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The Inclusive Innovation of Blockchain in Securities Issuance: Reduced Inequalities of Investors

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ABSTRACT

As an important driving force of financial technology, many financial institutions are exploring the application and scenario landing of blockchain. With the rise of the blockchain concept, the value of smart contracts is constantly being amplified and applied. Inefficient settlement, opaque asset issuance, and post-IPO regulation are the main obstacles facing securities markets in various countries. This research examines the application of blockchain in securities issuance. First, it reviews the current situation of the global and Chinese securities markets, analyses the existing problems and opportunities according to the existing processes, and focuses on the reliability of securities data, the transparency of securities issuance, and the application of smart contracts in securities trading. We also explore the regulatory hurdles and legal risks that blockchain-based securities may face and give recommendations accordingly. The mixed model method is chosen to make up for the limitations of various research methods. The collection of data is based on online questionnaires to collect people's opinions and attitudes toward these issues. Then the reliability and content validity of the data were verified. After confirming the valid data, the results of the data are analysed, the long-term effects and some recommended actions are discussed, and the hypotheses are validated based on the PLS-SEM model. Then, the paper proposes a scheme of blockchain securities based on weakened authority and looks forward to the future of blockchain securities. This research can provide theoretical guidance for the implementation of blockchain securities, and the proposed scheme solves the problem of transparency of securities and helps investors reduce losses caused by poor information. In the conclusion, we also analyse the practical challenges and considerations of implementing blockchain technology in the securities industry. Finally, intelligent transactions realized by blockchain securities can also reduce the economic and reputation losses caused by human errors for securities companies while reducing manpower costs.

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1. Introduction

In the current securities issuance business, the listed company needs to find the securities issuance intermediary, sign the entrusting issue contract with it, and formally apply for issuing stocks to the securities administration department directly under it. Subject to approval by the Stock Exchange and the SFC, investors may subscribe [1]. In the process of securities subscription, after the securities buyer issues a trading order, the securities company, the stock exchange, the securities registration and settlement institution, and the asset custodian bank must coordinate and cooperate to complete the transaction. The application process is shown in Figure 1.

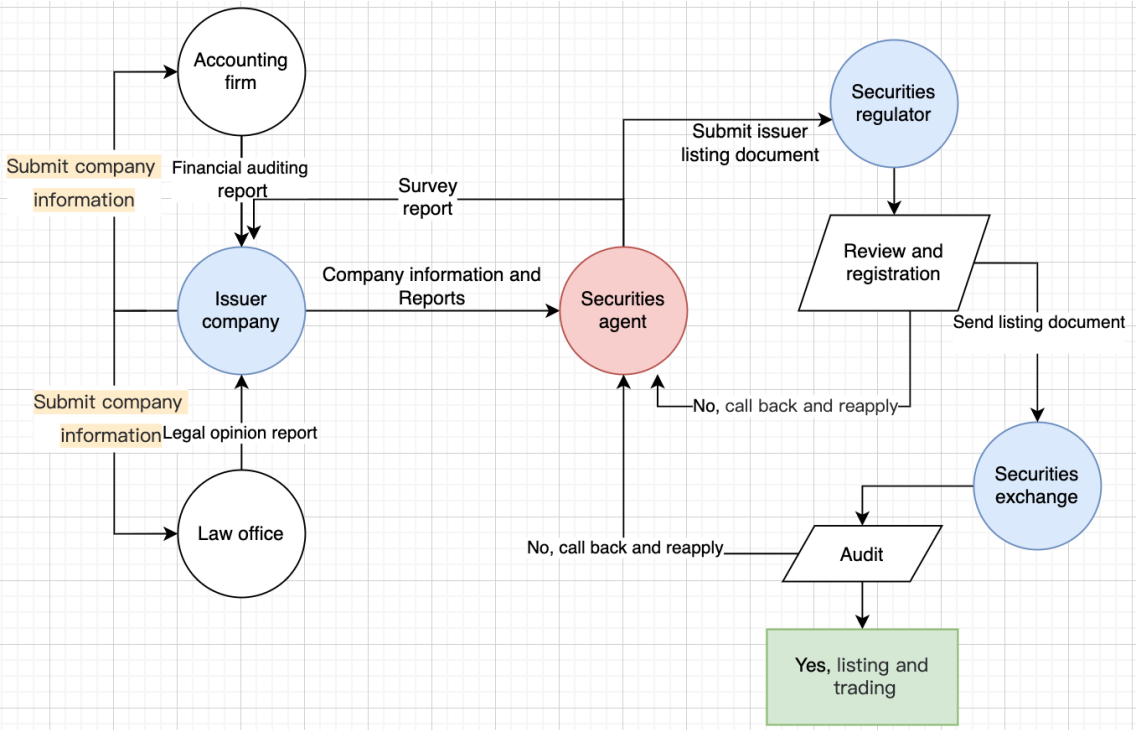

Fig. 1. Securities issuance process

In the current securities issuance and trading process, the securities issuance and trading business is done through the cooperation of multiple institutions, and the business data will be verified multiple times in each institution, which can reduce the risk of a central authority being responsible for all the business. If one of them makes a mistake, other partner institutions can help correct it [2]. However, each institution records its transaction data independently, and discrepancies between institutions can cause disputes that often require manual reconciliation or intermediaries to resolve, increasing settlement time and transaction costs. Because the existing business process requires a large number of intermediaries to participate in depth to complete the stock issuance business, not only the procedures are complex, but also the risk is large, and the whole process is time-consuming and laborious. At the same time, due to the large trading volume and high trading frequency of securities, a lot of resources will be wasted.

Since Satoshi Nakamoto created Bitcoin in 2008, blockchain technology, the core technology on which Bitcoin relies, has received great attention [3]. Even as Bitcoin continues to be controversial, blockchain technology continues to evolve rapidly. Subsequently, people found that the blockchain technology extracted from the bottom layer of Bitcoin can not only be applied to digital currency but also enable users to achieve trusted value transmission without mutual trust and trusted intermediaries. Therefore, several blockchain platforms represented by Ethereum to realize digital

asset trading have emerged. Any node can join and leave at any time without permission, so such blockchains are called public blockchains. The feature of public blockchain that allows any node to enter and exit at will is not suitable for enterprise applications. In the cross-institutional transaction scenario, multiple enterprises cooperating form a coalition, and only alliance members can join the blockchain and participate in transactions. In December 2015, the Linux Foundation launched the Hyperledger open-source blockchain project, which focuses on developing cross-industry enterprise blockchains [4]. Unlike traditional centralized systems, blockchains operate on a peer-to-peer network where data is stored on multiple nodes in a decentralized storage system. This distributed database ensures that no single entity can control the data, making it difficult for hackers to compromise the entire network. Decentralization also increases transparency and creates a trust less environment that gives users better control over their data ownership and facilitates transparent transactions.

Blockchain employs advanced cryptographic techniques to ensure data privacy, security, and information protection. By using cryptographic techniques including end-to-end encryption and public key infrastructure, blockchain can keep the sensitive information of user's secret. Hash functions enable the network to preserve the integrity of the data, as changing even a single character in a transaction result in a completely different hash output, making it almost impossible to manipulate the data without detection. Blockchain enables users to create and manage digital identities that can be used to control access to personal information. This identity management system provides users with greater control over their data, while also reducing the risk of identity theft and unauthorized access, helping to prevent data breaches. Blockchain networks provide pseudonyms by allowing users to transact using alphanumerical addresses instead of personal information. This functionality provides a layer of privacy, while privacy layers such as zero-knowledge proofs and off-chain transactions can further enhance user anonymity and data privacy. The essence of blockchain is a large-scale distributed database, which is jointly maintained by all participants on the chain. It has the characteristics of decentralization, de-trust, collective maintenance, non-tampering, traceability, and so on. It can be applied to securities issuance and trading business. Blockchain technology realizes the consensus verification of transaction data before writing, and the distributed accounting that cannot be tampered with after writing, which reliably ensures the data consistency between multiple institutions, realizes the trusted data sharing between multiple parties, avoids manual reconciliation, eliminates intermediaries, and reduce the delay and cost of transactions.

1.1 Problem Statement

The securities industry provides an important financing channel for enterprises. At the same time, it also promotes the improvement of investors' financial awareness, is conducive to the improvement of personal wealth accumulation, and is very important to maintain the high-quality development of the securities industry. Historically, the existence form of securities has always been paper, which requires the existence of centralized trusted institutions to issue, custody, clearing, and settlement. Even after the paperless reform in the information age, there is still a central institution, and there is still a complex business relationship between securities accounts and investors, securities companies, and securities registration and settlement institutions. However, how to ensure the efficient operation of the business, as well as the accuracy and security of data among multiple institutions in the securities business have always been the problems faced by the securities industry. In the general securities business, listed companies need to find a securities issuance intermediary, sign an entrusting issue contract with it, and formally submit an application for stock issuance to the

securities administration department. Investors can subscribe after the stock exchange has examined and approved the application. This process requires the participation of a large number of intermediaries to complete successfully. Issuing shares is not only complicated and expensive but also risky [5]. In addition, after a securities holder sends a transaction request, it needs the coordination and cooperation of securities companies, stock exchanges, securities registration and settlement institutions, and asset custodian banks to complete the transaction. In cross-institution transactions, each institution records its transaction data independently, and the difference in data between institutions will cause disputes, which usually need manual reconciliation or intermediary agencies to solve, thus increasing the settlement time and transaction costs [6]. The opacity and difficulty of accurately valuing assets make it difficult for investors to see the quality and risk level of the underlying assets.

Based on the existing problems in the securities industry, first of all, we should effectively reduce the cost of securities trading as far as possible, to improve the efficiency of securities trading. In addition, we will strengthen the transparency of securities assets and effective supervision of securities transactions to protect the legitimate rights and interests of investors. At present, China's securities settlement is mainly handled by the Central National Debt Registration and Clearing Co., Ltd. and China Securities Registration and Clearing Co., LTD., whose responsibilities mainly include securities registration, settlement, and account maintenance. In addition, securities-related services such as equity distribution, custody, financing, reporting, and securities lending also fall within its functional scope [7]. In doing so, they work with exchanges and clearing participants (typically securities firms) to hold, correct, and maintain all trading data, which is costly, inefficient, and less secure. Historically, the existence form of securities has always been paper-based, which requires the existence of centralized trusted institutions for issuance, storage, settlement, and settlement. Even after the paperless reform, there are still central institutions, and there are still complex legal relations between securities accounts and investors, securities companies, and securities registration and settlement institutions [8].

The main business of the securities industry, registration, custody, settlement, and settlement, is undertaken by one institution, which has problems of gradual concentration, low efficiency, high cost, and big risks. Since IPO involves the participation of multiple institutions, the issuance efficiency is relatively low, and the information asymmetry among various process institutions may lead to fraud and incomplete supervision, causing losses to investors, such as the Luckin Coffee fraud case in 2020. The involvement of so many intermediaries also increase the cost of going public. Therefore, despite the informatization of the securities industry, the cumbersome process of securities registration and trading and the low efficiency of securities trading is still solved due to the numerous central institutions involved in the process of securities registration and trading.

Blockchain technology implements a distributed ledger where transaction data can be verified by consensus before writing and cannot be tampered with after writing, credibly ensuring data consistency among multiple institutions and avoiding manual reconciliation and intermediaries. Blockchain is a decentralized, tamper-proof, traceable, trusted, multi-party shared distributed database. Blockchain can control the number of trusted nodes involved in the transaction process because, in blockchain, the persistence, validity, traceability, and collectively of the data can automatically reach a consensus, which can greatly shorten the confirmation and settlement time between the two sides of the transaction. At the same time, the encryption algorithm used by blockchain also reduces the settlement risk in the process of securities trading. The distributed algorithm has the function of decentralization, which can effectively weaken the control role of the central organization, realize the true "transaction as settlement", improve the liquidity of assets, and reduce transaction costs. The introduction of blockchain technology will change the way securities

are traded. In the blockchain network, you only need to input the source code of the information, which will be reviewed through the blockchain automation mechanism to shorten the release time. Instead of passively waiting for the underwriter to control the timing of the issue, the issuer can decide the timing of the issue itself. Because the execution and recording of securities transactions under blockchain technology are synchronized, fraud can be reduced.

1.2 Research Objectives

RO1: Improve the efficiency of securities issuance by increasing data reliability.
RO2: Increase investor confidence by improving the transparency of securities.
RO3: Reduce manpower costs through the application of smart contracts in securities.

1.3 Research Hypotheses

RH1: The distributed database has a positive impact on the reliability of business data.
RH2: The traceability of transaction data can improve the transparency of securities.
RH3: The use of smart contracts in securities subscriptions enables automated trading and reduces manpower costs.

1.4 Value Creation

At present, securities issuance relies on intermediaries to provide services, but human intervention has ethical and error risks. Blockchain is considered a technology that can change the existing financial system. Securities can be issued on the blockchain, reducing the risk and cost for investors and financiers. Before transactions, market participants share information on the blockchain, and perform joint verification and selective opening according to the conditions of smart contracts, while ensuring security and reducing costs. After transaction execution and transaction completion, blockchain is used to replace intermediaries for transaction and post-processing, and the risk of errors is reduced through procedural authentication.

1.5 Literature Review
1.5.1 Blockchain technology and securities

In recent years, financial markets have been more active than ever, and companies have increased their demand for IPOs and securities offerings. After the birth of blockchain technology with Bitcoin, scholars have put forward different studies and views on its technical development and application fields. The earliest landing of blockchain securities was ICO, which was very hot at that time. However, the lack of regulation has led many teams to scam through ICOs. Eventually, ICOs died. Through the ICO failure, we found that there is still a need for broker agents because they can provide a certain amount of regulation and background checks. So, we put forward the conceptual scheme of BSWI. Figure 2 shows the Development and relationship between blockchain and securities.

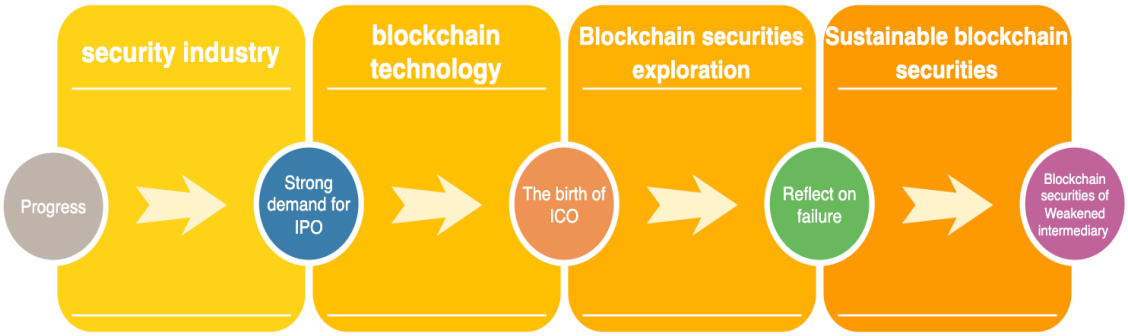

Fig. 2. Development and relationship between blockchain and securities

Blockchain technology was first proposed by a scholar who called himself "Satoshi Nakamoto" in his paper "Bitcoin: peer-to-peer electronic Cash System" in 2008, It uses cryptography and consensus mechanism to realize electronic payment in a distributed network environment, effectively solving the open problem of electronic payment. For example, duplicate payment of electronic payment and bottleneck of payment centres [9]. Blockchain technology has the characteristics of decentralization, distribution, and authentication. It is an underlying service platform technology that provides secure and reliable data storage and access control for network applications in a distributed network environment. Because of its safety, efficiency, convenience, and many other advantages, it has been widely considered by financial experts. At present, blockchain technology can be applied to electronic money, international settlement, equity transactions, insurance services, digital copyright, financial technology, electronic payment, and other fields, which will provide a good innovative development path for financial service innovation and derivative innovation [10]. In recent years, more and more scholars in the academic community have begun to pay attention to blockchain technology and explore the application of blockchain technology in fields such as finance. At the same time, the United Nations, the International Monetary Fund, and many governments have also released a series of reports on blockchain technology, it aims to actively promote the application of blockchain technology in industries such as finance [11].

1.5.2 Application status of blockchain securities

Many countries and regions have approved or announced the application of blockchain technology in the field of securities, and some countries are still in the test stage. It mainly has the following characteristics: First, the main body of research promotion mainly includes exchanges, banks, other market institutions, and financial enterprises; Second, the research and exploration practice present the characteristics of full coverage, but the officially announced application links focus on the issuance and trading of securities in the over-the-counter market such as private equity, and post-trade services in the over-the-counter market.

Citibank, Bank of America, and other international financial giants have begun to adopt blockchain technology in multi-agent, multi-level, and all-round applications in the financial industry, and the application of blockchain has been extended from finance to the Internet of Things, intelligent manufacturing, supply chain management, and other fields [12]. The U.S. Securities and Exchange Commission has approved online retailer Overstock.com's S-3 application to issue the company's new public shares on the blockchain. Nasdaq has announced Nasdaq Linq, a private equity trading platform based on blockchain technology, launched in partnership with blockchain startup Chain.com. The platform serves the equity transfer of unlisted companies and can complete the settlement of private equity transactions.

In September 2016, the British bank Barclays was the first to use blockchain technology to complete the first international trade settlement. The use of accounting and transaction processing systems based on blockchain technology can greatly improve the processing efficiency of trade settlements. The processing time of traditional international settlement business has been shortened from 5 to 10 working days to 4 hours.

In May 2018, HSBC partnered with ING to apply blockchain technology to produce digital credit certificates for Cargill, a company engaged in commodity trading, processing, transportation, and risk management, completing the world's first trade finance transaction. HSBC and ING used R3's Corda platform to complete a cross-border deal for Cargill to export soybeans from Argentina to Malaysia. The Corda platform used this time is a distributed ledger platform based on blockchain technology launched by R3, an American company, which can reduce the processing time of international settlement businesses based on letters of credit from 5-10 working days to 24 hours [13].

The Australian Securities Exchange (ASX) has announced that it will adopt distributed ledger technology to provide post-trade services for shares, replacing its existing post-trade settlement system CHESS. As of November 2017, the blockchain system has completed two years of proof of concept and suitability testing and will play a significant role in the interaction of information and business processes between multiple trading parties, which can meet the security, privacy protection, and scale trading functions expected by Australia's largest stock exchange. ASX will also be the first major exchange in the world to apply blockchain technology to its core business. Based on the literature, we summarize some existing blockchain securities technologies, as shown in Table 1.

Table 1
Existing Technology Summary Table

Existing Technology
Public chain [14] Fully decentralized blockchain network, each node is independent, and anyone can join the network, and jointly participate in its management and maintenance.
Private chain [15] A blockchain network managed and maintained by a specific organization or business allows only authorized nodes to participate.
ICO [16] The startup team or startup company issues digital assets (tokens) based on blockchain technology through the Ethereum public chain to raise funds.
Smart contract [17] Automated contracts based on blockchain technology. An executable computer program written in code that contains a set of conditions and actions to enforce rules and terms agreed upon in advance by the parties to a contract.
Alliance chain [4] A blockchain network that is jointly managed and maintained by multiple organizations or businesses, using consensus algorithms for transaction confirmation and ledger maintenance.

With the development of technology and the continuous exploration of scholars, blockchain technology has also had a stable development, in addition to the early Bitcoin and Ethereum these public chains, but also the birth of private chains, and alliance chains. Public Chain is a completely decentralized blockchain network. Each node is independent and anyone can join the network and participate in its management and maintenance. In the public chain, each user can add a transaction record to the blockchain and ensure the correctness and immutability of the transaction through consensus algorithms. The application scenario of the public chain is mainly digital currency, of which

Bitcoin is the most famous public chain [18]. However, because the public chain is completely public, it is easy to be targeted by hackers and has security risks.

A Private Chain is a blockchain network that is managed and maintained by a specific organization or business, allowing only authorized nodes to participate. Private chains typically have higher performance and privacy protection because they have a smaller number of participating nodes and operate in a more confined environment. The application scenarios of private chains are mainly internal enterprise information management, data sharing, and digital management of industrial assets [18]. Private chains avoid public problems, but they scale poorly.

Although ICO makes issuance and financing more convenient, due to the lack of supervision of ICO, many investors have suffered huge losses in the end. A smart contract is an application on the blockchain that enables automated transactions but is inflexible because it is a fixed code.

The Alliance Chain is a blockchain network managed and maintained jointly by multiple organizations or enterprises, using consensus algorithms for transaction confirmation and ledger maintenance. Affiliate chains are not decentralized like public chains, nor are they completely controlled by a single entity like private chains. The application scenarios of the alliance chain are mainly supply chain, financial transaction, healthcare, and other fields. But in the alliance chain, there is no complete standard at present.

1.5.3 Innovation and development of blockchain technology

With the continuous development of new solutions in recent years, several new technological innovations have also emerged, which we summarize in Table 2.

Table 2
Proposed technology table

Proposed Technology
Cross-chain transaction technology [19] Enable interoperability between different blockchain networks, including asset interoperability, cross-chain data transmission, and cross-chain smart contract execution.
Interchain atomic exchange settlement system [20] Based on cross-chain atomic exchange technology, it eliminates settlement failures and improves market management efficiency, which can be used for digital currencies of central banks. A new lattice-based sequential aggregation signature scheme is used to resist future quantum attacks.
Hyperledger Fabric [21] Store transaction records on multiple nodes to ensure data security and immutability. It also supports privacy and permission control, allowing different parties to access only specific data and transactions, thereby protecting business privacy and sensitive information.

Some researchers have proposed a blockchain-based standardized autonomous transaction settlement system for e-commerce. To record and track transactions that occur in a merchant's business, the device can operate a blockchain server on the merchant's property. By adding a digital identification layer, the user's real identity is masked [22].

Yunyoung Lee has proposed a blockchain-based settlement system that uses cross-chain atomic exchanges that can be used for central bank digital currencies (CBDC). Add an administrator ledger to the system, eliminate settlement failures, and improve the efficiency of market management. A novel lattice-based sequential aggregation signature scheme is proposed, which is generally known for its advantages against future quantum attacks [20].

Liu Ying and Yan Jin discussed some problems in the application of the combination of blockchain and electronic settlement and then proposed a certificate control system based on blockchain

technology, which can resist most fraud. Secure storage and immutability of transaction data are realized [23].

Among the many problems faced by blockchain, the interoperability between blockchains greatly limits the application space of blockchain. Regardless of whether it is a public chain or a private chain, cross-chain technology is the key to realizing the Internet of value, and it is a bridge for the outward expansion and connection of the blockchain. In the blockchain space, there are many different blockchain networks, each with its own rules, protocols, and tokens. Cross-chain technology aims to solve the isolation problem between these blockchain networks, enabling them to connect and communicate with each other, enabling cross-chain transfer of data and assets [19]. Through the failure of ICO and the existing problems of traditional securities, as well as the innovation of technology, we construct Blockchain securities of the weakened intermediary (BSWI) to retain the role of intermediary, intermediary can regulate abnormal transactions. It can also help exchanges and government agencies conduct qualification reviews and supervision of companies that issue securities.

1.5.4 Legal and regulatory challenges

With every dramatic transition to new technologies, blockchain poses a range of legal concerns [40]. At present, blockchain technology is still in the early stages of development, and the corresponding regulatory rules have not yet been perfected. This makes it possible for regulators to feel overwhelmed when dealing with blockchain-based securities. At the same time, due to the transnational nature of blockchain technology, it also increases the difficulty of regulation. Under the existing legal system, blockchain-based securities trading may have legal application issues. For example, in some countries or regions, there may be unclear legal provisions or legal gaps that make it impossible for regulators to effectively regulate blockchain-based securities transactions. The decentralized nature of blockchain technology makes traditional regulatory approaches difficult to implement.

Traditional regulatory means mainly rely on centralized financial institutions or intermediaries, and blockchain technology makes financial transactions more decentralized and autonomous, resulting in regulators' difficulty in effectively monitoring and managing financial transactions [43]. To solve these obstacles, regulators need to adapt to new technologies and regulatory approaches, improve the corresponding regulatory rules and technical specifications, and strengthen international cooperation to jointly address the regulatory challenges faced by blockchain technology in the field of securities.

2. Methodology

In this paper, we conduct research to determine whether blockchain-based issuance of securities has theoretical reliability as well as positive mass acceptance. The target audience of this study is securities practitioners, entrepreneurs and managers of small and medium companies, and investors, so we can learn whether the results of our research have social and commercial value from the acceptance of blockchain securities by securities practitioners and whether it can improve the way they work. And whether startup managers and investors feel that blockchain securities address and improve their concerns about transparency and convenience. To conduct research, a range of procedures and techniques are used to classify, select, process, and evaluate information, a process also known as research methods [25-27]. The three research methods widely used by researchers are qualitative, quantitative, and mixed model methods. Qualitative Research is a text - and language-

based research approach that focuses on understanding the meaning of phenomena and the complexity behind them. Qualitative research uses interviews, focus group discussions, textual analysis, and other methods to dig deeper into the reasons and motivations behind people's opinions, attitudes, and behaviours. Quantitative Research is a research method based on numerical data, which emphasizes the use of mathematical, statistical, and metrological methods to collect and analyse data. Quantitative research usually uses methods such as questionnaires, experiments, observations, and statistical analysis to quantify and measure the relationship between phenomena [28-31]. A mixed model approach is a design that combines the characteristics of quantitative and qualitative research to obtain more comprehensive and in-depth research results. In a mixed-model approach, researchers collect and analyse both quantitative and qualitative data and integrate them to capture more dimensions of information in one study [34,35].

2.1 Triangulation Mixed Mode Research

At the initial stage of the study, different research methods were considered for use in this study, including quantitative, qualitative, and mixed models. Finally, we chose to continue my research by using a mixed mode (quantitative and qualitative) research method, which will provide more intuitive and obvious results for the research [36,37]. Use digital survey tables and statistical charts to conduct mixed-mode research, which includes a combination of open and non-open questions.

This mixed-mode approach will collect data from various types of Internet users via online questionnaires to facilitate systematic surveys to study the application of blockchain in securities issuance and trading. The time frame for the final data collection will be a short cross-departmental or even cross-company study, which will take about 1 week.

2.2 Sampling

It is determined that the sample respondents should be practitioners related to the securities industry and investors or people interested in securities, such as exchange staff, brokerage staff, managers of private enterprises, individual investors, etc. The actual sampling will focus on China's securities practitioners and investors or people who are interested in securities, such as the Shanghai Stock Exchange, CITIC Securities, Everbright Securities, employees of companies with listing plans, and retail investors. At the same time, it is determined that the sample size of the total number of participants in the survey should be about 60 people. In addition, the survey will use non-probability sampling, in which respondents voluntarily decide to participate in the survey, also known as convenience sampling. The WeChat questionnaire form will be used for data collection, as WeChat has a high penetration rate in China and it is more convenient and accessible for respondents, which will increase the opportunity for participation. In the aspect of data analysis, interval data is used as the unit of measurement, and a variety of descriptive statistical methods such as mode, median and mean are used to summarize the range, standard deviation, and frequency of data. To collect and analyse the data, Microsoft Excel is used to make tables and ultimately visualize the data into meaningful graphs and charts.

2.3 Data Collection

Surveys are a widely used method of data collection that collects information by sending questionnaires to a large number of respondents. Surveys can be quantitative (using closed questions, such as multiple choice, true or false answers, etc.) or qualitative (using open-ended

questions, such as fill-in, feedback, etc.). Surveys are suitable for quickly collecting large amounts of data and performing statistical analysis under large samples [28]. The interview is a research method to dig deeper and understand the perspectives, experiences, and feelings of the interviewees. It can be structured (follow a predetermined list of questions) or unstructured (explore the topic freely). Interviews are usually conducted in person or over the phone. The Delphi method is an expert-consulting research technique in which consensus is reached through a series of anonymous, circular surveys [36,37] In the Delphi method, researchers send questionnaires to a group of experts, then formulate a summary report based on the opinions of the experts, consult the experts again, and gradually reach a consensus. In this study, the questionnaire was used for data collection.

WeChat questionnaire will be the data collection tool used in this study, because it is easier to access, and participants only need to tap directly on WeChat to participate in voting. Participants were surveyed via a digital questionnaire, also known as an online questionnaire, which is a research technique used in an Internet environment. The rapid development of the Internet allows us to make a questionnaire quickly and collect data quickly. The advantages of this method are low cost, fast production speed, and fast collection speed. We share the questionnaire QR code or link directly on various platforms on the network, and others can fill in it no matter where they are. Online questionnaires can be conducted under the anonymity of respondents, which can eliminate situations in traditional questionnaires where respondents may be reluctant to answer certain questions for fear of privacy disclosure.

These surveys fall under the category of Online Research Methods (ORM). Many of these ORMs are rooted in previous research programs that have been modernized and reimagined to function in an ever-changing and mobile digital world.

The survey questions were distributed to WeChat groups, QQ groups, Sina Weibo, and Baidu Tieba forum social platforms to collect data. Since the purpose of this survey is to allow most securities practitioners and investors to participate in it, the question design is simple and easy to understand, and there are also questions about the relevance of industry knowledge. Because this is a mixed-mode study, the length of the questionnaire will be around 8-10 minutes, rather than the usual 3-5 minutes for quantitative studies.

Mixed-mode research is to construct a questionnaire by incorporating both open and closed questions into the survey. The use of easy-to-understand language is to ensure that non-technical respondents can understand the question to reduce misunderstandings and thus obtain higher-quality data. Because it is designed to gradually get respondents into the questionnaire, rather than making it too cluttered and lengthy, this can negatively affect the quality of respondents and survey responses. The survey is divided into 4 parts and consists of 16 questions, which are basic information about users, views on the securities issuance process, views on the transparency of securities transactions, and evaluation of the application prospects of smart contracts in the securities industry.

2.4 Data Analysis

Interval data is a type of numerical data that has a fixed numerical difference and can be performed mathematically. Addition and subtraction can be performed between interval data, but there is no absolute zero. Common examples include temperature (degrees Celsius or Fahrenheit), time (hours, minutes), etc. The characteristic of interval data is that the size can be compared and the difference can be calculated, but the ratio cannot be calculated. The interval data is mainly used in this study, because it can capture the data range, such as the user's income range, age range, and the user's recognition degree of the problem. The option of question recognition degree is widely used in the questionnaire, including Strongly disagree, Disagree, strongly disagree, strongly disagree,

and strongly disagree. Neither agree nor disagree, Agree, strongly agree. These five options are followed by a scale of 1 to 5 in terms of their agreement with the problem.

Nominal data is a type of data that is used to classify an individual or object but has no fixed numerical meaning. Nominal data is often used to represent different categories, names, or labels, such as gender (male, female), user identity (securities practitioner, investor, company manager), etc.

To prepare data for analysis, duplicate submissions, and incomplete data will be deleted. The WeChat questionnaire management background can see the submitted data details and preliminary analysis, and can also reset the submission when releasing the questionnaire, such as by IP or MAC address. In addition, data verification can be set before submission, thus reducing unnecessary dirty data.

Structural equation modelling (SEM) is a popular statistical method in the field of social science. PLS-SEM is a method that combines principal component analysis with multiple regression and performs iterative estimation. The commonly used software tools include SmartPLS, PLS-Graph, VisualPLS, and so on. This statistical modelling technique is an emerging tool that has been used by many researchers in different disciplines [30]. This study will use SmartPLS software for detailed analysis, and the data will be processed using the equation modelling algorithm of PLS-SEM. In the case of this study, PLS-SEM will be expected to draw conclusions from open-ended responses and determine reliability and validity.

3. Results

3.1 Statistical Analysis

3.1.1 Demographic

In Figure 3, we can see that most respondents are between 30 and 40 years old. Therefore, most of the interviewees are employees with certain work experience in the workplace, and some of them are young people between 20 and 30 years old. Most of these young people have just entered the workplace for a few years. The proportion can also reflect that the largest proportion of employees and investors in the securities industry is between 30 and 40 years old. In most securities and financial industries, the longer the working years, the more popular they are. Unlike some industries that only eat youth, such as express delivery, takeout, and the Internet industry. In China, only graduates from top universities have the opportunity to work in the securities and finance industry.

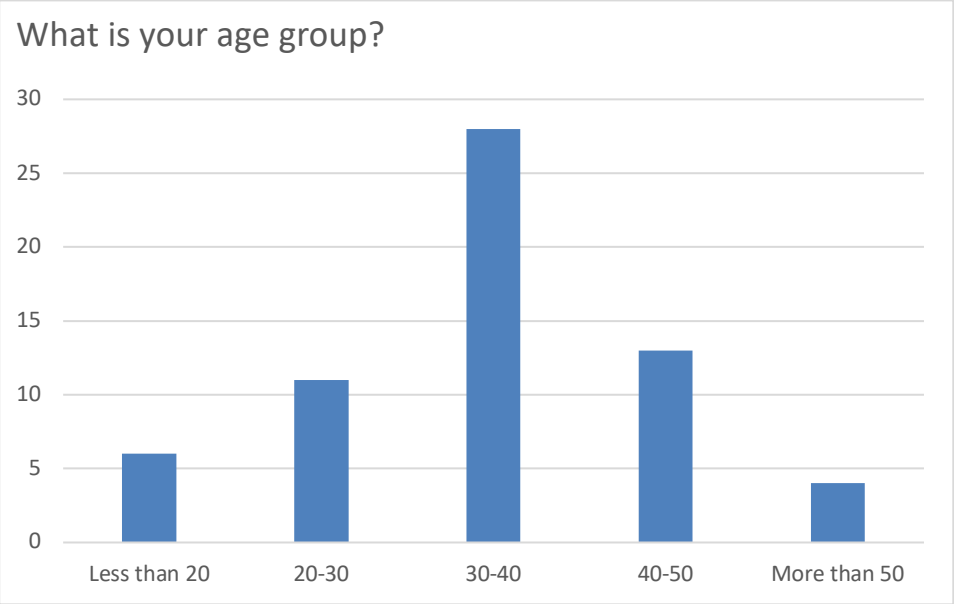

Fig. 3. Age Group

3.1.2 Requirement accuracy of data

Most of the respondents said that since the issuance of securities involves money, the accuracy of data and information in the execution of this business has a high requirement. Figure 4 shows that most people hold a favourable view on this issue. Because any small mistake or human-caused data inaccuracy in the application process can cause unimaginable amounts of losses, everyone is sensitive and cautious about things related to money.

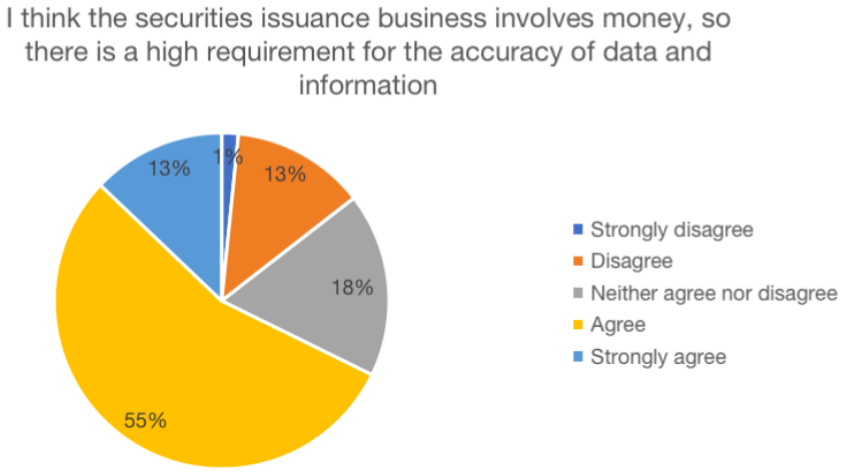

Fig. 4. High Requirement Accuracy of Data

Through the feedback of surveyors on this issue, we can conclude that the accuracy of data information in the securities industry is higher than that in other industries. Besides meeting the legal and financial requirements, the application for issuing securities by enterprises also needs to go through multiple layers of approval and qualification examination. For example, it provides necessary regulatory supervision to companies applying for issuance, ensures accurate financial disclosure to avoid data fraud, and protects investors. In addition, to facilitate management, the securities industry only allows qualified companies to issue securities. These qualified companies are the current

brokerage agents, and other companies can issue and trade securities through them. However, it also requires a lot of paperwork and adds unnecessary administrative burden. Securities institutions favour large companies over small ones, which may hinder innovation and entrepreneurship. The issuance and approval process should be simplified for small issuers, and the securities industry should improve the accessibility of startups.

The use of a blockchain-based securities issuance scheme, in the process of securities subscription under the support of the payment gateway can be directly written into the blockchain, based on blockchain broadcast to promote the participants to retain the authenticated asset data, neither party can tamper with these data information, to solve the problem of authenticity of the data source. With the support of blockchain, each participant can effectively realize the real-time synchronous update of data, and prevent problems in the docking of business systems, which has an important impact on the improvement of data flow efficiency and can also reduce the degree of information loss to a greater extent.

3.1.3 Investor awareness

As shown in Figure 5, many respondents worry that securities agencies will buy and sell securities without investors' knowledge after investment. Because the direct ownership of securities is in the hands of securities agents, and the trading on the exchange is the buying and selling of securities agents, most investors hold in the hands of a broker their company's 1:1 virtual security. Some respondents said the securities industry needs to be more transparent, reduce access restrictions for retail investors, and promote liquidity in the secondary market. Respondents also said that the securities industry needs to continuously innovate and improve, and should reduce its reliance on intermediaries, embrace digital solutions, embrace the tokenization of assets, or adopt decentralized finance (DeFi) solutions.

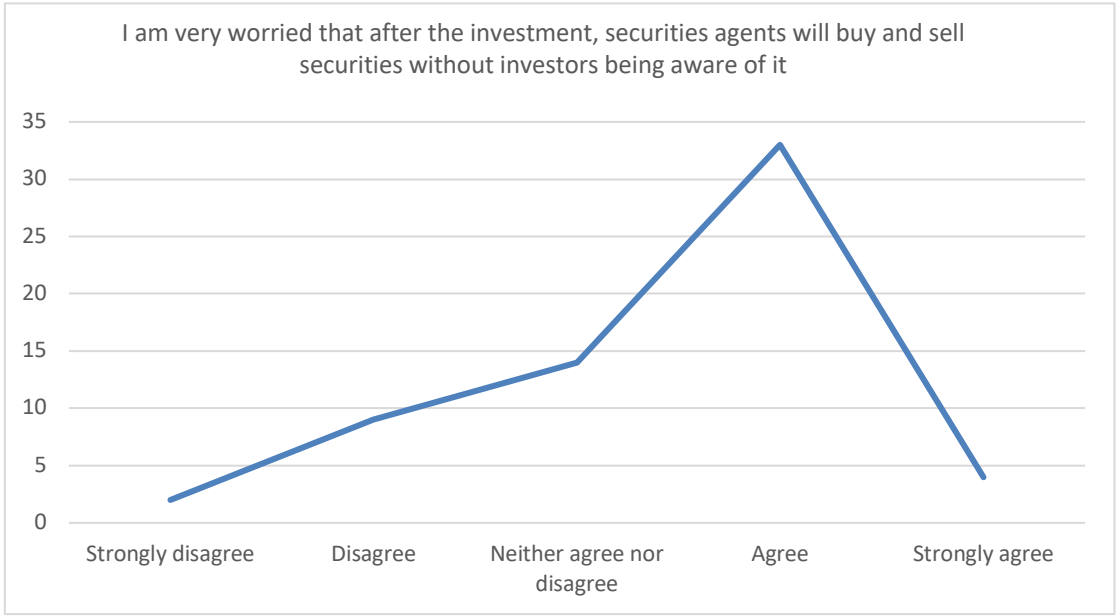

Fig. 5. Investor Awareness

A securities agency is a special institution that has always existed in the right industry. Since the securities business involves money and has high requirements for data accuracy, the stock exchange manages it effectively by reducing the number of institutions interacting with it, to ensure data accuracy with limited manpower. Take the Shanghai Stock Exchange as an example, there are 20-30

qualified securities agents, and the exchange only needs to manage these 30 companies, and then these 30 securities agents will deal with other companies or organizations that have real issuance needs. When the application information of startups reaches the exchange, they have passed the qualification examination of the following securities issuance agents. There are far fewer cases where information goes wrong. Imagine how the exchange can efficiently manage these thousands of startups or listed companies without securities agents. Therefore, there are advantages and disadvantages of securities agents. When designing the scheme, the disadvantages should be addressed and the advantages should not be erased. Therefore, we proposed the solution of BSWI (Blockchain securities of weakened intermediary), which not only retains the intermediary but is only responsible for the dynamic monitoring of transactions that reach the set threshold. At the same time, it does not hold the securities assets of buyers and sellers, making the assets transparent and controllable for buyers and sellers.

In blockchain-based securities issuance schemes, we can retain the role of intermediaries, but their functional responsibilities are relatively reduced, and most small transactions can continue to exist without intermediaries as middlemen. Here, a threshold is set in the blockchain securities platform. When a certain threshold is reached, the intermediary is required for secondary confirmation. The intermediary only has the confirmation right, and the assets and securities are still in the hands of the buyer and seller. Second, every transaction on the blockchain forms a corresponding time stamp that cannot be tampered with and can be traced back to all flows of money and securities. This can improve the transparency of transactions, but also bring regulatory convenience, and enhance the security of transactions. On the blockchain, achieve direct ownership of investors, reduce investors' legal risks and intermediary costs, and improve back-office efficiency. Because the trader must have the crypto securities, to form a private key, or public key to complete the transaction, in the blockchain crypto securities trading system, if a transaction is not completely reached, it is impossible to appear on the blockchain public ledger. Direct ownership of securities can also increase the transparency of securities, as investors can directly control the shares they hold and issuers can directly track the owners of securities.

3.1.4 Data transparency

In a follow-up survey, we asked whether putting securities transaction data on the blockchain could make investors feel more transparent about securities assets and transactions. As shown in Figure 6, more than half of the respondents are positive about the enhancement and improvement of the transparency of securities by blockchain technology, and a small number of people think that putting securities transaction data on the blockchain may not make assets and transactions more transparent. Some respondents felt that blockchain provides transparency and immutability without a securities agent, as well as improving security and reducing the risk of fraud without an agent.

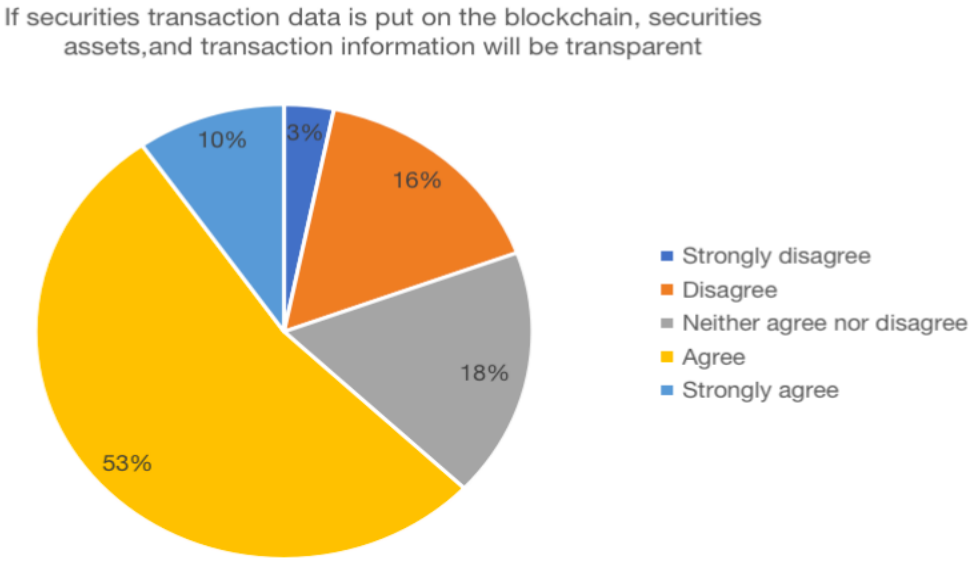

Fig. 6. Blockchain Improves Data Transparency

If our transaction data is saved directly on the blockchain, then the source of the data on the chain can be directly checked through the blockchain browser. Then there is no need for intermediaries to make guarantees and endorsements. As long as the company meets certain qualifications and completes procedures, it can issue digital securities on the chain, and investors directly own the ownership of the digital securities after spending money. Trading is also the transfer of digital securities from one wallet to another, no more than multiple intermediaries, which is the conclusion drawn from the perspective of investors and users. However, the existence of intermediaries sometimes has an additional agency for guarantee and direct communication, and securities agents can ensure compliance with anti-money laundering regulations securities laws and regulations, and other functions. Some functions of securities agents cannot be replaced by blockchain, so in the solution, we can let securities agents continue to perform those functions that cannot be replaced by blockchain, and those things that can be done by utilizing the advantages of blockchain can be realized by blockchain technology.

3.1.5 Securities trading

In the last question, surveyors hold a positive attitude toward the application of smart contracts in securities trading, which can replace some people's work in exchanges and settlement institutions. As can be seen from Figure 7, 35 out of 62 respondents are positive that smart contracts can replace some people's work in exchanges; At the same time, about a dozen people opposed it. Some investigators feel that smart contracts can simplify securities issuance and reduce administrative burdens, promote the tokenization of traditional securities, and enable securities compliance monitoring, conditional and automatically executed securities transactions. Some people believe that although smart contracts can make securities trading faster and more effective settlement, they can only be used in the fixed securities business, and it is also necessary to pay attention to possible loopholes and solutions because the contract code is open on the blockchain, if there is a logical loophole, it may be targeted by hackers and cause capital losses. Smart contracts on the Ethereum blockchain are frequently attacked due to vulnerabilities in the contracts.

Smart contracts can realize automated trading after pre-making logic, which is a development direction that can be applied in securities trading in the future. However, because it is automated, we should try our best to be rigorous in the audit and logic control of smart contracts and also

anticipate the emergency measures and circumvent measures that can be taken after the occurrence of vulnerabilities, such as monitoring and vulnerability scanning of contract codes. Restrict the rights to invoke contracts, etc.

Fig. 7. Securities Trading Uses Smart Contracts

3.2 Structure Equation Model Analysis

3.2.1 Convergent validity and construct reliability

Reliability measurement is the process of evaluating the stability and consistency of a measurement tool or research method over multiple applications. In scientific research and data collection, ensuring the reliability of measurement tools is crucial because it directly affects the accuracy and reliability of research results. The stability and consistency of the data are tested as part of the reliability measurement. This metric will help us determine whether the data we obtain is accurate and trustworthy. Cronbach's Alpha range indicates that greater than 0.9 is excellent, 0.8 to 0.9 is very good, 0.7 to 0.8 is good, and 0.6 to 0.7 is moderate. 0.6 is a difference [29]. Through the reliability test, we can know whether the employees, investors, and managers of securities institutions fill in the questionnaire seriously. If the Alpha coefficient is in a reasonable range, it indicates that our questionnaire is effective, and the subsequent analysis and discussion will be valuable. If the Alpha coefficient is low, such as below 0.6, it means that either the survey population does not match your study or the majority of respondents are not certified to fill out your survey. When using the PLS-SEM model, evaluations were used to detect the internal consistency reliability, index reliability, and mean-variance extraction (AVE) index of the reflectance measurement model [36]. According to Harit's research, the composite reliability threshold and indicator loading threshold of internal consistency are both greater than 0.70, and the threshold of exploratory research is greater than 0.80 [37]. It mainly consists of composite reliability and Cronbach's Alpha. The values of both data sets in Table 3 are greater than 0.90, indicating high reliability.

Table 3
Convergent Validity and Construct Reliability

Latent Construct		Loadings	Standard Deviation	Cronbach's Alpha	Rho_A	Composite Reliability	Average Variance Extracted (AVE)
Efficiency	Efficiency1	0.876	0.482	0.874	0.882	0.922	0.799
	Efficiency2	0.893	0.450				
	Efficiency3	0.912	0.410				
Transparency	Transparency1	0.940	0.342	0.931	0.932	0.956	0.880
	Transparency2	0.964	0.265				
	Transparency3	0.909	0.416				
Cost	Cost1	0.891	0.454	0.930	0.933	0.956	0.879
	Cost2	0.968	0.252				
	Cost3	0.952	0.306				

Discriminant validity refers to the degree to which an underlying variable (construct) differs from other constructs in the model. In a PLS-SEM model, cross-loading occurs when an indicator (item) of a potential variable shows a significant correlation with multiple potential variables. It ensures that each latent variable is unique and not highly related to other structures in the model. In terms of cross-loading, the load of each index should be higher than the load of each index of its related variable. As can be seen from Table 4, cross-loading conditions have been met.

Table 4
Discriminant validity: cross-loading

		Cost	Efficiency	Transparency	Practicability
Cost	Cost1	0.891	0.760	0.707	0.807
	Cost2	0.968	0.755	0.830	0.873
	Cost3	0.952	0.746	0.843	0.867
Efficiency	Efficiency1	0.646	0.876	0.577	0.721
	Efficiency2	0.758	0.893	0.673	0.772
	Efficiency3	0.745	0.912	0.754	0.864
Transparency	Transparency1	0.717	0.661	0.940	0.827
	Transparency2	0.813	0.730	0.964	0.879
	Transparency3	0.850	0.722	0.909	0.890
Practicability		0.906	0.883	0.924	1.000

3.2.2 Hypothesis validation

As shown in Table 5 of the internal structure model, the standard deviation is the measure of the deviation between the independent variable and the dependent variable in the structure model. The maximum deviation value is 0.066 and the minimum deviation value is 0.048. According to Zeng *et al.,* the standard deviation value should be less than 0.168 [38], proving that the deviation of the structural model does not affect it. Secondly, the significant differences from low to high P-values were 0.05, 0.01, and 0.001, respectively [39].

Table 5
Hypothetical Structure Model

Hyp	PLS Paths	Original Sample(O)	Sample Mean(M)	Standard Deviation (STDEV)	T Statistics (IO/STDEV)	2.5%	97.5%	P Values	Hypothesis Acceptance
H1	Efficiency-> Practicability	0.345	0.345	0.071	4.836	0.196	0.482	0.000	yes
H2	Transparency-> Practicability	0.466	0.476	0.084	5.531	0.326	0.654	0.000	yes
H3	Cost-> Practicability	0.234	0.224	0.108	2.166	0.006	0.441	0.030	yes

In Table 5 and Figure 8, it is assumed that Efficiency (H1: B = 0.345, P <= 0.001) is positively correlated with Practicability, and the reliability of securities data directly affects the Practicability and stability of securities business. Transparency (H2: B = 0.476, P <= 0.001) has a positive impact on Practicability. Issuing securities through blockchain improves the transparency of securities, making investors more confident in buying or holding securities assets for a long time. Cost (H2: B = 0.224, P <= 0.03) also has a direct impact on the Practicability of blockchain securities. The use of smart contracts helps securities institutions reduce fixed transaction business and release more manpower to engage in other more important work, which promotes the practicability of blockchain securities.

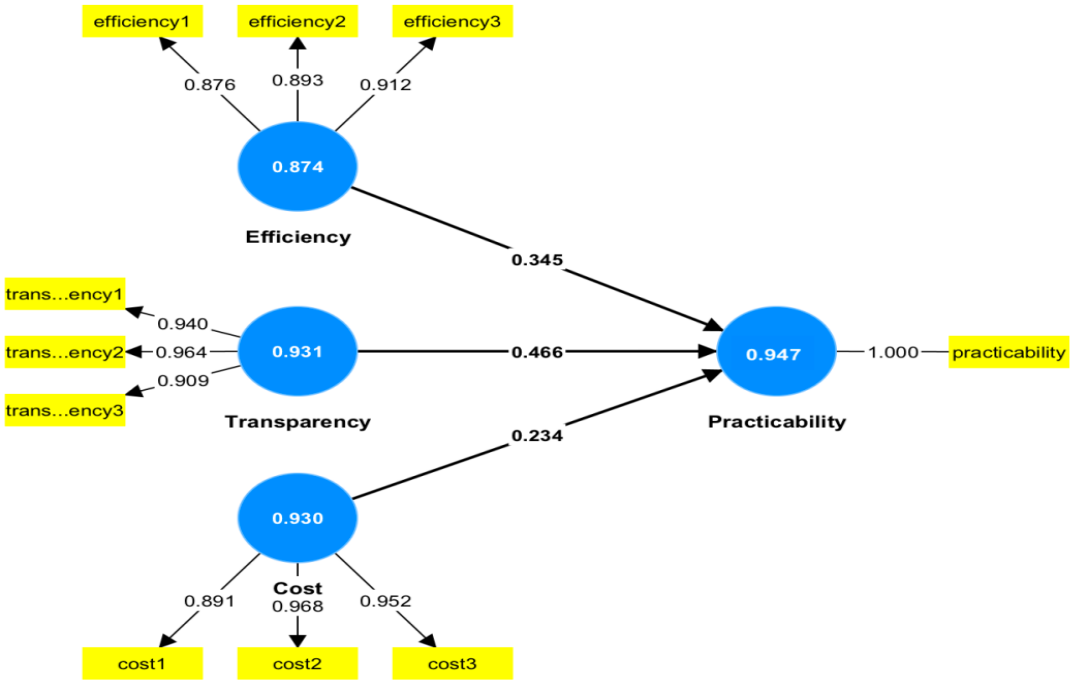

Fig. 8. Sample Mean Theoretical Framework

3.3 Practical Challenges of Implementing Blockchain

While the results of our research analysis indicate the feasibility of blockchain securities, practical challenges need to be considered when implementing blockchain technology in the securities industry. Such as scalability issues, interoperability with existing systems, and the costs involved in the adoption of new technologies.

3.3.1 Scalability problem

When implementing blockchain technology in the securities industry, the issue of scalability is an important factor that must be considered. Due to the decentralized nature of blockchain technology, every node in the network needs to keep complete transaction data, which makes the amount of data in the network constantly increase as the number of transactions increases.

In the securities industry, the trading volume can be very large, especially stock trading and bond trading. If you use a traditional centralized system to process these transactions, the performance of the centralized server will be limited because it has to process all the transaction data. The decentralized nature of blockchain technology allows each node to store complete transaction data, so the scalability of the system can be greatly improved.

However, with the increase of the transaction volume, if each node needs to save all the transaction data, the storage and computing resources of the node will also increase, which may lead to the performance of the node decline, which in turn affects the performance of the entire network. Therefore, when implementing blockchain technology, the securities industry needs to reasonably design and plan the nodes in the network to ensure that their performance and scalability can meet business needs.

3.3.2 Scalability problem interoperability with existing systems

Since blockchain technology is an emerging technology that is very different from traditional IT systems, interoperability with existing systems is also a key consideration during implementation. One possible solution is to use middleware technology to integrate blockchain technology with existing IT systems. Middleware is an independent system software or service that can connect different systems and applications and act as a communication bridge between them. Through middleware, blockchain technology can be seamlessly integrated with existing IT systems to achieve data and information sharing and interaction.

In addition, the securities industry needs to consider how to protect existing systems and data. Since blockchain technology is highly secure and transparent, how to ensure the security and privacy of existing systems is a problem that needs to be solved. One possible solution is to introduce blockchain technology with a detailed security assessment and testing to ensure that it does not pose a threat to existing systems.

3.3.3 Technical cost problem

Because blockchain technology requires a lot of computing and storage resources, a lot of money needs to be invested to purchase and maintain these resources. The operating costs of blockchain technology are also relatively high. In the operation, the need for professional personnel to operate, maintain, monitor, and manage the blockchain system, as well as the need to purchase a large number of computing and storage resources, which will lead to an increase in associated costs. Blockchain technology is very demanding in terms of security, which also means that high-security costs are needed to guarantee the integrity and security of the system. Need to carry out a lot of security testing and auditing, these workers also need to pay a lot of human and material costs. When implementing blockchain technology, the securities industry needs to comprehensively consider various cost factors, including development costs, operational costs, and security costs, and reduce costs through reasonable design, planning, and formulation of standardized processes.

4. Conclusions

Under the background of the current system of central depository and centralized clearing and settlement of securities trading in most countries, the discussion of relevant application scenarios is more focused on the securities exchange market or the over-the-counter market, rather than the discussion of application around sectors and links. The security advantages of blockchain technology such as immutable data and irreversible time are more prominent in the non-centralized custody registration, clearing, and settlement links such as the over-the-counter market and intermediary links. Local exchanges in the United States and Australia have launched blockchain stock exchanges, where private companies offer securities issuance, trading, and registration services. Blockchain technology is also evolving, with private chains and affiliate chains derived from the earliest public chains. Cross-chain technology, smart contracts, and enterprise-class blockchain projects such as the Linux Foundation's Hyperledger Fabric are already being piloted in some of the banks' businesses. Based on the analysis of ICO failures and the problems of inefficiency, opacity, and high operating costs of traditional securities offerings, we propose Blockchain securities of the weakened intermediary (BSWI).

Through a mixture of research methods, using both quantitative and qualitative data, a more complete understanding of the research problem is gained, and the findings are analysed to provide recommendations for management. Then intelligent PLS is used to verify the reliability of the research results, and the results of quantitative data and qualitative analysis provide strong support for the reliability of our proposed BSWI. Based on this scheme, we not only avoid the regulatory disadvantages of ICOs but also improve the transparency and efficiency problems of traditional securities, coupled with the use of smart contracts in BSWI to reduce manpower costs and the probability of human error. In general, blockchain securities are gradually being applied to more and more securities and financial business scenarios, which will certainly greatly improve our securities industry and enhance the service experience in the future.

Blockchain-based securities face multiple regulatory challenges. To address these challenges, cooperation, and efforts from regulators, technology providers, legislatures, and others are needed. As blockchain technology continues to evolve, regulators need to constantly update and improve regulatory technology to adapt to changes in technology. This includes the ability to monitor, analyse, and investigate blockchain transactions, as well as the technology to evaluate the security and stability of blockchain systems. Regulators can develop new regulatory rules and guidelines, such as reporting requirements for blockchain transactions, compliance requirements for blockchain platforms, and so on. In addition, regulators can also strengthen the supervision and guidance of the market through the way of public information disclosure.

Legislative bodies can also strengthen legal research and legislative work on blockchain technology, and clarify the legal status and scope of use of blockchain technology in the field of securities. At the same time, regulators can actively cooperate with international regulators to jointly study and develop international regulatory rules and standards for blockchain technology in the field of securities. Through continuous exploration and innovation, we believe that an effective regulatory approach can be found to safeguard the healthy and stable development of the blockchain-based securities market.

5. Implications of the Study

5.1 Theoretical Contribution

Through the analysis of existing scholars and literature review, we propose new solutions. Blockchain securities that weaken intermediaries are the theoretical framework of this study [41]. This theoretical framework can not only provide a certain reference for other scholars' future research but also provide theoretical and methodological guidance for the implementation of blockchain securities. In this paper, the technology of alliance chain, public chain, and private chain is analysed, which is convenient for enterprises to select the technology in application. After analysing the advantages and disadvantages of smart contracts, in addition to securities, other industries that want to use smart contracts can also refer to these advantages and disadvantages and the characteristics of smart contracts. Through the analysis of ICO failures and the results of the questionnaire, we support the idea of retaining the role of intermediaries in the scheme of blockchain securities, which also provides a case study and feasibility analysis method for other industries that want to apply the trust mechanism of blockchain to remove intermediaries.

5.2 Managerial Contribution

Through the BSWI solution, the reliability problem of securities data after application in the traditional securities field is solved, because the data on the blockchain is trusted and immutable, and the efficiency of data modification in the securities business is greatly improved through the Hyperledger. This reduces the cost of communication between securities-related agencies and facilitates the management of various organizations. BSWI allows the existence of intermediaries that help exchanges and regulators to filter and review the issuer's information, avoiding the confusion caused by the lack of regulation of ICOs. Through the blockchain securities platform, the information disclosed by enterprises and large transactions is transparent visible, and traceable, which facilitates the supervision of these companies by regulators and reduces the pressure on them to collect additional data for supervision, thus reducing the management pressure of regulators.

5.3 Social Contribution

With BSWI, the role of the intermediary changes from holding the assets of the buyer and seller to directly holding the assets of the buyer and seller, making the assets more transparent. Transactions carried out on the blockchain are also traceable, and through this feature, it can be said that the issue of securities transparency is completely solved. It not only reduces the fraud of the secret operation of brokers, but also avoids insider trading, which provides good protection for small and medium-sized enterprises and investors to a large extent, and also helps to reduce the generation of financial risks. Investors also benefit from greater transparency in securities. Previously, investors could not hold securities directly and could not detect insider trading taking place. Now investor accounts not only directly hold securities assets, but also the source of transactions can be traced, reducing the unequal treatment of investment. It also makes the securities industry healthier and more transparent by avoiding insider trading. Avoid the financial risk to achieve sustainable development of the securities industry.

5.4 Practical Contribution

Through the BSWI solution, smart contracts are used to help stock exchanges automate some fixed businesses and reduce the operational pressure of stock exchanges. In addition, the losses caused by human errors in these fixed businesses are reduced. Investors invest on blockchain-based securities platforms, and securities assets are no longer bought and sold entirely through securities agents, improving the user experience for investors. The blockchain-distributed database also allows securities organizations to collaborate more efficiently without increasing communication costs to support the same business [42]. The improvement of the efficiency of the securities business also allows startups to issue securities without going through such complicated processes and waiting and improves the friendliness and service quality of the company.

6. Limitations and Future Directions for Research

Like some other studies, this one has limitations. First of all, our sample survey is mainly concentrated in the same country. If we stand in the perspective of the whole industry, there may be some statistical deviations, because, in each country's securities market environment, the degree of informatization and the popularity of blockchain knowledge are different. Secondly, due to the small sample size in this study, it is difficult to collect data on managers of small and medium-sized enterprises, most of whom are securities investors and employees of a securities agency. Therefore, we urge further research in the context of different roles in the securities industry.

At present, we only provide the concept scheme -BSWI and determined that the securities industry chose the alliance chain as more appropriate, because securities need to connect with other industries such as banks, and also support high-frequency trading. Considering that security excludes public chains, private chains are also abandoned due to performance and expansion issues, the alliance chain has good scalability, and only licensed nodes can access it, ensuring security. However, the current market infrastructure is not mature, and the successful landing of blockchain securities requires mature market infrastructure, including the support of exchanges, settlement systems, and regulators. Due to the existence of multiple blockchain platforms, such as the Linux Foundation's Hyperledger Fabric, the R3 consortium's Corda, and the EEA's Quorum. At present, Hyperledger includes more than 200 members such as IBM, Intel, and Baidu; The R3 consortium includes more than 200 members of major financial institutions such as Citibank, HSBC, and Deutsche Bank. The EEA includes more than 400 members, including JPMorgan Chase, Microsoft, and Intel. How to ensure interoperability and data exchange between different platforms is a challenge.

The landing of blockchain securities also needs to be integrated with the traditional financial system, and it is necessary to overcome the acceptance and adaptation of new technologies by traditional financial institutions. These need to be explored and demonstrated by researchers in the future, to provide better schemes and suggestions for the landing of blockchain securities.

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