Electronic Invoice Management Strategy Based on Blockchain Technology

Baochao Yang[1] and Ahmad Yahya Dawod[2]

International College of Digital Innovation, Chiang Mai University, Chiang Mai, 50200, Thailand[1]
E-mail: baochao_y@cmu.ac.th, 1427595231@qq.com
International College of Digital Innovation, Chiang Mai University, Chiang Mai, 50200, Thailand[2]
E-mail: ahmadyahyadawod.a@cmu.ac.th

Abstract

Invoice management plays a very important role in the whole taxation system, and the staff of taxation authorities can measure the production and operation status of taxpayers through the usage of invoices, and verify whether there is tax evasion and leakage by taxpayers, so as to grasp the tax details of taxpayers. With the support of national policies and the continuous improvement of the network technology environment, the informatization construction of the taxation system is also gradually promoted, and electronic invoices are fully promoted in China. Compared with paper invoices, the use of electronic invoices helps reduce the operating costs of taxpayers and improves the tax collection and management level of government departments. However, electronic invoices also have problems in actual use such as repeated reimbursement, difficulty in bookkeeping, and reliable preservation. Although the above problems can be solved by auxiliary management means, it cannot fundamentally eliminate the occurrence of such problems. Blockchain technology can solve the problems of security and repeated reimbursement of electronic invoices. Blockchain-based electronic invoice cloud platform refers to the combination of blockchain framework and cloud computing to build a distributed electronic invoice cloud platform. By building an electronic invoice cloud platform, it can realize the issuance, flow, storage, and submission of expense accounts of electronic invoices, realize the data exchange of electronic invoices between self-built platforms and third-party platforms through each service platform of electronic invoices, and build an electronic invoice chain, so as to realize that the government, enterprises, and individuals can share the dividends of electronic invoices and continuously promote the healthy development of electronic invoices.

KEYWORDS: blockchain technology, invoice management, smart contracts, tax

1 INTRODUCTION

With the advent of the information age, electronic invoices came into being, whose main root lies in the business demand of e-commerce. in May 2013, the first electronic invoice in China was issued by Jingdong Mall, and in June 2014, the Beijing Municipal State Tax Bureau began to accept the first electronic invoice. Since then, China has started to step into the era of electronic invoices. Like traditional invoices, electronic invoices are issued by the taxation bureau for use by enterprises, and their invoice numbers are uniformly formulated and allocated by the taxation department and provided to users with a uniform encryption and

signature mechanism. Generally speaking, its legal validity, basic usage, and usage regulations are the same as the traditional paper invoices supervised by taxation authorities. Since the birth of electronic invoices, its advantages of convenience, efficiency, easy inquiry, low carbon, and environmental protection have been gradually recognized by enterprises and consumers, and the usage rate has been increasing. With the concept of "Internet taxation", electronic invoices have become an indispensable part of the new ecology of electronic taxation. From the viewpoint of usage, electronic invoices save costs and resources and improve efficiency. For taxation departments, electronic invoices are also more conducive to the realization of information on tax collection and management and the reduction of management costs. However, the large-scale application of electronic invoices inevitably has some problems, which are mainly due to the fact that electronic invoices can be copied completely, thus causing problems with data consistency, repeated reimbursement, and reliable preservation of electronic invoices. At present, the expedient solution is to solve it by auxiliary management means, but it cannot be completely eliminated, which to a certain extent affects the promotion of electronic invoices and the process of tax informatization in China. In addition, there are many electronic invoicing service platforms in China and many self-built platforms, and the data between the service platforms have not yet been opened and shared, which leads to difficulties in the flow, application, and mutual trust of electronic invoice data. Therefore, how to solve these problems in the current application of electronic invoices is of very realistic significance.

As Bitcoin continues to grow in popularity, blockchain, which is the core technology of Bitcoin, is also receiving more and more attention. The main advantage of blockchain technology is decentralization, based on public key cryptography, timestamp, P2P network, distributed storage, consensus, incentive, etc. to achieve decentralized peer-to-peer transactions and collaboration. In addition, the previous electronic invoice management system had problems such as over-centralization, overload, and low efficiency, and blockchain technology provides a new way to solve these problems.

2 PURPOSE OF THE STUDY

By building an electronic invoice cloud platform based on blockchain technology, we can make full use of the features of blockchain decentralization, consensus algorithm, and distributed broadcasting. This will help solve the pain points of electronic invoice application: firstly, the distributed storage based on a blockchain network is realized by using the decentralized characteristics of blockchain technology and through the common encryption and algorithm of a large number of nodes to ensure the trustworthiness, consistency, and tamper-proof of data; secondly, the public ledger jointly maintained by all nodes is used to solve the problems of repeated claims, repeated entries and inconsistent data in electronic invoices; thirdly electronic invoices involve the tax bureau, invoicer and consumer, which can avoid inconsistent electronic invoice data, prevent data tampering, and improve data accuracy and efficiency.

This paper firstly introduces the concepts related to blockchain technology, secondly analyzes the current problems in electronic invoice management using the research method combining literature research and experimental research, and finally puts forward the strategy

of using blockchain technology in the electronic invoice management business. Using modern information technology, invoice management is combined with the network to standardize operation, simplify execution steps, reduce usage and maintenance costs, control low-risk operations, and realize an innovative model of network invoice management, which optimizes the design and research of network invoice system in order to further promote the information of taxation system, improves the digital management and tax application level of the existing tax collection and management system, and comprehensively promotes the new reform of tax invoice network.

3 LITERATURE REVIEW

3.1 Status of foreign research

The existing foreign research literature on "Internet+" is mostly focused on the impact of big data, and the number is relatively small, probably because the research objects and contexts are different, because "Internet+" is originally a national development strategy with Chinese characteristics. However, there are still scholars who have studied tax informatization and constructed related models.

By comparing the traditional audit model with the blockchain audit model, Gault (2017) points out that the traditional audit model tends to lag and be inaccurate due to the design of the audit time and the analysis of large amounts of audit data, and that audit activities under the blockchain model are more in line with audit rules and real-time supervision can improve the timeliness of audit work. Selva Ozelli (2018)[1] points out that Blockchain can provide reliable real-time tax information, especially at the international level, changing the relationship between taxpayers and tax authorities on the one hand, and the way in which information is registered, submitted, and stored for tax purposes on the other. Naveen Joshi (2018)[2] argues that the use of blockchain technology in the field of taxation will provide more possibilities for the formation of a new globalized and unified collection mechanism. Deloitte[3] argues that blockchain technology practices such as improving tax compliance, collecting VAT and payroll taxes, enabling transfer pricing adjustments, and combating tax fraud have become a global focus. Andrew B. Raupp (2018)[4], a U.S. information technology expert, has proposed a solution idea to optimize participatory budgeting paths using blockchain taxation technology, thereby enhancing tax transparency. in April 2019, the EU officially launched the International Association for Trusted Blockchain Applications (I NATBA). in April 2019, the EU officially launched the International Association for Trusted Blockchain Applications (I NATBA). In March 2020, the EU's latest launch of the Trusted Blockchain Applications Association aims to support blockchain interoperability while developing industry norms to optimize rent regulation and standards convergence. Jeffrey Owens and Xin Chen (2020) look at the promising future of blockchain in taxation, arguing that blockchain will change the traditional payroll tax and VAT processing methods, invoices will cease to exist, audits will no longer be necessary, and automated models will replace manual intervention [5].

3.2 Status of Domestic Research

On the problems of tax collection and administration in the era of "Internet+", Kuang Haoyu (2018)[6] argues that, on the whole, China has a low level of tax services, insufficient information management, and weak awareness of tax risk management, which leads to a low level of tax compliance. Ren Dongbiao et al. (2017)[7] argue that China's traditional tax collection and administration model for natural persons is difficult to adapt to the changes in the tax system, the current self-reporting mechanism is not ideal in practice, there is a lack of a universal and standardized mechanism for collecting and analyzing and utilizing tax-related information, and there is a lack of supporting systems for the tax collection and administration of natural persons. Zhang Jian et al. (2017)[8] made an analysis from the aspects of low data sharing, lack of advanced collection means, and poor quality of internal tax-related data.

For the effective path of "Internet+" tax collection and management development, Ye Qing (2019)[9] proposed promoting the development of big data collection and management, accelerating the construction of a city-wide electronic tax bureau, interconnection of social security fee system with a Jin San information, docking of non-tax revenue system with Jin San system and strengthening the construction of professional and technical talents. Cai Chang (2019)[10] analyzed the impact of "Internet+" on the taxation ecosystem and proposed the realization path from three aspects: government fiscal governance, enterprise fiscal management, and social services of intermediaries. Ma Cai-Chen (2018)[11] believes that the taxable boundary is moving and expanding in the context of "Internet+", and the participating subjects of tax collection and administration are showing a trend of multi-governance. Gao Xinwei (2019)[12] explores the tax collection and management model based on the whole industry chain with the petrochemical industry as an example. Yu Chunmin (2018)[13] believes that the protection of taxpayers' tax-related information should be strengthened under the "Internet+ taxation" model. Lu Yufeng (2017)[14] elaborates on the strategic layout and implementation strategies of future tax development from three aspects: international trends, development laws, and innovative measures. Li D. (2020) [15] believes that blockchain technology applied to tax collection and administration solves the information asymmetry between tax collectors and taxpayers, eliminates the occurrence of tax evasion and tax revenue is secured, improves the efficiency and collection capacity of tax collection and administration, makes taxpayers more compliant, and promotes the modernization of tax collection and administration. According to Tan Jiayi (2020) [16], blockchain technology has features such as traceability and smart contracts, and its application to the field of tax collection and administration is conducive to the realization of information tax management, tax risk management, construction of taxpayer credit system, and solving the difficulties encountered in tax collection and administration. Cui Jiaxi (2021) [17] proposed building a risk credit assessment system focusing on the main risk indicators of enterprises, to import the enterprise situation derived from big data analysis into the credit assessment system, to generate enterprise credit rating in real-time, to isolate the deviation brought by the human subjective assessment, and to further control tax risks.

3.3 Review of Domestic and Foreign Research

By studying the relevant literature at home and abroad, I found that research on tax risk management started earlier in the West, and some countries already have a fairly complete

model of tax risk management using big data. However, the research on tax risk management in China started late, and the combination of big data and tax risk management is an important measure to solve the difficulties of tax risk management. At present, many scholars in China have started to conduct research on combining big data and tax risk management, hoping to explore a path for tax risk management by using advanced foreign theories and China's leading edge in big data development. The authors also found that the application of big data technology in tax risk management is not simple and there are still many obstacles. Taking advantage of big data and solving the current obstacles of big data in tax risk management remains a great challenge.

As a unique distributed accounting technology, the structure of blockchain itself enables transparency, sharing, and immutability, and it is expected that blockchain will be the best way to store data and share information. As technology is explored and applied, the transformational functions of blockchain in the accounting industry are gradually emerging. Blockchain technology will change the accounting and measurement model, simplify the accounting process, improve the data structure, reduce the cost of financial operations, reduce financial risks, and reshape the accounting and auditing ecology. The biggest contribution of blockchain to the accounting industry is to solve the problem of cost and efficiency. In the future accounting business, many tasks can be handed over to blockchain-based smart contracts to complete. After a lot of research and analysis, scholars both at home and abroad agree that blockchain technology has great advantages, and the biggest impact on accounting in the future may be Internet technology.

4 RESEARCH METHODOLOGY

This study adopts a research method combining literature research and experimental research. Firstly, the relevant domestic and international literature on blockchain technology, cryptography technology, application of blockchain technology in invoice management, and other technologies are surveyed, and their development lines are sorted out. Secondly, the application in electronic invoice management based on blockchain technology is analyzed, including the current situation of blockchain technology application in invoice management and the existing risks are analyzed. Finally, strategies for invoice management business under blockchain technology are proposed for the existing risks and problems, etc.

5 ANALYSIS OF THE APPLICATION OF BLOCKCHAIN TECHNOLOGY IN INVOICE MANAGEMENT BUSINESS

5.1 Concept of Blockchain Technology

Blockchain is a new application mode of computer technology such as distributed data storage, point-to-point transmission, consensus mechanism, and encryption algorithm. The Blockchain, an important concept of bitcoin, is essentially a decentralized database, and as the underlying technology of bitcoin, a series of blocks of data that are related using cryptographic methods, each block contains a batch of bitcoin network transactions to verify the validity of the information (anti-counterfeiting) and generate the next block. The original bitcoin white paper did not use the word blockchain, but the chain of blocks. In the original Chinese

translation of the bitcoin white paper, a chain of blocks was translated. This is the earliest appearance of the Chinese word "Blockchain".

Blockchain technology is a new distributed infrastructure and computing paradigm that verifies and stores data in a chained data structure, ensures secure data transmission and access in a cryptographic manner, and programs and manipulates data with smart contracts (consisting of automated scripting code). Based on the above technical principles, blockchain technology has the following features, as shown in Table 1.

Table 1: *Overview of Blockchain Technology*

Feature	Description
Immutability	All transactions are cryptographically secured and are immutable, meaning they cannot be modified or reversed.
Decentralization	The system is decentralized, meaning there is no single authority that controls the network
Transparency	All transactions are visible to everyone on the network and cannot be hidden or tampered with
Security	Blockchain technology provides a high level of security, as it is resistant to tampering or hacking

Generally speaking, the main technical architecture of a blockchain system consists of six layers: data layer, network layer, consensus layer, incentive layer, contract layer, and application layer, as shown in Figure 1.
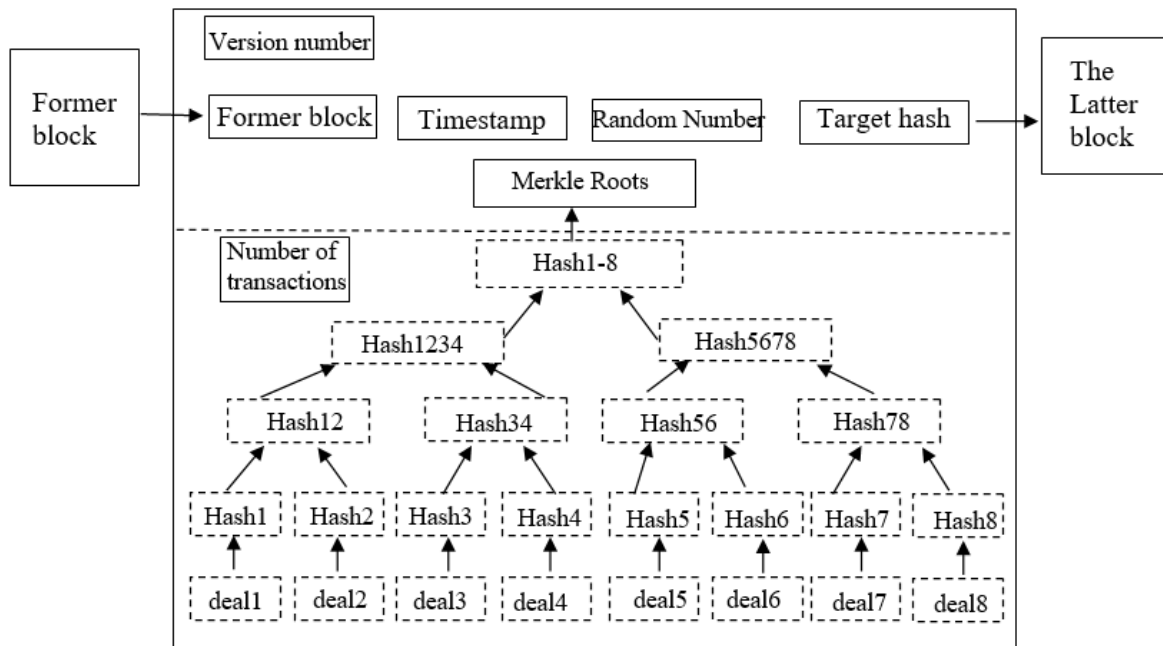

Figure 1: *The main technical architecture models of blockchain*

5.2 The Application of Blockchain Technology in The Tax Management Model

Application of blockchain data. The distributed account or intelligent contract features of blockchain provide a solution for improving the quality and efficiency of tax administration, it points out the direction for making tax policy scientifically and further improving tax Macroeconomic regulation and control ability.

The following flow chart can be shown.

A = tax department

B = Social Security Department

C = other agencies

D = payment agency

E = Enterprise

F = Employee
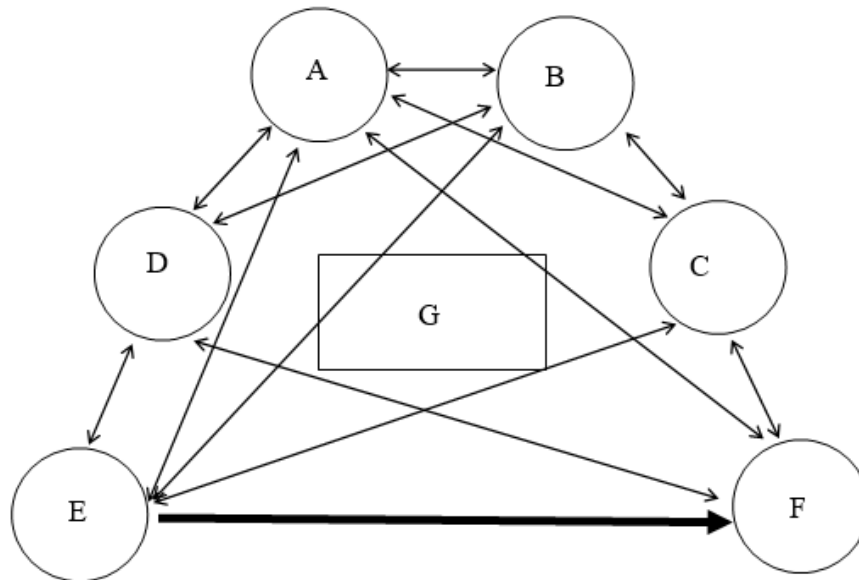
G = a smart contract

Figure 2: *Blockchain technology tax management flow chart*

1. risk identification. The tax department and the Market Supervision Department use AI to identify the risk through access to the blockchain, and one day there is a risk transaction, the government can still identify risks and effectively regulate the market by invalidating a trading chain by recording an equivalent transaction in the opposite direction (a negative one), as well as by soft and hard forks.

2. managing tax incentives through smart contracts. In recent years, in order to promote regional economic development, some regions and sectors have implemented various preferential policies in respect of tax revenue, main tax revenue, and fiscal expenditure for specific enterprises and their investors (or managers). To some extent, the implementation of preferential tax policies has promoted economic growth and industrial agglomeration, but the complex and diverse preferential tax policies have also increased the workload

of tax collection and management. In the technology of blockchain, all contracts can be intelligent. Using intelligent contracts can ensure the reliable execution of all contracts and avoid tampering, repudiation, and default. All kinds of tax incentives need to be set up in different smart contracts to achieve, one day reached the conditions that will automatically trigger the contract. On the one hand, it reduces the discretion of the tax preference policy; on the other hand, it avoids all kinds of tax evasion because of the tax preference.

3. To improve the tax system design and optimization ability through blockchain technology. First of all, on the basis of a large number of tax system implementation data and information-based means to support, the effect of tax system implementation is better tested, the existing problems are easier to be found, and at the same time, it is convenient to put forward optimization measures. Secondly, under the condition of information, tax system design is more easily supported by calculation and simulation, so as to correct the deficiency as soon as possible. Thirdly, because of the information of tax collection and administration, the complicated and well-regulated tax system can be carried out smoothly, and the tax system and the target of regulation that cannot be carried out smoothly can be improved. Finally, we can further make the tax system design and its optimization ability more in line with the needs of tax participation in economic regulation and distribution.

4. Scientific decision-making and fine management can be achieved through blockchain technology. The distributed ledger of x blockchain provides massive data. Integrating all kinds of economic activity information of market players, the market supervision information of industry and commerce, taxation and quality supervision departments, as well as all kinds of social management and family population information, forms a unified micro-data warehouse of economy, society, and population. Using big data, machine learning, artificial intelligence, and other technologies, intelligent analysis of economic operation, social management, and population data is carried out, so as to achieve a statistically intelligent decision support system with scientific decision-making, accurate economic and social governance, and efficient public services.•

5.3 Status of Application Blockchain Technology in Electronic Invoice Management

At present, the introduction of blockchain technology in the field of invoice management can solve the current problems of authenticity and reusability of electronic invoices under the premise of controlling the transaction subject. From the perspective of technical development, blockchain technology is still under development. If only invoice information is available in the blockchain, a self-restraint mechanism can be established for more participants based on blockchain technology. However, the phenomenon of "real invoices and fake invoices" is something that blockchain technology itself cannot solve at present. Only by integrating business information, financial information, and tax information of enterprises through blockchain technology can we ensure the authenticity of the information in the process of transformation from business to tax. The application of various new technologies such as blockchain requires the technical cooperation of tax-related subjects. Nowadays, the financial management of enterprises is mostly independent, which brings a blocking point to the promotion and application

of new technologies. Only by promoting the unified tax management concept of all tax-related subjects can a blockchain invoice application model featuring unified rules, joint cooperation, and achieving a win-win situation be formed.

From the perspective of the accounting system, the VAT electronic invoice system implemented by the State Administration of Taxation solves the problem of generating legal electronic original vouchers, and the management functions such as reimbursement audit provided by the industry financial system solve the problem of informatization of accounting vouchers. The two unify to constitute electronic accounting vouchers that can be recorded and archived. The revised Measures for the Management of Accounting Archives solves the problem of identifying electronic accounting vouchers as accounting vouchers. The above part is equivalent to solving the first half of the problem of electronic invoice management. The problem of the second half is that in terms of bookkeeping and archiving, electronic vouchers are different from paper vouchers in that they are not unique and unchangeable, and there is a lack of authoritative electronic ledgers and electronic accounting voucher archivists. If it is stored in a random database or a random computer hard disk folder like a manual operation, although it is reasonable, it is not feasible in the actual business. It is a bit like when the country implemented the VAT system but did not implement the VAT anti-counterfeit tax control system, and the manual operation provided opportunities for VAT invoice forgery because of the high cost of the inspection. Ideally, the core modules in the financial systems of each service organization that provide the bookkeeping and filing of electronic vouchers would be better if they were certified or issued by the Ministry of Finance and the National Accounting Association, or if they were prepared in a uniform standard. In this way, a complete closed loop of electronic voucher accounting management can be formed fundamentally. This is also the reason why there are currently differences between electronic invoice printing and reimbursement processing and paper invoices.

5.4 The Relationship Between Blockchain E-Invoice Management and VAT E-Invoice System

The current VAT electronic invoice system, which is part of the new invoice management system of the State Administration of Taxation, provides complete functions of VAT invoice issuing and information tax management based on the digital certificate of taxation and the electronic bottom account database. Even when viewed in conjunction with blockchain technology, the current new invoice management system is the best solution. What blockchain technology can contribute to e-invoice management is that the latter half of the demand for e-invoices as electronic accounting documents is actually the connection supplement and extension of the VAT e-invoice system.

5.5 Risk Analysis of Blockchain Technology Application in Invoice Management

5.5.1 Application Security Risk Analysis

Security is the core goal of e-invoice cloud platform construction. Ensuring the information security of e-invoices is the basic premise of the construction of an e-invoice cloud platform. Therefore, the data protection mechanism of the cloud platform should have a high degree
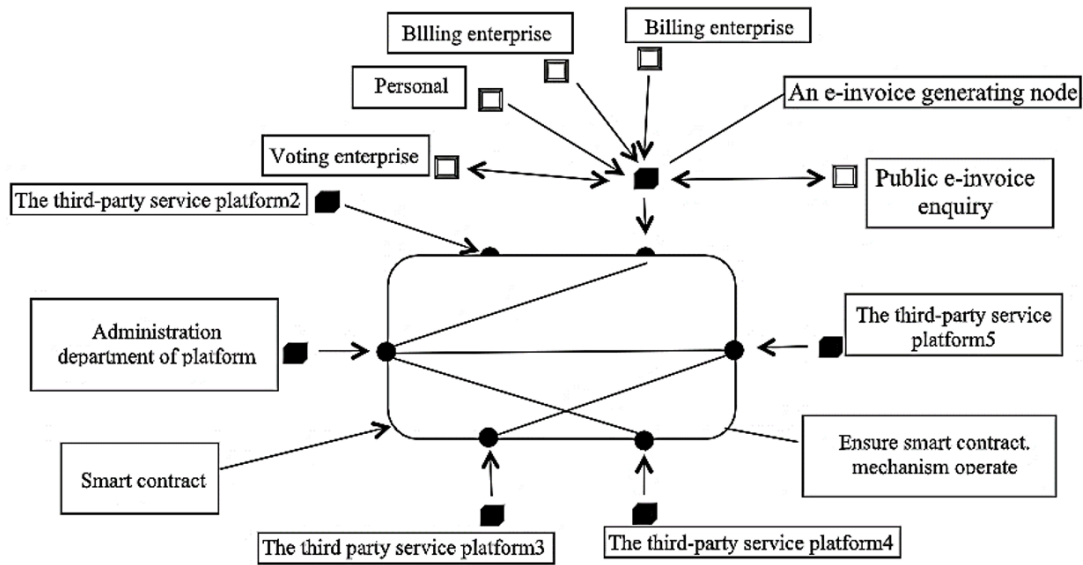
Figure 3: *Schematic diagram of the electronic invoice management system of blockchain technology.*

of security, and strict permission settings and management should be carried out on the information stored and exchanged in the block. In addition, in terms of technology, efficient, reliable, and comprehensive security emergency mechanisms and solutions should be used to ensure the security of e-invoicing data and cloud platforms. In the blockchain, when a node obtains the right to account, the ledger will be broadcast in every node to realize backup. Take Bitcoin as an example. Only when more than 51% of the nodes in the system are attacked at the same time can the security of the blockchain be affected, and this possibility is extremely small. However, in contrast to the centralized system, only the central node needs to be attacked to crash the system, so blockchain security is extremely high.

If an electronic invoice is widely promoted and applied, tax authorities will be faced with massive data that they have had little contact with before. The security of network security and the safe storage and use of business data of invoicing enterprises are other difficult problems for tax authorities to face. In the aspect of data information sharing, because the application of big data is a complex project, there is no system or system for which level of users have what permissions to use the data, and a reasonable mechanism between data query and data security has not been established. If the invoice inquiry module is established in the online tax platform website of the tax authority, criminals may use illegal means to steal VAT invoice information and specific data; If only the invoice flow query is provided, but the invoicing information query is refused, the invoice recipient will be unable to judge the authenticity of the invoice information. In the application of big data, how to protect the business secrets reflected in the invoicing data of enterprises needs the tax authorities to make preparations in advance.

5.5.2 Risk Analysis of Key Loss Management

5.5.2.1 Limited Application Scope, Electronic Invoice Platform is not Unified.

The current invoice information collection systems such as tax-controlled machine
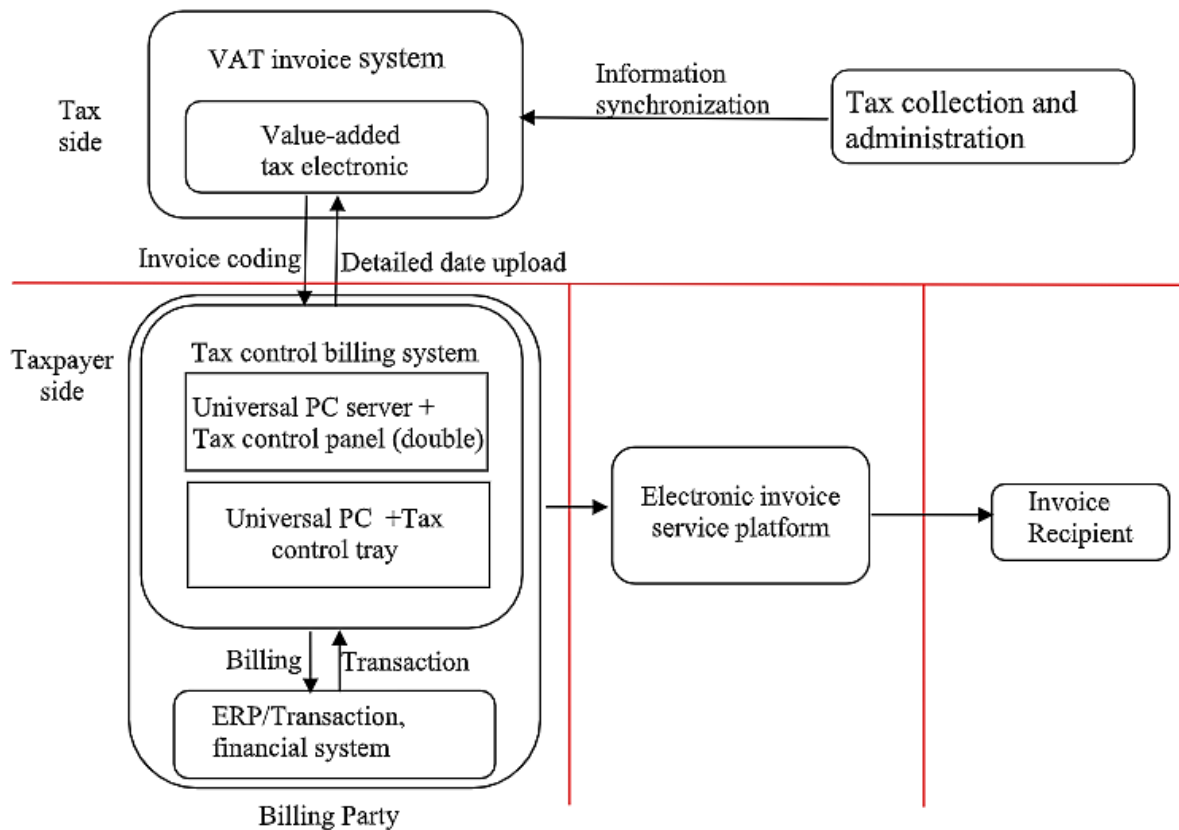
Figure 4: *Business flow logic diagram of VAT electronic invoice*

collection systems and network invoice systems are established by each province and lack nationwide unified standards. Most enterprises do not have their own electronic invoice service platform and cannot effectively dock with the invoice collection platform of the provincial bureau. In addition, the unified format and content of electronic invoices, operation specifications and security standards are not clearly defined, which cannot realize the rapid collection and reliable exchange of invoice information. However, the existing accounting policy requires paper invoices to be used as the basis of accounting for enterprises, so electronic invoices face the problem of difficult accounting from the very beginning. Otherwise, even if the electronic invoice is received, it is necessary to print out the paper version for normal financial reimbursement and other work, then the so-called resource-saving and convenient advantages of electronic invoice will no longer exist, and once the electronic invoice is printed out, the authenticity and uniqueness of the invoice cannot be guaranteed.

5.5.2.2 Data Association is not Comprehensive, Security into a Hidden Danger

In general, China's online invoice management has achieved initial results. It has realized the functions of real-time collection of invoice information and checking the old and receiving the new, which has laid a good foundation for the construction of the national electronic invoice platform in the next step. However, the application and management mode of paper invoices is still adopted, and the taxation authorities are still responsible for the printing and

supervision of invoices. Only the information management of paper invoices is realized, and the effect in terms of anti-counterfeiting, monitoring and cost saving is not satisfactory. In addition, taxpayers' invoice information involves taxpayers' commercial secrets. In terms of real-name invoices, due to the restrictions of traditional concepts and the original management system, real-name invoices have not been implemented, which also causes problems such as false invoicing and upselling of invoices.

5.5.3 Risk Analysis of Data Information Errors

One of the benefits of implementing electronic invoices is the regulation of e-commerce enterprises and the realization of taxation of e-commerce transactions. Regular B2C enterprises, such as Jingdong Mall, Tmall Mall, and other online stores, as well as physical stores, have long been included in the scope of government taxation. They can issue paper or electronic invoices to consumers in online transactions. In addition, some individual online stores, have a large number of unregistered customers. Due to the convenience of opening online stores, they are not registered for business and taxation at all. Therefore, the tax department has no way to check its business information and naturally cannot reasonably levy taxes.

Chinese consumers do not have a deep understanding of the law and the rights and obligations of taxpayers, and lack self-protection awareness. A large number of consumers are not in the habit of consciously asking for electronic invoices or even paper invoices when shopping online. Some even choose not to receive invoices directly. For example, when shopping at e-commerce companies such as Jingdong and Amazon, you can choose to "open a paper invoice" or "open an electronic invoice". Of course, there is also the "no invoice" option. In most cases, consumers set the system to "no invoice" by default. E-commerce and B2B companies have a large number of returns and exchanges. If a paper invoice is issued, the seller will ask for the paper invoice to be returned with the goods. However, for electronic invoices issued, it is only data information in the computer or cell phone, which cannot be retrieved by the enterprise. Consumers can still download and print invoice information after returning the invoice without the actual shopping fact, which leads to the existence and circulation of invalid electronic invoices in society and causes confusion and false reimbursement of enterprises.

5.6 Risk Analysis of Data Platform Openness

5.5.4.1 Electronic Invoices are Difficult to Claim

The popularity of electronic invoices has improved the ability of the tax bureau to supervise enterprise income, but there are operational loopholes in the supervision of enterprise expenditure as traditional paper invoices are replaced. First of all, electronic invoices do not have the physical anti-counterfeiting properties of the original paper invoices and require finance personnel to identify the authenticity by themselves. In addition, electronic invoices can be copied and reprinted, and will not be recognized by finance personnel if used for repeated reimbursement. The implementation of electronic invoices exposes enterprises to the entry risk of invoice authenticity and uniqueness, and a certain extent weakens the supervision of the tax bureau on enterprise expenditures.

5.5.4.2 The Standard of an Electronic Invoice is not Uniform.

At present, the main reason why electronic invoices are not effectively promoted is that pilot projects are carried out in different places, resulting in different standards and management

methods. Therefore, electronic invoices are not universal, and electronic invoices cannot be circulated in different places. In addition, e-commerce platforms are generally cross-regional enterprises, and the attribution of tax sources is also a problem that needs to be considered. Therefore, more comprehensive thinking is needed to realize the promotion and construction of the national platform.

6 APPLICATION STRATEGY OF BLOCKCHAIN TECHNOLOGY IN E-BILL MAN-AGEMENT BUSINESS

6.1 Information and Communication Research and Recommendations

6.2 Attach Importance to Electronic Invoice Data Processing

First of all, the electronic invoice information system should strengthen the maintenance and operation of the electronic invoice database system and invoice issuing, tax copying, tax declaration, and other sub-application systems. To realize the closed management of ordinary invoices such as examination and approval, purchase, issuance, old inspection, payment and cancellation, examination and comparison, and monitoring, accelerate the informatization, standardization, and paperless of enterprise office, so as to truly realize the electronic of invoices.

Secondly, it should strengthen the recording, analysis, and comparison of electronic invoice data information, use big data and cloud computing processing technology, introduce data processing talents, improve technical personnel's skills in financial accounting, tax law, law, and other aspects, and effectively master the knowledge of computer, VAT electronic invoice system, and third-party platform construction. And continue to deepen the technical staff to the actual operation of the electronic invoice management system master's degree.
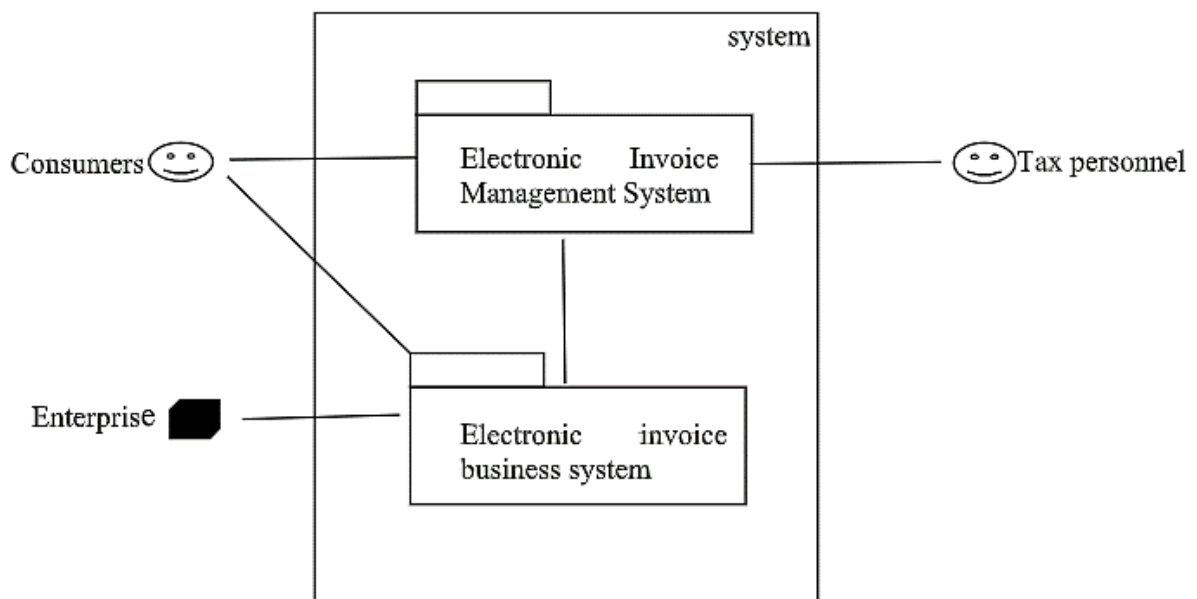

Figure 5: *Overall system use case diagram*

Finally, the ability and level of tax authorities to use big data to serve tax collection and administration should be improved. Connect the data processing application results with the actual tax collection and administration, study the connection between invoice data and tax declaration and other aspects of tax collection and administration, and constantly accumulate, analyze and summarize the data processing experience. Establish a national unified electronic invoice application service organization and comprehensive technology platform. Any registered enterprise can log in to this platform to input relevant invoice information and transfer it to the invoicing and tax authorities. All data will be included in this platform to facilitate the timely processing of corresponding data by the tax authorities. On the basis of data processing and analysis, the analysis results are used to establish the risk control model of billing information, and the invoice information is used to strengthen the supervision of tax sources and gradually improve the tax governance system, so as to improve the tax compliance degree to achieve the goals and requirements of the modernization of governance capacity.

6.2.1 Optimize the User Experience of E-Invoice

First of all, the national tax authorities should create an application market for the taxpayer software, open up ways to release the official website software, provide release channels and display tutorials for the endless taxpayer software platforms, and provide a free download experience for the taxpayer units, so as to reduce the operation and maintenance costs of the taxpayer developing related software and the third-party platforms. Ensure the sharing of application software platforms in different regions, avoid repeated development and construction, and simplify the functions of the software platform system to improve the user experience and recognition of e-invoices. For example, in the aspect of mobile billing, multiple social forces are encouraged to participate in the development of applications, research multiple billing terminals, reduce excessive reliance on special equipment for billing, realize the use of mobile phones, tablets, and other communication tools and equipment for billing, and avoid excessive binding of special equipment.

In addition, from the standpoint of purchasers, tax authorities understand that the motivation that can promote the successful application of electronic invoices is the facilitation and diversification of purchasers' access to invoice information carriers. The membership card and VIP card issued by the business can be used as the media to apply for invoices, check the authenticity, and issue rewards; In addition, consumers pay special attention to the usage rate of the information carrier. Firstly, the inducement factors of the information carrier should be increased to enable users to raise their awareness of the active use of the information carrier to obtain a higher degree of user satisfaction. For example, the incentive system for the use of electronic invoices should be established, improved, and promoted. In the first 6 months of the promotion of electronic invoices, partial rewards will be given to the invoicing users. If the number of electronic invoices issued by the invoicing users reaches a certain number or the invoicing amount of electronic invoices exceeds a certain limit, quota or fixed rate incentive measures will be given. Second, it is necessary to expand the memory rate of the information carrier, such as proactively verifying the approval authority of the electronic invoice, and giving corresponding subsidies according to the cost of different information carriers consumed by different enterprises. The third need is to improve the integrity of the

information carrier system platform. If the enterprise does not choose the third-party platform of e-invoice, it can choose to build its own e-invoice management system platform, which can connect with the enterprise ERP or business management system to obtain sales information and automatically connect with the electronic invoice management system of the tax authority.

6.3 Internal Environment Study and Recommendations

6.3.1 Establishing a New Taxpayer-Oriented Service Concept

In the process of tax service, taxation authorities should understand the needs of taxpayers and actively provide services for them. Consider the special characteristics of each taxpayer and meet the legitimate personalized needs of taxpayers; change the traditional face-to-face service mode to zero-distance information service; provide taxpayers with the whole process tracking service, and run the tax payment service through the whole process of tax collection and management.

6.3.2 Raising the Awareness of Tax Service Informatization

Although the development of modern information technology provides powerful means for tax services, it cannot be fundamentally realized if tax officers do not fully realize the necessity of tax service informatization construction. In the Internet era, the new demand of taxpayers for tax services is the embodiment of Adam Smith's famous "four principles of taxation" - fairness, certainty, convenience, and economy. In order to realize the deep integration of the Internet and tax services and zero service area of tax collection and administration, taxation authorities at this stage should actively introduce or cultivate computer talents to expand the Internet thinking and modern vision of the personnel of the information technology team. At the same time, they should also continuously improve the information quality of other tax personnel, vigorously carry out Internet application training and guidance, enhance the ability to apply the "Internet + taxation" working mode, improve the working ability, actively respond to the needs of taxpayers and provide information taxation services in line with the development of modern society.

6.3.3 Realize Online Calling Mode and Promote Business Packages

At present, the tax bureau is still in the traditional mode of the physical number-calling machine, and the single function makes the number-calling machine unable to meet the current needs of taxpayers. Based on the one-window operation of a tax-related business, the author believes that the online number-calling and queuing APP platform for tax service should be developed and utilized to no longer be constrained by the number-calling machine service in the tax service hall. Such as the real sense of "mobile tax", which can realize "mobile tax" at any time and allow taxpayers to reasonably arrange their tax time, which not only eases the problem of congestion and long queuing time in the tax service hall, but also improves the timeliness of tax appointment.

(1) Connecting the back-end server with the number-calling machine in the tax service hall It makes real-time statistics on dynamic data of tax service hall, grasps the queuing situation of the tax service hall, analyzes the average processing time and average waiting time of each work item through data, and analyzes the road condition with electronic map, so as to

accurately predict the time for taxpayers to reach the service hall. At the same time, taxpayers can also check the information of duty personnel and waiting for numbers through the cell phone number calling APP and make appointments to call numbers according to the actual work needs. At the same time, the APP can also realize the reminder service. For example, when taxpayers make appointments for tax-related business, the APP can inform the required information at one time and indicate the relevant precautions, so as to prevent taxpayers from making more trips because they bring less or no information.

(2) Promote the integrated management of some tax-related business packages Integrated management of tax-related business packages refers to the need to integrate multiple related items with high application frequency, complex business, high upstream and downstream correlation and cross-system operation into business packages in the process of tax reduction and fee reduction. on January 20, 2017, Nanjing Gulou District IRS and Wuxi IRS piloted the comprehensive application package for newly-run enterprises. on March 1, 2017, based on the experience of trial operation, the "newly-run enterprises Comprehensive Application Package" has been launched and implemented in the whole province. Up to now, the Shenzhen IRS has vigorously promoted and guided taxpayers to adopt the tax-related business package integrated application matters through the notice board of tax hall, public account of WeChat, and publicity manual, and has been included in the training plan of tax school. Comprehensive handling of tax-related business packages is an important initiative to promote convenient tax handling and an important measure to further promote "Internet + Taxation". It can effectively solve the problem of taxpayers running repeatedly and taxation authorities doing it repeatedly, alleviate the occurrence of queuing and congestion in the hall, and meet the taxpayers' demand for convenient, fast, and efficient taxation to the greatest extent.

6.4 Research and recommendations on control activities

6.4.1 To achieve smart taxation as the goal to promote the construction of information resources management

Adhere to the status of data as the core resource in tax administration, do a good job in data source management and external data intelligence collection, improve the quality of data, carry out multi-level data analysis and application, and give full play to the supporting function of data in tax administration. Build a data processing center, promote the construction of a data warehouse, strengthen the management of tax data information, explore the application of big data, build a big data analysis application platform, and ultimately provide intelligent data information resources.

1. Expand and integrate data and intelligence sources. Expand the way of data and information collection. To further expand the collection scope of internal data information of national tax authorities, adopt the means of Internet uploading, video, manual input, etc., to realize the diversification of data collection channels and carriers. Use the data exchange platform to conduct sufficient data exchange with other government departments, enhance the comprehensive service capacity of information resources, and meet the needs of the development of tax administration. Promote effective integration of source data. Unified integration of all kinds of isolated and heterogeneous data sources,

the use of reasonable data extraction tools and data conversion tools, targeted writing of data conversion code, completing the original data collection, error data clearing, heterogeneous data integration, data structure conversion, data dump, and data regularly refresh the whole process. Provide efficient and standardized data interface. Construction of standard interface, unified data acquisition, output channels, and standards. Pay attention to interface permission management to ensure data access is controllable and secure. Focus on strengthening the connection with the "Gold tax Phase III" project data interface, to ensure the seamless and efficient flow of data information.

2. Optimize the architecture of the data warehouse system. Continuous improvement of operational data storage (ODS). By means of information classification standardization, user view standardization, concept database standardization, logical database standardization, and data logical structure standardization, the data element standardization of source data is realized. After unified integration, the data source information is filtered and identified, and the data is classified and defined according to the needs of tax business, so as to form a unified standard ODS for multiple business topics, and realize the "co-construction and sharing" of the database. Promote the construction of enterprise-level data model (EDM), build departmental and prefecture-level data mart according to demand, and build a complete data warehouse management mechanism.

6.4.2 To Standardize the Management Process as A Means to Promote the Construction of Electronic Service Capability

Centering on the basic framework of e-tax governance, with process standardization and system science as the main line, the construction of an e-tax project management process and ITIL management process as the focus, the establishment of a sound scientific e-tax service system and the continuous improvement of e-tax service quality.

1. Implement electronic tax project management. Introduce advanced project management theories, improve the construction of e-tax project management process system, fully implement e-tax project management standards and norms, implement project process control, monitor project development track, correct the deviation between goals and status quo, improve the control and implementation ability of project management, and realize the project management method covering the whole project life cycle. According to the actual implementation of e-tax projects, from the strategic level of project management, the controllable management of e-tax projects should be promoted mainly from the following aspects: standardized project process management, e-tax project risk management, standardized project quality management system, standardized project process document management, and standardize project performance evaluation mechanism.

2. Improve the e-tax service process. In accordance with ITIL standards, the system operation and monitoring platform should be integrated, and the e-tax service organization system should be improved by establishing the e-tax service management system, further standardizing the e-tax.

3. Service process and content, and strengthening the e-tax service audit analysis. Establish the e-tax service management system, improve the e-tax service organization system, establish the ITIL management process, standardize the e-tax service content, strengthen the e-tax service audit analysis, and realize the service standard filing and upgrading.

7 BENEFITS OF BLOCKCHAIN TECHNOLOGY FOR ELECTRONIC INVOICE MANAGEMENT

The benefits of blockchain technology for electronic invoice management are numerous, which can significantly simplify the business process and greatly reduce the cost of invoice management, as shown in Table 2.

Table 2: *Benefits of Blockchain Technology for Electronic Invoice Management*

Serial number	Business Process	The benefits of blockchain electronic invoicing
1	Printing	No printing required
2	Lead Buy	No subscription required
3	Issue	Trading instant tickets on a blockchain system
4	Receive	Pick up invoices on the chain
5	Inspection	Distributed data sharing, one-click query, easy and efficient
6	Reimbursement	With the blockchain consensus algorithm and the difficulty of tampering, the invoice information cannot be tampered with, and the reimbursement process has traces to ensure that no duplicate reimbursement occurs.
7	book entry Archiving	Invoice issuance information and subsequent status changes in checking, reimbursement, and accounting can be permanently stored in blockchain network nodes
8	Audit	Instantly auditable
9	Save	Permanent storage to maintain data security in real time
10	Destruction	No need to destroy, permanently traceable

8 CONCLUSION

The emergence of electronic invoices has brought a very far-reaching impact on the whole of society. For taxpayers, electronic invoices have reduced paper costs, improved work efficiency, and optimized the taxation experience. To the government, electronic invoices promote the process of "Internet + taxation", improve the level of tax collection and administration, and enable the government to better realize the transformation from "tax control by invoice" to "information tax". To society, electronic invoice saves social resources and reduces environmental pollution. It can be said that electronic invoices meet the needs of economic and social development. Therefore, with the introduction of relevant laws, the development of science and technology, and the continuous optimization of the network environment, electronic invoices will truly realize universal tax and intelligent tax. However, before electronic invoices become popular, there are still some problems: duplicate reimbursement and records. At

present, these problems are mainly solved by enterprises' spontaneous or third-party auxiliary management means, and cannot be fundamentally avoided. In addition, in electronic invoice management, although there are a variety of electronic invoice service providers, each has its own advantages and disadvantages, and can not really realize the popularization of the electronic invoice function. With the Bitcoin craze sweeping the world, society seems to have entered a new phase. As the underlying core architecture of Bitcoin, blockchain technology is also receiving more and more attention. Currently, blockchain has been increasingly used in various areas of society, especially in cryptocurrency, finance, payment, and charity. Blockchain technology is essentially a decentralized distributed database. Relying on technologies such as asymmetric encryption, P2P network, and consensus mechanism, it can well realize peer-to-peer transactions and distributed storage with low trust cost.

REFERENCES

Ozelli S. (2018). EU's Proposed Digital Tax Doesn't Apply to Fintech Activities: Expert Take[EB/OL]. Retrieved March 06, 2018, from urlhttps://cointelegraph.com/news/eus-proposed-digital-tax-doesnt-apply-to -fintech-activities-expert-take.

Joshi N. (2018). Blockchian and taxation[EB/OL].Retrieved April 20, 2018, from `https://www.bbntimes.com/en/technology/blockchain-and-taxation`.

Deloitte. (2018). Blockchain technology and its potential in taxes[EB/OL]. RetrievedApril04,2018,from `https://www2.deloitte.com/pl/en/pages/tax/articles/blockchaintechnology.html`. 2018-04-24.

Raupp. A.B.(2018). Tax Return 2.0: How Blockchain Technology Can Bring America's Budget Into The Future [EB/OL]. Retrieved April 30, 2018, from `https://www.forbes.com/sites/forbestechcouncil/2018/01/22/tax-return-2-0-how-blockchain-technology-can-bring-americas-budget-into-thefuture/3/#7aa33d011236`.

Owens G., He Z., Wang S. and Zeng H. (2017). Prospective analysis of blockchain technology and its application prospects in taxation. International Taxation (9), 5.

Kuang, H. Y.. (2018). On the Implications of Tax Compliance for China's Tax Collection and Administration. Contemporary Economy(8), 4.

Ren, Dongbiao, Liu, Wei, Gu, Huiwu, He, Xiang, Zhang, Haibo. (2017). Experimental analysis of the problems and countermeasures of tax collection and management of natural persons. Taxation Research (10), 4.

Zhang J., Zhang R. Yan and Li L. (2017). Using "portrait" thinking to promote the transformation of tax collection and management. Taxation Research (12), 4.

Ye Q, and Lu Y. (2019). Research on tax informatization in the context of Ïnternet+taxation.. Tax Economic Research, 24(1), 6.

Cai, C., and Zhao X. Y. (2019). The construction of tax ecosystem in the context of "Internet+". Tax Research (3), 9.

Cai-Chen M., and Zhao, Di. (2018). The change of tax collection and management model in the context of "Internet +". Fiscal Science (9), 7.

Xinwei G. and Juan L. (2019). "Internet . +" background based on the whole industry chain tax collection and management model analysis — petrochemical industry as an example [N]. Journal of China University of Petroleum,2019(1).

Chun-Min Y. (2018). A preliminary study on the protection of tax-related information of taxpayers under the mode of "Internet+taxation". Taxation Research (11), 5.

Li D. (2020). The prospect of blockchain technology to help modernize China's taxation. Liaoning Economy(7), 2.

Chia-Yi T. (2020). Blockchain provides solutions for tax collection and management challenges. People's Forum (19), 2.

Chen, L. and Choi, J. H. (2022). Exploration of modern tax management model based on blockchain technology. Financial Management Research (2), 8.