

Discuss the Application of Blockchain in Sustainable Supply Chain

Muhua Liang, Shixing Nie*

School of Economics, Anhui University of Finance and Economics, Bengbu 233030, China

*nshx2000@163.com

Abstract

The application of blockchain technology promotes the reform and innovation in many industries. The sustainable development of supply chain is increasingly becoming the key direction of supply chain reform. At present, the research pays more attention to the application of blockchain in all aspects of supply chain, and lacks the comprehensive application analysis of blockchain to the sustainable development of supply chain. This paper analyzes the application of blockchain in the supply chain from environment, society and economy. The study has found that the application of blockchain technology can effectively promote the sustainable development of the supply chain in improving resource utilization, optimizing supply chain management, enhancing trust, and building a new system of cooperation. The application analysis of this article further clarifies the significance of promoting the sustainable development of the supply chain with the blockchain technology as the core, and has the reference value for the sustainable reform of the blockchain.

Keywords

Blockchain; Sustainable Supply Chain; Application Analysis.

1. The Questions

Created by Cong Nakamoto (2008), blockchain is considered one of the most disruptive technologies, as a point-to-peer distributed data infrastructure, blockchain can create decentralized currency (such as bitcoin), automatically executed digital contracts (such as smart contracts) and smart assets, and it also encourages industry and organizations to think about how to apply the technology. At present, promising directions such as cost saving, enhanced transparency and credibility, improving traceability ability, maintaining network security, and building an information system have been proposed in the application and exploration of blockchain technology. Sustainable supply chain (SSCM) refers to the supply chain that achieves environmental, social and economic balance in the actual operation, which needs to reduce the loss of supply chain operation resources while meeting the rising social demand. And better identify, combination and use the resources involved in the supply chain, integration and optimize the operation process, build perfect transparent information system, to realize the overall industry coordination and performance optimization, meet the requirements of the environment, social and economic benefits, to meet the sustainable development of the supply chain, it also promotes the block chain technology applied in it. Based on this background, this paper discusses the application of blockchain technology in the sustainable supply chain.

2. Blockchain and its Application in the Supply Chain Field

Blockchain technology first jumped on the world stage through the issuance of Bitcoin, although the initial blockchain technology research focus on cryptocurrency and financial regulation, but as it is known as "the most destructive" characteristics of change gradually revealed, more and

more industries and departments began to study how to use blockchain technology for industry reform. In 2016, China included blockchain technology development into the 13th Five-Year National Information Plan into key development areas; In 2021, the 14th Five-Year Plan for National Economic and Social Development and 2035 Vision Outline as one of the seven key areas of digital economy, focusing on the four innovative roles of blockchain technology innovation, platform innovation, application innovation and regulatory innovation. Blockchain technology is constantly being applied in many other medical, financial, regulatory, energy sector and e-government fields. In addition, blockchain technology is also applying more and more research in the supply chain.

At present, many articles involve all aspects of supply chain production, transportation, sales and financial development. In many studies, there are some related concepts of sustainable supply chain, but limited to one aspect, there is a complete and comprehensive research on the key application of block chain in the supply chain. Our research fills the gap in this aspect, aiming to comprehensively and fully study the application of blockchain technology in the sustainable supply chain, and promote the supply chain optimization and sustainable development.

In 2017, The State Council of China issued the Guiding Opinions on Actively Promoting the Innovation and Application of Supply Chain, which put forward two important directions of -- supply chain development for China's supply chain development. Blockchain technology can enhance confidence in the sustainable authenticity of supply chain products by closely and accurately tracking the product supply process; Social and environmental conditions that may threaten the environment can be tracked, And social issues such as the health and safety of others, Enhance social, environmental, and commercial sustainability; It can meet the specific business information needs of the supply chain by building a public blockchain network and a private blockchain network, Role in changing sustainable management; It can also achieve pollution emissions and energy trading plan monitoring based on blockchain, Improve the supply chain environmental sustainability; It can also reduce transaction costs, reduce transaction time and improve decision efficiency between supply chains to help sustainable economic development. Just as the scholars study the many aspects of the application of the blockchain technology in the supply chain, the blockchain technology also affects the sustainable development of the supply chain in all aspects.

3. Characteristics of Blockchain in the Application of Sustainable Supply Chain

3.1. Sustainable Environment

There is no lack of the use of environmental resources in the operation and management of the supply chain, which will bring about environmental problems such as the resource utilization efficiency, production pollution and the treatment of recyclable resources. The current green supply chain development is the concrete embodiment of the sustainable development of the supply chain in the environmental sustainability. Through the blockchain technology, the production information in the supply chain is true and effective to improve the disclosure of the information, and facilitate the public and government departments to supervise the resource utilization efficiency, energy use and whether they meet the green environmental standards in the production process. At the same time, blockchain technology can strengthen the information monitoring in the overall operation process of blockchain, and provide data support and decision help for members to strengthen the utilization of production means, pollution treatment and the disposal of recyclable resources.

In addition, the application of block chain technology construction supply chain traceability system, not only in the supply chain process of product production, transportation, sales, improve customer trust, realize social sustainability, but also through the establishment of

production traceability system, various sources of production, resource information transparency in the production process, avoid unnecessary waste of resources, and can improve the supervision and management of the production process of pollution behavior.

3.2. Social Sustainability

In terms of social sustainability, the establishment of a supply chain traceability system based on blockchain technology can provide customers with all the real information of products from means of production to production and transportation to sales, so as to realize the openness and transparency of the supply chain and enhance social trust. Based on block chain technology between supply chain accounting information disclosure can make the supply chain and related members of the business information to achieve real and accurate transparency, to avoid the social and economic vulnerable groups, small groups and farmers information asymmetry, reduce immoral, corrupt and fake practices to achieve social sustainable development.

Blockchain technology can also realize information collection and sharing between supply chains. While making the latest situation of the supply chain public to the public block to the public, it can quickly provide targeted proprietary information sharing and analysis in private areas. Under the block chain of the information collection and sharing technology, supply chain innovation and reform will be able to usher in a new height, can more effectively feedback the supply chain changes to the members and customer level, will also provide customers with continuous optimization and more intimate service, reduce business risk, is conducive to enterprise development and promote employment, promote social progress and development.

3.3. Economic Sustainability

Whether it discuss environmental sustainability or social sustainability, the most fundamental foothold of economic sustainability. The pursuit of economic efficiency is the most basic and direct demand for the sustainable development of the supply chain. Through blockchain technology support of intelligent contract, in the absence of the presence of a third party to streamline the contract performance procedures, can automate product trading and logistics delivery, at the same time, intelligent contract based on the Internet technology record on the network, facilitate traceability and proofreading, reduce the transaction time, reduce transaction costs, eliminate unnecessary barriers that do not increase production value. With the support of blockchain technology, the information collection and sharing of authenticity can be guaranteed, and an effective trust mechanism among supply chain members can be established to, avoid opportunism in transactions, improve the economic efficiency of the supply chain under the same resources, and achieve economic sustainability.

In addition, the information collection and analysis mechanism under blockchain technology can provide stakeholders with rapid changing information between supply and demand, faster and effectively measure customer satisfaction and grasp market demand, and also evaluate the external environment and risks to help make optimal decisions and achieve economic sustainability.

In the actual operation of the supply chain, it can quickly respond to the member information in the supply chain through the application of blockchain technology, and control the suppliers at a sufficient level based on market fluctuations to maintain the minimum cost of supply chain management. And in the large number of data support and rapid response of blockchain technology for inventory management and response to mutations. The most critical aspect of the sustainable development of the economy of the supply chain is to link enterprises around the world through blockchain technology, establish partnerships around the world, provide technical support for global trade, and create new ways of global trade.

4. Challenges Facing Blockchain in the Application of Sustainable Supply Chain

4.1. Technical Challenges

The innovative feasibility of adopting blockchain technology in sustainable supply chain needs to be considered in the application of sustainable supply chain, which will bring its technical limitation obstacles to the application of blockchain technology. Blockchain technology is not very mature, and its immaturity brings the corresponding technical challenges, including scalability, availability, and the technical feasibility of mutual operation. Blockchain technology is still affected by delay and throughput, which means that blockchain technology in supply chain will improve transaction time, and make the monitoring environment information type, location, quantity, directional analysis, access issues will increase the technical challenge, and if simply by increasing the construction of servers to reduce transaction time, will bring power resources, management resources and other environmental resources loss, obviously contrary to environmental sustainability.

In addition, one of the characteristics of the blockchain technology, the --data, is not variable, which means that the data and information are unchanged. Although this feature can effectively guarantee the reliability and authenticity of the information, a problem related to it is that the previous data and errors in the record will also be permanent. At the same time, put forward new technical challenges in security, such as blockchain technology using decentralized structure and independent algorithm to correspond to the hacker attack, but in the current cryptocurrency environment, by provoking the blockchain community and the participants lead to "blockchain division", in the blockchain public environment part caused two or more path split, exposed the security vulnerability of blockchain.

In terms of social sustainable development, blockchain technology can also be applied to other illegal activities, which will require a higher social ethics of the sustainable supply chain along with the application of blockchain technology.

4.2. Organizational Challenges

The combination of the application of new technology and the organization and industry partners will also bring organizational challenges, on the one hand, managers in the supply chain need to learn the application of blockchain technology accordingly, if the organization personnel lack of blockchain technology application to sustainable system knowledge, will lead to the application of blockchain technology cannot achieve the expected results, will lead to high efforts in technology application, not only can not improve economic benefits, and even bring unnecessary losses, obviously does not conform to the economic sustainable development of blockchain. Similarly, if the blockchain technology is only applied to the sustainable development of the blockchain technology, the senior managers in the organization may have a negative view on whether it can achieve high performance, and obviously can not well achieve the application of the blockchain technology in the sustainable supply chain. At the same time, combining supply chain processes with sustainability is a new challenge, which is more necessary for both supply chain members and partners to be familiar with, develop, and improve these processes to support more sustainable practices.

At the customer level, there are often confidentiality and privacy issues with customer data across organizational systems, and organizations are skeptical about sharing information because current organizations regard information as one of the competitive advantages. The application of blockchain technology makes information transparent and protects customer data and privacy through blockchain encryption technology. Due to the lack of unified cognition and system of information sharing between organizations, how to share the increased value of information between organizations and whether it will be troubling to customers because of

the disclosure of proprietary information will all hinder the application of blockchain technology in the sustainable supply chain.

5. Countermeasures and Suggestions

After the Industry 4.0 revolution, the production and operation mode and the terminal sales form are always in the rapidly changing reform and innovation, and the blockchain technology is just the dazzling catalyst in this melting furnace of great change. Under the influence of blockchain, the industry in every sector is rapidly changing and innovating. Seizing and using blockchain technology as a catalyst can help enterprises drive into the fast track of development, far ahead of other competitors. The application of blockchain technology in sustainable supply chain can achieve economic sustainability through improving regulatory transparency and authenticity, building green supply chain, social sustainable development in strengthening information disclosure sharing and improving social ethics; and economic sustainable development in the form of reducing transaction cost and risk, accurate analysis and decision-making, optimizing process management, and strengthening cooperation. Having opportunity means challenges, but in the continuous development and progress of blockchain technology, the development of world trade cooperation and globalization, I believe that the challenges will be well solved in continuous practice and exploration, and through constantly improved technology and system guidance and constraints.

In all, blockchain technology has shown unlimited possibilities in the current supply chain and hope for the application of sustainable supply chain. At present, the exploration and practice of this application is still in the initial stage. We should strengthen the research on the application of the blockchain technology and the sustainable supply chain, and explore how to apply the blockchain technology to the governance and construction of the sustainable supply chain with Chinese characteristics from multiple angles.

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