The Empowerment and Subversion of Financial Technology to Accounting Information System

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Abstract

Since the founding of the People's Republic of China, the "management activity theory" has been officially recognized in the discussion of the nature of accounting; however, the research on "information system theory" has never stopped. In the era of digital economy, accounting information systems are facing unprecedented challenges, and it is imperative to incorporate data assets into financial statements. Furtherly, from another perspective, based on the empowerment and subversion of financial technology, the development of accounting information systems can be described as even more powerful. To this end, the author proposes: firstly, the company should reshape the accounting information system based on "blockchain technology" and replace "numbers" with "data"; secondly, the researchers should use "big data + machine learning" to reconstruct accounting algorithms to realize financial calculation and forecasting; and Finally, the accounting authority should add data asset elements to the balance sheet, and add an enterprise value report for investment investors to realize the real-time and visualization of information disclosure.

KEYWORDS: *Financial Technology, Accounting Information Systems, Numbers and Data, Accounting Algorithms, Value Report*

1. Introduction

In the era of digital economy, with the help of science and technology, the accounting industry has begun to use big data, artificial intelligence, mobile Internet, cloud computing, and Internet of Things technologies, and has formed new research areas, such as "financial sharing", "smart accounting", "cloud accounting", "Big Data Accounting" and "Blockchain Accounting". The digital transformation of enterprises has achieved cost reduction and efficiency enhancement, strategic synergy, centralized management and control, business optimization and resource integration. In today's society, everything can be encoded. After land, labor force, capital, and technology, data has officially become the fifth factor of production. As the application of blockchain technology enters the 3.0 era [1], its impact on traditional accounting will be a disruptive innovation.

2. Literature review

Since the founding of New China, there have been three main types of views on the nature of accounting:

the first is the theory of applied technology; the second is the theory of accounting tools; the third is the theory of dual nature. The second nationwide discussion on the nature of accounting has formed two mainstream views, namely: "management activity theory" [2]and "information system theory"[3][4]. "Management activity theory" believes that accounting is essentially a management activity, and this view is recognized by academic circles as the most iconic Chinese local innovative accounting theory in the 1980s. "Information System Theory" believes that accounting is essentially an economic information system that mainly provides financial information. It was first introduced by the American Accounting Institute in "A Statement of Basic Accounting Theory" in 1966. Later, it was further explained by Chinese scholars [3][4], and it was listed together with "Management Activity Theory" as one of the two major discussions on the nature of accounting in China in the 1980s. Among them, the "management activity theory" has been officially recognized. However, until now, the academic circles still express their own opinions on these two theories, and there is no consensus. Xie Zhihua (2003) pointed out that the information system is not the essence of accounting, because enter-

prises still have many other information systems. In fact, the recognition and measurement of accounting is the essence of accounting. Professor Ge Jiashu (2012) proposed: From the perspective of the existing accounting development practice, it is the basic principle of the accounting field to regard accounting as an information system. Subsequently, Liu Feng (2015) issued a document: Both information systems and management activities are accurate descriptions of existing accounting work. The former focuses on methods and processes, while the latter focuses on the consequences derived from implementation. He proposed that the attribute of accounting is defined as a trust tool. At present, the value of accounting as an information system is constantly being weakened, and the relevance and usefulness of accounting information provided by traditional financial reports is declining. For this reason, Li Lin (2021) proposed: we need to Reconsider the construction of the entire accounting information system based on data thinking. Information technology will promote the highly flexible accounting entities to achieve in-depth business-finance integration and innovative development.

3. The visual analysis of the research status of "Fintech + Accounting"

At present, the value of accounting as an information system is constantly weakening, and the relevance and usefulness of accounting information provided by traditional financial reports is declining. Information technology promotes highly flexible accounting entities to achieve in-depth business-financial integration and innovative development. In August 2013, at the International Internet Conference, Academician Wu proposed the concept of " Great Wisdom Propelling Clouds", namely: big data, intelligence, mobile Internet and cloud computing, of which intelligence includes the Internet of Things and big data mining. In 2016, the Chinese government issued the "China Blockchain Technology and Application Development White Paper". Today, the " Great Wisdom Propelling Clouds" represents the most cutting-edge network information technology, and their application in the financial field is called financial technology [5]. In the field of accounting, domestic researches has focused on "big data accounting", "intelligent accounting", "cloud accounting", "IoT accounting", and "blockchain accounting". Based on the CNKI database, the author makes a visual analysis of the research status of " financial technology + accounting" as follows:
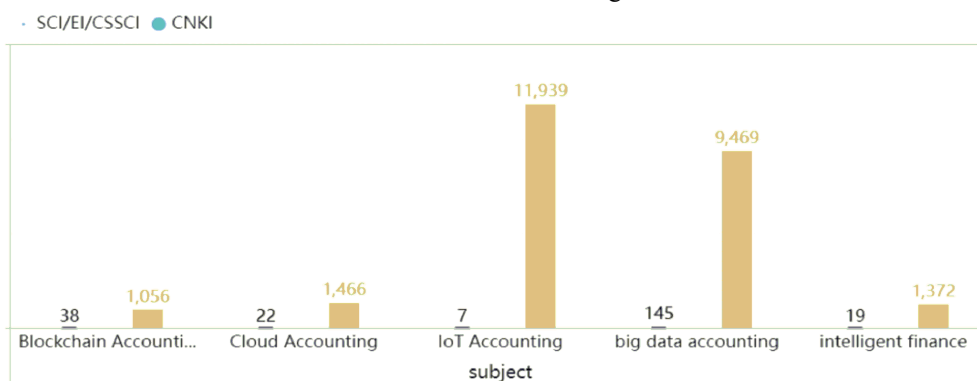

Figure 1 The comparison of the number of articles in journals between CNKI and SCI/EI/CSSCI
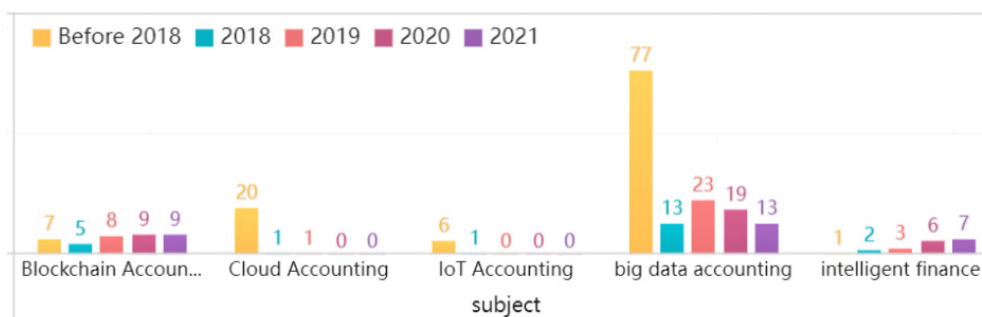

Figure 2 The comparison of the number of articles in SCI/EI/CSSCI from different years

According to the visual graphs, the research status of " financial technology + accounting" shows the following characteristics: Firstly, there are a large number of studies, but few high-quality papers. For example, there are as many as 11,939 papers on the theme of "Internet of Things Accounting", while only 7 high-quality papers are included in SCI/EI/CSSCI. Most papers propose some ideas with the help of hot technologies, but there is a lack of research based on in-depth understanding of technology, and lack of implementation of "tech-

nology + accounting", which requires researchers to have a considerable level of compound knowledge and convincing qualifications. Secondly, from the perspective of articles in SCI/EI/CSSCI, the peak of research on "cloud accounting", "big data accounting", and "IoT accounting" was before 2018, and then showed a downward trend; The related researches on "blockchain Accounting" and "Intelligent Accounting" are on the rise year by year, but the overall scale is still small, with less than 10 papers per year. This shows that in recent years, blockchain accounting and intelligent accounting have become research hotspots, but the relevant high-quality results are limited. To further study the empowerment and subversion of "financial technology" to accounting information system, the author puts forward the following points:

4. In the era of digital economy, how to empower and subvert accounting information systems by " Financial Technology"?

4.1. it is imperative to incorporate data assets into financial statement projects

4.1.1. In the internet sharing economy, data assets are crucial

In February 2021, the China Internet Network Information Center released 47th statistical reports on China's Internet development. As of December 2020, the number of netizens in China has reached 989 million, and the Internet penetration rate has reached 70.4%. The proportion of Internet users using mobile phones to access the Internet reached 99.7%. The Internet has penetrated into every aspect of our life with a turbulent trend, leading our society and life to undergo earth-shaking changes. At the same time, the sharing economy is very popular. It relies on Internet platform technology, decentralization, matching information, and connection of many idle resources in society, including manpower, material resources, and facilities, so that it can create the largest social economic value. At present, the sharing economy platform has driven more than 800 million jobs, and the transaction scale has exceeded 3 trillion. In the era of the Internet of Everything, the platform sharing economy model is an important force in China's economic transformation and upgrading. For enterprises in the Internet sharing economy, data assets are crucial. We selected Meituan and Didi, the typical companies in the Internet sharing economy, and analyzed their balance sheet and income statement data as follows:

TABLE I. THE COMPARISON OF ASSET STRUCTURE BETWEEN THE INTERNET SHARING ECONOMY AND OTHER INDUSTRIES

Industry	Enterprise	Total Assets	The Proportion of each Asset（/Total assets）		
			Cash and Short-term Investments	Inventories	Intangible Assets
Internet Sharing Economy	Meituan	375.43	55.15%	0.27%	12.82%
	Didi	241.14	39.71%	0.16%	33.90%
Manufacturing	Sany Group	1366.01	22.21%	13.05%	2.62%
Real estate	The Vanke	19674.03	7.48%	56.57%	0.39%

TABLE II. THE NET PROFIT OF MEITUAN AND DIDI SINCE 2018

Net profit	2018	2019	2020	2021	Sum
Meituan	-172.52	3.24	6.82	-46.96	-209.42
Didi	-22.64	-14.08	-15.23	-15.45	-67.4

For comparison, the author introduces two reference industries, namely traditional manufacturing enterprises and real estate enterprises, and selects the leading enterprises among them as representatives, namely Sany Heavy Industry and Vanke A. It can be seen from Table 1 that compared with traditional manufacturing enterprises and real estate enterprises, the proportion of intangible assets of Internet sharing economy enterprises is significantly higher, the proportion of cash and short-term investment is also higher, and the proportion of inventory is very small. Compared with traditional enterprises, the sharing economy used a completely different business model and profit model. Combined with the data in Table 2, Meituan company and Didi company have been in a state of loss since 2018, with accumulated losses of 20.942 billion yuan and 6.74 billion yuan. In fact, they are accumulating users and fans while making losses in the early stage. Data resources play an important role in the process of enterprise's value creation, but existing accounting standards cannot capture such information.

4.1.2. The Data assets should be included in financial statements

Assets in the traditional sense refer to resources that are formed by past transactions or events of the enterprise, owned or controlled by the enterprise, and expected to bring economic benefits to the enterprise. Whether this definition is reasonable in the new economic era needs to be re-examined. The sharing economy characterized by resource integration and resource sharing has caused a huge impact on the definition of asset elements proposed in the old economic era [6]. The sharing economy (Didi, Meituan, etc.) does not aim to own or control resources, but the accessibility, availability and utilization of resources are the key. On March 30, 2020, the Central Committee of the Communist Party of China and the State Council issued the "Opinions on Building a More Perfect Market-Based

Allocation System and Mechanism", which identified data as the fifth factor of production after land, labor, capital, and technology, and made it clear that the cultivation of "Data Element Market" should be accelerated. Therefore, it is imperative to incorporate data assets into financial statement items.
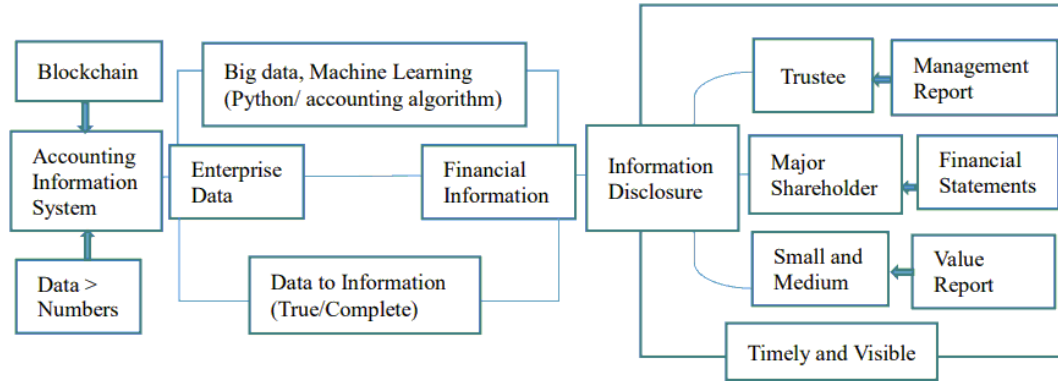
4.2. Building an accounting information system model based on financial technology

based on financial technology mentioned before, the author builds an accounting information system model as follows:

Figure 3 The accounting information system model based on " Fintech "

4.2.1. Reshaping the accounting information system based on "blockchain technology", and replacing "numbers" with "data"

The current accounting information system still uses currency as the main unit of measurement. After the business documents are processed by the accounting information system, the presentation is the accounts and figures, which finally generate our financial statement items as well as financial indicators. The result of this process is that accounting information is easy to fall into the digital circle of "from finance to finance", and financial information measured in currency greatly reduces the relevance and usefulness of financial information. If users of accounting information are based on an all-encompassing "number", and it is difficult to see the economic substance behind it and to make a correct value judgment.

The "data" in the digital economy era is far richer than the "number" connotation. A number is a written symbol used to represent numbers. For example, we commonly use Arabic numerals in financial statements as the main unit of measurement. Data is the result of facts or observations, it is a logical induction of objective things, and an unprocessed raw materials used to represent objective things. Data can be continuous values (sound and image, etc.) or discrete values (numbers, symbols, and words). That is to say, the accounting information system can present not only numbers, but also sounds, images, words, symbols, and so on. The accounting information system based on blockchain technology adopts a P2P network architecture and defines a permissioned network. Each transaction information stored in it includes the source of income (In), the hash value of the transaction block of the source of income (Previous tx), the source of income area, the specific

transaction in the block (Index), the sender's private key signature (Scriptsig), the output party (Out), the sent currency value (Value), the receiver's public key (Scriptpubkey) and many other information. As a result, the transformation of financial information from numbers to data can be realized. Finally, the accounting information system based on blockchain technology forms a distributed ledger (or data) that can be mastered by the whole network by continuously solidifying and transparentizing the transaction information, which is enough to generate trust between strangers. Replacing pure numbers with massive data can provide more comprehensive and valuable information, and provide a comprehensive and credible database for subsequent financial analysis and forecasting.

4.2.2. "Big Data + Machine Learning" reconstructs accounting algorithms to realize subversive innovation in financial calculation and forecasting

All transaction information is stored in the accounting information system based on blockchain technology, and is composed as chain data. These data can be stored in various forms such as sound, image, text, symbols, numbers, etc. and then comes the challenge of computer storage capacity and computing power. with blockchain technology, in order to facilitate storage, network nodes output these data as a fixed-length hash value through a hash function, and then verify, encapsulate, and generate blocks through each node in the network. This treatment greatly reduces the storage pressure. However, due to the requirements of the proof-of-work mechanism, the mining process of each node requires the guarantee of strong computing power. Thanks to the empowerment of cloud computing, the pressure on storage and computing power can be effectively relieved.

In the traditional accounting information system, the preparation of reports, the calculation of financial indicators and financial forecasts are mainly based on numbers. However, in the era of digital economy, as mentioned above, "big data" has surpassed the connotation of "numbers", so the relevant financial operations, financial forecasting, and decision-making will undergo fundamental changes, that is, disruptive innovations in accounting algorithms are required. With the continuous emergence of research results in the field of mathematics, cryptography and computer science, many planning analysis, management processes and calculus reasoning done by financial experts can be turned into codes and handed over to computers to do. This is the accounting algorithm behind accounting information system. In the computer world, with the increasing perfection of the Python ecosystem, the native objects that the Python language can handle include: numbers, strings, Booleans, lists, tuples, Dictionary and set; you can also call extension libraries, such as Numpy, which can process arrays, including vectors and matrices; you can also call Pandas, which can process series, data frame and so on. Coupled with the continuous deepening of the research results of machine learning, some models, such as Random Forest model and Decision Tree Prediction model etc., have been Joined into the accounting algorithm, and have made subversive changes to financial calculation and analysis forecast based on financial big data.

4.2.3. Adding a timely and visible enterprise value report

Referring to the classification of the demanders of accounting information (Zheng Anping, 2020), that are divided into three aspects: business managers (trustees), management investors (large shareholders) and investment investors (small and medium shareholders). Based on the current accounting information disclosure system, the first level is oriented to the managers, we can achieve target of information disclosure through management accounting, and the application of technology empowerment in the field of management accounting has been at the forefront; the second level is oriented to management investors, we can achieve through financial accounting. In fact, the major shareholders generally have the ability to read reports by themselves, or have a think tank that can read reports. The empowerment of information technology can improve the authenticity, timeliness and comprehensiveness of information disclosure; and the third-level is oriented to Investment investors (small and medium shareholders), what is lacking in current accounting. Duing to information asymmetry, investment investors often do not have the professional ability to read financial statements, and it is difficult for small and medium shareholders to verify the authenticity of financial statements, and they often rely more on securities company brokers or securities researchers' research report. In order to protect the interests of resource clients and to regulate and ensure the healthy and stable development of the capital market, an information disclosure system for investment investors should be introduced. On the basis of the big data foundation and accounting algorithm innovation mentioned above, a timely and visual enterprise value report for investment investors can be formed.

5. CONCLUSION

Demski et al. (2002) believe that the core competitiveness of accounting lies in its information processing technology, which is the unique information processing method of accounting that enables information users to obtain valuable information from massive accounting data. To this end, the author proposes that the reconstruction of the accounting information system based on blockchain technology will ensure the authenticity and integrity of the data source to a large extent; coupled with the continuous innovation and improvement of accounting algorithms by big data technology and machine learning models, the efficient transformation of data to information will be realized; and in the final disclosure process of information, a timely and visual enterprise value report for small and medium shareholders is added. This will realize subversive innovation of the entire accounting information system, and better serve for the real economy, and reshape new business models to create value. However, the revision of accounting algorithms in practice has seriously lagged behind the development speed of practical innovation, which will become the next research topic. The application of blockchain technology in accounting information system will be another research direction.

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