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Optimization of Power Enterprise Financial Management System Based on Artificial Intelligence

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Abstract The society is like a boundless sea that never stops and keeps rolling. Enterprises are like fishing boats floating in the sea. The vast society like the sea has never stopped moving forward, and various enterprises of all sizes are also constantly changing their way of existence to adapt to the development process of the times. Electric power enterprises are no exception. In recent years, with the continuous reform of the power system, the competition between power enterprises is becoming more and more fierce. All enterprises that can stand the competition have the common ground that is to adapt to the current situation and make timely changes in the form of operation, which is inseparable from the construction of the financial management system (FMS). Therefore, in order to optimize the FMS of electric power enterprises and improve their core competitiveness, the traditional financial concepts and accounting methods should be changed. This paper puts forward the research on the optimization of FMS of electric power enterprises based on artificial intelligence (AI), and designed relevant comparative experiments and questionnaires. The comparison experiment results showed that the invoicing time of power enterprise FMS B based on artificial intelligence was less and more stable than that of traditional power enterprise FMS A. In the traditional electric power enterprise FMS A, the time for financial personnel to issue an invoice was basically controlled between 90 and 120 seconds, and the time for electric power enterprise FMS B to issue an invoice was basically stable between 50 and 100 seconds. It shows that the FMS of electric power enterprises based on artificial intelligence can effectively improve the invoicing time of electric power enterprises and optimize the invoicing speed of the FMS of electric power enterprises. This paper hoped that the application of AI in the FMS of electric power enterprises could effectively drive the financial management work towards a more scientific, professional and intelligent direction. This paper has provided the direction for the development of power enterprise FMS and the reference for the promotion and application of power enterprise FMS based on artificial intelligence, and makes contributions to the update and development of power enterprise financial management.

Index Terms Artificial Intelligence, Electric Power Enterprise, Financial Management, Information System

I. Introduction

In the expansion of social science informatization, AI has been developed and updated strongly, and at the same time, it has also promoted the development of all walks of life towards the direction of information intelligence. In this era with the economy as the mainstream, enterprises must do well in their own management if they want to get a foothold. The core of management is to control enterprises to withstand the rapid changes of the times. For power enterprises, financial management is a very important and necessary work content. The integration of the rapid development of AI with the financial management of power enterprises can effectively promote the improvement of the FMS of power enterprises, and contribute to the standardization of the financial management of power enterprises and the more reasonable allocation of resources.

With the development of society becoming complex and cumbersome, the research of enterprise financial management has been the focus of many scholars. Ahrorov Zarif Oripovich discussed the objectives and tasks of formulating financial policies in financial activities. For enterprises, organizational financial strategy is financial policy at different levels [1]. Mabandla Ndonwabile Zimasa investigated the relationship between working capital management and corporate financial performance [2]. Valaskova Katarina calculated the financial ratios of profitability, activities, liquidity and liabilities that might affect the company's financial health [3]. Tkachenko Volodymyr believed that the financial and economic security of an enterprise was a complex system, which included a set of specific internal characteristics to ensure the efficiency of the use of resources in all directions of the enterprise's activities [4]. Akhtar Shamim believed that the financial statements contained insightful statistical data related to the possible risks and the returns of many decisions, which played an important role in the success of the company, especially for small and medium-sized enterprises [5]. Micic Ivan believed that finance came into

being with the development of the concept of money and its function as a payment and transaction mechanism [6]. Hussain Javed studied the relationship between financial literacy, financing channels and growth of SMEs in the central UK [7]. Karadag Hande investigated the cash, accounts receivable and inventory management of small enterprises and their relationship with financial performance and competitiveness [8]. With the continuous changes in financial aspects, the competition among enterprises is becoming increasingly fierce. Enterprises need a more perfect FMS to improve their internal core competitiveness. However, previous studies have not deeply explored the impact of the FMS, and there are still some limitations in the actual operation.

Financial management has become a hot topic in the process of enterprise growth. Financial management is of great significance to the development of enterprises. Therefore, enterprise financial management has also attracted the attention of many scholars. Ratnasingam Jegatheswaran found that the two major issues that SMEs were most concerned about were financial management and supply chain disruption. Most SMEs' operating capacity was far lower than their capacity, which had caused huge financial pressure on their business viability [9]. Devie Devie discovered the true nature of corporate social responsibility effect as a future investment and made contributions to corporate social responsibility and financial management literature [10]. Gao Jun analyzed and discussed the enterprise financial accounting information management [11]. Levytskyi Viktor, on the basis of analyzing the investment in enterprise marketing activities, elaborated the main problems of the formation and optimization of enterprise FMS [12]. Rosyadah Khairina analyzed the impact of financial knowledge, financial attitude and personality of Makassar Food on the financial management behavior of SMEs [13]. Kamau WAWERU ALLAN believed that the reason why most state-owned enterprises had been losing money was the lack of sound financial management, internal control system and audit team [14]. The continuous development of science and technology has made changes to society. If enterprises want to have a more complete FMS, they must constantly introduce scientific information technology to adapt to emerging changes. Based on the role of AI in it, this paper studied the role of AI in the FMS of electric power enterprises.

In order to reflect the positive role of AI in the FMS of electric power enterprises, this paper has carried out comparative experiments and questionnaires. The results of the questionnaire showed that 122 financial personnel said that the introduction of AI into the power enterprise FMS made financial work more convenient. 124 financial personnel said that AI effectively reduced the error rate of work and made data collation more accurate. The number of people who believed that AI could improve the efficiency of financial management was the largest, reaching 125. There were 123 financial personnel who believed that AI could effectively reduce workload. It is fully proved that the application of AI in the FMS of electric power enterprises can effectively improve the financial management and income level of enterprises, and make the FMS of electric power enterprises more intelligent and reasonable.

II. Optimization of AI and Power Enterprise FMS

II. A. Overview of AI

AI can be said to serve all aspects of society. The concept of AI is always in dispute. Academia is progressing in the debate, and ideas are advancing in the debate. In fact, AI technology is a scientific data processing technology, which is used to develop and research technical methods of intelligence and simulation. It has made great contributions to sustainable economic growth and solved various social problems [15]. This paper mainly studies the application of AI in the financial management of electric power enterprises.

There are many kinds of AI algorithms. This paper takes ID3 (Interactive Dichotomizer 3) algorithm of decision tree as an example to introduce the classification basis of ID3 algorithm for data. In the FMS of electric power enterprises, ID3 algorithm of decision tree in AI is used to analyze and sort out data.

First, the concept of information entropy is introduced into ID3 algorithm. Information entropy can be understood as the classification standard of data records. The classification attribute is based on the attribute with large amount of information in the data records. The attribute forms a branch, and finally constructs a decision tree. The information entropy of a node attribute is calculated, and the maximum value as the attribute branch is calculated according to the size of the information entropy.

X information with the same probability is defined, and the probability P of each information is:

$$P=\frac{1}{X} \tag{1}$$

Then, the amount of information delivered by a message is:

$$Y=\log_2(X) \tag{2}$$

There are X messages, and the given probability distribution is:

$$P=(p_1, p_2, ..., p_n) \tag{3}$$

Among them, there are:

$$\sum_{k=1}^{n} p_k=1 \tag{4}$$

The amount of information transferred by this distribution is called the entropy of P, namely:

$$C(P)=-\sum_{k=1}^{\backslash n} p_k \log_2 p_k \tag{5}$$

II. B.Enterprise FMS

Enterprise FMS mainly includes modern and traditional. The traditional FMS is more dependent on financial personnel for business operation, and its foundation is accounting business. Modern FMSs tend to be more financial, such as personal income tax calculator, financial budget, etc. Figure 1 shows the core business of enterprise financial management.

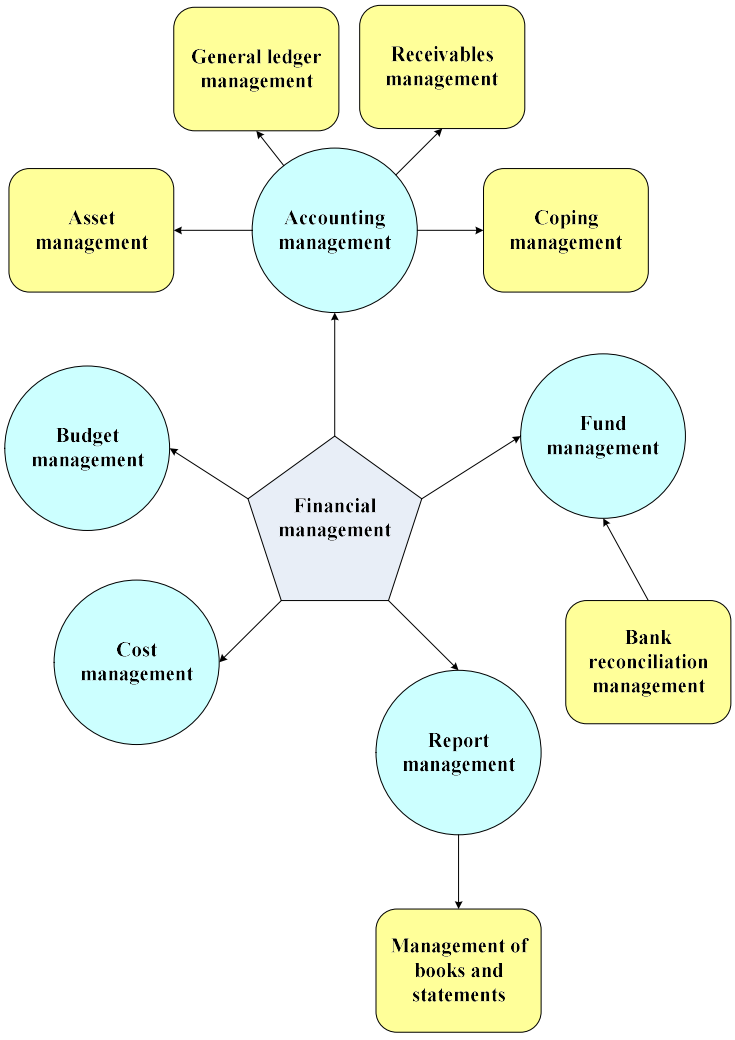


Figure 1: Enterprise financial management core business diagram

II. C.Application of AI in the FMS of Electric Power Enterprises

(1) Positioning transformation of financial personnel by AI

In the traditional FMS, the financial staff is the center of the system, and its business process is almost carried out around the financial staff. A FMS without financial personnel is like a fish losing its soul without water resources. The addition of AI has injected new nutrients into the FMS. It can not only replace the financial staff to do some simple work, but also greatly improve the work efficiency of the financial staff and reduce the error rate. However, this also led to the financial personnel no longer occupying the leading position in the FMS. The development of science and technology has brought progress to society and challenges to many employed people. In the past, the demand for financial personnel in power enterprises was always in short supply. The arrival of AI era has created a new chapter for the future of financial management. The decrease in the demand for financial personnel means that a large number of financial personnel are faced the risk of being laid off. The society is changing, and the survival of the fittest is even more important among enterprises. Therefore, financial personnel need to correct their attitude in time and have a clear understanding of their own positioning. In addition to understanding that they are not irreplaceable, they should continue to learn and enrich themselves to improve their competitive advantage, and improve their self-cognition level while constantly exercising their own abilities.

(2) Development and transformation of AI to FMS

Based on the influence of AI, enterprises' demand for financial personnel has been increasing. The traditional FMS only requires accountants to understand the basic financial operation process. However, nowadays, the work with high repeatability and low difficulty can be replaced by AI. In addition, AI can ensure a certain accuracy and prevent the workflow from being limited due to detailed errors. Therefore, the FMS under AI requires accountants to have a solid professional knowledge of financial management, as well as multiple knowledge and talents. Only compound financial talents can stand out under the FMS of AI. These talents can not only integrate the financial management data of enterprises, but also provide suggestions for the development of enterprises.

Therefore, the FMS is gradually developing from financial management to financial management. Traditional financial management focuses on finance, and financial data is the focus of financial management. Enterprises are in a very passive situation when they conduct development analysis around financial data. The FMS based on AI focuses on management. It can be understood that in the past, financial data led the development of people, while the FMS under AI promoted the development of data, mainly reflected in the financial staff making decisions on the needs of financial work. The financial management of power enterprises can effectively promote the development of enterprises in a better direction.

(3) Optimization effect of AI on FMS

The optimization effect of AI on FMS is mainly reflected in three aspects: the optimization of issuing accounting vouchers, the optimization of financial accounting methods and the optimization of financial data processing.

a) Optimization of issuing accounting vouchers

With the popularization of electronic documents in the society, it has added great convenience to the financial work. AI adds convenience to the relevant accounting documents of electronic documents. The issuance of traditional paper invoices needs to go through four steps: submission of relevant invoicing information, relevant review by financial personnel, issuance of invoices by financial personnel, and receipt of invoices by staff. The implementation of the four simple steps is affected by many factors, such as the limited time arrangement of financial personnel, the limited location of invoicing, and the unknown waiting time for review. Sometimes it takes only a few minutes to issue an invoice, but sometimes it takes several days to wait, which inevitably affects the smooth implementation of the workflow. The implementation of electronic invoices has greatly saved human and material resources. By scanning the code, the staff can issue invoices independently, which improves the work efficiency and reduces the workload of the financial staff. In addition, AI can participate in the filling and printing of various electronic documents, which can also help enterprises save labor costs. Many simple tasks are gradually replaced by AI to continuously optimize the whole financial accounting method and improve the efficiency of financial management.

b) Optimization of financial accounting methods

For electric power enterprises, the daily financial personnel need to deal with numerous large and small current accounts. These current accounts play a very important role in power enterprises, regardless of the amount or data size. Therefore, it is necessary for financial personnel to carefully compare the data of each current account, which limits the working efficiency of financial personnel. AI can intelligently compare relevant data, reduce error rate and improve the efficiency of checking current accounts. AI is not limited by time and space, and can conduct business anytime and anywhere. Therefore, AI plays an obvious role in optimizing the accounting method of FMS, and has practical significance for improving the data collation of enterprises.

c) Optimization of financial data processing

AI has obvious advantages for data processing. Therefore, in the FMS, in the face of many data, AI can more comprehensively and clearly extract and integrate various financial data, and analyze the information contained in

financial data from multiple perspectives. The analysis of these financial data based on AI can effectively understand the development of enterprises, and help power enterprises better sort out and monitor financial information in real time.

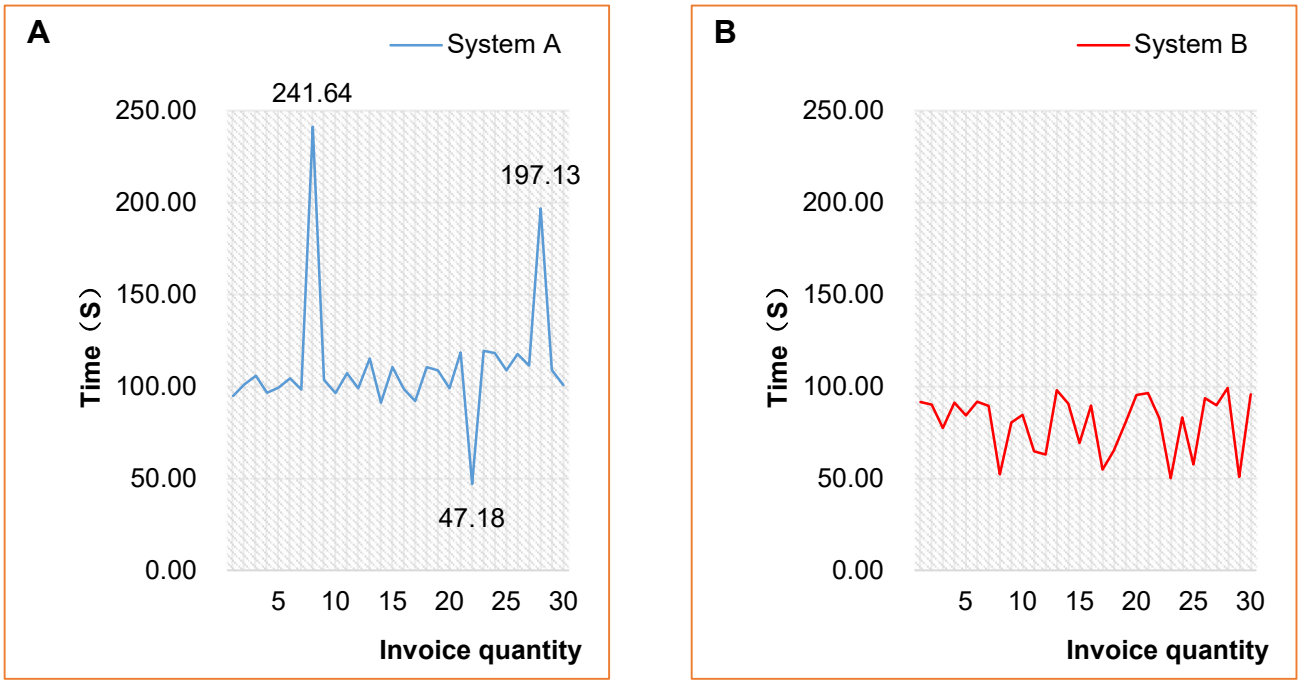
III. Comparative Experiment and Questionnaire Survey on the FMS of Electric Power Enterprises

III. A. Comparative Experiment on FMS of Electric Power Enterprises

In order to test the effect of AI in the FMS of electric power enterprises, this paper selected a large electric power enterprise for a comparative experiment. In this enterprise, the traditional power enterprise FMS (A) and the power enterprise FMS (B) after the introduction of AI were used. The difference between the traditional power enterprise FMS (A) and the power enterprise FMS (B) after the introduction of AI has been verified respectively in terms of the time of issuing invoices, the speed of data processing and the efficiency of verifying current accounts. Among them, the traditional power enterprise FMS (A) is the control group, and the power enterprise FMS (B) after the introduction of AI is the experimental group. The two were compared experimentally.

(1) Comparison of invoicing time

With the popularity of electronic documents, more and more enterprises begin to use electronic invoices instead of paper invoices. The emergence of electronic vouchers has opened up a new way for the financial management of enterprises. The foundation of electronic voucher is electronic network. Therefore, the comparison of the issuing time of electronic invoices can effectively understand the role of AI in the FMS of electric power enterprises. Figure 2 shows the comparison of the invoicing time of 30 invoices issued by the FMSs of two groups of electric power enterprises.



(A) shows the invoicing time of power enterprise FMS A in the control group

(B) shows the invoicing time of power enterprise FMS B in the experimental group

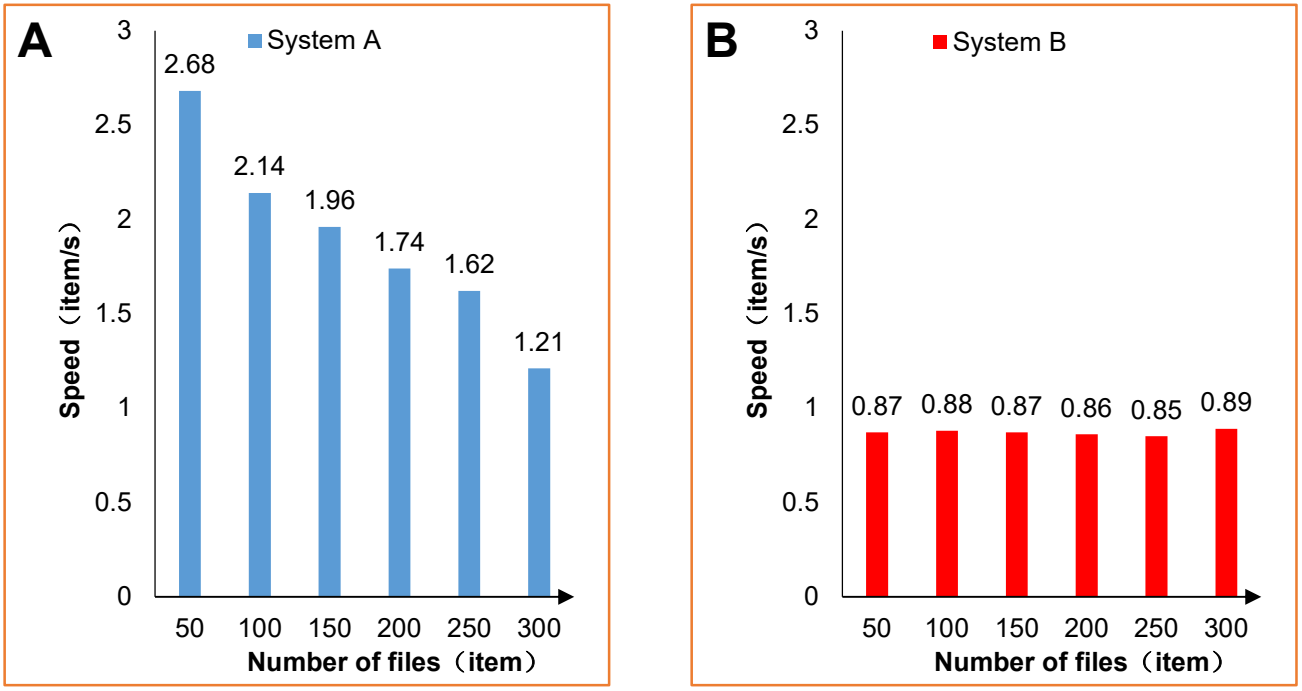
Figure 2: Comparison of invoicing time of two power enterprise FMSs

Looking at the data comparison chart, it can be seen that the invoicing time of electric power enterprise FMS B was less and more stable than that of electric power enterprise FMS A. The traditional FMS A of electric power enterprises used the traditional manual invoicing method to issue invoices. Generally speaking, the issuance of invoices by financial personnel has been affected in many ways. Therefore, the invoicing time of financial personnel is not stable. As can be seen from Figure 2A, the time for financial personnel to issue invoices was basically controlled between 90-120S, which means that it took 1 minute and a half to 2 minutes for financial personnel to issue an invoice. Among them, there were also three times when the time exceeded the range of the general stable value, namely, the time spent in issuing the 8th invoice, the 22nd invoice and the 28th invoice was

241.64S, 47.18S and 197.13S respectively. The FMS B of electric power enterprises based on AI is invoiced by AI instead of financial personnel. The FMS B of electric power enterprises based on AI can conduct intelligent invoicing according to the invoicing information of business personnel. As can be seen from Figure 2B, the invoicing time of power enterprise FMS B was basically stable between 50-100S, which was more stable and faster than that of power enterprise FMS A. It can be seen that the power enterprise FMS based on AI can effectively improve the billing time of power enterprises, and optimize the billing rate of the power enterprise FMS, so as to reduce the workload of financial personnel.

(2) Comparison of data sorting speed

For the traditional financial work, the data that financial personnel have to face and sort out every day is very huge. For small-scale power enterprise companies, their financial staff generally needs 20 to 30, while large power enterprise companies may need hundreds or more financial staff. This is because a large amount of financial data has been generated in each link of the power enterprise company. Therefore, professional financial personnel are required to sort out, classify and summarize these data. However, in this way, a lot of money is spent on the human cost of financial personnel. Therefore, this paper studied the role of power enterprise management system based on AI in data collation. Figure 3 shows the data collation speed of two groups of power enterprise FMSs.



(A) shows the data processing speed of the power enterprise FMS A in the control group

(B) shows the data processing speed of the power enterprise FMS B in the experimental group

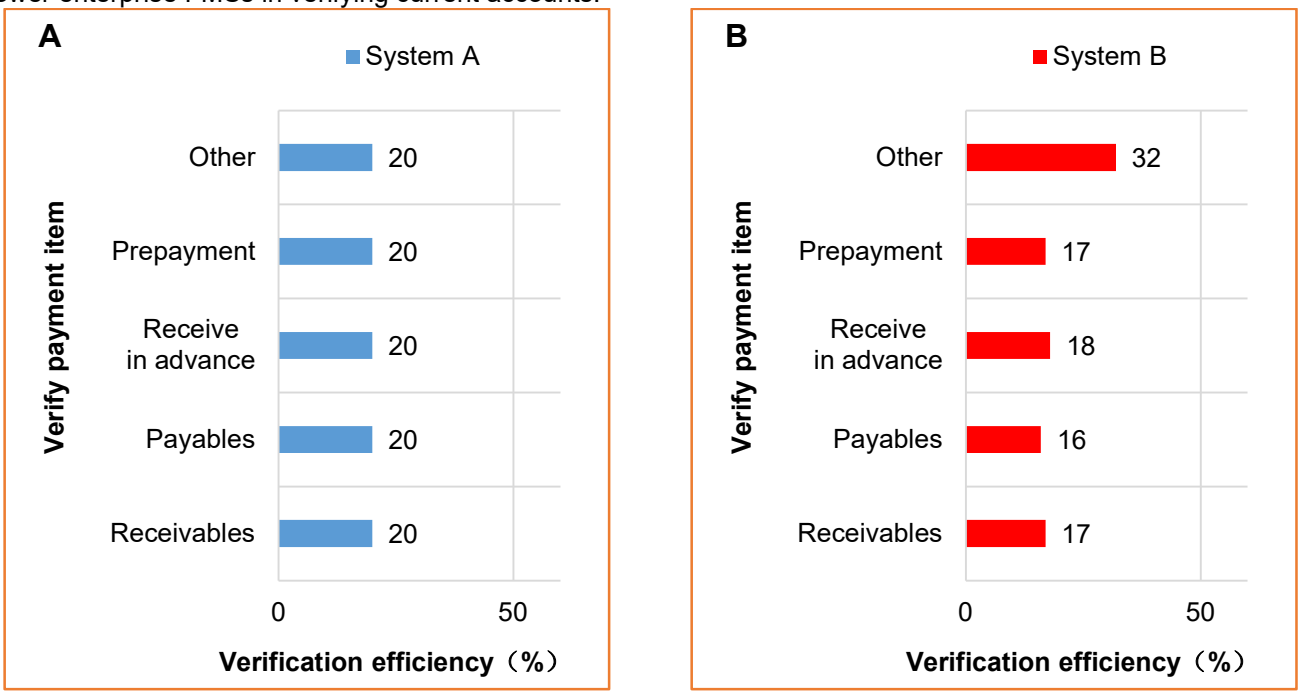
Figure 3: Comparison of data collation speed of two power enterprise FMSs

As can be seen from Figure 3, in the traditional power enterprise FMS A, the speed of financial staff processing files changes according to the number of file data. With the increase of the number of data files, the speed of the financial personnel to sort out data has also slowed down. This is because the larger the number of files, the longer the time for financial personnel to process the file. The processing of a document for a long time is easy to cause fatigue, so the speed is getting slower and slower. It can be seen that as the file data increased by 50 pieces each time, the data sorting speed of the financial personnel was 2.68/S, 2.14/S, 1.96/S, 1.74/S, 1.62/S and 1.21/S, starting from 50 pieces. The speed at which financial personnel collate data was also unstable and has been in a fluctuating state. Figure 3B shows the data processing speed of power enterprise FMS B based on AI. It can be seen from Figure 3B that the data collation speed of power enterprise FMS B was more stable, without fluctuations due to the change of the number of data files, and the collation speed was basically controlled between 0.85-0.89/S. Therefore, it can be explained that AI can bring special advantages to the FMS of electric power enterprises in data collation, and the speed of AI computing data is far beyond human's reach. AI can also help power enterprises to better summarize and integrate financial data, and make the financial situation of enterprises

clear. At the same time, it can save the calculation time of financial personnel and improve the work efficiency of financial personnel.

(3) Time of checking current accounts

For electric power enterprises, the operation of enterprises need to involve the transactions of multiple project funds, and one of the financial work is to verify the details of these transactions with invoices. Verification of current accounts is a very complex work in enterprise financial management. Therefore, this paper used AI to optimize the verification efficiency of power enterprise FMS. Figure 4 shows the proportion of time spent by the two groups of power enterprise FMSs in verifying current accounts.



(A) shows the proportion of time for verifying current accounts in the FMS A of power enterprises in the control group

(B) shows the proportion of time for verifying current accounts in the FMS B of electric power enterprises in the experimental group

Figure 4: Comparison of time between two electric power enterprise FMSs in verifying current accounts

From the comparative data in Figure 4, it can be seen that in the traditional FMS A of electric power enterprises, the financial personnel distribute the accounting work according to the average, and the planned time spent on each project accounts for 20%. However, in practice, due to the specific solution of specific problems, the time spent on accounts receivable, accounts payable, advances and prepayments is often longer than the planned time. Therefore, the time left for other accounting work is less than 20%. The power enterprise FMS B based on AI can effectively reduce the proportion of time spent on traditional current accounts and increase the work efficiency of financial personnel. It can be seen from Figure 4B that the proportion of time spent by the power enterprise FMS B based on AI for accounts receivable, accounts payable, advance receipts, prepayments and other accounting work is 17%, 16%, 18%, 17% and 32%. By reducing the time spent on the first four items, more time can be reserved for other financial work, thus improving work efficiency.

III. B. Questionnaire on the FMS of Electric Power Enterprises

III. B. 1) Questionnaire reliability

In order to truly reflect the impact of AI on the optimization of the FMS of electric power enterprises, this paper conducted a questionnaire survey on 127 financial personnel of electric power enterprises in this experiment. A total of 127 copies of the questionnaire were distributed and 127 copies were recovered. There were no mistakes or omissions. Therefore, the number of questionnaires finally included in the statistics was 127. The questionnaire results were analyzed by SPSS (Statistical Product and Service Solutions) software, and the Clonbach coefficient α was selected as the reliability coefficient. The reliability coefficient of the questionnaire was 0.9189 (greater than 0.85), indicating that the reliability of the questionnaire is good.

III. B. 2) Questionnaire results

This questionnaire is for financial personnel to investigate the role of AI in the FMS of electric power enterprises. The results of the questionnaire are shown in Figure 5 (multiple choices are allowed).

Figure 5: Questionnaire survey results

According to the results of the questionnaire in Figure 5, 122 financial personnel said that the introduction of the AI FMS of electric power enterprises increased the convenience of financial work and made the work of financial personnel more convenient. 124 financial personnel said that AI effectively reduced the error rate of work and made data collation more accurate. The number of people who believed that AI improved the scientificity of the FMS of power enterprises was 119. The number of people who believed that AI could improve the efficiency of financial management was the largest, reaching 125. The total number of people was 127, accounting for 98.43% of the total number. There were 123 financial personnel who believed that AI could effectively reduce workload. In addition, 117 people put forward other functions that were not shown in this paper. It can be seen that the FMS of electric power enterprises after the introduction of AI is deeply loved by financial personnel. Financial personnel are very satisfied with the convenience that AI brings to the work, which shows that AI can optimize the FMS of power enterprises.

IV. Conclusions

The research on the optimization of FMS of electric power enterprises based on AI is of great significance for the survival and development of electric power enterprises. The experimental data shows that the introduction of AI into the FMS of power enterprises is an inevitable trend. From the experimental data, it can be seen that the power enterprise FMS based on AI has effectively reduced the workload of financial personnel, and improved the work efficiency of financial management, so as to reduce the human cost of financial personnel. At the same time, it has also played a significant role in improving the FMS and mechanism and optimizing the allocation of financial management resources, which is of promoting significance for realizing the sustainable development of electric power enterprises and improving the informatization and intelligence level of electric power enterprises. However, there are some problems in this study while achieving certain results. First of all, due to the urgency of time, the time of this experiment is not long, which may lead to some errors in the experimental results. Secondly, in terms of experimental data collection, this paper has only selected a certain power enterprise company as the experimental data, without considering the situation of other power enterprises. The experimental data volume is small and not representative. Finally, the emergence of AI has brought earth-shaking changes to human life. However, there are numerous conjectures about AI. While the development of AI brings convenience to human beings, human beings are also constantly thinking about its disadvantages. After all, from a dialectical point of view, the existence of anything has two sides. While recognizing the advantages of AI, its hidden crisis cannot be denied. However, it is believed that with the continuous progress of human science, it is only a matter of time to consider these issues. In order to understand the optimization role of AI in the FMS of electric power enterprises in a deeper level, the analysis results are further improved in the follow-up research based on these problems.

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