

IMPACT OF BLOCKCHAIN TECHNOLOGY APPLICATIONS ON THE EFFICIENCY AND PERFORMANCE OF COMPANIES

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Abstract

Pervasive ICT, the knowledge economy, and intense global competition define the business landscape in the 21st century. Long-term sustainability for companies hinges on continuously boosting competitiveness through increased efficiency and profitability. This paper explores how Blockchain technology influences management quality, reduces operating costs, and enhances overall competitiveness. Initially known for cryptocurrencies like Bitcoin, Blockchain is now increasingly vital for improving business and management efficiency. Through extensive research, the authors found that decentralization, transparency, and enhanced security — core benefits of Blockchain — significantly improve decision-making across all management levels and optimize business processes. The ultimate outcomes are reduced costs, greater operational efficiency, increased profitability, and sustainable development. Therefore, Blockchain technology is a crucial factor shaping future management and business practices in our dynamic global environment.

Key words: *Blockchain Technology, Competitiveness, Business Costs, Profitability, Sustainable Development.*

Introduction

Modern business conditions are continuously changing the way modern companies function, requiring modern managers to harmonize traditional decision-making models and ways of doing business with the dynamic changes taking place on the global market to achieve the long-term sustainability of their companies' operations. In this process, blockchain technology is positioned as one of the most important innovations of the 21st century, offering modern management concrete, new, digital transformation-based solutions for improving competitiveness through increased efficiency and profitability of business.

Blockchain, although known to the general public primarily as the basis for cryptocurrencies such as Bitcoin, turns out to have a much wider application - from a tool for forming digital currencies and improving international money transfer beyond the control of central banks (Antonopoulos, 2024). Blockchain's decentralized nature, high level of security, and ability to track transactions in real-time radically transform business processes in various industries (Harvey et al., 2021). Blockchain technology enables another technological layer, through the existing financial market structure, the exchange of digital financial instruments and digital currencies, without the need to involve intermediaries (Sandner et al. 2020). The effects of its application in the optimization of the decision-making process and the way of doing business of modern management are fascinating through the reduction of administrative costs, the acceleration of the decision-making process, and the increase in the

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reliability of the available information and data based on which business decisions are made, both at the strategic and operational levels (Bashir, 2023).

This research aims to analyze blockchain technology's impact on the efficiency of managerial processes and the business performance of companies in modern business conditions based on high digitalization and the application of telecommunications assets in the global market, as well as the necessity of applying the knowledge economy. A special focus is placed on the economic aspects of blockchain applications and their role in transforming traditional management models in modern company management.

After reviewing the results of the conducted research, priority was placed on understanding and presenting the potential of introducing blockchain technology into the business processes of modern companies. Its intensive application opens the door to further digitization of business operations. Specifically, managers, by transforming the way they make business decisions and organize business processes, can strategically improve the competitiveness of their organizations' global competitiveness, thereby ensuring their sustainable development and survival in the future. In this context, this research contributes to understanding how the application of innovations such as blockchain technology redefines the basic principles of business in the era of globalization and the digital transformation of modern companies.

Literature review

Blockchain technology is based on a decentralized database, which enables transparent storage, sharing, and tracking of data within business networks (Fill & Meier, 2019). Its application provides security resistance to misuse and manipulation, directly affecting the increase of trust among participants in business processes. Blockchain technology transforms the logic of the Internet, from the Internet of digital copies to the Internet of original values (Sandner et al., 2020). Sandner et al. (2020) investigated the application of blockchain technology in various industries, with a special emphasis on the transformation of traditional ways of making business decisions and organizing business operations by modern management, intending to improve competitiveness at the global level and ensure the long-term sustainability of business through reducing costs, increasing operational efficiency, profitability and transparency of business. Key advantages of applying blockchain technology were identified:

- a) Improving operational efficiency (Milićević et al., 2022):
 - Simplifies and accelerates business processes, thereby optimizing supply chains.
 - It allows data monitoring in real-time and reduces the risk of manipulation, abuse, and fraud because every transaction is recorded without the possibility of deletion.
- b) Increasing transparency (Zheng et al., 2017):
 - All transactions are visible and available to all participants in the network based on a decentralized database.
 - Reduces data reconciliation costs because everyone uses a single database version.
- c) Cost reduction (Peters et al., 2015):
 - Elimination of manual processes and automation of business using the so-called "smart contracts".

- More efficient cross-border transfers significantly reduce operating costs.
- d) Increasing profitability (iShares.com, 2024):
- It opens new investment opportunities and access to global markets due to the emergence of various forms of cryptocurrency trading, using the advantages of digitalization in the broadest sense.
 - Reduces operating costs by increasing the speed of transactions and reducing reconciliation costs; thus, there is a less need for capital reserves due to lower risks and more transparent processes.

Traditionally, the transaction takes much time to process and is initiated into a banking organization. The use of Blockchain technology helps to reduce the time for processing and initialing to many times, from approximately 3 days to several minutes or even second (Golosova & Andrejs, 2018). Its key features - security, transparency, and speed - make it the basis of the digital transformation of business in the 21st century and an essential factor of competitive advantage in the modern business environment (Smith, 2019).

Methodology

In order to understand the impact of blockchain technology on business processes, the research was conducted. Methodological approach included qualitative and quantitative analytical methods, including data collection from primary sources and analysis of data from secondary sources. This multidisciplinary approach allowed for a reliable examination of the impact of blockchain technology on operational efficiency, transparency, business costs, and profitability.

When selecting the sample, preference was given to companies that have already implemented blockchain technology in specific business segments (Deutsche Börse, Deutsche Bank, Commerzbank, Börse Stuttgart, Société Générale, Siemens, DHL, and Bayer). The secondary data analysis (studies and reports of renowned organizations such as McKinsey, PwC, and IEEE) supplemented understanding existing trends and best practices in a defined geographic area.

The research aimed to examine the impact of blockchain technology on increasing the efficiency of management and economic performance of companies to increase the competitiveness and sustainable operation in the coming period. Secondary data were used to identify existing trends and best practices, while primary data provided insight into concrete examples from practice.

Research results

Applying blockchain technology brings numerous advantages in data management, transaction optimization, business automation, cost reduction, and increased business transparency and efficiency.

Increasing business efficiency using blockchain technology

The results of the research indicate that the transition from traditional business and decision-making systems to modern ones, including the inclusion of blockchain in the organization of business processes, has enabled significant savings in time and costs. Reducing the time to complete transactions to only 0.5 hours allows companies to use available resources more efficiently. A typical stock transaction can be executed within microseconds, often without human intervention. However, the settlement—the ownership transfer of the stock—can take

as long as a week. That's because the parties cannot access each other's ledgers and can't automatically verify that the assets are owned and can be transferred.

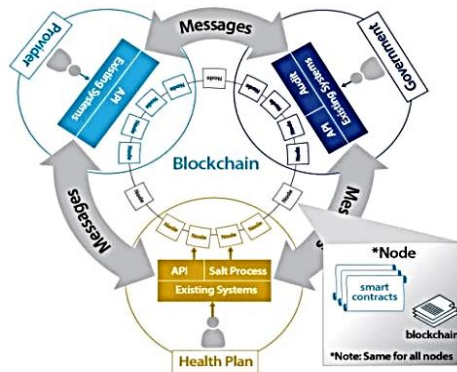


Figure 1. Blockchain application of smart contracts in healthcare
Source: Stagnaro (2021)

The application of blockchain technology is broad and not limited to one industry, i.e., the financial sector, as it is most often considered in the broader social community. However, it has found its most excellent application in the financial industry, primarily in the capital market and international money transfers without intermediaries and central bank control.

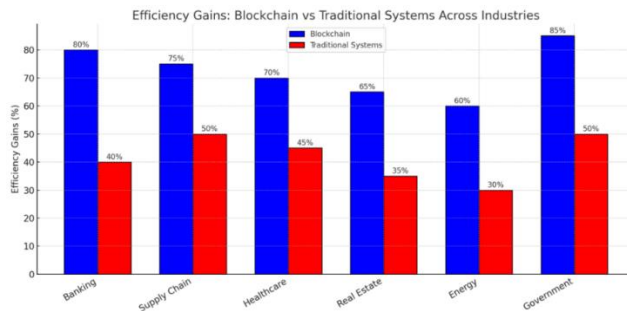


Figure 2. Blockchain vs Traditional Business Systems in Different Industries
Source: Rao et al. (2024); Nigmatov et al. (2023)

The data shows that blockchain technology significantly contributes to business efficiency compared to the traditional systems used so far, especially in banking and government services, where many manual tasks are replaced by automated processing through "smart contracts". With further analysis, we can see where this increase in efficiency comes from.

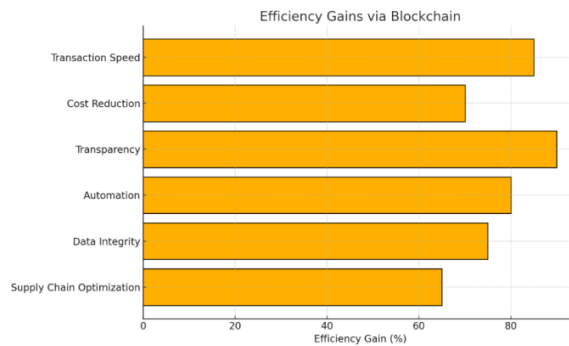


Figure 3. The origins of operational efficiency using Blockchain
Source: Wilkie & Smith (2021)

As seen in the chart, the increase in efficiency is the result of the following activities highlighted below.

- Increasing transparency: Implementing a unique database where all participants have insight, i.e., identical information they receive reduces the risk of mistakes and increases trust between partners (Nakasumi, 2017).
- Reduction of operational costs: The use of Blockchain enables the elimination of manual processes, reducing data reconciliation costs by as much as 95%. These results indicate the practical cost-effectiveness of the technology, especially in sectors such as banking and logistics.
- Process automation: Smart contracts enable the automation of complex transactions, thereby reducing the need for human intervention. This will additionally contribute to speeding up business processes and reducing labor costs (Kim & Laskowski, 2017).

Increasing business transparency using Blockchain technology

The increase in transparency is directly related to reducing the so-called reconciliation costs. Namely, blockchain is essentially one large database, decentralized with all market participants or all participants in one transaction. In practice, all participants have one identical copy of that database. The transparency of the blockchain is achieved on the transactions copying process. Every participant can look all transactions, which means that each action is shown to participants of the Blockchain. Nobody can do anything insensibly (Golosova & Andrejs, 2018).

This leads to complete transparency and the near disappearance of the costs of harmonizing data from a specific transaction. Although these costs seem negligible at first glance, the data show they are a significant part of every financial transaction in the capital market.

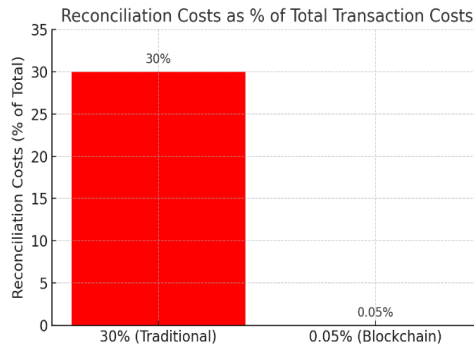


Figure 4. Share of reconciliation costs in total costs with and without the use of Blockchain
Source: Wilkie & Smith (2021)

The attached data shows that the participation of the mentioned costs has been reduced from 30%.

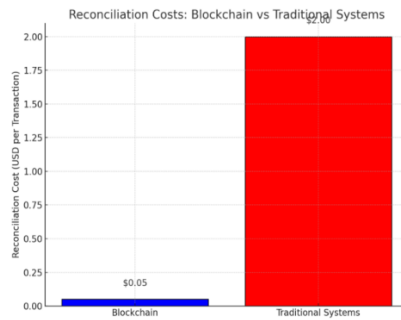


Figure 5. Compliance costs with and without the use of Blockchain
Source: Dixon (2021)

Therefore, the greater the number of transactions a company performs, the more significant the savings achieved by applying blockchain technology. In addition to savings, one of the advantages that blockchain technology brings to companies is the speed of the transactions themselves, whereby the period from the initiation of the transaction to its completion, i.e., settlement, is shortened.

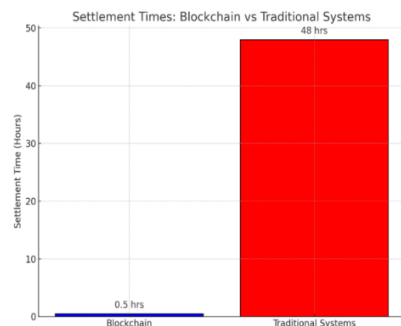


Figure 6. Speed of transactions with and without the use of Blockchain
Source: Chan (2024)

Reducing business costs using blockchain technology

If we look at the business sector, the reduction of costs due to the application of blockchain technology can be attributed to the following factors:

- Security and resistance to manipulation
- Reduction of regulatory compliance costs
- Process automation through smart contracts
- Reduction of data reconciliation costs by using a single, decentralized database
- Increased transparency and trust
- Increasing efficiency in cross-border transactions because they are performed without intermediaries.

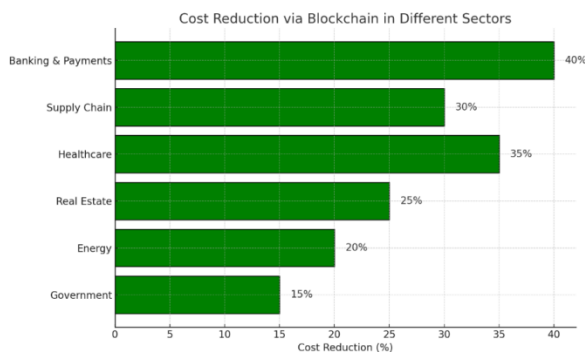


Figure 7. Cost savings using blockchain in various industries, including public administration

Source: Ali et al. (2021)

In the example of the banking sector, one of the industries in which the application of blockchain technology contributes to a significant reduction in costs, we can see specific reasons, i.e., business cost reduction factors:

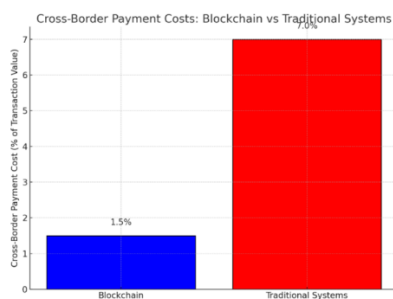


Figure 8. Savings in transaction costs using blockchain in the financial sector

Source: Nawrocki (2024)

Increasing profitability using blockchain technology

Blockchain technology and cryptocurrencies, i.e., crypto-financial instruments, boost a company's profitability in some of the following ways:

- They open the possibility of diversification and investment in new investment classes.
- They open up opportunities for companies to offer their services more efficiently to previously unavailable markets (blockchain is accessible everywhere in the world; all you need is a mobile device and the Internet).

- Due to the shorter duration of the specific transaction and the reduced risk of manipulative activities, companies do not have to keep large risk reserves, which free up "frozen funds" and opens up the possibility of investing capital in more profitable projects, i.e. a higher return on the total capital invested by the company.

Financial services companies, for example, are finding that the private blockchain networks they've set up with a limited number of trusted counterparties can significantly reduce transaction costs. Organizations can also tackle specific problems in transactions across boundaries with localized applications. Companies are already using blockchain to track items through complex supply chains, for instance.



Figure 9. Increasing profitability using blockchain on the example of BlackRock's fund in 2024
Source: (iShares.com, 2024)

Conclusion

In this work, the authors presented the results of primary and secondary research on the potential of the application of blockchain technology for improving the efficiency of management and economic performance of business. This knowledge indicates the need for prompt transformation of traditional models of organizing business operations and decision-making processes by all levels of company management for companies to increase their competitiveness and sustain their business in the dynamic global market. This technology speeds up business processes, reduces costs, increases profitability, and increases business transparency. The potential of blockchain technology for improving the economic performance of business is reflected in the ability to reduce costs, increase business transparency, and speed up business processes, which has a direct consequence of increasing profitability. Blockchain technology has proven to be a key tool for modernizing and improving management and operations in various industries. Further research can focus on adapting the technology to different sectors' specific needs to realize its maximum potential.

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UTICAJ PRIMENE BLOKČEJN TEHNOLOGIJE NA EFIKASNOST I UČINAK KOMPANIJA

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Apstrakt

Sveprisutna IKT, ekonomija znanja i intenzivna globalna konkurencija definišu poslovni pejzaž u 21. veku. Dugoročna održivost kompanija zavisi od kontinuiranog povećanja konkurentnosti kroz povećanu efikasnost i profitabilnost. Ovaj rad istražuje kako blokčejn tehnologija utiče na kvalitet upravljanja, smanjuje operativne troškove i poboljšava ukupnu konkurentnost. Prvobitno poznata po kriptovalutama poput Bitkoina, blokčejn je sada sve važnija za poboljšanje efikasnosti poslovanja i upravljanja. Kroz opsežna istraživanja, autori su otkrili da decentralizacija, transparentnost i poboljšana bezbednost – osnovne prednosti blokčejna – značajno poboljšavaju donošenje odluka na svim nivoima upravljanja i optimizuju poslovne procese. Krajnji rezultati su smanjeni troškovi, veća operativna efikasnost, povećana profitabilnost i održivi razvoj. Stoga je blokčejn tehnologija ključni faktor koji oblikuje buduće upravljačke i poslovne prakse u našem dinamičnom globalnom okruženju.

Ključne reči: *Blokčejn tehnologija, Konkurentnost, Troškovi poslovanja, Profitabilnost, Održivi razvoj.*

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