Proceedings of ICEMGD 2024 Workshop: Innovative Strategies in Microeconomic Business Management
DOI: 10.54254/2754-1169/109/2024BJ0128

The Impact of Blockchain Technology on E-commerce Product Development: Case Studies of Walmart and LVMH

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Abstract: In the current digital era, the emergence of blockchain technology has profoundly impacted business models, especially in e-commerce. Blockchain technology brings new opportunities and challenges to product sales, transactions, and management. This study examines the impact of blockchain technology on the development of e-commerce products, particularly through the cases of Walmart and Louis Vuitton (LVMH). It demonstrates the application of blockchain and its effects on product traceability, anti-counterfeiting verification, data transparency and privacy protection. It was found that blockchain technology improves data security and user trust, reduces transaction costs, and enhances supply chain management efficiency. However, blockchain also needs help regarding energy consumption, performance bottlenecks, privacy protection, inconsistent technical standards, and unclear laws and regulations. It is necessary to take appropriate measures to reduce risks and ensure the effective application of technology. This study concludes with a series of recommendations to promote the effective application of blockchain technology in e-commerce to facilitate the e-commerce industry's sustainable development.

Keywords: Blockchain Technology, E-Commerce Development, Product Traceability

1. Introduction

In the current digital era, the emergence of blockchain technology has brought about profound changes to business models [1, 2]. Particularly in the field of e-commerce, blockchain technology brings new opportunities and challenges to the sale, transaction and management of products [3, 4]. This study aims to explore the impact of blockchain technology on the development of e-commerce products. Blockchain is the emerging technology with the greatest potential to revolutionize e-commerce products [5]. It is widely used in finance, the internet and supply chain, bringing more efficient, secure and trustworthy solutions to various industries. In the field of e-commerce, the application of blockchain technology has already begun to show results. For example, through blockchain technology, the traceability and quality assurance of e-commerce products can be realized, which enhances consumers' trust in the products [6, 7]. It also reduces transaction costs and risks, enables peer-to-peer transactions and reduces intermediate links [8]. In addition, blockchain technology can improve the security and transparency of e-commerce platforms, protecting consumers' privacy and rights [9].

However, the application of blockchain technology also faces several challenges and issues, such as high technology costs, data privacy and security risks [10]. Therefore, this study analyses and

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explores the impact of blockchain technology on developing e-commerce products and uses this new technology to promote the development and progress of the e-commerce industry. In the next section, this paper will explore the impact of Internet blockchain technology on developing e-commerce products and its application practices through specific case studies.

2. Case Description

Blockchain technology is ushering in a wide range of applications on the ground, especially regarding the traceability of the growing number of applications. Walmart, the world's largest retailer, has been introducing blockchain technology recently. Food is the material basis for human survival, and food safety has a bearing on social stability, economic development and public health. As a result, food safety has always been an issue of great importance and concern for countries around the globe. Walmart sells fresh food and other products in shops and online and has an extensive quality security and distribution system worldwide. Walmart has always sought food traceability and transparency, which is why Walmart uses blockchain technology. Walmart and IBM Collaborate to Launch Food Safety Traceability Platform Leveraging Blockchain Technology to improve the transparency and security of the food supply chain. The platform allows participants to track food products from production to distribution and access information by scanning QR codes on product packaging.

For example, Walmart targets pork and its journey from farm to fork in China. Blockchain technology allows Walmart retailers to digitally trace individual pork commodities within minutes to learn everything from farms and processing plants to batches, storage temperatures, and shipping details. From there, you can determine if the item is authentic, safe, and when it expires. If there is a food contamination incident at a farm or factory, blockchain can let Walmart retailers know which items need to be recalled and which can continue to be sold.

The proliferation of counterfeit goods seriously threatens the image and status of luxury brands. Consumers can become skeptical about the authenticity of a brand, which affects their trust and loyalty to the brand. LVMH has always been a leader in the luxury industry. To curb the proliferation of counterfeit goods and the illicit trade in luxury goods on the grey second-hand market. Hence, LVMH adoption of blockchain technology. The Aura platform, launched by LVMH in partnership with Microsoft, utilizes blockchain technology and aims to protect the intellectual property rights of luxury goods. The platform does this by recording the production and distribution of products, including the various types of raw materials used, such as wool, leather, tanning processes, production, transport and ultimately, to the consumer at every step. Ensure product authenticity and origin and provide brand authorization management and anti-infringement piracy features. For example, in LV's crocodile bag, consumers can scan its QR code or chip from the crocodile farm to the processing plant and then to the sales market and the second-hand market bag circulation path consumers can see at a glance. Through two specific cases, to analyze and compare, blockchain counts both ordinary food e-commerce and high-grade luxury e-commerce, which have their unique advantages and roles. The principle of blockchain technology applied to products involves the core features of blockchain, including decentralization, distributed ledger, cryptographic protection, etc., and the positive impact of these features on product traceability, anti-counterfeiting and tracking. From the basic concept of blockchain, blockchain is a distributed, tamper-proof ledger consisting of blocks containing a certain amount of transaction data [11]. Blockchain technology is a database technology with cryptographic principles and distributed networks. Blockchain has no concept of a "center". Structurally, the peer-to-peer network is at the bottom of the blockchain, maintaining and updating data through the consensus mechanism between nodes, thus achieving decentralized and more efficient management and storage of product data. The utilization nodes maintain a complete copy of the ledger and protect the data from being easily tampered with or forged by ensuring consistency across all nodes through a consensus algorithm.

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3. Case Analysis

3.1. Blockchain Technology and E-commerce Products

Blockchain technology in the development of e-commerce products is inevitable and rational. It is mainly reflected in the following aspects.

Increased Data Security and Trustworthiness. The first important characteristic of the blockchain is to build a decentralized and de-trusted mechanism, which no longer needs a third-party credit certification and guarantee agency, no matter if you are a good person or a bad person, the mechanism of the blockchain can guarantee that the result is credible because the bad person does not have the opportunity to do bad things. In the e-commerce space, data security and trustworthiness are critical. Blockchain technology's decentralized and encrypted nature can ensure the security and non-tampering of transaction data, thus enhancing the trust and user experience of e-commerce platforms. For example, the LV aura platform protects creative intellectual property, offers exclusive offers and campaigns for each brand's customers and anti-advertising fraud.

Commodity Traceability and Anti-counterfeiting Verification. Blockchain technology enables traceability tracking and anti-counterfeiting verification of commodities. Consumers can scan the commodities' blockchain QR codes or barcodes to understand their production process and origin information and ensure they buy authentic commodities, strengthening their trust in the products. For example, Aura can provide proof of the authenticity of luxury goods and track their origins, from raw materials to point of sale to the second-hand market.

Increased Data Sharing and Transparency. Blockchain-based data element flow platform for supply chain finance. First, it can help solve the trust problem across geographies, organizations and systems. Enterprises in the supply chain are often located in different geographies, involve many organizations, and their business systems are not interconnected, and there is the problem of data silos. Blockchain technology enables the sharing and updating distributed ledgers, where each participant can access and update data in real-time, improving data transparency and sharing. E-commerce platforms can realize data sharing with suppliers, logistics companies and other partners with the help of blockchain technology, which strengthens the efficiency of supply chain management and collaboration. For example, before Walmart used blockchain, tracking food’s origin usually took almost a week. Now, with blockchain, traceability can be done in just above seconds.

Combating Counterfeiting and Copyright Infringement. Blockchain technology can track the ownership and circulation of goods, preventing the inflow of counterfeit goods and infringements. Consumers can verify the authenticity of goods through public records on the blockchain, thus reducing the sale of counterfeit goods and infringement. For example, Aura says that every step of the production cycle of each item is recorded, resulting in a new, transparent way of verifying authenticity. The timeline of a product - from the raw material to its passage through dyeing, weaving, tanning, manufacturing and shipping through blockchain technology - will allow consumers to identify whether the product they are buying is authentic effortlessly.

In summary, the application of blockchain technology in e-commerce products has reasonableness and certainty, which can enhance data security and trustworthiness, realize commodity traceability and anti-counterfeiting verification, apply smart contracts, enhance data sharing and transparency, and combat counterfeiting and infringement of rights, to promote the development and progress of the e-commerce industry.

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3.2. Adverse Effects

Blockchain technology is not a panacea; it can positively impact e-commerce products, but its development has many problems. Despite the many advantages of blockchain technology in many ways, it also has some drawbacks and possible adverse effects when applied to e-commerce products:

High energy consumption. The consensus mechanisms of blockchain technology (e.g., proof-of-work) require a large amount of computing power and electricity to validate and package transactions, which results in high energy consumption that may increase the operating costs of e-commerce platforms and adversely affect the environment. Mining brings with it a huge waste of energy. Some early estimates put the waste at $15 million daily, while others are even higher.

Performance bottleneck. Performance bottlenecks in blockchain technology are a common problem. The blockchain network's limited throughput and transaction processing speed may lead to transaction delays and congestion, affecting the transaction efficiency and user experience of e-commerce platforms.

Difficulty of privacy protection. With the blockchain approach, which lets everyone store their records in a decentralized way just by holding a pointer and a possible channel, many issues still need to be solved to make users feel trustworthy. The characteristics of blockchain technology determine its attributes of data non-tampering openness and transparency. However, this also means that user's personal information and transaction data will be permanently stored on the blockchain, and there may be a risk of privacy leakage, which is an important hidden danger for e-commerce platforms.

Different technical standards. The standards for blockchain technology still need to be unified, and different blockchain platforms use different protocols and algorithms, which leads to difficulties in cross-chain interoperability and may increase the complexity and cost for e-commerce platforms in selecting the appropriate blockchain technology and platform. For example, due to the imperfections in the financial regulatory coordination mechanism, there is still a problem of fragmentation of regulatory bodies and allocation of regulatory resources. Fintech innovation, the trend of mixed business operation in the financial market is deepening, there is a complex correlation between different financial services, cross-industry, cross-market financial products and financial services class boundaries become more and more fuzzy, and attribute identification is more and more difficult to split.

Unclear laws and regulations. Due to the relatively rapid development of blockchain technology, the relevant laws and regulations still need to be clarified. This brings certain legal risks and uncertainties to e-commerce platforms applying blockchain technology and may increase enterprises' compliance costs and legal risks.

Low user acceptance. For general users, the concept of blockchain technology is relatively complex and not highly popularised, and many users may need help understanding or trusting blockchain technology, which may reduce the willingness and effectiveness of e-commerce platforms to introduce blockchain technology.

3.3. Recommendations

Adopt more energy-efficient consensus mechanisms. For example, consider using consensus mechanisms such as Proof of Stake to reduce energy consumption. Promote renewable energy: Encourage e-commerce platforms to adopt renewable energy sources for power supply to reduce the adverse environmental impact. The LV Group can use sustainable raw materials, such as recycled fibers, organic cotton, biodegradable materials, etc. Energy consumption and carbon emissions can also be reduced by optimizing logistics and transport, which can be done by using more efficient modes of transport, such as sea, rail, etc., and reducing air transport.

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Optimise blockchain network architecture. They are improving network throughput and transaction processing speed by optimizing block size, adjusting block generation time and other measures. Introducing Layer 2 solutions, consider introducing Layer 2 scaling solutions, such as Lightning Network, to improve transaction processing efficiency. Investments in skills such as artificial intelligence and robotics learning can be made to improve supply chain operations, identify potential cover or bottlenecks promptly and take corrective action.

Use of privacy-preserving techniques. Privacy-preserving techniques (e.g., zero-knowledge proofs, homomorphic encryption, etc.) are used to encrypt and protect sensitive user information to safeguard the user's privacy. Strengthen permission control mechanism: Establish a strict permission control mechanism to ensure that only authorized users can access and modify specific data to reduce the risk of privacy leakage.

Promote standardization of cross-chain interoperability. Actively participate in blockchain technology standardization organizations to promote standardization of cross-chain interoperability to reduce technical barriers between different blockchain platforms. Collaboration with other companies and organizations to share resources and expertise could be adopted. Conduct research and discussions on the direction, scope and objectives of the standardization work to identify more comprehensive and reasonable standards for blockchain technology.

Choose blockchain platforms with greater versatility. When choosing blockchain technologies and platforms, prioritize platforms with greater versatility and better ecosystems to reduce the risks associated with varying technical standards.

Pay close attention to changes in regulatory policies and laws and regulations. Keep abreast of and comply with relevant regulatory policies and laws to ensure blockchain technology's application in e-commerce products complies with legal requirements. Active participation in relevant legislation and policy formulation: actively communicating with regulatory authorities, industry associations, and others; participating in the process of relevant legislation and policy formulation; and promoting the improvement and clarification of regulatory policies, laws, and regulations.

Low user acceptance. Strengthening user education and publicity: Introducing blockchain technology’s advantages and application scenarios to users by organizing training and publishing publicity materials. Increase users’ awareness and acceptance of blockchain technology. Provide a friendly user experience, design a simple, intuitive and easy-to-operate user interface to lower the threshold for users to use blockchain technology products and enhance the user experience.

Through the above measures and suggestions, the possible adverse effects of blockchain technology in e-commerce products can be effectively counteracted, and the success and effectiveness of its application can be improved.

4. Conclusion

In the digital age, e-commerce is booming, providing consumers with a more convenient and efficient shopping experience. And the emergence of blockchain technology provides new opportunities and challenges for developing e-commerce products. Reasonable use of blockchain technology to maximize its positive benefits is significant in promoting the development of e-commerce products.

Blockchain technology enables the traceability and tracking of goods from production to distribution. By scanning the blockchain QR code or barcode on the goods, consumers can obtain detailed information about the production of the goods, the source of raw materials and other details. This transparency increases consumer trust in the product, enhances brand credibility, and helps to build a good quality image of the e-commerce product. With the help of blockchain technology, e-commerce platforms can implement anti-counterfeiting verification functions for goods. Consumers can verify the authenticity of goods through blockchain records, which reduces the inflow of counterfeit and shoddy goods and protects the legitimate rights and interests of consumers. This

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protection mechanism enhances consumer trust in e-commerce products and helps to increase user loyalty. The smart contract function of blockchain technology enables automated transaction execution and contract fulfillment, improving transaction efficiency and security. E-commerce platforms can use smart contracts to automate payment, logistics tracking, and after-sales service, reducing the possibility of human intervention, lowering transaction risks and enhancing the user's shopping experience. Through the blockchain's decentralization and encryption features, e-commerce platforms can better protect users' personal privacy and transaction data security. Consumers' personal information and transaction data are stored on the blockchain and are not easily tampered with or leaked. This protects users' privacy and data security and enhances consumers' trust in the e-commerce platform. Reasonable application of blockchain technology can enhance the brand value and market competitiveness of e-commerce products. Functions such as commodity traceability and anti-counterfeiting verification not only improve the quality and credibility of the products but also establish a good image for the brand, enhance the brand's competitive advantage, and help the e-commerce products stand out in the fierce market competition.

The rational application of blockchain technology has brought many positive benefits to developing e-commerce products. Applying commodity traceability and quality assurance, anti-counterfeiting verification, consumer rights and interests protection, smart contract and transaction safety and security, data privacy and security protection, brand value enhancement, and market competitiveness strengthening. E-commerce products can achieve a more efficient transaction process, a more secure transaction environment, and a more trustworthy product quality, thus promoting the continuous development and growth of the e-commerce industry. Therefore, actively exploring and reasonably applying blockchain technology will become an inevitable trend for developing e-commerce products.

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