

Construction of an Economic and Financial Management System Based on the Concept of Big Data

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Abstract: China's economy has grown by leaps and bounds since its reform and opening up, especially since it entered the 21st century. However, although China's total economic volume has jumped to the second place in the world, its per capita economic growth rate is far behind that of developed countries. In recent years, modern information technology, represented by the Internet, has been developing rapidly, and Big Data (BD) technology has received widespread attention. Under the guidance of the "Big Data" concept, China's economic and financial management system is also undergoing some changes. In the context of global economic integration, China's economic and financial system has also been presented with new opportunities for development. In response, the Chinese government has made timely macroeconomic adjustments and optimized the allocation of resources in order to maintain the momentum of economic growth. This article first provided a detailed definition and introduction of BD and economic and financial management. Through experimental analysis, data association technology was used to analyze the association rules between stocks (the support rate for stocks with code 002137.XSHE and code 002558.XSHE was 52.3%), proving that BD technology could build a financial management system.

Keywords: Big Data, Financial Management, Economic System, Market Development

1. Introduction

The continuous deepening of China's financial marketization would inevitably accelerate the development of China's financial marketization, which would be a major driving force for the future development of financial marketization. The main manifestation of the deeper marketization process is the deeper level of opening up to the outside world. Chinese companies are expected to relax their entry barriers to the financial industry, thereby promoting the deepening of interest rate marketization and forming a multi-level capital market.

A large number of scholars have conducted relevant research on financial and economic management. Wang L used a combination of SVM and fuzzy mathematics to establish an evaluation model for corporate financial risk. The project adopted support vector machines and applied them to financial datasets. The results showed that the optimal support vector machine based on support vector machines could achieve an average recognition accuracy of over 90% on financial datasets; meanwhile, the recognition accuracy of this method for financial data could reach 46.8%. Through example analysis, it showed that the model based on fuzzy support vector machine could effectively remove irrelevant indicators and had high prediction accuracy for investment and operational risks of enterprises. The prediction accuracy of this model for financial and tax risks increased by 12.4% compared to before application [1]. Al-Dmour A explored the role of the knowledge management function (acquisition, integration, and application) in the process of digital financial innovation. The study was based on cognitive theory and used a self-administered questionnaire to survey 181 subjects. The empirical analysis found that the implementation of the knowledge management function had a positive and significant effect on digital financial innovation. The study found that factors such as work experience and work location in Lebanese commercial banks had a greater impact on the relationship between them and digital financial innovation. Commercial bank executives in Lebanon and other similar countries could use the above findings to improve their understanding of knowledge management practices in banks and the technology used by employees in their institutions in order to improve their digital financial innovation [2]. Reshetnyk N pointed out the shortcomings that affected

the development of the company's strategic behavior and the execution of financial strategies during the process of change. In order to explore how to establish an effective strategic financial management model in the context of contemporary transformation, and further improve the company's strategic financial management system, he analyzed the strategies of globally leading sustainable development companies and proposed their main strategies in terms of sustainable development. To identify the importance of various elements in business strategy and financial management for sustainable operation, researchers analyzed the financial performance of global business leaders: market value, profit, customer loyalty, and brand awareness. On this basis, the study proposed how Ukrainian companies could improve their strategic financial management efficiency in the context of modernization transformation. This required Chinese companies to closely monitor the company's external financial risks, make timely adjustments to the company's strategy, and reflect on the company's sustainable development concept [3]. Although the above research has made theoretical contributions to financial and economic management, the technology is not mature enough and the application scope is not broad enough.

The development and application of BD have brought new development opportunities to China's financial system, and have been widely used in the growth process of many enterprises, driving the development of China's economy and financial market. It should be clearly recognized that the development of BD thinking is centered around quantification. In the processing and application of data, it is necessary to search for time related resource content from massive data resources. The discussion objective of this article was to use the obtained data to make scientific predictions about the main forms and development paths of China's economic and financial regulatory system construction, so as to help the Chinese government better carry out macroeconomic regulation of the Chinese economic market and ensure the stable development of the Chinese financial system.

2. Concept of BD and the Construction of Economic and Financial Management System

2.1. BD Concept

In this era of BD, the value of data is fully explored, and even small amounts of data can create incredible value [4]. The characteristics of BD are: huge scale (data scale is huge), from GB to TB, PB, and even EB, with a huge scale of collection, storage, and calculation [5-6]. The diverse data sources determine the diversity of BD forms; fast, efficient, efficient, high data volume, high processing, and high timeliness; value: That is to say, in the generated data, valuable data only accounts for a small portion, and the value density of the data is very low; the significant difference between BD and traditional data is that it is always online and can be called and calculated anytime and anywhere. The main differences between the two are scalability, distribution, availability, and model, as shown in Table 1.

Table 1: Differences between BD and traditional data.

	Traditional data	Big Data
Scalability	Vertical Scaling	Horizontal Scaling
Distributed	Resource pooling	Resource Distribution
Availability	Single copy data	Data Replication
Models	Mobile Data	Mobile Computing Programs

Three major strategies for building a financial management system under BD:

(1) Accelerating comprehensive reform of the financial market

Undoubtedly, the scientific application and rapid popularization of BD have greatly developed China's financial market. Under the guidance of BD, China's economic and financial system reform has achieved astonishing achievements [7-8]. On the other hand, the economic regulatory mechanism based on BD has also lowered the entry threshold for many financial industries and increased capital. BD is profoundly changing the competitive landscape of industries such as economy and finance, and playing an increasingly important role in it [9-10]. In today's era, the traditional advantage of "seniority" has become insignificant. In the main mode of financial market operation, whether accelerating reform or achieving integrated management of funds, industry norms are the primary standard. In addition, China should vigorously promote the economic entity policy of "Renminbi internationalization" from economic and financial perspectives, and globally enhance the exchange rate status of the Renminbi as a whole [11-12].

(2) Breaking the boundaries of the management system

The construction of China's economic and financial management system has been continuously improving and upgrading. At this stage, Chinese enterprises need to fully adapt to the overall development trend brought by the BD era to Chinese enterprises and formulate a specific work plan. In this process, breaking down various boundaries within the economic and financial management system is very important. This can effectively improve the overall level of economic and financial management. When using BD, enterprises should use scientific methods to grasp the core and key points of economic and financial regulation, and comprehensively supervise the economy and finance with a purposeful and targeted approach. At the same time, enterprises must also conduct comprehensive supervision of the entire economic and financial system to prevent legal loopholes. Objectively speaking, China's BD system can achieve comprehensive prediction and simulation of economic, financial, and other aspects. When economic, financial, and other risks arise, the BD system can provide early warning and make corresponding judgments and prevention [13-14].

(3) Enhancing the application of BD

The concept of BD has become increasingly influential in society, and its application level has become an important indicator of a company's comprehensive strength. Therefore, Chinese enterprises must increase the application of data and accelerate the construction of BD. The economic and financial management system has been constructed in the context of BD. This requires enterprises to utilize the scientific advantages of BD for economic and financial management. At the same time, in the financial regulatory system, the work "Promoting the Development of BD" should be fully utilized. In the process of building an economic and financial regulatory system, information technology should be fully utilized to achieve accurate, scientific, and reasonable explanations of existing economic phenomena, and accurately predict the overall economic trend in the future [15].

2.2. Construction of Economic and Financial Management System under the Concept of BD

(1) The position of BD concept in the economic and financial management system

Today, Chinese enterprises have entered the era of BD, which has brought opportunities and challenges to many areas of industrial development in China. Applying BD to the construction of economic and financial management systems can better meet the requirements of diversified development goals. Therefore, in order to promote the economic development of China's region, it is necessary to continuously optimize the content of the economic and financial management system to enhance the financial informatization of the Chinese region. This requires the establishment of a BD platform that enables multi-channel and diversified data organization, combined with corresponding data procurement indicators, to promote scientific adjustment of data and ensure that the collected financial information can be widely applied to the development and construction of enterprises. The era of BD is also a great challenge for the development of the Chinese government. In order to better predict economic development trends, it is necessary to use relevant data to compare and compare policy formulation of economic development, so as to reflect the value of BD in the establishment and improvement of economic, financial and other systems.

(2) The BD concept breaks through the internal limitations of the financial system.

When managing the Chinese economy and financial system, it is necessary to break the limitations of traditional systems, and clarify the focus of the financial system. It needs to expand the business scope of financial companies, and use BD technology to transform the traditional financial system, so as to optimize existing operating models, and use advanced management methods to promote the rapid development of the Chinese economy [16]. Continuous scenario testing can also ensure that the internal dynamics of the financial system are developed and fully prepared for potential financial crises. Enterprises should also strengthen their supervision of their financial activities and regularly report their business development to regional regulatory agencies. To adapt to the development of the BD era, it is necessary to establish a sound socialist market economy system, and develop and optimize the software and hardware of economic and financial management systems. At the same time, based on the actual situation of China's development, a group of excellent managers were selected to pursue further education in other countries, and a set of business plans that were in line with China's actual situation was formulated [17].

(3) The development direction of financial markets influenced by the concept of BD

In the process of China's reform, the development and innovation of the financial market must be

carried out in accordance with China's policies. Internally, Chinese enterprises can relax the entry conditions for some industries and allow more companies, institutions, and individuals to join. In the context of BD, the focus of Chinese enterprises' work is on sharing and adjustment, rather than the operational capabilities of individuals and companies [18]. In the current market vitality of the economy, it is necessary to further strengthen capital management to ensure that the establishment of a market economy is compatible with the China's business development model. In addition, it is necessary to promote institutional reform in the financial sector, and expand the range of market participants in the sector, so as to encourage the development of advanced products, and reduce the impact of sector concentration through public regulation. The development concept of BD has been applied to the construction of economic and financial management systems, thus comprehensively enhancing the professionalism and professional ethics of employees, promoting the construction of China's socialist economic system through government control of the market, and enhancing the influence of the Renminbi in the world economy and financial management system [19]. With the deepening of economic globalization, the development of the financial system market requires the corresponding expansion of China's access market to make up for the lack of commodity types in current market development. All financial activities must be approved by relevant government departments. It is necessary to adhere to the organic integration of market economy development and government management, and firmly grasp the main direction of financial market development [20].

2.3. Existing Issues in the Economic and Financial Management System

(1) In terms of management system operation

From the current trend of economic development, in the economic and financial management system, various management models are mainly used for management work, which has played a positive role in promoting the comprehensive development of the economy. In terms of management content, the focus is on cracking down on small loans, thus strictly controlling illegal investments, and approving financing guarantees. These three management tasks would be implemented in place, and the economic and financial management system would be improved to make financial management more scientific and reasonable, thus promoting economic development. However, in reality, especially in areas with imperfect financial management systems, there is often a mismatch between the management system and the knowledge business sector, which reduces the scientific nature of the management system and hinders its normal operation, thus seriously affecting economic development.

(2) In terms of power and responsibility

In recent years, the Chinese economy has continued to grow rapidly. With the transformation of the economic system, many Chinese enterprises have gained favorable conditions for development. Under the new economic system, enterprises have undergone continuous changes, which has led to the gradual establishment of management systems in economic, financial, and other aspects, and has played an important role in various aspects. However, in real life, although there are systems, there may still be some problems in the operation process, most of which are related to rights and responsibilities. If rights and responsibilities cannot be coordinated, it would inevitably create obstacles to the operation of the economy and financial system. China is a country with a large population and numerous regions. Therefore, the development mode and scale of each country are different, resulting in varying degrees of economic and financial development. Under this prerequisite, to ensure the sustainable development of regional economy and finance, it is necessary to comprehensively consider different regions and create different economic development models based on reality.

(3) In terms of regulatory efforts

In recent years, although China's economic and financial management system has gradually been established and has undergone comprehensive reforms and innovations, various problems have emerged in practice. One of these issues is inadequate regulation. The national conditions of different regions in China vary greatly. Therefore, there are also significant differences in economic development between different regions. Especially in areas with relatively backward economic development, there is a lack of corresponding economic and financial management systems in these areas. Even if a management system is established, the management concepts and techniques used are relatively traditional, and there are still incomplete phenomena. In this situation, it is difficult to fully realize the actual value of the management system and promote economic growth in the region. In addition, in the construction of economic and financial management systems, human resources are often the main implementers. The professional level and personal qualities of management personnel

determine the efficiency and quality of financial management to a certain extent. Some regions have not been well implemented in terms of human resources, and there is a lack of effective management of employees on a regular basis. At the same time, a comprehensive training system has not been established, which results in managers not being able to fully utilize their practical value in practice, thereby weakening the functionality of the financial management system. In addition, these managers lack practical work experience, and their understanding of management boundaries and responsibilities is not deep enough, resulting in many business sectors being unable to effectively manage them, and some even experiencing duplicate management, which has had a significant impact on economic development.

3. Apriori Association Rules Evaluation Financial Data Experiment

1) Dataset introduction

The RichQuant website is a Python based stock analysis platform that provides servers and data interfaces to facilitate research; All API are built around a powerful Python based Pandas library and can be matrixed according to the way Excel manages data. The following stock information can be obtained from the website.

Table 2: Historical rise and fall of internet industry stocks.

Date Stock Name	000503. XSHE	000606. XSHE	000676. XSHE	000835. XSHE
2023/1/2	-0.00986	-0.00126	0.0079	-0.00222
2023/1/3	0.00733	-0.00399	0.01537	0.00372
2023/1/4	0.01615	-0.00162	0.01454	0.00218
2023/1/5	-0.0187	0.02213	-0.00661	-0.00184

As shown in Table 2, stocks in a certain industry experienced historical ups and downs from January 1, 2023 to January 5, 2023. If the daily average price of a department's stocks and related services was more than 5% higher than the previous day's average price, the department's stocks and related services were Vere on that day; otherwise, the stocks and related services of a certain department would be Fales on the same day.

2) Dataset preprocessing

The experiment extracted the daily change rate of stocks in the aforementioned industries and related services, and converted it into a form that can be used in the priority algorithm. If the daily change rate of each stock is greater than 0, it is true. If it is less than 0, it is false. The experiment also needs to calculate the confidence level $(X \rightarrow Y) = P(X \cap Y)$ (the probability of a group of item X and a group of item Y appearing simultaneously) and the confidence level $(X \rightarrow Y) = P(X|Y)$ (the probability of a group of item Y also appearing simultaneously in a transaction T where a group of item X appears). This level of support is often used to eliminate meaningless rules. The reliability index shows the reliability of the established reasoning.

This rule is also related to the expected confidence level (expressed as the probability of a group of items B appearing in all transactions without conditional influence):

$$\text{sup port}(B) = P(B) \quad (1)$$

The formula for the ratio of credibility to expected credibility, namely the Lift, is as follows:

$$\text{Lift}(A \rightarrow B) = \frac{\text{confidence}(A \rightarrow B)}{\text{sup port}(B)} = \frac{P(B|A)}{P(B)} \quad (2)$$

The degree of improvement helps to determine whether the occurrence of Project A has a positive impact on Project B, and helps traders decide whether to put Project A and Project B together. For example, "improvement degree=1" means that these two projects are not related. The "degree of improvement<1" means that the occurrence of Projects A and B is mutually exclusive. Generally speaking, if the improvement value is greater than 3, data mining would recognize the value of association rules.

Result analysis:

Here, the Apriori algorithm is combined with modeling analysis. The data obtained from the third part of preprocessing is used as input data and inputted into SPSS Modeler software, and the Apriori model is selected for actual software operation. The basic rules were obtained through modeling and analysis, and the results are as follows.

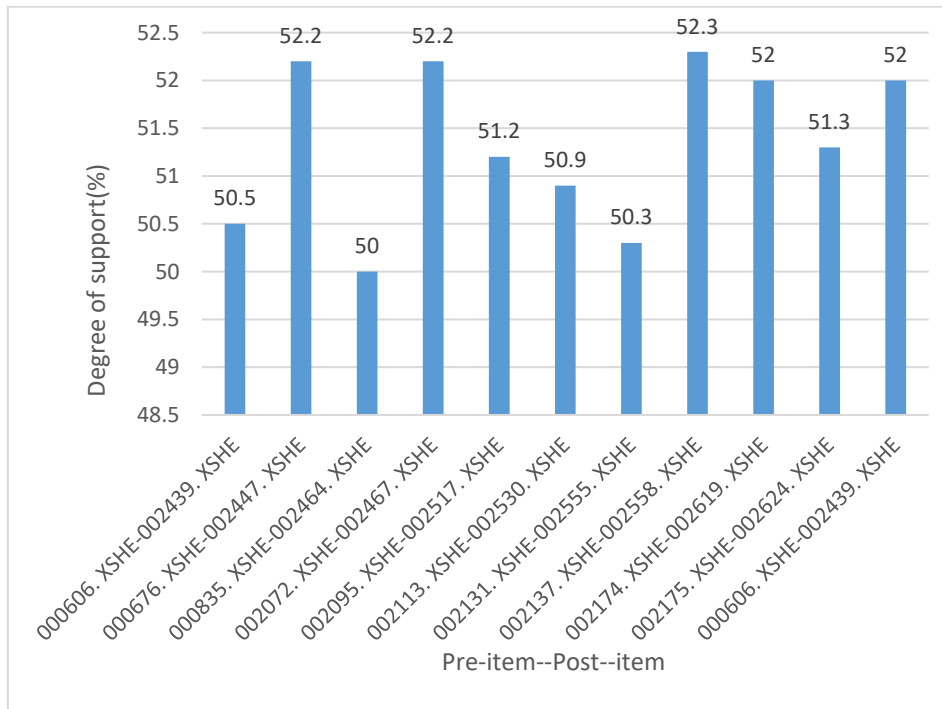


Figure 1: Support for stock ups and downs.

As shown in Figure 1, the correlation relationships between the above stock increases were all supported by more than 50%, with the stocks with codes 002137.XSHE and 002558.XSHE having the highest support. The minimum support between the above stocks was 50%, indicating that the increase relationship between the above stocks had association rules.

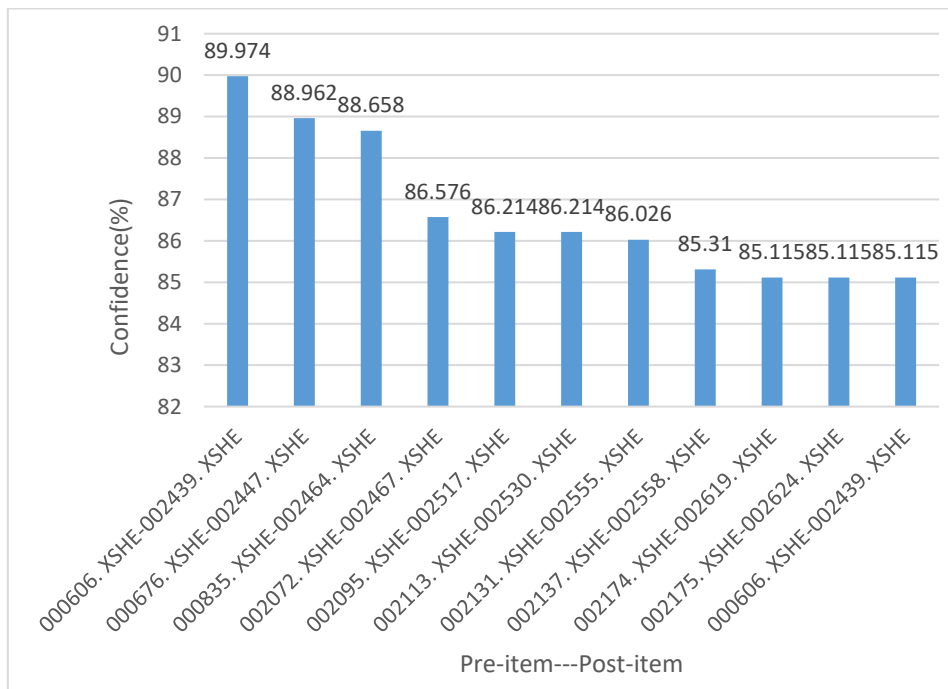


Figure 2: Confidence level of stock price fluctuations.

As shown in Figure 2, the correlation relationships between the above stock increases were all those with a confidence level greater than 80%, indicating that the inference of the increase relationship

between the above stocks through rules was reliable.

Based on the above research results, research could identify relevant laws related to stocks. From this rule, it could be seen that under this supporting condition, codes 000606 and 002439 had a synchronous upward trend. Therefore, for investors: Firstly, when the stock price rises, they could consider buying 002439 shares; secondly, when the stock price of 002439 rises and the stock price of 000606 drops, they could sell the stock price of 002439.

4. Conclusions

The economic and financial BD system established based on the concept of BD would provide a good infrastructure for processing economic and financial data, enabling authorities to timely detect signs of economic and financial crises and guide market participants to take reasonable measures to respond to changes as they gradually move away from direct intervention in economic transactions through administrative means. From the previous management model based on experience and intuition, to the authorities playing a better role in the market economy, this transformation has made financial regulation and economic management faster, more accurate, and more efficient.

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