The Construction Strategy of Enterprise Financial Decision-Sharing Model Based on Big Data Analysis Technology

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Abstract: With the advancement of information technology, enterprise financial management has entered a new stage of development. Around the modern management concept of adhering to data-driven decision-making, it is necessary to propose solutions that better meet the financial information needs of enterprises. Based on the dynamic evolution of enterprise development, a theoretical analysis framework for enterprise financial decision-making is constructed according to the internal logic of financial management. This can explain the financial decision-making development mechanism jointly generated by the sharing mechanism and feedback loop mechanism involving big data analysis and cloud computing, and continue to explore the possibility of moving towards high-quality development goals from the perspective of enterprise development. The purpose of enterprise financial management is to provide financial services that meet expected standards for enterprises and to strive for continuous improvement of service quality to enhance customer satisfaction. To achieve it measures such as strengthening management control based on the internal cycle of service quality, constructing an interaction and feedback mechanism between finance and customer quality perception, and establishing a service and customer evaluation system should be taken to achieve high-quality financial management, promote enterprise development, and truly meet customer needs.

1. Introduction

Financial management is one of the main responsibilities of enterprises and a general term for the sustainable development of enterprises. It can be divided into basic financial management and non-basic financial management, consisting of internal financial management and external financial management, respectively. To improve efficiency, enterprises also entrust third-party outsourcing of financial management processes. Since the information technology revolution, data has become the key to corporate financial decision-making, and financial transparency has become a criterion for evaluation. Unlike traditional financial management, modern financial management emphasizes more on the accuracy, timeliness, and availability of data. Therefore, a topic based on big data analysis has been proposed, while cloud computing provides a new perspective for financial decision-making.

2. The "Sharing Model" of Big Data Analysis Technology and Enterprise Financial Decision-Making to Realize New Changes in Financial Management

2.1 The Digital Transformation of Enterprise Financial Decision Content

Enterprise financial decision-making, as a concept developed in parallel with information technology, lies in the precise analysis and efficient processing of financial information. The rise of the concept not only reflects the profound impact of the information age on corporate financial management strategies but also the infiltration and practice of modern management concepts. Driven by the wave of digitalization, enterprise financial decision-making has gradually shown characteristics of intelligence, automation, and data-driven, which has largely overturned traditional financial management models and brought unprecedented opportunities and challenges to enterprises.

However, when we try to define financial decisions and their essence using certain digital standards, we find that it is not an easy task. It is because the essence of financial decision-making

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cannot be fully summarized by a single digital standard. It involves a comprehensive understanding of a enterprise's financial situation, keen insight into market dynamics, and precise risk control. These factors interact with each other and together shape the complexity and diversity of financial decision-making. In the information age, the connotation and extension of corporate financial decision-making are constantly expanding. On the one hand, digital technology provides enterprises with massive financial data and powerful analytical tools, enabling them to more accurately predict market trends, optimize resource allocation, and improve decision-making efficiency. On the other hand, with the continuous development of technologies such as big data, cloud computing, and artificial intelligence, the level of intelligence in financial decision-making is constantly improving, which brings more accurate and rapid decision support to enterprises.

2.2 Big Data, Cloud Computing, and Artificial Intelligence

2.2.1 Analysis of Enterprise User Data and User Needs

User data is an important criterion for financial decision-making in enterprises and a quantitative expression of user needs. Big data and cloud computing discuss different definitions of user needs from different perspectives. Some scholars believe that user needs are the degree of demand or the expectation of demand.[1] It is precisely because user needs are more uncertain to some extent that they belong to management science with the goal of meeting needs. The history of user needs can even be traced back to early commercial activities, which mainly include market research and consumer behavior analysis.[2] The concept of user needs and data technology are closely related to the progress of information technology.[3] Through big data analysis, user needs have become an important responsibility for corporate financial decision-making. The financial decision-making theory of the information age mainly contributes to rapid response to demand and personalized services. Therefore, the concept of user needs initially focused on quantitative measurement based on digital standard attributes.

2.2.2 Market Trends Driving Intelligent Financial Decision-making

Compared with traditional market analysis, big data analysis emphasizes the interrelationship between market dynamics and financial decision-making and has the characteristic of dynamism. Although some scholars question whether market dynamics may not be directly related to financial decision-making,[4] most scholars advocate that big data can provide a rational evaluation of market trends.[5] Some scholars have proposed a classic model for financial decision-making that includes market trends, which has since become a typical tool for financial decision-making,[6] leading to the development of the concept of intelligent financial decision-making. These scholars believe that intelligent financial decision-making is predictive and refers to "future finance". Only when market trends are accurately predicted can intelligent financial decision-making generate value. As a result, market trends become the result of financial decisions. Some scholars have summarized intelligent financial decision-making as predictive models based on market dynamics and response models based on user needs.[7] The former focuses on market forecasting, while the latter focuses on demand response, which is customer-centric. Although intelligent financial decision-making has experienced some practical failures, from the perspective of information technology, it can improve decision-making efficiency. As a result, the concept of intelligent financial decision-making has gradually become a consensus in enterprise research and practice.

3. Financial Management Challenges Brought by Big Data and Cloud Computing

3.1 Chaos of Data: Excessive Concentration of Data Causes Financial System Imbalance

In the field of corporate financial decision-making, the chaotic phenomenon of data is becoming increasingly prominent, rooted in the imbalance of the financial system caused by excessive concentration of data. The phenomenon forces enterprises to deeply reflect on data management, leading to a new alternative model of data governance. Data governance, as a specific application of information management thinking in enterprise finance, aims to overcome various shortcomings in

traditional data management and achieve effective management of enterprise financial data. The basic concept of a data governance framework includes four aspects: first, ensuring that data can effectively support decision-making. The second is to set professional standards for data output to ensure the quality of the data. The third is to fully explore and "capture" the value of data through advanced technologies such as cloud computing. The fourth is to use data analysis methods to comprehensively measure the impact of data on corporate financial decision-making. The proposal of the framework reconstructs the model of financial data management, emphasizing the need to enhance data transparency, build the accuracy, timeliness, and reliability of data, and provide solid data support for enterprise financial decision-making.

Under the data governance framework, enterprises need to scientifically manage financial data to ensure its accuracy and completeness. It requires enterprises to establish a comprehensive data quality management system and to follow strict norms and standards in all aspects of data collection, storage, processing, and analysis. At the same time, enterprises also need to pay attention to data security issues, take effective measures to prevent data leakage and abuse and protect their interests.

3.2 Technical Difficulties: Financial Automation Operation under Technological Leadership

3.2.1 Errors in Intelligent Decision-making and Mechanical Deviations in Management

In today's rapidly changing business environment, automated decision-making, as a core feature of enterprise financial management, is reshaping the face of financial decision-making with its unique technological charm. It not only improves decision-making efficiency but also achieves real-time feedback on market dynamics and corporate financial conditions, which is undoubtedly a profound reform of traditional decision-making models. With the continuous evolution of enterprise financial management systems, a series of constituent elements such as financial analysis models, risk assessment frameworks, and performance evaluation systems are gradually moving towards intelligence and automation, becoming a key force in promoting the sustainable development of enterprises.

However, there is often an insurmountable gap between ideals and reality. Although automated decision-making has unparalleled advantages in theory, its application is still in the exploratory stage of practical operation, and there is still a considerable distance from maturity and stability. On the one hand, current automation practices mainly focus on improving the efficiency of data processing, while insufficient attention is paid to the deep optimization of decision logic, which may lead to a one-sided problem of "only seeing trees, not forests" in the decision-making process. On the other hand, the construction of automated decision-making systems relies on complex algorithms and massive data. Ensuring the fairness, transparency, and security of these algorithms has become a challenge for enterprises. In addition, due to the lack of unified standards and norms, there may be significant differences in automated decision-making systems between different enterprises, which not only increases the difficulty of industry communication and cooperation but also may exacerbate the risk of unfair competition in the market.

More importantly, the issue of management behind automated decision-making cannot be ignored. While pursuing efficiency and precision, neglecting the influence of human factors such as employee emotions, experience, and creativity may lead to decision-making results deviating from the long-term development goals of the enterprise, and even trigger ethical and moral controversies. Therefore, while embracing automated decision-making, business leaders should also focus on cultivating a talent pool that can understand and master automation tools. Ensure equal emphasis on technological progress and humanistic care, and jointly promote the development of corporate financial management towards a healthier and more sustainable direction.

3.2.2 Data Security Issues and Compliance Risks

From the perspective of data management, data security is a fundamental aspect of corporate finance and a core manifestation of corporate social responsibility.[8] Therefore, data security is primarily generated based on compliance logic. Data security is the primary responsibility of enterprises and an important component of enterprise risk management. At present, enterprises

strengthen data security control from a compliance perspective, mainly in three forms: first, data encryption. Ensure the security of data between transmission and storage. The second is access control. By establishing user authentication standards, permission management standards, and disclosing security standards to internal users, standardized control of data access can be achieved. The third is internal data process reengineering. In recent years, many enterprises have used technological means to enhance data security and compliance. However, compared to the ideal state, the data security of current enterprises still needs to be further improved. The data security issues and compliance risks are shown in Figure 1.

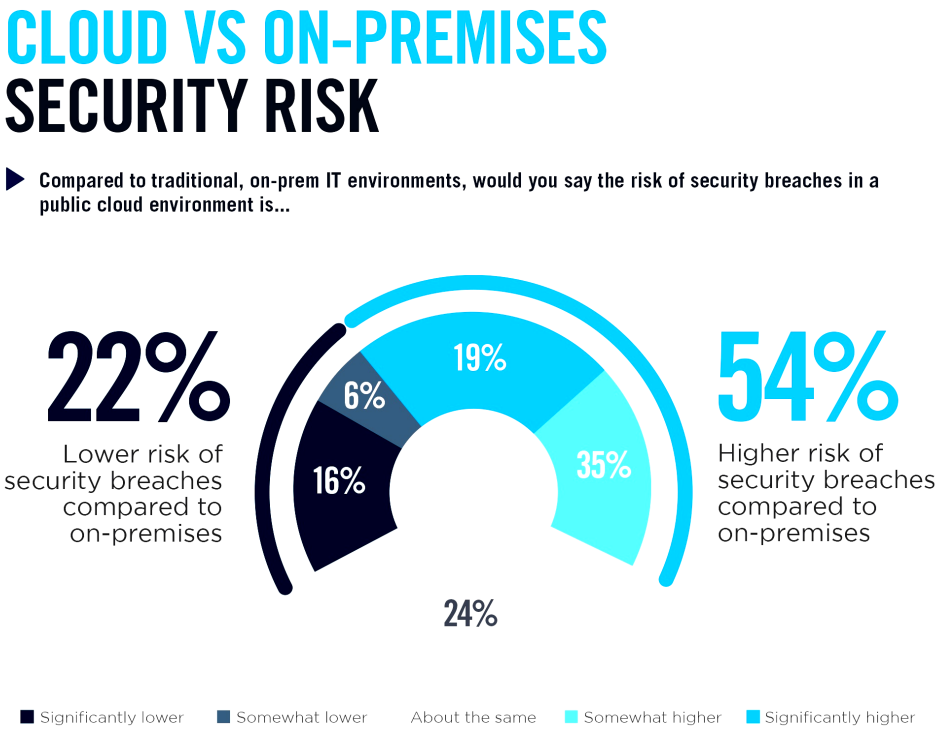

Figure 1: Data security issues and compliance risks

3.3 The Birth of Derived Risks Under the Governance of Technology

The analysis standards of big data and the principles of cloud computing are aimed at decision support, and the development of big data mainly reflects predictability and personalization. In the framework of data governance, accurate prediction, timely response, personalization, and reliability are the core values and highest principles for the development of big data. The diversity of current data types and the complexity of analysis have led to a chaotic trend in big data. Despite technological advancements, due to incomplete data management, big data itself lacks self-correction mechanisms. Therefore, this creates a "weakness" in big data, which affects the quality of financial decision-making.

4. Strategies for Responding to the Development Process of Enterprise Financial Industry under Technological Challenges

4.1 Bidirectional Empowerment: Enterprises Get rid of Technological Challenges

4.1.1 Improving Data Quality to Achieve High-quality Transfer of Financial Decisions

From the perspective of data management, corporate financial data cannot accurately provide the insights needed for decision-making. The satisfaction evaluation of financial data by users is the main form, but enterprises lack relevant information and feedback mechanisms for data quality and data governance. The core of this problem may be data quality. In data governance, data quality is often described as the "lifeblood of decision-making", and its impact on financial decisions directly reflects

the health status of the enterprise. However, most of the existing data is about historical performance and other information, and prospective analysis is relatively scarce. Usually, high-quality data is difficult to obtain or measure. Asymmetric data and imperfect data governance directly lead to obstacles in decision-making. When facing the limitations of enterprise financial data, which mainly focuses on historical performance description and lacks forward-looking analysis ability, the application of advanced statistical and machine learning technologies has become a key strategy to compensate for this deficiency.

Time series analysis is a powerful tool for predicting future trends in financial indicators. Among them, ARIMA (autoregressive integrated moving average model) and SARIMA (seasonal ARIMA) models are particularly prominent. The ARIMA model consists of three key parameters: p p (the number of autoregressive terms), d d (the number of differences), q q (the number of moving average terms), and its mathematical expression is :

$$\phi(B)(1-B)^d X_t = \theta(B)\epsilon_t$$

Among them, B is the backward shift operator, Å (B) and θ (B) are autoregressive and moving average polynomials, respectively, and ϵ t is a white noise sequence.

The SARIMA model further considers the seasonal patterns of the data, enhancing its modelling ability for data with significant seasonal fluctuations by adding seasonal parameters P, D, Q, and seasonal cycles s. The expression for the SARIMA model is:

$$\Phi(B^s)(1-B^s)^D(1-B)^{\ d}X_t = \Theta(B^s)\theta(B)\epsilon_t.$$

Machine learning provides a more flexible prediction framework that can handle complex nonlinear relationships and integrate multiple data sources. Among them, ensemble learning methods such as Random Forest and Gradient Boosting Tree are favored for their predictive performance and robustness. Random forest reduces overfitting and improves model stability by constructing multiple decision trees and synthesizing their prediction results. The training dataset for each tree is obtained through bootstrap sampling, and feature selection is randomly performed at each node, increasing the diversity of the model. Gradient boosting trees gradually optimize prediction errors by iteratively adding weak learners (usually decision trees). Each newly added model focuses on the residual of the previous model and optimizes the prediction performance by minimizing the loss function.

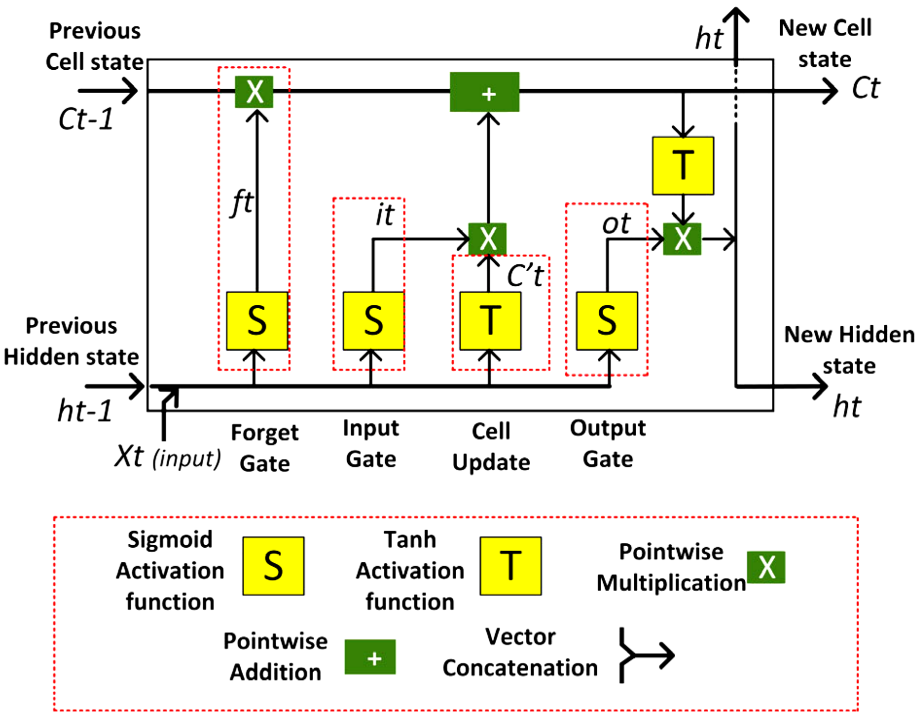

Figure 2 LSTM Network

Traditional statistical and machine learning methods may not be able to capture financial data that involves long-term dependencies. At this point, LSTM (Long Short Term Memory Network) in deep learning stands out due to its excellent sequence processing ability. The LSTM unit effectively learns long-term dependencies through gating mechanisms (input gate, forget gate, output gate), overcoming the gradient vanishing problem of traditional RNNs (recurrent neural networks). The structure of LSTM allows models to remember important historical information while forgetting irrelevant details, making it particularly suitable for handling nonlinear dynamic changes in financial data. The LSTM network is shown in Figure 2.

4.1.2 Financial Process Upgrading under Technological Domestication

From the perspective of process optimization, technology has long constrained the efficiency of corporate financial processes. The rapid development of information technology has integrated multiple financial processes and reshaped financial management through process automation. However, the drawbacks of traditional processes still constrain the development of enterprises. Due to technological limitations, and human factors, the process still needs to be improved. Under the premise of automation, process optimization is seen as a direct way to improve efficiency. However, the actual impact of technology-driven automation on financial processes remains subject to debate. Meanwhile, due to difficulties in data, the process lacks flexibility. Therefore, automation does not always seem to achieve the expected goals. Process optimization is not only a technical challenge, but also faces challenges in management and culture.

4.2 Risk sharing: Optimization of Risk Management System and Corporate Governance

Enterprises cannot avoid the "risk sharing" as decision-makers in risk management. In the risk management mechanism, internal control is a standardized and effective risk management tool that plays an important role in enterprise management. It also makes risk management not only a technical concept but also a strategic concept. Therefore, the risk management system that focuses on "risk sharing" has become the core mechanism of corporate governance. The practical interpretation of risk management is generally a risk management path gradually formed based on internal control, although this path contains innovative attempts. From risk identification to risk mitigation, risk management closely revolves around the enterprise's goals from beginning to end. However, enterprises should strive for risk avoidance to meet market requirements. However, in situations where risks are magnified, this also brings a dilemma of subjectivity in risk management. Overall, there is still room for improvement in risk management in areas such as risk identification, and its internal controls need to be further improved, which is also an important task of corporate governance.

4.3 Value Restoration: Correcting the Application of Technology and Restoring the Essence of Financial Management

When building a financial management system, there are usually two types of relationships to start with financial data and financial processes. Financial data can be directly extracted from raw data, while financial processes require complex analysis of existing data to obtain, and this relationship can reveal deeper dynamics of an enterprise's financial situation. The construction process includes: building a data management system at the financial data level, building a process optimization system at the financial process level, building a risk management system at the internal control level, and a multi-level financial management system for the overall enterprise. After constructing a multi-level financial management system, it is necessary to make correct judgments and quality evaluations of the entities in the field that have joined the system to ensure that the constructed system has high accuracy. Compared to a single-level system, a multi-level system is structurally more complex, capable of storing more entities, and has more complex entity relationships. Therefore, advanced technology can be utilized for validation, which is a variable-sharing technique with smaller parameter scales and higher application advantages compared to other technologies. In the application stage, this technology can combine financial data and processes to complete the representation from data to decision-making. In addition, this technology can score entities under the influence of decision functions, select the scheme with the highest score as the accurate decision, and analyze and predict

multiple times to improve decision accuracy, thereby verifying that the constructed system has high accuracy.

5. Conclusion

The financial management system is not only a symbol of enterprise modernization and an important means to improve competitiveness but also an urgent need to achieve enterprise goals and maintain enterprise health. Essentially, it reflects the internal requirements of enterprise development. Under the guidance of information technology, the enterprise financial management system has constructed a theoretical analysis framework and practical mechanism for financial management. In recent years, modern information technologies such as big data and cloud computing have driven the development of financial management. By empowering financial decision-making through data and improving the accuracy and science of decision-making, its value aligns with the internal logic of enterprise development. Therefore, financial management based on information technology provides a new path for enterprises. In short, the sustainable improvement and development of enterprise financial management systems help to better achieve enterprise goals and enhance the overall competitiveness of the enterprise.

References

[1] Du L, Chen H, Fang Y, et al. Research on the method of acquiring customer individual demand based on the Quantitative Kano Model[J]. Computational Intelligence and Neuroscience, 2022, 2022(1): 5052711.

[2] De Mooij M. Consumer behavior and culture: Consequences for global marketing and advertising[J]. 2019.

[3] Wilson T D. Information needs and uses: fifty years of progress[J]. Fifty years of information progress: a Journal of Documentation review, 1994, 28(1): 15-51.

[4] Rouwette E A J A, Größler A, Vennix J A M. Exploring influencing factors on rationality: a literature review of dynamic decision-making studies in system dynamics[J]. Systems Research and Behavioral Science: The Official Journal of the International Federation for Systems Research, 2004, 21(4): 351-370.

[5] Wang H, Xu Z, Fujita H, et al. Towards felicitous decision making: An overview on challenges and trends of Big Data[J]. Information Sciences, 2016, 367: 747-765.

[6] Almeida-Filho A T, de Lima Silva D F, Ferreira L. Financial modelling with multiple criteria decision making: A systematic literature review[J]. Journal of the Operational Research Society, 2021, 72(10): 2161-2179.

[7] Bidiuk P I, Prosiankina-Zharova T I, Terentieev O M, et al. Intellectual technologies and decision support systems for the control of the economic and financial processes[J]. Journal of Theoretical and Applied Information Technology, 2019.

[8] Suto M, Takehara H. Corporate social responsibility and corporate finance in Japan[M]. Springer, 2018.