

# Business Model Innovation based on Blockchain Technology: A Review

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**Abstract**—Blockchain technology, as a hot Internet technology, has powerful functions such as decentralized collaboration, product traceability, intelligent contract automatic performance and so on. At present, relevant application research has been carried out in many fields, but the literature research on blockchain technology in business model innovation is relatively novel, so this paper carries out cross-database retrieval based on CNKI database, including relevant literature collected from Web of Science, SCI, EI and other databases from 2008 to 2021, to determine the three research perspectives and two research directions of this paper. The research results of this paper have a certain enlightening value for the theoretical research and practical exploration of business model innovation under the background of blockchain.

**Keywords**—blockchain technology; business model innovation; literature review

## I. INTRODUCTION

In 2015, as the first year of blockchain, the variety of digital currencies continues to enrich and the bitcoin market has ups and downs. In this context of the Internet, the concept of blockchain has been widely understood and used. But now the development of global blockchain is only in the early stage of 2.0, now blockchain is only used for the mining and trading of electronic money, and no enterprise can use blockchain to replace the traditional industry. Although the development of blockchain is not rapid in practice, the R & D of some foreign experts and scholars has entered the 3.0 era, and the R & D results are far ahead of the practical application. We need to closely link the blockchain with practical applications and focus on new forces in emerging or traditional industries such as finance, insurance, healthcare and the sharing economy. The integration of these industries and blockchain can stimulate new forces and explore a path of innovation based on the "blockchain +" business model.

On October 24, 2019, the political Bureau of the CPC Central Committee conducted the 18th collective learning with the current situation and trend of blockchain technology as the theme, and identified blockchain technology as the key breakthrough in enterprise technological independent innovation promote the integrated development of blockchain, technology and industrial economic innovation, and

make it a recognized force for the rapid development of blockchain and its highly respected application. Blockchain technology has outstanding application advantages, such as data traceability, decentralization, openness and trustworthiness and so on. Blockchain technology has a wide range of applications, from Bitcoin, the real economy, the Internet of things, financial services to public services. With the rapid development of blockchain technology, it can bring the driving force of business model innovation for enterprises, and only by constantly innovating business models can enterprises obtain economic profits in the fierce market competition and achieve sustainable development.

In the related academic research field, the research on the business model innovation of blockchain technology is gradually increasing, and different scholars have different views. Song Lifeng et al. through the comparative analysis of the cases of business model innovation path, established that the direction of block chain business model innovation is to eliminate monopoly, independence and win-win cooperation [1]. Zhang Hao and Zhu Peifeng analyzed the main application scenarios and corresponding enterprise innovation cases of business model innovation, and constructed a preliminary analysis framework for exploring business model innovation under the background of blockchain [2]. Zhu Xiaowu and Hu Dongbin et al believe that blockchain technology can accelerate the business model innovation of enterprises, and through case studies and scientific measurement respectively, this paper constructs the blockchain-driven business model innovation theoretical model and the "blockchain +" business model research framework, which provides a solid theoretical basis for enterprises to use blockchain technology [3,4]. Through the scholars' research on blockchain technology in business model innovation, we can know that enterprise business model innovation combined with blockchain technology has a very promising application prospect. Scholars have many research perspectives on business model innovation under the background of blockchain technology and the research trends are different. For this reason, this paper summarizes and analyzes the related research, defines the concepts of blockchain technology, business model and business model innovation, and reveals the research perspective and the development trend of the research direction.

## II. THE FORMULATION OF LITERATURE COLLECTION STRATEGY

Considering the authority of the literature database and the pertinence of the literature, this paper carries on the cross-database search based on the CNKI database, including Web of Science, SCI, EI and other articles about blockchain technology and business model innovation. Blockchain technology is a new concept of technological innovation put forward by Satoshi Nakamoto for the first time in 2008, which has set off an upsurge of research on blockchain technology in academic circles. Therefore, the search interval is set to 2008-2021 in this paper. In view of the fact that after 2008, scholars may put forward the concepts of blockchain technology, business model and so on. In this paper, this part of the literature will be analyzed and summarized, and will be added to the study of this paper.

## III. RESEARCH RESULTS

### A. *The concept of Block chain and Business model innovation Technology*

Because of the future application value of blockchain technology, many scholars have studied it and put forward different views on its concept. Sun Yi believes that blockchain is a data structure that combines blocks in a chained way, which has no central control node and uses distributed collective operation to build a distributed peer-to-peer network [5]. Hussein and Khalifa pointed out that blockchain is the main mechanism of bitcoin concurrency [6]. The Agbo and Mahmoud proposed that block chain is an immutable ledger or database shared by peers in the network, which consists of events or transactions attached in chronological order [7]. The Schwarz and Lewin proposed that blockchain is a decentralized transaction repository that is continuously coordinated by all participants and whose data is considered immutable [8]. Chu proposed that blockchain is an advanced technology to realize intelligent contracts, various transactions and P2P cryptocurrencies in e-commerce society [9]. Based on the definition of blockchain technology by scholars, it is found that the concept can be summarized as a distributed ledger with consensus mechanism and intelligent contract.

Different scholars have given many kinds of concepts about business model, among which Clauss believes that business model innovation is the innovation of value creation, value proposition and value acquisition. Because business model innovation involves the relevant structures of suppliers, dealers, customers and other business systems, we should consider the elements and pay attention to the integration of internal and external resources and capabilities in business model innovation [10]. Other scholars' concepts of business model innovation are as follows. Zhaojie Wang believes that business model innovation is the key driving force for the development of strategic emerging industries, and puts forward that technological breakthroughs and new technology applications are the basis of business model

innovation [11]. Euchner believes that business model innovation is the key to gain value from internal innovation [12]. Meng pointed out that business model innovation is the innovation of business positioning, marketing model and profit model [13]. Laudien business model innovation is a strategic choice for enterprises to enhance their competitiveness [14]. Filser, Kraus et al. believes that business model innovation is the key for enterprises to maintain sustainable and dynamic development [15]. Ma et al. described business model innovation is a kind of value creation activity based on market demand [16].

### B. *The Research Perspective of Block chain Technology*

By collecting, reading and sorting out the relevant literature, it is found that there are many kinds of prospects for the current blockchain technology research. On this basis, this paper summarizes the different perspectives of previous studies.

- Perspective of technology application

The results of Ying and Jia survey show that blockchain brings a new IT capability, and focuses on how to use blockchain and its capabilities to create new IT applications and business models, which is conducive to the cooperation between different types of business units in distributed networks [17]. Zhang and Wen realizes the transaction of intelligent property and payment data on the Internet of things with the help of P2P transactions based on blockchain and intelligent contracts [18]. Hussein et al. believe that blockchain can improve the efficiency of the network and improve the security of the network [19]. Agbo et al. and Kuo et al. compare the popular generic blockchain framework with the requirements of healthcare systems to guide health informatics researchers and practitioners to choose an appropriate platform to develop and test blockchain-based healthcare applications [20,21]. Alammary et al. considered that research on educational applications based on blockchain had been conducted, focusing on three main themes: educational applications that have been developed using blockchain technology, the benefits that blockchain technology can bring to education, and the challenge of adopting blockchain technology in education [22]. Gai et al. believe that blockchain technology is an ideal choice to strengthen existing computing systems, and that the integration of blockchain technology with existing cloud systems has great potential in terms of feature enhancement and security privacy improvement [23]. Jovic et al. and Pu et al. described in detail the current situation and rising trend of blockchain technology in shipping industry, and provided the most prominent application examples of blockchain in shipping industry [24,25]. Aderibole et al. analyzed the standard NIST conceptual model in the smart grid domain, involving three key blockchain features: decentralization, trust and motivation [26]. Wang and Su believe that blockchain may be promoting renewable energy and our energy sustainability, and finally put forward the possible

development trend of energy blockchain in the future [27]. Zhao and Chan proposed a cost and risk analysis framework and a planning method for the application of blockchain in carbon trading. The implicit design requirements are inferred and analyzed, and a new architecture of hybrid block chain system is proposed [28]. Li et al. proposed a wireless blockchain middleware architecture (BlockWare) based on the blockchain middleware layer that connects wireless applications and the underlying blockchain infrastructure [29]. Vijay et al. believe that blockchain is one of the key innovative technologies in logistics and supply chain management. Blockchain technology can effectively record every asset in the entire logistics process, helping to track orders, receipts and payments, as well as digital assets such as warranties and licenses in a unified and transparent manner [30].

- Business model perspective

Mukkamala et al. studied the application of blockchain technology in solving some key challenges in the field of social business. The study found that the solutions provided by blockchain technology can enhance the trust, transparency and auditability of social business activities [31]. Burer et al. consider aspects related to the energy consumption of blockchain architecture, as well as the risks and opportunities of emerging business models, while ensuring reliable distribution networks and supply security [32]. Chong et al. interpret how pioneers in this field use blockchain to create and capture value by using the theoretical perspective of digital business model and value allocation, so as to promote the contemporary knowledge of blockchain business application [33]. Dehbasteh et al. proposed that the determinants of the business model based on blockchain include nine canvas blocks, and a new category, called "cooperation", has been identified in this study. Given the nature of blockchain information sharing, the way to cooperate is for all stakeholders in the value chain to share their values and generate new value-added products or services that they cannot access alone [34]. Mokeychev et al. proposed a new Russian insurance model by using blockchain technology to develop the Russian insurance market, which began with the use of blockchain technology to develop mutual insurance associations [35]. Morkunas et al. based on the complete business model framework of Osterwalder and Pigneur, outlines the impact of blockchain technology on each element of the business model, as well as the illustrations of companies that develop blockchain technology [36]. Oganda et al. believe that the combination of blockchain technology and MOOC-based intelligent program education platform is the development trend of Internet online education [37]. Rajnak and Puschmann believe blockchain technology will reshape the existing business model of the financial services industry [38]. Aghaei et al. show that the blockchain platform has changed the business model of tourism [39]. Blockchain technology can improve sustainability by achieving information traceability,

security and non-manipulation, which is especially useful in the field of agri-food, developed a set of meaningful predictions of the impact of 36 blockchains on business models, and it is expected that by 2030, the value Internet will replace the information Internet [40].

- Business model innovation perspective

Nowinski and Kozma proposed that blockchain technology can influence and destroy business models in three key ways: through certification of traded goods, through disintermediation and by reducing transaction costs. Research shows that blockchain technology may affect different dimensions of business models in different industries. It is recommended that managers should pay attention to developments in this area in order to prepare for possible industry disruptions [41]. Klockner et al. blockchain can help companies overcome intellectual property and data security barriers and enable them to take advantage of emerging 3D printing business models. Specifically, blockchains can promote local manufacturing and may lay the foundation for new business models, such as safety design markets and shared factories. Blockchain can change the way companies create, deliver, and acquire value in the 3D printing ecosystem [42].

#### IV. CONCLUSIONS AND PROSPECTS

First of all, although the blockchain technology is the integration of many technologies, it does not overlap and is different from the blockchain. The configuration of technology composition determines different business innovation models; secondly, because of the diversity and complexity of block chain technology, it is difficult to generalize the characteristics of "blockchain +" business innovation model. It needs to be summed up and improved in time in the continuous dynamic changes. Because blockchain technology itself is related to interconnection, the characteristic dimension of "blockchain +" business model innovation is not independent. Like the relationship of blocks, they exist independently and are related to each other, so it is difficult to separate them. Together, it constitutes a comprehensive and comprehensive form of expression. Finally, although blockchain has many advantages and is constantly innovating, blockchain technology is not omnipotent. From the perspective of the impact of blockchain on the existing business model, its scope only includes network security, privacy, data rights and so on, or in other areas to achieve the role, so the scope of blockchain is not extensive. The essence of "blockchain +" business model innovation is to reshape the distribution system, make the division of labor in the virtual world move towards orderly specialization, and ensure that each participant maximizes his or her own interests without harming the interests of others. Thus, stimulate new innovative research results and promote the sustained, healthy and stable development of "blockchain +" business model.

As an emerging Internet technology, blockchain is trying to enter various industries and have a great impact on the future economy. Blockchain technology can be well applied in many industries and fields. As long as the value-related data or information and the block chain have a natural affinity, they can be combined to develop new business models to better meet the needs of different industries. Due to different industries and fields, there will be different requirements, there will be a variety of forms of implementation. The future business model of blockchain should be composed of many different functions and forms of blockchain. It should be noted that blockchain, as an emerging industry, is still facing many challenges: first, the standardization of underlying technology and architecture; second, a series of technical issues such as performance, capacity, security, scalability and so on; third, on key issues such as digital currency and intelligent contracts, how to meet the legal compliance requirements of the government and connect the physical world. Blockchain technology will profoundly change society, but it will take time to hone. Blockchain technology can explore the most beneficial response to society and business only through continuous innovation and trial and error.

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