Proceedings of ICFTBA 2025 Symposium: Global Trends in Green Financial Innovation and Technology
DOI: 10.54254/2754-1169/2025.BJ28617

The Application of Blockchain Technology in the Global Economy: A SWOT Analysis and Strategic Recommendations

Siyuan Wang

School of Economics, Heilongjiang University of Science and Technology, Harbin, China
wsynov3@zohomail.cn

Abstract. Blockchain technology is reshaping economic activities globally, with significant potential across healthcare, finance, and supply chain management. Despite regulatory and adoption challenges, it is a disruptive innovation. According to IDC's "2021 V1 Global Blockchain Spending Guide," the global blockchain market is projected to reach $18.95 billion by 2024, with a CAGR of approximately 48.0% during 2020-2024. This study explores the current application status of blockchain technology in the global economy. It integrates SWOT analysis models with case studies and market reports to examine the strengths, weaknesses, opportunities, and challenges of blockchain technology. Based on economic competition theories such as effective competition theory and Porter's competitive theory, the research analyzes how blockchain can gain advantages in intense market competition. It identifies potential opportunities in the global blockchain market over the next five years from technology, industry, and application scenario perspectives. The study provides a holistic assessment of blockchain's application status, offering valuable insights for policymakers and entrepreneurs.

Keywords: Blockchain, Opportunities, Challenges, Global Economy, SWOT

1. Introduction

The 2008 global financial crisis exposed systemic flaws in traditional financial systems, while simultaneously fueling growing demand for digital currencies and digital assets. Satoshi Nakamoto proposed a digital currency framework that leverages blockchain technology as its foundational infrastructure, effectively addressing the shortcomings of existing digital currency systems [1].

Blockchain technology has now been widely adopted across various sectors. It has transformed traditional financial systems while presenting both challenges and opportunities for the global economy. The challenges include reduced reliance on intermediaries, the tension between data transparency and privacy protection, as well as existing legal frameworks that struggle to adapt. Simultaneously, blockchain offers opportunities such as simplified transaction processes, cost reduction, enhanced data security, and improved fraud prevention capabilities. These advancements are driving new business models and services like smart contracts, token economies, and decentralized finance (DeFi), while also boosting financial inclusion [2].

The adoption of blockchain technology is gaining momentum across the global economy. Research indicates that industry spending in this field is projected to exceed $3 billion by 2025.

DOI: 10.54254/2754-1169/2025.BJ28617

Industry leaders including Goldman Sachs, Maersk, and Microsoft have launched pilot initiatives in this sector. Furthermore, governments and organizations are actively exploring similar blockchain projects to drive innovation.

This paper employs SWOT analysis to examine the strengths and weaknesses of blockchain technology. It also compares the development status of major countries and formulates targeted strategies. These strategies include strengthening international cooperation and promoting the standardization process, aiming to optimize the development of blockchain technology and maximize its benefits in the global economy.

2. Literature review

2.1. Domestic and foreign blockchain technology research

In recent years, blockchain technology has achieved remarkable research progress across multiple domains, particularly in technological development, industrial applications, and methodological frameworks. At the technical level, researchers primarily focus on key areas such as underlying architectures, consensus mechanisms, and smart contracts. Research on underlying architectures aims to enhance blockchain's scalability, security, and efficiency. For instance, Chen Wuhui and colleagues explored sharding technology to alleviate current system performance bottlenecks. Meanwhile, the emergence of sidechains and cross-chain technologies has further promoted interoperability between different blockchain systems. Regarding consensus mechanisms, researchers have improved existing algorithms like Proof of Stake (PoS) and Delegated Proof of Stake (DPoS) to address the high energy consumption issues associated with Proof of Work (PoW) mechanisms [3]. Smart contract research focuses on enhancing their security, programmability, and interoperability. These advancements have driven theoretical innovation in blockchain technology, provided new approaches for practical applications, and hold profound academic and practical value [4].

In terms of industry applications, blockchain technology has significantly improved transaction transparency, reduced costs, and enhanced security in the financial sector. For instance, the Ripple network is used for cross-border payments, while DeFi applications on the Ethereum platform are transforming traditional financial service models [5-6]. In the government sector, blockchain technology has improved the efficiency and transparency of public services, such as China's "Chang' an Chain" project. Additionally, in supply chain management, blockchain has been widely adopted to enhance transparency and traceability, exemplified by the food traceability system jointly developed by Walmart and IBM.

From a methodological perspective, existing research primarily employs three main approaches: quantitative studies, case studies, and modeling studies. Quantitative research focuses on evaluating blockchain performance through experiments and simulations to analyze the efficiency and energy consumption of different consensus mechanisms. Case studies examine blockchain technology applications in specific industries or projects, such as Condos et al.'s research in healthcare. Modeling studies develop mathematical models to analyze blockchain system operations and performance, exemplified by the GHOST protocol proposed by Sompolinsky and Zohar to address blockchain forking issues.

To sum up, the continuous innovation and application expansion of blockchain technology provide a broad space for future technological innovation and academic research.

DOI: 10.54254/2754-1169/2025.BJ28617

2.2. Research gaps and contributions of this study

Although blockchain technology has made progress in the global economy, existing research remains insufficient in depth and breadth, mostly consisting of conceptual or case-based discussions lacking systematic empirical studies and cross-national comparisons. Although IDC reports reveal an increasing number of application cases of blockchain technology in fields such as finance and supply chain management, these cases generally lack quantitative analysis, making it difficult to accurately assess their specific impacts on economic efficiency and transparency. For instance, blockchain technology can enhance the efficiency of payment clearing in the financial sector, improve the efficiency of logistics information transmission, and increase the transparency of product traceability. Furthermore, existing research overlooks the interactions between blockchain technology and specific national or regional cultural, legal, and economic environments, resulting in non-targeted strategic recommendations. For example, China and the United States have adopted different policy orientations in blockchain technology development, yet existing literature rarely delves into the reasons behind these differences and their implications for global applications.

SWOT analysis not only systematically integrates internal technological advantages and external challenges, but also visually demonstrates the developmental disparities of blockchain technology across nations through comparative analysis of key factors. Compared with traditional quantitative evaluation models like the PESTEL analysis method, SWOT analysis demonstrates greater adaptability and comparative effectiveness in assessing cross-border development differences of blockchain technology due to its dual consideration of internal and external perspectives. Based on this framework, this paper proposes targeted strategic recommendations including promoting international collaboration, optimizing regulatory systems, and fostering technological innovation, aiming to provide a reference pathway for the sustainable development of blockchain technology within the global economic system.

3. Problem-solving framework

3.1. Background and research motivation of framework construction

In the context of rapid technological advancement, blockchain technology as an emerging distributed ledger system presents both potential and challenges. The development of a dedicated framework aims to address technical bottlenecks, regulatory barriers, and insufficient international collaboration encountered during blockchain evolution. These issues not only restrict the widespread adoption of blockchain but also hinder its deep integration across various industries. Therefore, this framework seeks to provide methodological support for strategic planning, thereby promoting the healthy development and effective implementation of blockchain technology.

3.2. Theoretical basis and design concept of the framework

This framework is designed based on systems theory, emphasizing the interaction and compatibility between blockchain technology and its institutional environment. It also draws on the theory of technology-institution adaptation to focus on the co-evolution of technology and institutions. The innovation diffusion theory provides theoretical support for the adoption and dissemination of blockchain technology across various fields. Following a problem-oriented approach, the framework employs multidimensional analysis to reveal the complexity of blockchain technology applications,

DOI: 10.54254/2754-1169/2025.BJ28617

while adopting a dynamic feedback mechanism to adapt to continuous changes in both technology and environment.

Compared to traditional analytical tools such as SWOT, PESTEL, and the Logical Framework Method, this framework stands out for its systematic and dynamic nature. It not only analyzes current conditions but also forecasts future trends, while providing more detailed strategies for formulation and implementation.

3.3. Core structure and components of the framework

Blockchain technology, as a disruptive innovation, faces multidimensional challenges. These include surface-level issues affecting current application promotion, deep-seated problems determining long-term development, structural issues requiring system restructuring, and practical implementation challenges. Technologically, scalability and transaction speed are surface-level concerns, while energy consumption and security of consensus mechanisms represent deeper issues. Institutionally, the lack of a unified regulatory framework and legal standards constitutes practical implementation challenges, while compatibility with existing legal systems remains structural. Market-wise, public acceptance and user education are surface-level issues, whereas value transfer integration with monetary systems represents deeper challenges. Socially, public understanding and trust pose practical implementation issues, while social structures and power distribution dynamics create structural challenges. Therefore, the development of blockchain technology requires resolving technical bottlenecks alongside structural adjustments and practical optimizations at institutional, market, and societal levels.

The development of blockchain technology requires coordinated strategies across multiple dimensions. First, institutional reform forms the foundation. Given the decentralized architecture and immutable nature of blockchain, establishing compatible legal frameworks is crucial to address regulatory gaps. Simultaneously, creating regulatory sandboxes can encourage innovation while maintaining risk control. Technological advancements should prioritize breakthroughs in transaction throughput bottlenecks and energy efficiency optimization. By innovating consensus mechanisms and refining algorithms, system performance can be enhanced to boost technical maturity and commercial viability. Education plays a pivotal role: building a multi-tiered talent development system that emphasizes blockchain literacy and practical application training will provide intellectual support and talent reserves for industrial growth. Ecosystem development requires cultivating a healthy blockchain ecosystem through open collaboration, optimizing infrastructure and supporting Section 3.4 Hierarchical Applicability Analysis of the Framework to create a sustainable industrial environment.

3.4. Hierarchical applicability analysis of the framework

At the national strategic level, policy innovation plays a pivotal role in driving the vigorous development of blockchain technology. On one hand, improving the legal framework to create a clear, stable, and forward-looking legal environment forms the cornerstone for institutional safeguards that ensure the steady advancement of blockchain technology. For instance, clearly defining data ownership clarifies rights attribution during blockchain transactions, laying the foundation for reasonable data usage and protection. Simultaneously, recognizing the legal validity of smart contracts provides reliable legal basis for blockchain-based contract execution, enabling practitioners to precisely define their operational boundaries and actively pursue innovative practices within legal frameworks [7-8]. On the other hand, active participation in international

DOI: 10.54254/2754-1169/2025.BJ28617

cooperation—building cross-border regulatory frameworks and promoting unified technical standards—serves as a key initiative to propel blockchain technology onto the global stage. Unified technical standards not only help resolve long-standing challenges in global finance such as cross-border payments but also facilitate seamless global circulation and widespread application of blockchain technology, injecting new vitality into the process of global economic integration.

In shaping the industry ecosystem, establishing unified standards has become pivotal for enhancing system interoperability and operational efficiency. By clarifying node access protocols, standardizing data formats, and regulating operational procedures, diverse blockchain systems achieve seamless compatibility—akin to building an interconnected highway network where data and value flow efficiently across nodes. Simultaneously, collaborative mechanisms serve as a key driver for fostering deep cooperation among enterprises within the sector and accelerating innovation. For instance, forming industry innovation alliances enables companies to share cutting-edge technological achievements, jointly tackle technical challenges, and create synergistic industrial momentum. This approach optimizes resource allocation and amplifies innovation capabilities through multiplied effects.

From an organizational operational perspective, technology integration aims to achieve seamless integration and deep fusion between blockchain technology and existing business systems. Taking financial institutions as an example, skillfully incorporating blockchain technology into payment and clearing systems not only enhances payment security and efficiency but also provides customers with more convenient and transparent financial service experiences [9]. Meanwhile, governance optimization focuses on ensuring cybersecurity and compliant operations. By establishing rigorous internal regulations and strengthening audit supervision mechanisms, organizations can ensure that blockchain technology applications always adhere to security compliance principles, effectively mitigating potential technical and legal risks [10].

In conclusion, policy innovation combined with international cooperation, industry standards and collaborative mechanisms, along with internal technological integration and governance optimization, collectively form the core pillars of the blockchain problem-solving framework. Only through the comprehensive application of these strategies and a multi-pronged approach can we ensure the steady advancement of blockchain technology on a sustainable development path, enabling its widespread adoption and deep empowerment across various fields.

4. Conclusion

This study, using a SWOT analysis of blockchain technology's application in the global economy, proposes strategic recommendations. Strengthening international cooperation to create a unified regulatory framework can address the regulatory ambiguity. Promoting blockchain’s integration with traditional industries can resolve compatibility issues, leverage its decentralization, transparency, security, and traceability, and enhance technological maturity. Blockchain has vast potential, but it requires global efforts from governments, enterprises, and developers. By formulating sound policies, advancing R&D, and improving public education, challenges can be overcome and sustainable development can be achieved.

However, this study was limited by data accessibility and timeliness constraints, failing to comprehensively cover the development status of blockchain across all countries and regions. Meanwhile, blockchain technology is evolving rapidly, with some emerging applications and models not appearing during the study period, making it difficult for analytical results to fully reflect current market trends. Therefore, this study should incorporate more innovative thinking and forward-looking analysis in its prediction and recommendation sections

DOI: 10.54254/2754-1169/2025.BJ28617

Looking ahead, the global research on blockchain technology applications can be developed through three key dimensions: industry-specific implementations, technological integration, and policy analysis. Investigating practical case studies across sectors, examining policy incentives and market-driven initiatives, and evaluating their impacts on local economies are important. It also emphasizes integrating blockchain with cutting-edge fields like AI and IoT, leveraging AI's data analysis for precise decision-making and blockchain's immutability for data security. An interdisciplinary approach, combining economics, management, and computer science, provides comprehensive insights for policymakers, entrepreneurs, and investors.

References

[1] Nakamoto, S. (2008). Bitcoin: A peer-to-peer electronic cash system. Retrieved from https: //bitcoin.org/bitcoin.pdf
[2] Buterin, V. (2014). A next-generation smart contract and decentralized application platform. Ethereum white paper. Retrieved from https: //ethereum.org/en/whitepaper/
[3] Poon, J., & Buterin, V. (2017). Plasma: Scalable autonomous smart contracts. Ethereum. Retrieved from https: //plasma.io/
[4] Szabo, N. (1997). The idea of smart contracts. Nick Szabo's papers and concise tutorials. Retrieved from http: //www.nickszabo.com/writing/smart_contracts_idea.htm
[5] Wood, G. (2014). Ethereum: A secure decentralised generalised transaction ledger. Ethereum yellow paper. Retrieved from https: //ethereum.github.io/yellowpaper/paper.pdf
[6] Ripple. (2025). RippleNet: The global network for instant, cross-border payments. Retrieved from https: //ripple.com/ripplenet/
[7] Yonatan, S., & Sompolinsky, Y. (2013). Ghost protocol. Retrieved from https: //arxiv.org/abs/1311.0243
[8] Sompolinsky, Y., & Zohar, A. (2015). Secure high-rate transaction processing in Bitcoin. Financial Cryptography and Data Security.
[9] Pompella, M., & Matousek, R. (2021). Palgrave handbook of financial technology and blockchain. Palgrave Macmillan.
[10] Zhang, F., Cecchetti, E., Croman, K., Decker, C., Eyal, I., Gencer, A. E., ... & Sirer, E. G. (2019). Town Crier: An authenticated data feed for smart contracts. In Proceedings of the 2016 ACM SIGSAC Conference on Computer and Communications Security. Retrieved from https: //www.usenix.org/conferences