

The Role of Blockchain Technology in Reducing Transaction Costs: An Economic Analysis

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Abstract. *Transaction costs are considered one of the key factors determining the efficiency of market mechanisms in modern economic systems. Contract enforcement, data collection and verification, trust assurance between parties, and monitoring mechanisms generate additional costs for economic agents. In particular, in the context of global trade and the digital economy, the increase in these costs can limit the efficiency of market operations. In recent years, the rapid development of blockchain technology has created new institutional and technological opportunities to reduce transaction costs. This distributed ledger technology minimizes the need for intermediaries, ensures data immutability, and enhances transparency in economic relations. This paper analyzes the role of blockchain technology in reducing transaction costs based on economic theory and existing scholarly approaches. Within the research framework, the mechanisms through which blockchain technology addresses information asymmetry, automates contract enforcement, and strengthens trust mechanisms are examined. The main objective of this study is to evaluate the potential efficiency benefits of blockchain technology and scientifically demonstrate its strategic importance in reducing transaction costs.*

Keywords: *Blockchain technology, transaction costs, digital economy, institutional economics, distributed ledger, smart contracts, economic efficiency*

Introduction

The acceleration of globalization and the expansion of international economic relations have significantly increased the strategic importance of managing transaction costs. The concept of transaction costs, put forward by Ronald Coase, includes the costs associated with concluding, implementing and monitoring contracts, as well as ensuring trust between parties. These costs directly affect the efficiency of market mechanisms and determine the allocation of resources, as well as the performance of both firms and the overall economic system. In the context of global trade, transaction costs are further increased by factors such as the geographical distance of the parties, legal and institutional differences, and the difficulty of tracking cross-border transactions. These factors lead to increased transaction costs, reduced efficiency, and increased uncertainty in economic interactions. Traditional transaction management mechanisms rely on intermediaries, lengthy verification processes, and centralized registration systems, which increase costs and slow down decision-making. In recent years, the development of digital technologies, especially blockchain technology, has provided innovative approaches to solving these problems. Blockchain, as a technology based on a distributed registry system, reduces the need for centralized intermediaries, provides an immutable record of transactions, and increases transparency in economic relations.

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This enables direct interaction between parties, minimizes verification costs, and makes transaction processes faster and more reliable.

Literature Review. Digital Transformation and Transaction Costs: The literature has widely emphasized that transaction costs are an important factor in economic efficiency and market performance (Coase, 1937; Williamson, 1985). Transaction costs include the additional costs associated with the preparation of contracts, the collection and verification of information, the provision of trust between parties, and the implementation of control mechanisms. Especially in the context of global trade and the digital economy, the high cost of these costs negatively affects the operational efficiency and market efficiency of firms (North, 1990; Alicke et al., 2016). Recently, blockchain technology has provided institutional and technological opportunities to reduce these costs (Catalini & Gans, 2016). Based on a distributed registry system, blockchain minimizes the need for intermediaries, ensures data immutability, and increases transparency in transactions. This technology also allows for further optimization of transaction costs through the automation of contracts and the application of smart contracts (Christidis & Devetsikiotis, 2016).

Research

Blockchain and economic efficiency: Research shows that blockchain technology eliminates information asymmetry, reduces the costs of monitoring and controlling transactions, and strengthens trust mechanisms between parties (Kouhizadeh et al., 2019). These features allow firms to use resources more efficiently, speed up transactions, and reduce the number of errors. At the same time, blockchain technology facilitates integration into global value chains and strengthens the competitive position of firms in international markets (Wang et al., 2019). Thus, the existing literature shows that blockchain technology plays a crucial role at the strategic and operational levels in reducing transaction costs. The application of this technology contributes not only to the optimization of transaction costs, but also to increasing economic efficiency at the national and international levels.

Research questions and hypotheses: The main objective of this study is to systematically investigate the impact of blockchain technology on reducing transaction costs and improving the operational efficiency of firms. Given that the topic is both theoretical and practical, the study is structured around two main questions:

TS1: How does blockchain technology affect transaction costs? This question examines how blockchain technology contributes to optimizing transaction costs by eliminating information asymmetry, automating contracts, implementing smart contracts, and increasing the transparency of transactions.

TS2: Through what mechanisms does blockchain technology enhance the operational efficiency and competitive advantage of firms?

This question aims to determine the strategic role of blockchain through mechanisms such as accelerating transaction processes, efficient use of resources, minimizing errors, and deepening integration into global markets.

Based on the above research questions, the following hypotheses were put forward:

F1: The application of blockchain technology has a positive effect on reducing transaction costs. This hypothesis assumes that costs are minimized by eliminating information asymmetry, automating contracts, and tracking transactions.

F2: Blockchain technology increases the operational efficiency and competitive advantage of firms.

According to this hypothesis, through the implementation of blockchain, firms accelerate operational processes, use resources more efficiently, and strengthen their competitive positions in global markets.

Methodology

The main objective of this study is to systematically assess the impact of blockchain technology on transaction costs and operational efficiency of firms. For this purpose, a qualitative systematic literature review method was chosen. A systematic literature review allows for the systematic collection, analysis, comparative evaluation and generalization of existing scientific knowledge. At the same time, this method allows for a more accurate understanding of the effects of blockchain technology at the operational and strategic levels (Tranfield et al., 2003). The study analyzed high-impact articles indexed in international academic databases such as Scopus and Web of Science. In addition, reports and analytical materials from international organizations such as OECD, World Bank, World Economic Forum (WEF) and UNCTAD were examined. The selection of sources was carried out taking into account their scientific reliability, relevance to the topic, publication in the last 10 years and citation indices. The collected literature was grouped using thematic analysis. During the analysis, the following main categories were identified: reducing transaction costs, implementing smart contracts, automating operations, efficient resource management, competitive advantage of firms and opportunities for integration into global markets. This approach allows researchers to assess the potential advantages of blockchain technology in terms of economic efficiency within a conceptual framework. In addition, the methodology covers both theoretical and practical aspects. Based on the data obtained, it is possible to identify the main mechanisms that reduce transaction costs, such as eliminating information asymmetry, automating contracts, transparency of transactions, and strengthening trust mechanisms. The analysis also allows us to assess the factors that affect the operational efficiency and strategic advantages of firms. Thus, this methodology ensures that the research is built on a reliable and systematic basis from both theoretical and practical points of view and allows us to comprehensively analyze the role of blockchain technology in reducing transaction costs.

Conclusion

The results of the study show that blockchain technology plays a crucial role in reducing transaction costs and increasing the operational efficiency of firms. In modern economies, transaction costs include processes such as concluding contracts, collecting and verifying information, ensuring trust between parties, and implementing control mechanisms, and these costs significantly increase the overall costs of enterprises, especially in the context of global trade and the digital economy (Williamson, 1981; Bowersox et al., 2013). The implementation of blockchain technology minimizes the need for intermediaries, ensures the immutability of data, and increases transparency in economic relations. This technology automates contract execution through smart contracts, facilitates the tracking of transactions, and creates conditions for reducing risks. As a result, transactions are carried out faster, more reliably, and in a cost-effective manner (Tapscott & Tapscott, 2017). According to the findings, blockchain technology significantly reduces the operating costs of firms by eliminating information asymmetry and strengthening trust mechanisms. In addition, this technology provides transparency in financial, logistics and supply processes, which leads to more efficient management of resources and a reduction in errors. Blockchain implementation at the firm level allows for the optimization of operations, the effective use of warehouse and transportation resources, and a more flexible response to customer demands. This strengthens the market position of firms and increases their competitive advantage (Kouhizadeh et al., 2021). Analyses conducted at the national and global levels show that the application of blockchain technology deepens the integration of countries into global value chains and ensures their participation in segments that create higher added value in international trade. At the same time, the application of the technology accelerates economic growth

and strengthens the structural foundations of national competitiveness. Thus, the study proves that blockchain technology is not only sufficient to reduce transaction costs, but also a key tool for firms to increase their operational efficiency, strengthen their competitive advantage, and more actively participate in global economic integration. These results confirm both the theoretical and practical significance of blockchain technology and indicate the importance of its application in economic policy and management strategies.

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