ICIC Express Letters
Part B: Applications
Volume **14**, Number **12**, December **2023**
 ISSN 2185-2766
pp. **1251–1258**

OPTIMIZATION OF NEW RETAIL MODEL OF ONLINE AND OFFLINE INTEGRATION UNDER BLOCKCHAIN TECHNOLOGY FROM THE PERSPECTIVE OF CONSUMER VALUE

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Received March 2023; accepted May 2023

Abstract. *From the perspective of consumer value and based on the network consumer value model, this paper deeply analyzes a series of problems existing in the new retail model of online and offline integration from the three dimensions of consumer functional value, consumer experiential value and consumer social value. By using the high adaptability of blockchain technology to new retail, the technical advantages of blockchain distributed accounting, non-tampering and smart contracts are applied to new retail. Through targeted improvement of information security, improvement of quality traceability systems and strengthening of service consistency supervision, consumer value has been increased from different links in the consumer value chain, and the new retail model of online and offline integration has been optimized.*
Keywords: Online and offline integration, New retail model, Consumer value, Blockchain, Optimization

1. **Introduction.** In recent years, due to the impact of the epidemic, offline business forms have been under severe pressure. More offline stores have moved online and adopted a new retail model that integrates online and offline. With the increasing popularity of this model, many enterprises have laid out new retail, vicious competition is serious, online and offline complementary advantages are difficult to play, and more new technologies need to be integrated to break through the bottleneck [1]. The advantages of distributed accounting, non-tampering and smart contracts of blockchain technology provide a new carrier for new retail to meet new needs.

At present, there are more than 14,200 articles on the application of blockchain, more than 6,600 articles on new retail, and only 43 articles on the combination of blockchain and new retail. Most of them focus on the changes of new retail formats driven by blockchain and the application of blockchain in new retail supply chain. For example, based on the internal motivation of new retail format changes, the future development path of new retail driven by blockchain technology is studied [2]. In 2020, Wang et al. analyzed the current development status of China's new retail supply chain, and combined the asymmetric encryption technology in blockchain technology to upgrade and optimize the retail supply chain [3]. A few studies have also explored the application prospects of blockchain technology in the field of new retail. For example, the development prospect of blockchain, the main problems of new retail and the application potential of blockchain to solve these problems are analyzed in detail [4].

The core of new retail is consumers [5], and deconstructing the current consumer's ideas and needs is also the key to optimization. However, the existing research on the combination of blockchain and new retail has not really analyzed and optimized the new retail

DOI: 10.24507/icicelb.14.12.1251

model of online and offline integration from the perspective of consumer value. Therefore, from the perspective of consumer value, combined with the network consumer value model, this paper analyzes the existing problems of the new retail model of online and offline integration from the three dimensions of consumer functional value, consumer experiential value and consumer social value. Combined with blockchain technology, consumer value is added from different links of the consumer value chain, and the new retail model of online and offline integration is optimized. Through analysis and optimization, this paper clarifies the main problems that damage consumer value at this stage for enterprises adopting the new retail model of online and offline integration, and provides them with the theory and method of optimizing the model based on consumer value to continuously improve consumer value.

2. Theoretical and Technical Basis.

2.1. **Network consumer value model.** In the context of the increasing competition in the online retail market and the increasing rationality of consumers' online shopping, Ma [6] adopted the method of literature review and qualitative research, based on the theory of consumer value of Sheth et al. [7], constructed the model of consumer value structure in the network environment, and clarified that the network consumer value is a multi-dimensional structure composed of functional value, experiential value and social value.

Functional value is the perception of online consumers that the Internet is simple and convenient to buy good and cheap goods. The problem of commodity quality is one of the most concerned issues for consumers, and it is more difficult for consumers to distinguish the authenticity of goods in the new retail environment. From the perspective of consumer functional value, the new retail model of online and offline integration is analyzed and optimized, and the continuous improvement of consumer functional value is the top priority for the long-term development of the new retail model of online and offline integration.

Experiential value refers to the value of reliable, safe service and pleasant shopping experience that network consumers experience in the process of online shopping. As the main place for consumers to shop in the new retail format, the network's service quality and service attitude will greatly affect consumers' willingness to consume. Therefore, it is of great significance to analyze the new retail model of online and offline integration from the perspective of consumers' experiential value, so as to make the service level of each sales channel develop in coordination, and to give full play to the advantages of the new retail model of online and offline integration.

Social value refers to consumers' perception of the value brought by online shopping in terms of self-image enhancement and group sense of belonging, which is divided into

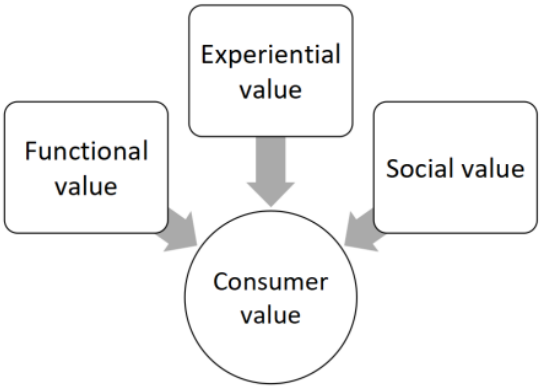

FIGURE 1. Network consumer value model

identity reinforcement and B2C relationship value. Consumer information is becoming more transparent in the new retail environment, and private information security is also under threat. From the perspective of consumer social value, the problem analysis of the new retail model of online and offline integration can effectively improve consumers' sense of belonging and trust in new retail, and lay a consumer foundation for better development in the future.

2.2. **Blockchain technology.** Blockchain technology is composed of data layer, network layer, consensus layer, application layer, and contract layer, and different levels have different functions [8]. First, the data layer. This is essentially a data ledger that can receive transaction data and connect to the main blockchain to form a new block. Second, the network layer. This layer encapsulates the relevant networking methods and data verification mechanisms of the blockchain system, so that each node in the system can participate in the data verification process. Third, the consensus layer. The main role of this layer is to reach consensus. With the continuous development of blockchain technology and increasingly fierce currency competition, it is necessary to form a reasonable currency consensus mechanism. Fourth, the contract layer. This layer mainly encapsulates various script codes of blockchain system to form smart contracts. This can help more applications of blockchain technology in financial and social systems.

2.2.1. *Decentralized.* The accounting, storage, transportation and other activities of data under blockchain technology are based on distributed network systems, and each data node has equal power. In the decentralized new retail environment, each party in the system can join the blockchain system as a node, and each node is equal, ensuring the fairness and security of the transaction. HLA insists on zero inventory, uses the characteristics of decentralization and distributed accounting of block chain technology, directly reduces its own inventory cost, transfers and controls the risk of operation.

2.2.2. *Open and transparent.* The blockchain system is open. In the whole transaction process, the system not only retains the private information of each transaction party, but also makes the whole transaction process open and transparent. In 2017, Jingdong launched the 'Jingdong Blockchain Anti-Counterfeiting Traceability Open Platform', which displays the traceability information provided by commodity brands on the platform to visualize and digitize the quality of goods. New retail based on the blockchain network, from raw materials to commodity production, processing, distribution can be supervised by the blockchain system, and all aspects of information are shared, the product will be more transparent.

2.2.3. *Non-tampering data.* The blockchain uses asymmetric encryption, and uses a distributed system to prevent external attacks, ensuring that data cannot be tampered with and forged, and has strong security. If the manufacturer or new retailer wants to modify the data or conduct product quality fraud, it needs to modify more than 51% of the node information to avoid the possibility of data tampering to the greatest extent, so as to ensure the data reliability of the product quality traceability system. Medical data and new retail customer data are highly similar. The introduction of blockchain technology by Xima Health has effectively guaranteed the authenticity, privacy and security of data and provided a new method for privacy protection.

3. Current Situation and Problems of New Retail Model Integrating Online and Offline.

3.1. **Current situation of new retail model integrating online and offline.** Online and offline integration of the new retail model is the combination of online and offline and

logistics at the same time, to achieve the integration of goods and logistics channels, to achieve the integration of online consumption and offline experience, to meet the multiple needs of consumers. Taking three squirrels as an example, three squirrels opened an offline physical store in order to enable customers to achieve experiential consumption, providing the same category of goods and the same pricing as online, making up for the online platform's inability to meet the experiential consumption and after-sales service of goods.

A major feature of new retail is to use big data to accurately control consumers' purchase behavior and real needs through the collection of consumer information, and conduct intelligent marketing. At the same time, merchants also have a large amount of consumer information, and there is a risk of information leakage. In May this year, for example, UNIQLO's Japanese online shopping site was hacked and the information of more than 460,000 customers was leaked. On the basis of online and offline multi-party integration, the source of orders is more extensive, and many unscrupulous merchants use the gap in commodity traceability of the new retail model to tamper with commodity information to deceive consumers. Omni-channel marketing in the context of the unity of goods and services cannot be guaranteed, e-commerce supply, platform sales and other common.

3.2. **Problem analysis of new retail model integrating online and offline.** Based on the network consumer model, the new retail model of online and offline integration is analyzed from three aspects: social value, functional value and experiential value, as shown in Figure 2.

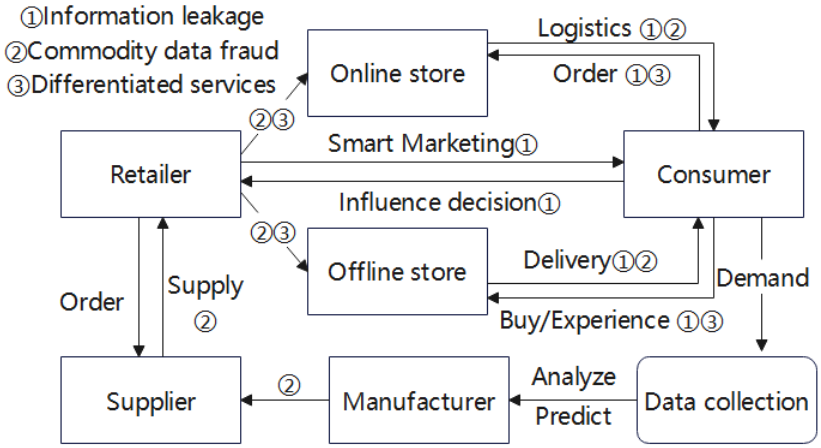

FIGURE 2. Current situation of new retail model integrating online and offline

3.2.1. *Consumer social value.* When users purchase goods in the new retail environment, the filling of online information and the distribution of offline logistics may become channels for criminals to purchase and steal consumer information. In addition, merchants or sales platforms with a large amount of consumer information also have the behavior of intentionally or unintentionally leaking consumer information. Taobao, for example, in 2020 there is a black industry through the mtop order evaluation interface to bypass the platform risk control batch crawl encrypted data, and nearly 1.2 billion user information was leaked. The leakage of consumer information hinders the establishment and maintenance of the relationship between retailers and consumers, and reduces the social value of consumers.

3.2.2. *Consumer functional value.* As the new retail industry in the commodity information technology has not yet formed a complete process and the country in the constraints of product quality, information traceability aspects of the legal provisions are not very perfect, many manufacturers or logistics enterprises through data fraud, in order to seek

profits. On March 14 this year, 100,000 pieces of Dandong strawberry sold by e-commerce were exposed to fraud. The consignee purchased and packaged strawberries in Jiangsu, and then shipped them for online stores in the name of "warehouse delivery". In the new retail environment, it is difficult to distinguish the authenticity of products, which seriously damages consumers' good perception of the quality of goods, reduces brand credibility, and affects consumers' functional value.

3.2.3. *Consumer experiential value.* For online and offline integration of the new retail model, retailers sell channels, there are many ways, and there is information asymmetry between retailers and consumers, consumers cannot perceive other channels of commodity service levels. Some merchants will provide different discounts and after-sales services to various channels due to various factors. Taking Taobao and Pinduoduo as examples, the same giant snack gift bag of three squirrels is sold for 188 yuan on Taobao and 133 yuan on Pinduoduo. After the same situation occurs many times, the effectiveness of the information provided by the website will be greatly reduced, and it will also lead to a series of problems before and after purchase, which will directly affect the pleasure of consumers' shopping process and damage consumers' experiential value.

4. Optimization of New Retail Model Integrating Online and Offline.

4.1. **Specific optimization measures.** Aiming at the problems of the new retail model of online and offline integration in the three aspects of consumer functional value, consumer experiential value and consumer social value, this paper optimizes the model by improving the product quality traceability system of each channel, strengthening the supervision of the consistency of goods and services, and improving the security of consumer information, as shown in Figure 3.

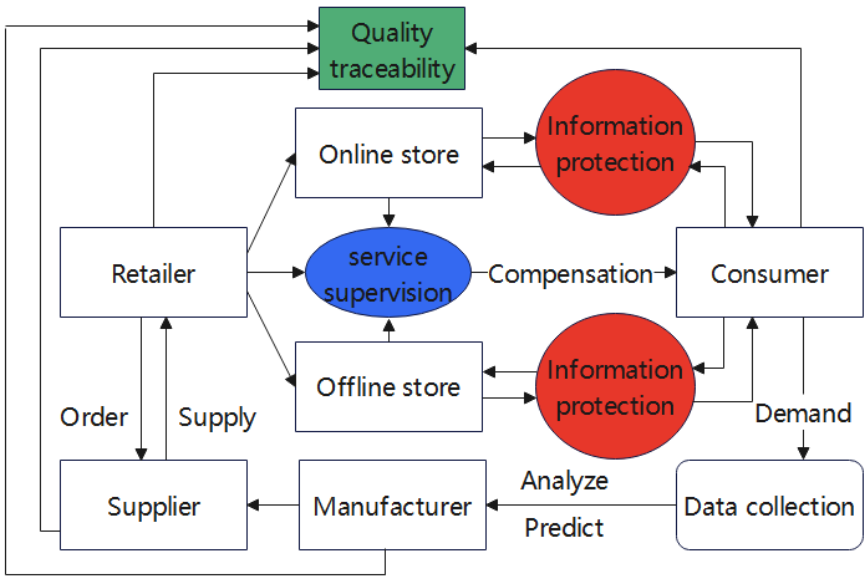

FIGURE 3. Optimization of new retail model integrating online and offline

4.1.1. *Improveing the information security.* In the context of new retail, consumers are very passive in protecting their private information. The introduction of blockchain technology allows users to retain control over personal information: First, consumers can create their own independent identity on the blockchain, and control this identity to effectively protect their privacy. Secondly, blockchain technology adopts asymmetric encryption. Each customer will have its own public key and corresponding private key. Only when they have two corresponding keys at the same time can they be decrypted, which

ensures that personal privacy cannot be stolen by other users to a greater extent. Finally, the transaction data on the blockchain is open and transparent to all users, and consumers can track the use of their own data, thereby strengthening the monitoring of personal information. In addition, the blockchain uses a distributed network structure, there is no central data service provider, and there is no problem like Taobao batch user data leakage. The introduction of blockchain makes consumers' private information highly protected, effectively increases consumers' sense of belonging and their perception of online retailers' efforts to build various relationships, and improves consumers' social value.

4.1.2. *Perfecting the quality traceability system.* The distributed accounting of the blockchain can realize the joint accounting of each node in the new retail supply chain. The commodity registers the commodity information at the source, and gives each product a unique 'identification code'. Each link records the operation information to the corresponding block through the identification code, and supervises the whole process of the product. All stored data are completely trustworthy without tampering and can be traced back to the quality information of raw materials, price information of goods, logistics information of transportation process, etc. By mastering the data of each stage, retailers can also monitor the product quality more closely. If there is a problem with the product, the responsibility can be quickly divided through data query, and the compensation for consumers in the later stage will be faster. All data are screened and classified, and uploaded to the quality traceability platform. Consumers can trace products through the platform. The introduction of blockchain technology enables consumers to join the supervision of the entire supply chain, maximize customer needs, and save energy costs and time costs for consumers. The establishment of the quality traceability system effectively improves the higher the product quality and brand credibility, and significantly increases the functional value of consumers.

4.1.3. *Strengthening the supervision of service consistency.* Merchants and consumers rely on blockchain technology to jointly negotiate smart contracts that constrain the behavior of both parties. A smart contract refers to writing a program code and running the corresponding code to fulfill the promise of digitization. When the condition meets a certain contract, the corresponding contract will be automatically executed [9].

After the two parties sign a smart contract, the smart contract will automatically compensate the consumer if the difference between the price of the same goods or services from other channels (the same retailer) and the consumer's purchase price exceeds the normal floating range (the floating range can be set) when the consumer has purchased the goods or services. It no longer needs the supervision of the central agency and excludes the possibility of third-party intervention. It can ensure the accuracy and efficiency of contract execution, avoid disputes between various channels due to differences in service and price, and effectively suppresses the occurrence of irregular behaviors. All transaction information and smart contract information will be stored on the blockchain, and the data will be open and shared, breaking the previous information asymmetry problem. The effectiveness of information, service superiority, and process pleasure have been significantly improved, and consumer experience value will also increase.

4.2. **Consumer value enhancement.** Lai from the perspective of individual consumers and characteristics, through theoretical abstraction, questionnaire survey, SPSS software analysis concluded that consumer value chain includes understanding information, convenient purchase, utility, economic payment, assured consumption, easy to dispose of six links [10]. Through the optimization of the new retail model of online and offline integration, the improvement of consumer value is obtained through three links, as shown in Figure 4.

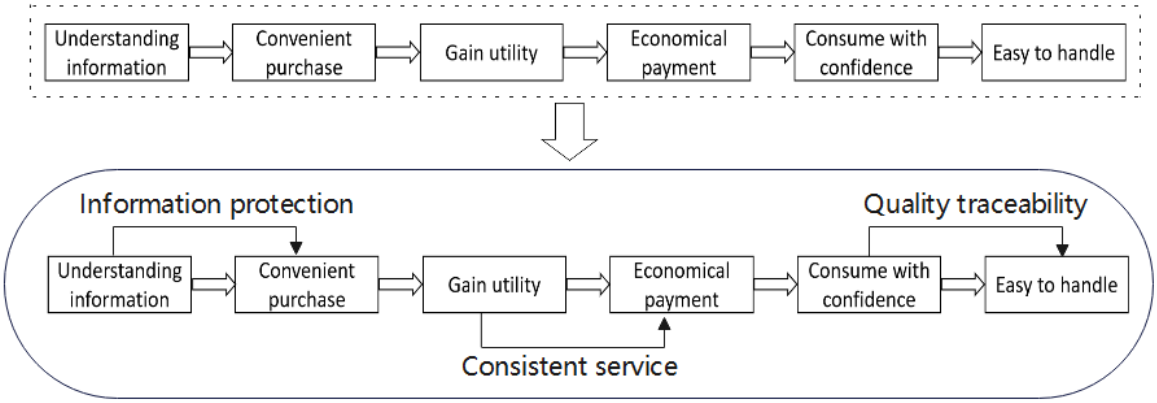

FIGURE 4. Consumer value chain

Information protection optimization: The addition of the blockchain improves the security of consumers' private information in the pre-purchase stage of consumers in the new retail environment, reduces consumers' mistrust in the process of evaluation selection and purchase decision-making, and understands the concerns of personal information leakage in information, meets the needs of consumers, and effectively improves consumer value.

Service quality optimization: Through the smart contract of blockchain technology, the online and offline service differentiation is constrained, so that consumers' multiple service needs in the purchase behavior are met, and the consumer value is improved again.

Quality traceability optimization: The establishment of a quality traceability system based on blockchain technology has made consumers more confident in the authenticity and safety of product attributes under the new retail model of online and offline integration, reducing consumers' concerns about product quality and enhancing consumer value.

5. **Conclusion.** This paper analyzes and optimizes the new retail model of online and offline integration from the perspective of consumer value and relying on the network consumer value model. Always standing in the perspective of consumers and constantly improving consumer value have a positive impact on the future development of the new retail model of online and offline integration, and also provide new retailers that adopt the online and offline integration model with the theory and method of continuous model optimization based on consumer value.

Compared with the current situation of the new retail model of online and offline integration, the introduction of blockchain technology for the purpose of improving consumer value can not only solve the problem of consumer information security to a certain extent, but also effectively eliminate the problem of commodity data fraud and online and offline provision of differentiated services. It provides conditions for better integration of online and offline, and also puts consumers at the core, which is in line with the central concept of new retail. In the long run, blockchain, as a new generation of information infrastructure, has changed the way information and goods are connected through decentralized trust mechanisms, bringing about changes in production relations. In the future, new production relations and trust relations will have a significant impact on new retail. Combining blockchain technology with new retail, the retail industry will develop more vigorously.

REFERENCES

[1] X. Hu, M. Wang, Z. Wang, Y. Sun and S. Ye, Current status and prospect of research on operation and management of new retail model integrating online and offline, *Systems Engineering Theory and Practice*, vol.40, no.8, pp.2023-2036, 2020.

[2] X. Yan, The change and development path of new retail formats driven by blockchain technology, *Techno-Economics and Management Research*, vol.1, pp.10-15, 2019.
[3] Q. Wang, Z. Chen and P. Wang, Application of blockchain technology in new retail supply chain, *Business Economics Research*, vol.14, pp.34-36, 2020.
[4] X. He, Blockchain and the future development of new retail business model, *China Collective Economy*, vol.7, pp.109-111, 2020.
[5] S. Zhao and X. Xu, The meaning, model and development path of 'new retail', *China's Circulation Economy*, vol.31, no.5, pp.12-20, 2017.
[6] H. Ma, Research on consumer value structure in the network environment, *Business Economics Research*, vol.19, pp.5-7, 2016.
[7] J. Sheth, B. Newman and B. Gross, Why we buy what we buy: A theory of consumption values, *Journal of Business Research*, vol.22, no.2, pp.159-170, 1991.
[8] B. Sun, Development status and prospect of blockchain technology, *Digital Communication World*, vol.11, p.51, 2018.
[9] J. Xu and X. Guo, Mechanism and promotion strategy of blockchain technology driving new retail ecosystem, *Economic System Reform*, vol.2, pp.180-186, 2021.
[10] Y. Lai, Theoretical construction and empirical analysis of consumer value chain, *China Circulation Economy*, vol.27, no.12, pp.45-52, 2013.