Research on Design and Implementation of Accounting Computerization System in Small and Medium-sized Enterprise

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ABSTRACT: The accounting informationization platform can provide relevant, accurate, reliable and timely information for users in the information age. Based on the actual situation of small and medium-sized enterprises in China, this paper analyzes and discusses the feasibility of constructing a big data platform, and applies for the cloud computing technology and B/S structure model to construct an accounting information platform with the functions of comprehensive financial monitoring, comprehensive financial decision and comprehensive financial forecasting, and then introduces specific cases to verify the superiority of accounting data analysis platform in the financial application.

Keywords: accounting informationization; small and medium-sized enterprises; construction; application; forecasting

1 RESEARCH BACKGROUND

The revolution of information technology has dramatically changed the nature of enterprises and created competitive advantages for the enterprises appreciating it. Information technology affects the form and nature of information, and accounting information is no exception. The advent of e-commerce makes the enterprise willing to change the accounting systems, in order to ensure the timeliness of accounting system output and flexibility of non-geographic restrictions. Accounting computerization is a process of replacement of the artificial bookkeeping, accounting and reimbursement by the electronic computer, and analysis and utilization of accounting information. Its advent is a “revolution” in accounting techniques, which can reduce the labor intensity of financial staff, liberate the majority of financial staff from complicated bookkeeping, accounting and reimbursement, improve the accounting efficiency, and solve non-standard, error-prone, omission-prone and other problems in the manual operation, promote the standardization of accounting work, and improve the quality of accounting work, thus producing a profound impact on the traditional accounting work, and laying a foundation for the informationization and modernization of the entire accounting management. In addition, the accounting computerization system can also capture non-financial information to support financial information for decision-making. Therefore, the accounting computerization system can provide relevant, accurate, reliable and timely information for users in the information age [1].

At present, China’s large-scale enterprises attach great importance to the design and implementation of accounting computerization and informationization system, while the majority of small and medium-sized enterprises fail to realize the accounting computerization system or achieve a poor effect due to their own factors [2]. The significance of small and medium-sized enterprises in the development of the national economy has drawn attention in previous academic reports and their important contribution is very obvious [3-9]. The informationization level of small and medium-sized enterprises also directly determines the overall level of China’s enterprise competitiveness, which has a significant impact on China’s economic development, so it is necessary to improve the accounting informationization level of small and medium-sized enterprises. Based on the above viewpoints, this paper aims at research of design and implementation of accounting informationization system, and hopes to help small and medium-sized enterprises for the construction of accounting computerization platform.

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2 OVERVIEW OF RELATED RESEARCHES

The foreign countries began to apply the computerization technology to accounting since the 1950s. After the 1970s, with the extensive application for information technology, the rapid development of accounting informationization has been promoted. In 1980, Sprague proposed DSS framework of three-component integrated structure of user interface, data component and model component. This structure had a great impact on the research of decision support system. On this basis, Holsapple defined six kinds of knowledge of DSS [10]. Manheim et al introduced the decision support system in the accounting information system and proposed the concept and framework of accounting decision information system to facilitate the decision analysis of accounting data [11]. Gianpaolo Carraro and Frederick Chong conducted specific research of the evolving stages of the user’s use of cloud computing platform [12].

The development of IT technology in the accounting field in China was later than that in foreign countries. Only by the late of the 20th century did the academic circles recognize the importance of IT technology in the accounting field, mainly marked by the software enterprises, such as UFIDA started to transform the research and development of accounting management software. Xin Maoxun believed that accounting informationization is a digital, dynamic, diversified and real-time accounting information system that can achieve the combination with accounting and information technology through relying on the existing information technology and integrating with information flow, capital flow, business flow and logistics [13]. The survey of Yuan Fenglin showed that the research of the existing accounting informationization theory was not thorough enough, and a comprehensive theoretical framework of accounting information system was not formed [14]. Wang Jian believed that the main reason was that the scholars paid too much attention to the technology application of accounting informationization and its impact on accounting theory, but ignored its impact on the nature of accounting informationization [15]. Discussion on TMAIM architecture of accounting informationization published by Yang Zhouan marked that the academic circles began to discuss the theoretical framework of accounting informationization [16]. Fan Xianhong, Zhang Shijun, Hao Lina and Yi Jia analyzed the problems in the process of enterprise accounting informationization in detail, and put forward corresponding countermeasures [17-20]. Taking the small and medium-sized enterprises as an example, Hu Wei analyzed the status quo and development trend of accounting computerization and put forward five opinions on the improvement of accounting computerization [21].

3 CONSTRUCTION OF ACCOUNTING DATA ANALYSIS PLATFORM

3.1 Feasibility analysis

3.1.1 Theoretical feasibility analysis

The enterprise accounting big data Y can be considered as an integral of the independent variable x:

\[ Y = \int \rho(x) dx \]  

(1)

Where, \( \rho(x) \) is the density of accounting big data. All objective information can be obtained through formula (1), and on this basis, the useful accounting data V can be confirmed as value correction of accounting big data Y:

\[ V = Y^r \]  

(2)

Where, value coefficient \( r \in [0,1] \), when \( r = 1 \), \( V = Y \), all accounting big data have value; When \( r = 0 \), \( V = 1 \), one accounting data have value. Knowledge K is an integral of the useful accounting data V:

\[ K = \int ivdv \]  

(3)

Where, i is the knowledge transformation coefficient of the useful information.

In accordance with the above theory, accounting information system is to classify, summarize, excavate and analyze the objective information Y, and automatically provide decision information K. In this paper, accounting big data analysis platform is to expand the scope of accounting data, excavate and analyze the accounting big data by using information technology based on the above theory, and provide decision information. Therefore, the establishment of platform is theoretically feasible.

3.1.2 Economic feasibility analysis

Enterprises store the accounting big data in the cloud and acquire accounting information in the accounting big data by using the application program in the cloud, thus saving a lot of expenses. Firstly, the cost of investing cloud computing at the earlier stage is lower than that of other programs, and the enterprises can adjust the cost to actual use. Secondly, the enterprises do not need to provide redundant resources to meet the needs of the business peak time. At present, the use ratio of high-end server is only 15% to 20%. In the information system of using cloud computing, the enterprises do not pay limited capacity, and further save costs. Finally, when a cloud service provider provides a basic cloud service platform of software development for an enterprise, the enterprises only need to pay for the services obtained after the lease, and do not need to purchase and maintain hardware device. Thus, it is economically feasible to construct a big data analysis platform with the economic benefits.
higher than the benefits of traditional information system.

3.2 Construction of platform function

In this paper, the accounting data analysis platform is a smart accounting information system, which mainly uses cloud computing technology and B/S structure model to integrate with the internal and external accounting big data of the enterprise and processing tools, thus achieving online analysis of accounting big data. The construction of analysis platform should integrate all internal and external original accounting data of the enterprise that are helpful for the enterprise decisions and the processed accounting data into accounting big data based on the accounting system and relevant laws and regulations, and collect, store, analyze, and apply them, and find the value behind the accounting big data. Its main functions are comprehensive financial decision, comprehensive financial forecasting and comprehensive financial monitoring.

3.2.1 Comprehensive financial decision

The age of big data has brought a huge data source for the comprehensive financial decision. The comprehensive financial decision relies more on the data acquisition, processing, analysis and application capabilities, but no longer solely relies on the financial accounting data of the enterprise and experience-based judgment of the decision-makers. The specific comprehensive financial decision process in this research is shown in Figure 1.

3.2.2 Comprehensive financial forecasting

In the comprehensive financial forecasting, combined with the results of comprehensive financial analysis, according to the historical business data and external objective environment and accounting big data, the univariate and multivariate linear regression method is used to predict the financial crisis, business performance and cost budget of the enterprise.

The activity-based costing method is used to predict the operating cost, which specifically allocates the costs to each operation. The cluster analysis method is used to test the impact of different factors on the cost. Later, based on the historical production and variation trend of cost data, the trend model with the same variation trend is automatically selected to predict the future costs. Financial risk prediction uses Z-value model to predict financial crisis of the enterprise.

3.2.3 Comprehensive financial monitoring

Comprehensive financial monitoring is mainly to help managers understand the enterprise operation conditions and enterprise budget enforcement conditions, and then monitor the cash, accounts receivable, accounts payable, inventory and other specific content in the current assets and current liabilities, in order to timely detect problems and make adjustments. The design principle of accounting data analysis platform is as follows: 1. in terms of cash monitoring, the capital budget and capital plan are used as standards for real-time monitoring; 2. in terms of accounts receivable monitoring, the accounting treatment method is unified; 3. in terms of inventory monitoring, the finance, sales, purchasing and other departments should be closely connected to achieve consistent delivery of the inventory data; 4. in terms of production monitoring, the activity-based costing method is really applied.

4 IMPLEMENTATION OF ACCOUNTING COMPUTERIZATION ANALYSIS PLATFORM

4.1 Background of small and medium-sized enterprises

4.1.1 Enterprise background

A small and medium-sized pharmaceutical company is characterized by a larger scale, rapid development and more institutional level, with the pharmaceutical research and development, manufacturing, distribution and retail as the core. The company adopts the centralized management method to centrally manage the budget and financial decision activities of several branches, factories and departments of its subsidiaries.
However, the financial software of the subsidiaries is inconsistent with the corporate headquarter, and the information transfer is lagging behind. With the continuous expansion of sales volume, the company urgently hopes that the accounting information system can quickly acquire all internal and external accounting data of the company and integrate data, and improve the decision accuracy of the managers, reasonableness of budget control, and timeliness of financial monitoring through the financial intelligence analysis.

4.1.2 Existing problems of enterprise accounting system

The current enterprises have generated a large number of data in the operating process, but they are not accurate enough and hinder the rapid development of the enterprise. The problems are: 1. no data sharing center; 2. low centralized budget management efficiency; 3. lack of comprehensive financial decision analysis; 4. poor response ability of accounting computerization and informationization system.

4.2 Construction of accounting computerization and informationization analysis platform

In order to change the existing situation, there is a need to optimize based on the existing accounting information system of the enterprise and construct an accounting data analysis platform. Based on the scalable IT architecture of computerization, the platform uses the data processing and data analysis method to deal with the enterprise’s historical accounting data, in order to facilitate managers to understand the development trend of financial operation situation of the enterprise, monitor the current business conditions, and predict the future development conditions. Specific measures are as follows: 1. to acquire accounting data in real time, and achieve integration of business and accounting; 2. to build an accounting data sharing center to improve the efficiency of information communication; 3. to build a financial decision analysis center and achieve the centralized management of the Group; 4. to optimize the basic functions of platform, and realize platform intelligence.

4.3 Application test of financial forecasting function of accounting data analysis platform

4.3.1 Operating revenue and cost forecast test

According to the operating revenue and operating costs in 2002 to 2016, the platform automatically draws the corresponding trend lines, the users can choose to forecast the next few years, and the forecast lines automatically extends, as shown in Figure 2.

In 2012, the forecasted operating revenue was 418.1 million, the actual amount was 397.2 million, and the error rate was 5%; in 2013, the forecasted operating revenue was 548.9 million, the actual amount was 530.2 million, and the error rate was 3.5%; in 2014, the forecasted operating revenue was 693.90 million, the actual amount was 699.8 million, and the error rate was 0.8%; in 2015, the forecasted operating revenue was 781.5 million, the actual amount was 782.2 million, and the error rate was 0.1%. Except for a relatively large forecast error in 2012 and 2013, other year limits were within the allowable error range. The main reason for the sales volume in 2012 and 2013 less than the forecast amount was that the introduction of new medical reform brought a new round of structural adjustment and market expansion in the industry. Uncertainty of the macroeconomic environment and changes in policies and regulations had an impact on the industry, resulting in decline in the sales amount, and then the company integrated the measures of other companies to recover the sales amount in 2014.

After selecting the operating revenue point in 2012, you can click to view the sales revenue histogram of different products in different regions in 2012. If you click region, you can view the sales details of different products in the region. After selecting the operating cost point, you can view the proportion of operating costs classified according to the industry, and you can specifically view that the main operating costs are raw materials, accounting for 80%.

4.3.2 Forecast conditions of testing three expenses

As can be seen from Figure 3, the error between the forecast sales cost and the actual amount was 3% in 2012, the error between the forecast sales cost and the actual amount was 0.5% in 2013, the error between the forecast sales cost and the actual amount was 3% in 2014, and the error between the forecast sales cost and the actual amount was 0.3% in 2015. The forecast of management expense and financial expense was no longer described (as shown in Figure 3).

The management expense and financial expense in 2012 and 2014 had a big error, mainly because many enterprises were integrated in 2012 and 2014, and a large amount of management expense and financial expense were generated in the consolidated statements. The increase of financial expenses in 2013 was caused by a large amount of exchange losses, while the financial expenses returned to normal in 2014, and the in-
ternal financing method was used to reduce financial costs. However, there were actual differences between the forecast exchange rate and the actual exchange rate in the platform, resulting in the forecast error in 2012 and 2014. The above situation was unexpected, and unpredictable for the platform, which was also the shortcoming of platform.

Note: F1: sales expenses; F2: management expenses; F3: financial expenses; F4: trend line of sales expenses; F5: trend line of management expenses; F6: forecast trend line of financial expenses.

Figure 3. Forecast situation of three expenses in the platform.

4.3.3 Financial warning forecast analysis test
Accounting computerization data processing platform mainly uses Z value model to predict the financial distress of the company.

\[ Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + X_5 \]  

(4)

When \( Z < 1.81 \), it is more dangerous, and it is expected to go bankrupt in one year; when \( 1.81 < Z < 2.675 \), there is a risk, and financial distress; when \( Z > 2.675 \), there is no risk or financial distress. For real-time monitoring of platform financial warning, once Z value reaches 1.81, the system will automatically remind. As can be seen from Equation (4) and Table 1, main influencing factors of Z value are \( X_4 \) and \( X_5 \). The main influencing factors can be concerned in time through financial warning (as shown in Table 1, Figure 4).

![Figure 4. Financial warning situation.](image)

Table 1. Table of platform financial warning analysis.

<table>
<thead>
<tr>
<th>Quarter</th>
<th>( X_1 )</th>
<th>( X_2 )</th>
<th>( X_3 )</th>
<th>( X_4 )</th>
<th>( X_5 )</th>
<th>Z forecast</th>
<th>Reality</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012.3</td>
<td>0.315</td>
<td>0.131</td>
<td>0.019</td>
<td>1.30</td>
<td>0.341</td>
<td>1.745</td>
<td>Risk</td>
</tr>
<tr>
<td>2012.6</td>
<td>0.315</td>
<td>0.132</td>
<td>0.0343</td>
<td>1.21</td>
<td>0.665</td>
<td>2.067</td>
<td>Risk</td>
</tr>
<tr>
<td>2012.9</td>
<td>0.323</td>
<td>0.138</td>
<td>0.049</td>
<td>1.338</td>
<td>0.99</td>
<td>2.535</td>
<td>Risk</td>
</tr>
<tr>
<td>2013.3</td>
<td>0.325</td>
<td>0.155</td>
<td>0.016</td>
<td>1.46</td>
<td>0.38</td>
<td>1.916</td>
<td>Risk</td>
</tr>
<tr>
<td>2013.6</td>
<td>0.31</td>
<td>0.150</td>
<td>0.031</td>
<td>1.089</td>
<td>0.72</td>
<td>2.0577</td>
<td>Risk</td>
</tr>
<tr>
<td>2013.9</td>
<td>0.310</td>
<td>0.1555</td>
<td>0.043</td>
<td>1.59</td>
<td>1.057</td>
<td>2.7426</td>
<td>Risk-free</td>
</tr>
<tr>
<td>2014.3</td>
<td>0.298</td>
<td>0.168</td>
<td>0.016</td>
<td>1.25</td>
<td>0.367</td>
<td>1.7826</td>
<td>Risk</td>
</tr>
<tr>
<td>2014.6</td>
<td>0.257</td>
<td>0.155</td>
<td>0.034</td>
<td>1.01</td>
<td>0.699</td>
<td>1.9426</td>
<td>Risk</td>
</tr>
<tr>
<td>2014.9</td>
<td>0.256</td>
<td>0.161</td>
<td>0.044</td>
<td>1.166</td>
<td>1.07</td>
<td>2.4375</td>
<td>Risk-free</td>
</tr>
</tbody>
</table>

According to the early warning forecast results and comparative analysis of the actual business operation conditions, the company had a financial distress at the beginning of each year, mainly because the sales plan at the beginning of the month was adjusted and just implemented, which was prone to financial risks, especially the financial report fraud in May 2012. The platform can accurately forecast that the company would have a financial risk according to the enterprise conditions in March and April, but there was an error in forecasting data in March 2014, and the company did not have the financial crisis. Therefore, there is an error in the forecast, but it is more accurate, with a certain forward looking.

4.3.4 Financial monitoring analysis testing
Financial monitoring analysis includes the monitoring of funds performance, monitoring of accounts receivable, and monitoring of sales budget completion. In the profit analysis, the profit is calculated from the perspective of region, product type and time, and the profit completion conditions are viewed according to the budget. In the sales monitoring analysis, the overall sales budget of each agency and the specific enforcement progress are viewed. The specific budget number, statement number, internal offset number, consolidated statement number and completion progress of the tertiary departments can be seen from Table 2.

5 CONCLUSION

This paper analyzes the feasibility of constructing a big data analysis platform. In view of the advantages of using big data analysis technology to construct the platform, such as high data processing efficiency, low construction cost, and non-geographic restrictions, this paper constructs an accounting information analysis platform with the accounting big data analysis as a core by virtue of cloud computing technology. The platform has the functions of comprehensive financial forecasting, comprehensive financial decision and comprehensive financial monitoring. Subsequently, the platform has been applied to the financial risk prediction of a small and medium-sized enterprise and has achieved good results.

With the rapid development of computer technology, constant emergence of emerging enterprises and
frequent introduction of new enterprise management systems, the accounting information system should not only be updated, but also make breakthrough progress. In the future, there is still a need for continuous summarization from the accounting theory and practical work, thus constructing an accounting big data analysis platform with more perfect functions and man-machine interaction, which is more in line with the needs of managers. These are the research directions we should make great efforts in the future.

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REFERENCES