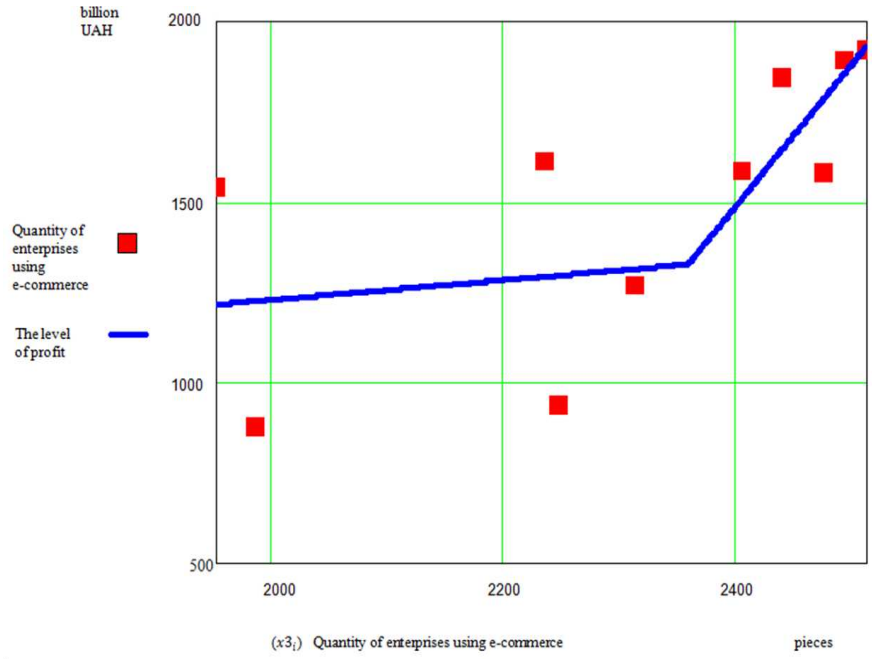

Figure 4: Quantity of enterprises using e-commerce and level of profit.

The results of the relationship between the company's expenses (x_4) and the level of profit (Y) showed that with an increase in the level of profit, the level of expenses also increases, which indicates a linear relationship between these two indicators (Figure 5).

Therefore, in order to minimize costs and at the same time maintain a sufficient level of profit, it is necessary to use innovative technologies, such as blockchain, cloud services, Big Data, artificial

intelligence (AI), which make it possible to automate most of the enterprise's business processes, while reducing manual labor and increasing the quality of work.

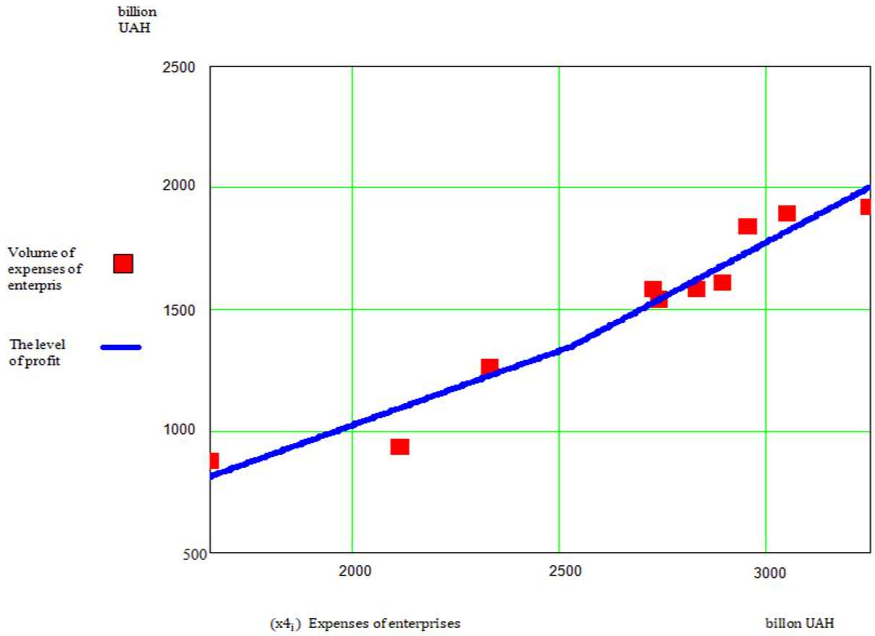

Figure 5: Volume of expenses of enterprises and level of profit.

6. Conclusions and future scope

Thus, the introduction of blockchain technology for the automation of business processes at the enterprise opens up new opportunities for management and improvement of operations. Blockchain guarantees immutability and transparency of data, thereby minimizing the possibility of errors and fraud, while at the same time increasing trust in information and procedures.

Its ability to automate transactions using smart contracts helps reduce costs and speed up transaction processing, which is critical to staying competitive. Blockchain technology improves supply chain management by offering real-time tracking of goods and promoting transparency. By introducing blockchain technology into existing enterprise systems, it becomes possible to optimize processes and reduce administrative costs.

Blockchain cryptographic techniques ensure data security by providing protection against misuse and unauthorized access. The flexibility of blockchain solutions allows you to quickly adapt to market changes and expand the solution according to your business requirements. The company’s reputation is enhanced by increasing customer and partner satisfaction thanks to transparent and efficient processes. Blockchain's tangible impact on profitability is clear, as cost reductions and efficiency gains directly contribute to overall financial success. Overall, blockchain has significant potential to revolutionize business processes, opening new avenues for innovation and facilitating sustainable growth within an organization.

Further research will be aimed at improving the use of blockchain technology, in particular, to increase the efficiency of operations in comparison with the suggested model and algorithm. In addition, it is planned to consider the use of other digital technologies by enterprises for the possibility of adapting them to changing regional conditions and making effective management decisions.

Declaration on Generative AI

The author(s) have not employed any Generative AI tools.

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