

A Study on the Application of ‘Blockchain+’ Technology to Address Digitalisation Challenges in the Exhibition Industry and Its Impact

Yimeng Li

Al-Farabi Kazakh National University

Abstract

Against the backdrop of global economic integration, the exhibition and convention industry, as a vital platform for economic exchange and cooperation, is constantly seeking breakthroughs and innovation. Following an examination of the characteristics of blockchain technology and trends in the exhibition and convention economy, this paper primarily explores the relationship between the industry and blockchain. It analyses, from a practical perspective, how ‘Blockchain+’ technology can be utilised to address specific challenges in the digitalisation of the exhibition and convention sector, thereby promoting innovation and development within the industry.

Keywords

“Blockchain+” technology; exhibition economy; digitalisation challenges; information security; distributed storage technology.

1. Introduction

In the context of sustainable development within the digital economy, the exhibition industry is facing unprecedented opportunities and challenges. Given its innovative and disruptive nature, blockchain technology offers new approaches to marketing activities and overall design within the sector. Traditional exhibition design centres on user needs, presenting user-centric exhibition spaces through multiple dimensions such as functional fulfilment, emotional resonance and interactive experiences. However, the actual operational models of exhibition marketing are relatively monotonous, failing to effectively target key clientele and unable to meet the green economic development objectives of the new era. Achieving the digitalisation of exhibition construction and management under the guidance of blockchain technology holds significant importance for the in-depth and stable development of the exhibition industry.

2. Analysis of the Relationship Between the Exhibition Industry and Blockchain

Currently, the exhibition industry continues to face numerous challenges in its reform and innovation efforts, including intellectual property protection, a lack of management systems, and inadequate day-to-day supervision ([1]). Under the influence of these issues, China’s exhibition industry has failed to establish a sound industrial ecosystem, resulting in characteristics such as instability and a lack of standardisation. However, the decentralised, open and immutable nature of blockchain technology is set to inject significant momentum into the industry’s digital transformation process [2–4]. For instance, by utilising technical

measures such as information sharing and identity verification, the industry can overcome the lack of authenticity and limitations inherent in traditional exhibition development. All identity information can be stored uniformly on the blockchain, thereby avoiding the need for users to undergo the overly cumbersome verification processes typical of traditional methods. Furthermore, the use of smart contracts can effectively prevent breaches of contract; once the booking conditions are met, these contracts are enforced automatically and cannot be terminated, which helps to attract more exhibitors and clients to participate in exhibition activities. It is evident, therefore, that blockchain technology is closely linked to the digital transformation of the exhibition industry. Integrating 'Blockchain+' technology into exhibition projects enables the immutability and traceability of data throughout the entire process, addressing industry pain points such as fraudulent exhibitor credentials, opaque transaction data, and difficulties in protecting intellectual property rights. At the same time, a decentralised identity verification system can establish unified digital identity credentials for multiple stakeholders, thereby enhancing the operational efficiency of the entire exhibition ecosystem and, consequently, gaining public recognition and trust [5].

3. How to utilise 'Blockchain+' technology to address challenges in the digital development of exhibitions and the resulting outcomes

3.1. Information Security Issues

Currently, certain exhibition data is overly centralised, posing risks of data leakage or tampering that directly affect clients' rights and interests; however, the consensus algorithms of blockchain technology can effectively resolve this issue. The blockchain consensus process comprises four stages: first, selecting block nodes; second, constructing a new block; third, broadcasting and verifying the new block; and finally, adding the new block to the chain. A comparative analysis of the advantages and disadvantages of three common blockchain consensus algorithms is presented in Table 1:

Table 1 Comparison of the Advantages and Disadvantages of Three Common Consensus Algorithms

Consensus Algorithm	Advantages	Disadvantages
Proof of Work (PoW)	Simple and easy to implement, high security	Low processing efficiency, increasingly centralised
Proof of Stake (PoS)	Reduces consensus time	Detrimental to liquidity, attracts attacks
Delegated Proof of Stake (DPOS)	Faster and higher performance	Weakly centralised or partially decentralised

As one of the most representative consensus algorithms, Proof-of-Work (PoW) provides a foundation for building secure and reliable systems. From a theoretical perspective, if an attacker controls more than 50% of the system's computing power—that is, possesses at least 51% of the hashing power—they have, statistically speaking, gained control over the right to produce blocks across the entire network. In such a scenario, attacking the system would result in the attacker becoming the greatest victim. Building upon this, imposing economic

constraints on attackers can increase the cost of malicious behaviour for nodes. By establishing specific reward mechanisms, any node participating in the ledger that is the first to secure the right to generate a new block receives the corresponding reward. This approach addresses cheating issues from a technical perspective whilst, from an economic standpoint, incentivising users to voluntarily adhere to the rules, thereby ensuring the system remains secure. In response to the information security challenges facing the digitalisation of the exhibition industry, prioritising consortium blockchains—which offer faster transaction speeds and higher security—can fundamentally enhance the speed of online transactions in the exhibition sector [6-8].

3.2. The Crisis of Online Exhibitions

Supported by scientific and technological theories, the exhibition industry has gradually evolved into a development model where online and offline activities run in parallel. The two are not in competition with one another, but rather mutually reinforce each other, develop in synergy, and innovate together. However, an examination of the current phenomenon of insufficient reach in digital exhibition dissemination reveals the following primary issues: Firstly, the video streaming and online tools employed are inadequate; secondly, exhibition livestreams are one-way, lacking interfaces for customer enquiry services, making it difficult for customers to communicate directly with exhibitors on the trading platform; furthermore, live stream pages can be closed at any time, preventing viewers from extracting valuable content from the vast amount of information; finally, participating in online exhibitions requires the submission of extensive personal details, the overall process is cumbersome, and there is no guarantee of customer data security. To address these issues, the appropriate use of blockchain technology can be employed to construct a platform architecture that facilitates direct interaction between manufacturers and customers. This would enable customers to enquire about specific details and use technologies such as 3D rendering to directly visualise the internal differences between products, whilst ensuring that customer information is not stored by local organisations. Furthermore, merchant information would be subject to strict scrutiny to prevent false advertising [9]. Supported by this architecture, online and offline exhibitions can be effectively integrated: on the one hand, a visual management interface can simplify the administration of the blockchain network, whilst one-click automated deployment capabilities enable rapid network setup; on the other hand, it supports a variety of security control strategies to ensure the secure and reliable operation of the blockchain network; simultaneously, by leveraging standardised components and development interfaces, it enables the rapid development and integration of various exhibition-related blockchain applications, thereby reducing overall operational costs, improving resource utilisation efficiency, and promoting the vigorous development of the exhibition industry [10].

3.3. Excessive Data Traffic

As a data storage application method, distributed storage technology primarily utilises the storage space of all machines within a network system to consolidate overly dispersed storage resources into a unified virtual storage device. Although data is distributed across different machines in the system, users can directly search for and utilise the data when accessing it [11-13]. An analysis of data distribution methods indicates that these methods primarily employ horizontal sharding to distribute tuples from business data tables across various nodes. This helps filter out unnecessary data, enables rapid identification of data storage

locations, and consequently enhances database performance. The overall system design offers exceptional availability, scalability and data security, effectively addressing the issue of excessive data traffic in the digitalisation of the exhibition industry [14–15].

Conclusion

In summary, ‘Blockchain+’ technology can effectively address multiple challenges in the digitalisation of the exhibitions and conventions sector, including information security, intellectual property rights, customer trust and service traffic. However, in practical application, comprehensive exploration must be conducted in conjunction with specific exhibition projects; only in this way can the advantages of ‘Blockchain+’ technology be fully demonstrated, thereby driving the innovative development of China’s exhibitions and conventions industry.

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