Research on the Development Trend of Block-Chain Audit Theory——Based on CiteSpace V Analysis

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Abstract—Blockchain audit is the development direction of information technology audit that is highly concerned by the audit industry. This paper employs mathematical statistics theory and related analysis methods and uses CiteSpace V knowledge graph to carry out keyword cluster analysis and spatio-temporal evolution analysis of relevant literature on blockchain audit in the SSCI & CNKI databases in recent years. The study finds: (1) Blockchain technology research has tended to integrate with the audit field, and has long-term research enthusiasm; (2) Blockchain technology and audit theory and practical application scenarios exist Many similarities; (3) The integration of blockchain and auditing entity technology can improve the economic supervision function of auditing, data security, and automated auditing and audit method innovation.

Keywords- digital economy management; financial technology; blockchain audit;

1 Introduction

In recent years, in the context of the development of the digital economy, cryptocurrency, which is based on blockchain technology, has received extensive attention from the global market. As a distributed database, blockchain technology is decentralized, the features of anti-tampering and traceability have gradually penetrated many fields such as digital currency, asset protection, the Internet, finance, medical care, and new infrastructure. According to the Deloitte [1] Global Blockchain Survey Report in 2020, from multiple perspectives, global digital identities are still based on theoretical foundations, but 55% and 26% of the companies in the survey sample will deploy blocks respectively As a priority and key strategy, blockchain technology is seeking its foothold in the torrent of global commerce and has the possibility of subverting traditional industries. With the wider application of blockchain, especially in the cross-border layout, the problems of corporate financial and process certification records will become more severe, and the governance and supervision of digital assets will become more complicated.

As a powerful means of modern corporate management and internal supervision, auditing is mainly aimed at enhancing the effectiveness of corporate internal control, reducing corporate financial risks, stabilizing corporate development order, and ensuring the fairness, legitimacy,

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and authenticity of the information related to corporate audit objects. In the context of the era of big data, the combination of blockchain technology and traditional auditing modes can accelerate the process of audit automation [2], and blockchain auditing has become the general trend of audit information. In general, the transition from traditional auditing to blockchain auditing is still subject to the constraints of theory, technology, system, and law[3]-[5]. There is little literature on audit theory and method innovation based on blockchain technology, and blockchain auditing The actual application results of the blockchain are few, and the blockchain has had a significant impact on the financial industry with the development of the times[6]. The application of blockchain technology in the field of auditing is an important topic [7]-[8]. Therefore, this paper will review the current research literature in the field of blockchain auditing at home and abroad from the perspectives of blockchain audit theory exploration, blockchain audit models, and blockchain audit development trends and challenges, as well as future research and research. Prospect the development direction.

2 Materials and methods

2.1 Research design and data

This paper will use the CiteSpace V tool to establish a model for bibliometric measurement. Based on the advanced detection topic "Blockchain Audit" in the CNKI database on September 18, 2021, a total of 2010-September 18, 2021 will be obtained in Figure 1.

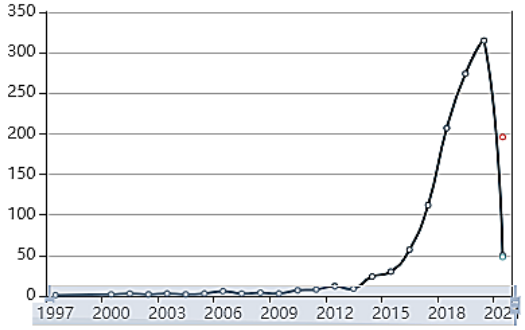

Figure 1 Trend chart of articles posted on blockchain technology

1159 documents within 5 years, forming a sample research data group of "blockchain"; further defining the discipline to "economics and management" and "audit", 215 documents can be extracted to form a research data group of blockchain auditing.

2.2 Descriptive statistical analysis

From the descriptive statistics of the number of posts, the popularity of blockchain technology has emerged since 2012. The initial stage was within 10 years. The literature on blockchain audits has reached popularity in the past 5 years, but the posting of blockchain audits The amount is currently relatively small and in a downward trend, and related research is progressing slowly. After further analysis of the combination and distribution of blockchain technology and other disciplines, it is found that the degree of integration between blockchain technology and

different disciplines is very different in Figure 2. From the perspective of the degree of combination and distribution of blockchain and other disciplines, blockchain technology and "information technology" The degree of combination with "economics and management science" is the highest, reaching 78.5% and 75%, and the degree of combination with social sciences, engineering technology, and other disciplines is low, both less than 10%, indicating the high degree of blockchain technology and economic management disciplines Integration has certain research prospects.

Figure 2 The distribution map of the discipline combination of blockchain.

2.3 Dynamic analysis

Figure 3 depicts the results of the visual analysis of the literature cross-citation that the relevant literature related to blockchain audit has a higher citation rate for the same reference, and the concentration exceeds that of the cited literature and the original literature.

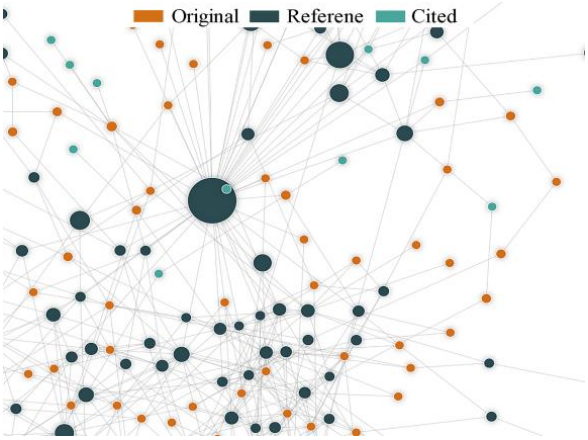

Figure 3 Blockchain audit literature mutual citation network

What's more, most of the literature citations have a high degree of uniformity. This directly shows that the current literature on blockchain audits in China has a problem of high repetition. The literature research on blockchain audit is mostly similar in content and type, and the homogeneity is too high, which lacks an innovative perspective.

3 Experimental analysis

According to the CiteSpace knowledge graph measurement of the blockchain audit literature, it can be seen that blockchain technology is currently developing from the 2.0 stage to the 3.0 stage. The 2.0 stage mainly uses smart contracts as the medium to transmit data and realize transaction functions, while the 3.0 stage tends to block the chain. The idea of integrating with physical industries, such as economic management, technological engineering, financial currency, etc., is an important cornerstone of building the Internet of Everything and the Digital Internet of Things. Based on the Data Visualization technology of CiteSpace software, a keyword co-occurrence measurement analysis was performed on 215 documents of the functional blockchain audit research data group. The results are shown in figure 4 below. As can be seen from Figure 4, the current blockchain audit literature research closely surrounds Traditional blockchain finance is developed, and in the audit discipline, it focuses on big data, federal learning, blockchain, smart contracts, data privacy, access control, and data security as the subdivision center for research, mostly related to the blockchain technology itself Related, from the visualization of keyword clustering statistics journals, blockchain, and audit-related research hot spots are mostly focused on audit tools and audit methods, and the research on "blockchain + audit theory" is not yet mature[9]-[12].

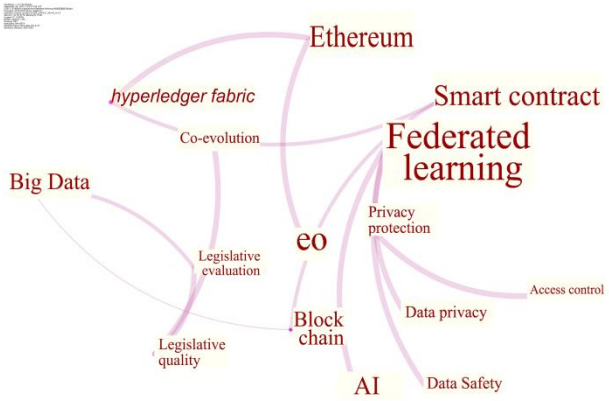

Figure 4 Blockchain audit keyword co-occurrence visual knowledge graph

After switching to the Timezone View function of CiteSpace, we can further observe the scientific research evolution trend and hot spot transfer of blockchain technology and audit discipline in China's scientific research, as shown in Figure 5 below. According to Figure 5, the research on the combination of blockchain technology and audit began in 2018. In 2018, the research hotspots of the combination of blockchain technology and audit disciplines are mainly blockchain, Hyperledger fabric, eo, smart contracts, and co-evolution.

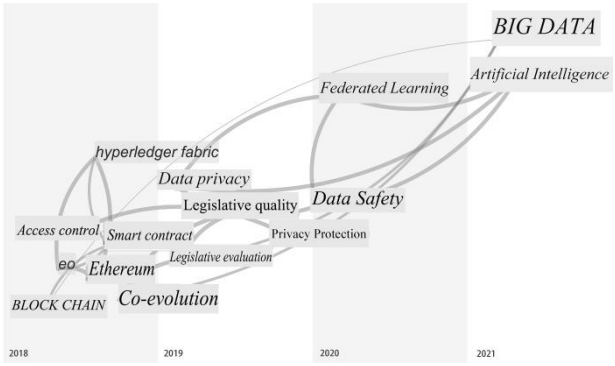

Figure 5 Time zone map of the evolution of blockchain audit technology

After 2019, from the blockchain technology itself to the blockchain data privacy, legislative evaluation, legislative quality, data security, privacy protection, federal learning, etc., the above-mentioned research hotspots have excellent fit and connection and are highly concentrated. Beginning in 2021, more research will be conducted in the direction of big data and artificial intelligence auditing, but at present, there are few related hot research documents, and it is difficult to form a standardized research system and theory.

4 Discussion about the challenges of blockchain audit

With the advent of the era of blockchain technology 3.0, the capital market pays more and more attention to the physical application value of blockchain technology, and blockchain technology has gradually integrated into various sub-industries. This article uses the CiteSpace V knowledge graph visualization tool to focus on sorting out The literature research status of blockchain audit theory and practical methods are summarized. In recent years, scholars have been relatively mature in the research cognition of blockchain technology, and the blockchain audit methods of internal audit and financial institutions have been relatively mature. It is gradually taking shape, but there are still shortcomings for a few departments and areas. The technical application of blockchain audit is still in the incubation period. This article will put forward further prospects for the research logic of blockchain audit in the future [13]-[15]. At this stage, blockchain auditing is still in its infancy. The application of blockchain technology to group audits and national audits still needs to overcome technical, legal, and conceptual difficulties. According to the Heisenberg Uncertainty Principle, the conclusion of the working method of blockchain audit technology can be a prerequisite. Therefore, this article summarizes the following challenges for building a blockchain audit ecosystem.

4.1 Industry change

The entity application of blockchain technology will make the work efficiency and effectiveness of the audit unprecedentedly improved. It can endow the audit with functions such as data analysis and data feedback. This will not only more closely combine the audit work with taxation, accounting, and financial management, but also enables the audit to obtain a higher guarantee for the timeliness, accuracy, and completeness of the data information [16]. In

traditional audit work, post-event auditing is usually the main work mode. The processing of audit work is often lagging behind economic management. It is difficult to clarify responsibilities for post-event events that occur after the event, and the accuracy of data storage is reduced. . In the era of blockchain 3.0, after the close integration of blockchain technology and auditing, real-time data chain audits can be realized, which can transform traditional post-event audits into pre-event audits and in-event audits, which solves the lagging defects of traditional auditing It is undoubtedly a qualitative leap to improve the satisfaction of audit results. However, the introduction of blockchain technology entities into audit work will undoubtedly require adaptive changes in the traditional audit industry, which will have irreversible effects on traditional audit theories, audit methods, and audit procedures. For practitioners in the audit industry, it is A huge challenge.

4.2 Data traceability

Figure 6 shows that blockchain technology is a distributed accounting database that relies on a consensus mechanism. Its unique hash key can guarantee the immutability and traceability of the data on the chain, but the two are based on the authenticity of the data on the chain [17]-[18]. Based on the operation, if the authenticity and validity of the data are difficult to guarantee before being put on the chain, then the data on the block node on the chain is also false. In this regard, to ensure the credibility of the data in the blockchain audit, it is necessary to supervise the accuracy of the off-chain data and input accurate data into the blockchain in time.

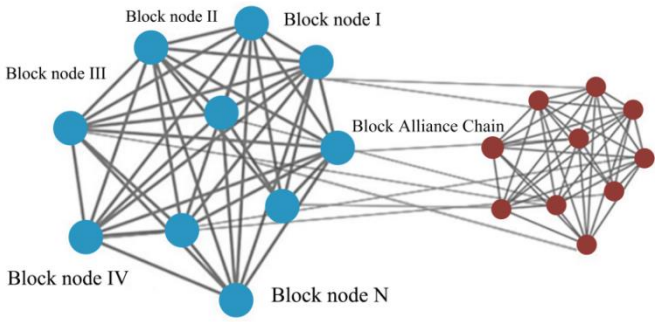

Figure 6 Schematic diagram of the consensus mechanism of the blockchain

However, for many carefully fraudulent work scenarios, the introduction of blockchain technology is also difficult to prevent the authenticity and reliability of the data sources on the blockchain nodes [19]. This requires the collaboration of multiple departments and the improvement of internal control to efficiently and securely store off-chain data and data. Manage data information. In addition, the difficulty of identifying the authenticity of off-chain data determines that blockchain audit is currently more suitable for use in the internal audit of entities. The requirements for technical talents in the entity are relatively high, and few talents can reasonably use blockchain audit technology.

4.3 Regulatory safety

According to the blockchain consortium chain theory, the supervision platform of the blockchain system has certain differences on the platforms of different departments, and the supervision difficulty also fluctuates according to the platform differences. For the audit of the

alliance chain, if you want to build a blockchain audit platform with efficient supervision and safe data storage, it is necessary to break the traditional audit department's conservative thinking that is unwilling to keep pace with the times. In addition, although the blockchain audit platform uses the encrypted database system of the hash key, it has not been cracked so far, but it does not rule out the possibility of virus attacks in the future. When the blockchain audit platform is attacked by hacker viruses, the platform The financial information, accounting accounts, and other information of the audited entity will be subject to malicious tampering and theft. For the current immature development environment of domestic blockchain technology, lagging legislation and lack of a regulatory environment is an urgent problem that needs to be improved. Therefore, in terms of regulatory security that needs to be solved urgently, more attention needs to be paid to the quality of legislation in the blockchain industry. , Data security and privacy protection and other aspects of the supervision mechanism to ensure the orderly and standardized development of the blockchain audit industry in the future, and reduce and plan the application risk of blockchain audit.

5 Conclusion

This paper uses the CiteSpace V knowledge graph visualization tool to focus on sorting out The literature research trend of blockchain audit theory and practical methods. On the whole, scholars' research cognition on blockchain technology has been relatively mature, and blockchain audit methods for internal audits and financial institutions have gradually taken shape, but there are still shortcomings for a few departments and areas. The physical technology application of blockchain audit is still in the incubation period. This paper discusses how to build blockchain audit applications and method standards, accelerate the development of domestic blockchain audit platforms, improve the data security and legislative quality of blockchain audits, and better implement the economic supervision functions of audits and national audits. Policy formulation also has important reference significance.

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