Analysis and Evaluation of Railway Accounting Information System

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ABSTRACT

With the rapid development of China's economy and the deepening of reform and opening up, the development of enterprises has many favorable platforms and faces more opportunities. This question conducts literature research on the basic theories and the current situation of domestic and foreign research in the fields of enterprise financial management, information system integration, information system evaluation, etc. The analysis of the current situation of the road accounting information system summarizes the characteristics of the railroad accounting information system, and on this basis, the railroad accounting information system evaluation index system is constructed, from the level of infrastructure, the level of accounting information system function, the level of accounting information system performance The evaluation index system of railway accounting information system is constructed, and the railroad accounting information system is comprehensively evaluated in five aspects: infrastructure level, accounting information system function level, accounting information system performance level, accounting information security level, and accounting information performance level.

Keywords: *Accounting and Finance Information System, Information System Analysis, Letter System Evaluation.*

1. INTRODUCTION

1.1. The current situation of railway accounting information system

From the 1980s to the present, after 40 years of development, railway accounting information system has basically formed a more complete application system with more than 30 subsystems, covering the whole business activities of accounting, financial budget, fund management, revenue management, clearing management, cost management, financial supervision, accounting personnel management and other financial accounting.

In 2020, according to the "Railway Financial and Accounting Management Information System (2019) General Technical Plan", the railroad accounting information system relies on the integrated railroad information integration platform, starts the integration and optimization of railroad accounting information system, proceeds to design the railroad accounting information big data with unified standard, consistent caliber, one number and one source, and dynamic

update, and builds a unified structure, complete function, friendly interface, single entrance The information system of railroad accounting is unified in structure, complete in function, friendly in interface, single entrance and interconnected in business.

1.2. Analysis of railroad accounting information system characteristics

Through the analysis of each subsystem, railroad accounting information system has the following characteristics.

1.2.1. Hierarchy

At present, China's railroad group is managed at three levels: group company, railroad bureau and railroad station. There are 18 railroad bureaus under the jurisdiction of the National Railway Group, which undertake the national railroad transportation tasks, while the railroad station section is the first-level management unit of the railroad, which plays the main role in the organization of railroad safety and transportation production. Therefore, the group

companies, railroad bureaus and railroad station sections at different levels have their own railroad accounting information systems. At present, there is a problem that the "channel" of financial information network environment within the railroad is too narrow, and only the financial departments form the networked environment of financial information in the top-down order, i.e. the Finance Department of the State Railway Group - the Finance Department of the Railway Bureau Group Company --The information service includes uploading of notices, scanning and uploading of electronic invoices, etc. The degree of information sharing with other related business departments is too low, and the lack of horizontal information sharing is not conducive to the development of financial management information work.

1.2.2. Decentralization

As a result, the deployment of the railroad accounting information system of the National Railway Group is scattered, and the degree of coordination among the subsystems is poor, which poses a certain challenge to the improvement and optimization of its financial informatization strategic planning, financial informatization system management, financial informatization application management, information system (IS) service capability, financial management capability, financial management efficiency, financial information quality, etc. This poses certain challenges.

1.2.3. Heterogeneity of subsystems

There are more than 30 subsystems under railroad accounting information system, which are responsible for daily accounting business processing, comprehensive query and statistical analysis of accounting information and personnel, and decision support of economic activity analysis and other business activities of railroad accounting. This sub-system has significant heterogeneity, and its database stores its own business data, realizes its own business processing, and can realize the statistical analysis of each system in the current year and across years, in addition to some data from other railroad computer application systems and computer application systems outside the railroad.

1.2.4. Integrity of business and finance

National Railway Group is mainly engaged in railroad passenger and cargo transportation, and has diversified operations with a wide range of businesses. The company not only needs to be responsible for the unified scheduling and command of railroad transportation, coordinate the allocation of road network capacity resources, undertake the public welfare transportation tasks stipulated by the state, and be responsible for the clearing of railroad industry

transportation revenue and revenue input management, but also needs to consciously accept administrative supervision and public supervision, and be responsible for the safety assessment of new national railroad lines in operation to ensure transportation safety, improve service quality, enhance economic efficiency and strengthen market Competitiveness. Therefore, the current design of railroad accounting information system revolves around the basic idea of business-financial integration, and establishes a business event-driven financial integration information processing process based on the IT environment including network, database, management software platform and other elements, so that financial data and business can be integrated. However, the huge scale of China's railroad network, complex network structure and the new technologies and equipment put into use in large quantities have put forward higher overall requirements on the management quality, business flow efficiency, system security and the degree of integration of business and finance of railroad accounting information system, and the current railroad accounting information system of the National Railway Group does not fully meet the needs of smooth financial business at this stage. Therefore, it is urgent to integrate and optimize the railway accounting information system, further optimize the system resource allocation, strengthen the system software integration, expand the system functions, and promote the resource sharing among the systems, and also better adapt to the overall requirements of deepening the railroad accounting reform, strengthening management, improving economic efficiency, and meeting the requirements of refining cost calculation and strict accounting in the process of railroad enterprises going to market. Ultimately, it can maximize data sharing, control economic business in real time, truly bring accounting control functions into play, improve economic efficiency services, improve the level of informationization of railroad accounting system, and promote the rapid and healthy development of railroad industry.

2. RAILWAY ACCOUNTING INFORMATION SYSTEM EVALUATION GUIDELINES AND PROCESS

To build a complete evaluation system of railroad accounting information system and evaluate the utility of railroad accounting information system is helpful to clarify the work target of integration and optimization of railroad accounting information system, to provide guidance for its integration and optimization, to form a high-quality accounting information system that is coordinated and unified with the business needs of railroad accounting, and to promote the financial accounting informationization strategy of the national railway group. For how to evaluate the quality level of this management mode of railroad accounting

information system, whether the use of internal process management is reasonable and effective, and whether it can achieve the expected effect, it is necessary for us to analyze from theoretical to practical perspectives combined with the current situation of informationization and financial management characteristics of China Railway Group. This topic introduces the hierarchical analysis method to construct the index system, and calculates the index weights, and calculates the comprehensive evaluation results by designing the evaluation model.

2.1. Evaluation criteria of railroad accounting information system

2.1.1. System structure optimization

That is, the way or order of interconnection and action between the internal components of the system is reasonable, and it has an optimized structure that can actively adapt to the changes of the external environment, specifically: ① Harmonious symbiosis between different types of information people. ②The elements of information environment are coordinated with each other. ③ High adaptation of information people and information ecological environment.

2.1.2. Good system function

The direct manifestation of the function of enterprise information ecosystem is the realization of its core value, that is, it can efficiently meet the information needs of information users, which is manifested as follows: ① smooth information channels, that is, there are no missing channels, no blockage, no breakage and no disconnection in the information flow channels in the system. ② Rapid information flow, that is, the information flow in the system is fast and timely, the information intake, acceptance, absorption, response, feedback and a series of processing processes are fast and efficient. ③ Accurate information conversion, that is, the information staff can accurately understand the needs of information users and accurately convert the needs into information products through information activities and deliver them to users. (4) Information input and output are comparable, i.e., the amount of information input and information output are roughly comparable, and there is no system deficit caused by insufficient input and output, nor is there system overload and information loss caused by more input and less output.

2.1.3. Relative stability of the system

Stability is a basic characteristic of system existence. The reason why the system can maintain its orderliness is that there is a stable connection between all elements.

The disturbance of external environment may make the system deviate from a certain state and produce instability, but once the disturbance is eliminated, the system can restore the original state and continue to maintain stability. Therefore, the stability of enterprise information ecosystem means that the system tends to maintain a relatively stable state within a period of time.

2.1.4. The system has the driving force of evolutionary optimization

A healthy information ecosystem must have the power of continuous development. Under the condition that the number of internal elements of the system is appropriate, coordinated and orderly, and the structure of the system is reasonable and well-functioning, a sustainable system must have the will to break the existing equilibrium, adjust the composition of its own elements in the interaction with the external environment, further optimize the structure of the system, so as to realize the evolution of the system from the disorderly state when the equilibrium is broken to a higher level of equilibrium and orderly state. Therefore, equilibrium is not a dead equilibrium, and an excellent enterprise information ecosystem should have a dissipative structure and achieve order by rising and falling under the impetus of certain elements.

2.1.5. System elements maintain a high level

The four aforementioned evaluation criteria focus on the organic connection between the elements within the system, the coordination status, and the embodiment of the system function based on the excellent structure. This is important, but the level of the system elements themselves should also be one of the evaluation criteria, because relative to the overall strategy of the organization, the system is in a relatively stable balance at a high level is the goal of system evolution, which can reflect not only the requirements of coordination, but also the requirements of development.

2.2. Evaluation Process of Railway Accounting Information System

Railroad accounting information system, as a core component of the management informationization of national railway group, plays an indispensable role in improving the management level and even the core competitiveness of national railway group. However, while railroad accounting information system brings benefits to the group, it also brings many risks. In order to ensure the safety, reliability, effectiveness and efficiency of railroad accounting information system, it is necessary to evaluate it. Therefore, it is also essential to design a reasonable evaluation process, which is as follows.

(1) Familiarize and describe the accounting information system

(2) Check and record the application processing procedures

(3) Evaluate the business process through the accounting information system

(4) Examine the accounting information system and its functions

(5) Evaluate the adequacy of the information system

(6) Evaluate the adequacy of each subsystem

(7) Evaluating the effectiveness of the system

(8) Build a comprehensive evaluation model

3. RAILWAY ACCOUNTING INFORMATION SYSTEM EVALUATION INDEX SYSTEM CONSTRUCTION

Comprehensive evaluation is an important means to deeply understand and objectively recognize events, a decision basis to rank and preferably select evaluation objects, a key support to improve the practice process, optimize management measures and an important basis to implement management actions such as rewards and punishments. The scientificity of the indicator system directly affects and determines the reliability and credibility of the evaluation results.

3.1. Principles of railroad accounting information system evaluation index system construction

Information system evaluation index system refers to an orderly collection of evaluation indexes composed of various factors affecting the quality of information system application described qualitatively or quantitatively. The success of the whole evaluation project depends to a large extent on whether the evaluation index system is scientifically and reasonably designed. In order to improve the validity and accuracy of evaluation indexes as much as possible, this study follows the following principles in the selection of indexes: (1) scientific principle; (2) association and independence principle; (3) holistic principle; (4) operability principle; (5) development principle.

3.2. Evaluation index system of railroad accounting information system

3.2.1. Selection of indicators

① Qualitative analysis method. Among the influencing factors of accounting information system, there are direct obvious ones and indirect not obvious ones, and these influences are short-term and long-term,

induced and accumulated. No matter which influence factors, they can be screened by qualitative analysis. First of all, the existing influencing factors are summarized, excluding the repetitive and obviously unreasonable factors, and the qualitative analysis results are obtained after categorization.

②Quantitative analysis method. For the preliminary indexes obtained qualitatively, quantitative analysis methods, such as factor analysis and correlation analysis, are used to quantify a series of data such as statistical data and survey data, and statistical analysis is conducted by software to find out the main influencing factors as the dominant factors, and finally form an evaluation index system of accounting information system.

③ Combination of qualitative and quantitative analysis method. Qualitative analysis such as social survey and expert consultation is conducted for the preliminary selected indicators, and then combined with quantitative analysis method to finally determine the index system for participation in the evaluation.

3.2.2. Determination of indicators

The construction of evaluation index system is the key link of multi-factor comprehensive evaluation, and the construction should follow the principles of scientificity, wholeness, operability and development, combining general indicators with characteristic indicators to fully reflect the characteristics of accounting information system. The whole process should be scientific and standardized, including the steps of target determination, preliminary identification of indicators, screening and classification of indicators, and determination of the basis of indicator evaluation.

Firstly, this study conducts preliminary identification and classification of evaluation indicators based on the reading of literature related to the field of information system and accounting information system evaluation; secondly, the initial identified indicators are revised, including the determination of inter-indicator affiliation, classification rationality and indicator meaning; finally, the unified opinions of experts on the evaluation criteria of each indicator in the process of accounting information system evaluation are obtained, and the importance of indicators is determined.

The research will be guided by the theoretical analysis framework of information system evaluation, combined with the characteristics of railroad accounting information system such as hierarchy, decentralization, subsystem heterogeneity and financial integration to build the evaluation index system, which contains 5 secondary indicators and 24 secondary indicators. As shown in Table 1.

Table 1. Evaluation index system of railroad finance and accounting information system

First-level indicators	Second-level indicators	Third-level indicators
Railroad Accounting Information System Evaluation Index System	Infrastructure level	Software and hardware construction level
		Network construction level
		Data center construction level
	Financial information system function level	Accounting
		Tax management
		Financial statement
		Budget Management
		Fund Management
		Asset Management
		Cost Management
		Financial Analysis
		Risk Management
	Financial Information System Performance Level	Convenience and flexibility
		Stability and compatibility
		Integration and scalability
		Security and advancement
	Level of assurance of financial information technology	The level of importance of financial informatization
		Financial informatization planning
		Daily operation and maintenance management
		Talent team and training
	Performance level of financial informatization	Economic efficiency indicators
		Accounting efficiency
		Decision support level
		Financial internal control level

3.2.1.1. Infrastructure level

It mainly measures the information infrastructure work and network construction of enterprise hardware and software. Infrastructure refers to the various common technology platforms (such as enterprise portal, application integration platform) and network and hardware infrastructure needed to support and guarantee the safe, reliable and efficient operation of various business application systems of the company. Infrastructure indicators focus on the boundary delineation and functional/technical requirements of the common technology platforms and infrastructure of the enterprise, thus driving the standardized construction of technology platforms and infrastructure. It is reflected by hardware and software construction level, network construction level and data center construction level.

① Hardware and software construction level

Lu Weiwei (2017)[1] used software and hardware platform construction as one of the indicators for evaluating infrastructure, aiming to evaluate the reliability of infrastructure in the process of implementing information technology construction, giving inspiration to this study to establish the indicator of software and hardware construction level.

② Network construction level

Fu Lingsheng et al. (2007)[2] qualitatively, quantitatively, and positioned "enterprise informatization", and established network performance level and computer networking rate indicators, with the aim of allowing enterprises to recognize their own level of informatization, and to correctly understand and evaluate the construction of enterprise informatization. Yang Shiyong et al. (2007)[3] established network scale and network performance indicators to evaluate the level of information technology investment and facilities. Wang Hongliang et al. (2009)[4] proposed network center equipment value and total network exit broadband indexes to reflect the information access capacity of the unit. Based on the above literature, this study establishes the network construction level for weighing the level of infrastructure.

③ Data center construction level

Yang Shiyong et al. (2007)[3] combined the Japanese informatization index system and the American Borat index system to establish an informatization index system, including five major items such as information technology investment and facility level, production process automation, management informatization, marketing informatization level, and personnel quality, including a total of 18 indicators, which examined the basic database construction level of enterprises. Zhu Hirong (2007)[5] evaluated the scale of database construction from two perspectives of enterprise

informatization level and enterprise informatization benefit to provide ideas for this study.

Cui-Cui Chen (2019)[6] established an informatization evaluation system through literature analysis method and empirical analysis method, and emphasized that the level of database construction is an important indicator to reflect the level of enterprise informatization.

3.2.1.2. Functional level of accounting and finance information system

The main measure of the functional situation of each part of the enterprise information system, the system function is the ability of the system and the environment in the interaction, reflecting the relationship between a system and the external environment for information exchange. By evaluating the value of functional areas to better define improvement goals, find obstacles to the realization of information system functions and propose improvement solutions, it is mainly reflected by accounting, tax management, financial statements, budget management, fund management, asset management, cost management, financial analysis and risk control functions.

① Accounting

Liu Zhe (2018)[7] used the accounting error rate as one of the indicators to evaluate the internal process dimensions of the financial sharing center to provide ideas for establishing functional indicators in this study. Gu Baoguo (2018)[8] discussed the construction of the financial evaluation index system of group enterprises from the source orientation of financial evaluation, mentioning that accounting is the basis of financial information management capability. Chen Zhangnan (2020)[9] evaluated the accounting business of the company's financial shared service platform from the perspective of the use of grassroots employees and combined it with strategic objectives.

② Tax management

Wang Lei (2019)[10] establishes tax audit difficulty indicators from the perspective of geographical differences and legal risks, aiming to examine the degree of attention paid to tax-related business and laws and regulations by personnel in the financial shared service center, so as to improve the accuracy and efficiency of audit processing in the financial shared service center.

③ Financial statements

Chen Liang (2002)[11] mentioned that the accounting information system transmits the financial information formed after collection, processing and transformation treatment to all relevant information users in a timely manner through certain information carriers and channels. For external information users, financial information is transmitted through the carrier of financial accounting statements; for the financial information required by internal management departments, it is transmitted with the carrier of management accounting statements. He (2014)[12] defines the report management function that it should have certain security and reliability design, and the format and content of the report should be encrypted so that the content and format cannot be opened or modified without the correct password.

④ Budget management

Ye Shiren (2017)[13] assessed the budget management risk starting from the five elements of business finance risk and internal control - internal environment, risk assessment, business activities, information and communication, and internal oversight. Zhou Yulong (2018)[14] selected indicators to examine the level of comprehensive budget management from the perspective of strategic financial resource integration and internal financial resource integration. Yang (2018)[15] highlighted the importance of budget management from the perspective of financial management capability, pointing out that budget management is the guiding management of enterprises for various operations in the future operation process, and took comprehensive budget management as the first-level indicator to evaluate the financial management capability of enterprises, providing ideas for establishing indicators in this study.

⑤ Financial management

Tian Feng (2014)[16] analyzed the influencing factors of fund management from the perspective of value chain management, in which the key points of internal value chain specifically include fund settlement and management information system, staff quality, organizational design, degree of centralized fund management, and internal management system development and implementation, and the external value chain is mainly in terms of banks. Several methods of funds management are demonstrated from the funds settlement business process, specifically including loose funds management mode, highly centralized funds management mode, and funds management mode of two lines of income and expenditure, which have implications for this study.

Yang Xiaolei (2018)[15] proposed the capital control level index from the perspective of the integration of production and finance. For the indicator layer of the ability of combining production and finance, this paper sets two sub-level indicators: first, the cooperative relationship between enterprises and banks and other financial institutions, capital is the blood that drives the normal operation of the functions of the enterprise's vital body, and the most direct way for enterprises to

replenish their blood is to borrow from financial institutions, therefore, enterprises must maintain a good cooperative relationship with them. Second, the level of capital management and control, enterprises must continuously improve the level of capital management and control if they want to improve the efficiency of capital use.

⑥ Asset management

Tian Feng (2014)[16] examined asset quality indicators from the perspective of centralized capital control, which sheds light on the establishment of evaluation indicators in this study.

⑦ Cost management

Yi Shi (2019)[17] mentioned cost as a typical dimension for measuring financial shared service centers. Chen Zhangnan (2020)[9] established performance evaluation indexes for financial shared centers by combining SWOT analysis, and examined cost business management with the strategic goal of reducing operating costs and improving operating efficiency.

⑧ Financial analysis

Liu Yingbin et al. (2019)[18] considered the perspective of operation and the height of management, and used operation analysis management as one of the indicators for enterprises to evaluate financial sharing centers.

⑨ Risk control

Yang Xiaolei (2018)[15] examined the financial risk control capability based on the effectiveness of the internal control system and early warning system on the basis of financial management informationization.

3.2.1.3. *Performance level of accounting and finance information system*

The main measure of information technology system strengths and weaknesses. The normal operation of the information system requires that the system is first of all flexible and convenient, and should be able to adapt to changes in the enterprise, changes in the business environment and changes in the needs of its decision makers, and because various factors such as technological progress, competitive pressure, regulations and business activities of the enterprise are constantly changing, the accounting information system must adapt to these changes; at the same time, under the prescribed circumstances, the information system working ability should be as At the same time, under the stipulated circumstances, the working ability of the information system should be stabilized at a good level as much as possible to provide guarantee for the normal operation of the enterprise and to reduce errors or to

resume work as soon as possible after the errors are made. It is reflected by convenience and flexibility, stability and compatibility, integration and scalability, and security and advancement.

3.2.1.4. *The level of assurance of accounting information technology*

The main measure of the enterprise in the overall layout of information technology, especially the long-term information technology construction of the degree of attention and the overall level. Information leadership is the enterprise according to the characteristics and development trend of the industry and the actual situation of the enterprise's own programmatic goals and guidance, so that enterprises more purposeful and targeted investment in information technology construction. At the same time, the enterprise's ability to carry out information technology work such as operation and maintenance, resource security and the introduction of enterprises to train information technology talents is assessed.

3.2.1.5. *The level of performance of accounting information technology*

Mainly measure the informationization of enterprise production and operation, comprehensive office and management decision-making. The ultimate goal of enterprise informatization is to apply information technology in the daily operation of enterprises, with the help of network management, business operation platform, improve the transparency of enterprise information, realize the sharing of resources, strengthen staff communication, improve staff efficiency, improve enterprise economic efficiency, streamline office costs and workflow, and use the network information dissemination with timely, interactive, direct and other characteristics to achieve business integration and information sharing. It is reflected by economic efficiency, accounting efficiency, decision support level and financial internal control level.

In summary, on the basis of summarizing the current evaluation indexes, the evaluation indexes applicable to the evaluation of railroad accounting information system are proposed on the basis of the construction principles of evaluation indexes for the characteristics of high qualitative degree of indexes.

4. COMPREHENSIVE EVALUATION OF RAILROAD ACCOUNTING INFORMATION SYSTEM

4.1. *Constraints of railroad accounting information system evaluation*

For railway accounting information system, the

security of information system, risk control and financial internal control level are the most basic and important reference factors.

Railroad accounting information system is mainly to improve the effectiveness of the use of funds of the national railway group, and to provide the corresponding professional accounting information management services. In order to better strengthen the accounting information service, the railroad accounting information system should be more secure and trustworthy. Such is the need to be able to well regulate the contradiction between the openness of the network world and the security of user information, accounting information system to achieve the smooth flow of company network information, but also to timely identify some unsafe illegal access, these comprehensive factors determine the security and risk control of accounting information system is essential.

The security and risk control of the accounting information system can let the manager understand the group's own network security status or other related application systems very precisely, and then clearly understand the group's information system security needs. In addition, the information security control of network and application systems can further classify the risks accordingly, so that the enterprise can avoid or reduce the possible loss of interests caused by the security of accounting information system in the future.

Based on the above analysis, this study considers that the primary evaluation conditions of financial information system are system security, risk control level and financial internal control level. If the financial information system fails to fully guarantee these three elements to meet the expected objectives, it is considered that the information system does not meet the requirements. Accordingly, the following evaluation criteria are established: (1) Risk control level. (2) Security of accounting information system. (3) The level of financial internal control.

4.2. Comprehensive evaluation of railroad accounting information system

Through the above analysis, this study calculates the comprehensive level of accounting information system under the condition that the security of accounting information system is high, and the level of risk control and financial internal control is good.

This study invites experts in railroad accounting information technology, and evaluates the above indicators by combining the current situation of railroad accounting information system. The calculation steps are as follows.

(1) To judge whether the constraints are satisfied, i.e. whether the level of risk control, financial information

system security and financial internal control meet the requirements.

(2) If the constraints are satisfied, the research questions are corresponded to the indicators separately, and the score of each indicator is calculated according to the options.

(3) Multiplying the score of each indicator with the total weight of the hierarchy to obtain the final score of each indicator.

(4) The scores of each index are added together to get the comprehensive score of railroad accounting information system.

5. CONCLUSION

(1) A literature study was conducted on the basic theories and the current situation of domestic and foreign research in the fields of enterprise financial management, information system integration and information system evaluation, which provided theoretical guidance for the subsequent work.

(2) Through the analysis of the current situation of railroad accounting information system, the characteristics of railroad accounting information system are summarized, and on this basis, combined with literature research, the evaluation index system of railroad accounting information system is constructed, which contains 5 secondary indicators and 24 secondary indicators, mainly from the level of infrastructure, the level of accounting information system function, the level of accounting information system performance, the level of accounting information security The system mainly evaluates the railroad accounting information system in five aspects: infrastructure level, accounting information system function level, accounting information system performance level, accounting information security level, and accounting information performance level. Under the premise of considering the constraints, the comprehensive rating of the existing railroad accounting information system is 2.82, which belongs to the passing status, calculated by the expert rating. The analysis of the scores of each index found that the railroad infrastructure is comprehensively constructed, the budget management and cost management functions need to be optimized, the advancedness of the system needs to be improved, the financial internal control management is better, but there is more room for improvement in management effectiveness and efficiency.

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