Development of Enterprise Management Accounting Information System Based on Big Data Technology

An Wang and Zhijiao Chu(✉)

Chong Qing College of Architecture and Technology, Chong Qing, China
335512646@dlvtc.edu.cn

Abstract. Based on big data technology, combined with Web technology, the enterprise management accounting information system is built under Hadoop framework, in order to realize the value transformation of the function of enterprise management accounting, and become the core engine for enterprises to implement innovative management in the current data information era. The management accounting information system of enterprises, with the help of the significant advantages of big data technology, such as informationization, high efficiency, low cost and flexibility, innovatively solves the dilemma that strategy, finance and business can't be integrated in the current management accounting work of enterprises through the digital and informationized functional design and implementation of the development strategy, cost management, risk management, performance evaluation and other links of enterprises. It can effectively solve the problems of disjointed business activities and strategies, loose business and financial links, untimely information transmission and feedback, low utilization efficiency of data resources, etc. It has effectively promoted the construction process of networking, digitalization and intelligence of enterprise management accounting, and promoted the efficient play of the role of enterprise management accounting.

Keywords: Big Data Technology · Management Accounting · Management Accounting Information System

1 Introduction

With the rapid development of China's social economy, the market economy has achieved rapid development, and various enterprise economies have also made great progress. At the same time, the wide application of new and high technology, the intensification of market competition among enterprises, the deepening reform of the overall economic system and other factors have prompted enterprises to formulate sound economic management systems and management models based on their actual development status, and apply accounting work to them, so as to perfect the internal control system of enterprises and improve the economic management efficiency of enterprises. In view of this, the traditional financial accounting work has been unable to meet the needs of

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business development, and must be transformed into management accounting with subjective initiative. Management accounting refers to an accounting branch that focuses on improving the economic benefits of enterprises, and processes, collates and reports the data provided by financial accounting and other data through a series of processing methods, so that managers at all levels of enterprises can plan and control the daily economic activities and help decision makers make various special decisions. [4] Modern management accounting is the further expansion and enrichment of traditional financial accounting. It organically combines the three functions of analyzing the past, controlling the present and planning the future, and becomes the most effective tool for the integration of enterprise strategy, business and finance.

Management accounting, also known as "analytical report accounting", compared with traditional financial accounting, focuses on enterprise management departments making plans, making decisions to control economic activities, recording and analyzing economic business, capturing and reporting management information, etc. [10] Although management accounting and financial accounting are in the same clan, they are tied for each other, but the economic management of enterprises is gradually developing in the direction of accuracy, data informationization and scientific decision-making, thus highlighting the importance of management accounting under the internal management and control of enterprises. However, in the practical application of enterprises, there are still some problems in the implementation of management accounting, such as complicated manual operation, difficult data statistical analysis and processing, and closed data information of each business module. In addition, the concept of management accounting in China was established late, and the application of technical route was immature, which directly led to various application problems of management accounting in terms of functional flexibility, expandability, calculation ability and convenience of calculation model maintenance. Therefore, this paper holds that the enterprise management accounting information system is built by using big data technology and Web technology, which is applied to the system on the Web side. It relies on the advantages of big data technology in data quality, data effectiveness, data collection, data analysis and processing, and high concurrent processing and high-speed operation calculation of data information, so as to realize the comprehensive upgrade of enterprise management accounting business network, digitalization and intelligence, and provide substantial reference for the successful construction of enterprise management accounting information system.

2 Key Technology Introduction

2.1 Big Data Technology

In the current network information age, data has spread to all aspects of our human activities. From simple information display to event recording, as well as scientific research, design, production, digital service or product delivery, data information gradually forms a huge data collection, that is, big data resources, with the characteristics of large data scale, fast data flow, diverse data types and low value density. With the emergence of big data, traditional data processing methods have been unable to meet the massive real-time demand of big data, and a new generation of big data processing technology is needed to deal with the outbreak of big data. Big data technology can dig out the information and

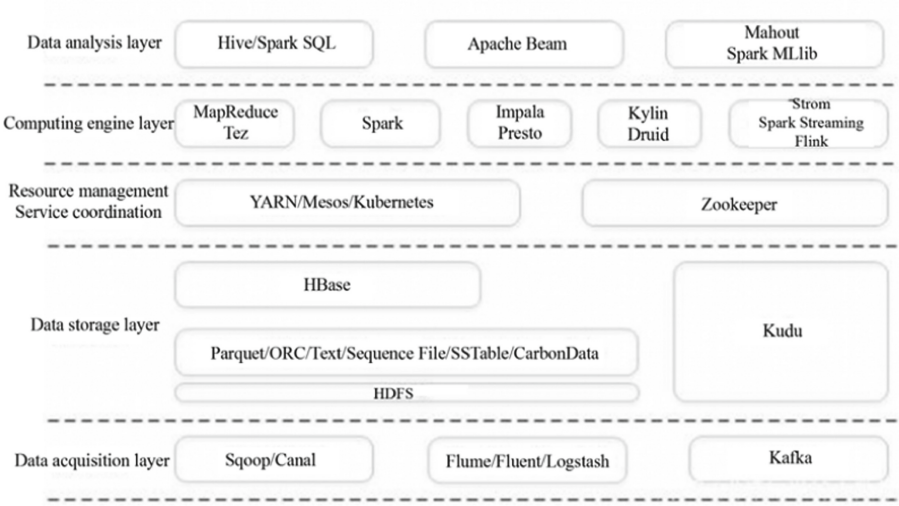

Fig. 1. Big Data technology stack.

knowledge hidden in large-scale data, provide the basis for human social and economic activities, improve the operation efficiency in various fields, and even the intensification of the whole social economy [8].

The development speed of big data technology is accelerating with the wide application of big data, and the technical requirements are updated and iterated, so that the big data technology stack is formed. The big data technology stack includes data acquisition layer, data storage layer, resource management service coordination layer, computing engine layer and data analysis layer, as shown in Fig. 1.

With the blessing of big data technology, the management accounting information system built by enterprises can solve the problem of fine control of production and operation activities of enterprises at present, and realize the docking and circulation of data information among multiple management system modules of enterprises, meet the all-round accounting requirements of enterprises at the present stage, and achieve the goals of enterprise information sharing, dataization and intelligent decision-making. And it can thoroughly help enterprises to continuously optimize diversified business processes with sound management mechanism, and the organizational structure of enterprises will be further upgraded and reformed.

2.2 Web Technology

Web is an application architecture based on Internet, and its core lies in providing users with various forms of information content and information services. With the rapid development and application of Web technology, the development and application of its architecture presents a trend from simple to complex, which makes the scale of Web constantly change and its functions become more and more powerful. But its essence is unchanged, that is, B/S structure browser and server in interact with each other through

HTTP protocol, locate resources with the help of URL, and finally get the response, and the content of the response is HTML [7].

As the development technology assembly of Web services, Web technology can be divided into Web server-side technology and Web client-side technology. In the primary stage of client technology, Web pages can only present static single files and information content, which has obvious limitations and can not fully meet the needs of people's socialization, complexity and entertainment, thus promoting the transformation of static Web pages into dynamic Web pages. With the appearance of GIF image format, CSS architecture, JavaScript language, QuickTime plug-in and Flash animation, the presentation effect of Web pages is gradually dynamic to obtain better presentation effect and higher execution efficiency [5].

In the development of Web server technology, CGI technology has changed the situation that Web server can only transmit static files. By executing external programs through CGI, external programs can generate dynamic HTML pages according to the content of Web requests, thus realizing the dynamic information exchange between client and server. Since then, the Web server-side development technology has entered the era of framework and template, and various technologies to assist Web development help people to develop the Web better, faster and more efficiently. In the whole Web development technology, powerful object-oriented programming languages such as Java, PHP and C# refine and improve the Web development in the form of script language, and introduce external database system to store and call system data, which not only strengthens the Web function, but also improves the adaptability and stability of the system.

2.3 Hadoop

Hadoop is a software platform for analyzing and processing big data, and it is an open source distributed system infrastructure implemented in Java language. Users can easily develop and run distributed programs for processing large-scale data on Hadoop, and realize parallel high-speed operation and complex call of big data. Hadoop architecture is characterized by low cost, high reliability, high scalability, high efficiency and high fault tolerance, which makes Hadoop the most popular big data analysis system. [6] Hadoop is a multi-component architecture, which mainly includes core components such as HDFS, MapReduce, HBase, Zookeeper, Pig, Hive, and other plug-ins with data capture or transmission functions such as Sqoop and Flume. The deployment of multiple components can provide many functions to the Hadoop architecture, and constitute the ecosystem with the Hadoop architecture as the core.

2.4 Development Environment

According to the usage requirements of the above related application technologies, we can complete the construction and deployment of the development environment. In the hardware environment, Linus system is used as the bottom operating system of the system, Java environment is the basic development environment, and JDK version 1.8 or above is selected to facilitate the installation of subsequent parts and meet the requirements of system compatibility. Hadoop architecture is installed and deployed in

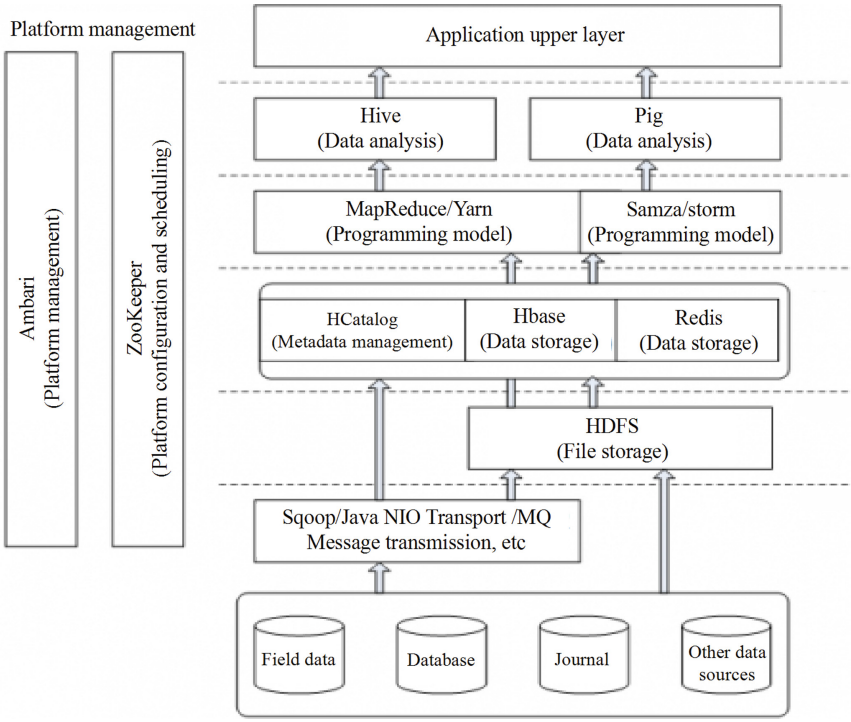

Fig. 2. The Hadoop implementation of data analysis and processing technical architecture diagram.

JVM virtual machine environment, and according to the processes of data capture, data cleaning, data analysis and processing, data storage and data visualization, components such as Flume, Sqoop, Hive, HDFS, MapReduce, Mysql and Echarts are installed and deployed in turn. As shown in Fig. 2, the arrow direction is the data flow direction. According to the structure of the whole system, it can realize the analysis and call of enterprise management accounting system to the data of enterprise business system, financial system and other management systems. In the whole development process of the system, the big data technology represented by Hadoop architecture is deployed on the Web server, and the Web server chooses Nginx to improve the processing of static data content and control the overall concurrent running quantity of the system under the load. The database uses MySQL, the system development language uses PHP, the Web client pages use JSP technology, and the basic pages are built by Java language and HTML language.

Through the brief introduction of the above key technology theories, we have determined the overall environment of system development, the configuration of related software and tools, and also made clear the technical feasibility of the overall project of enterprise management accounting information system.

3 Requirement Analysis

3.1 System Requirements Analysis

The enterprise management accounting information system based on big data technology will meet the needs of enterprises for their own management refinement, and achieve the whole process control of the pre-planning, in-process control and post-evaluation of daily production, operation and management activities of enterprises. Compared with traditional single financial accounting, management accounting can rely on network information technology and big data analysis and processing technology to collect and analyze all data related to the development of enterprise production experience management. It can completely solve the data island problem between various business departments and financial departments of enterprises, improve the situation that enterprise managers or decision makers can only obtain the business development status of enterprises by financial accounting reports, and effectively realize the deep integration of financial information. It provides timely, accurate, comprehensive and personalized information or reports that meet the needs of all responsible units, departments and management within the enterprise through orderly processing and transmission of relevant data [2].

The development strategy function can support enterprise managers or decision makers to make scientific predictions and form various data analysis reports based on the management accounting information data according to the business development in the enterprise stage. Reports can help enterprise managers or decision makers to complete the formulation, implementation, control and supervision of development strategies quickly and concisely. The risk management function can support enterprise managers to control various risks faced by enterprises within the scope of meeting relevant system requirements and enterprise risk tolerance, which is the guarantee of enterprise promotion strategy. Cost management can support enterprise managers to focus on the whole value chain of enterprises, and use relevant methods and models to manage the costs of enterprises in advance planning, in-process control, and after-the-fact analysis and evaluation. The performance appraisal function supports each department of the enterprise to evaluate the performance of each employee of the enterprise according to the execution results of various business activities and to reward and punish them accordingly.

3.2 Global Design

Enterprise management accounting information system based on big data technology adopts B/S architecture. On the one hand, it can reduce the volume of the whole system and improve the operating efficiency of the system. On the other hand, it is also convenient for users of different levels, departments and roles to log in and use the system through various equipment terminals. According to each link of data flow and analysis process, the

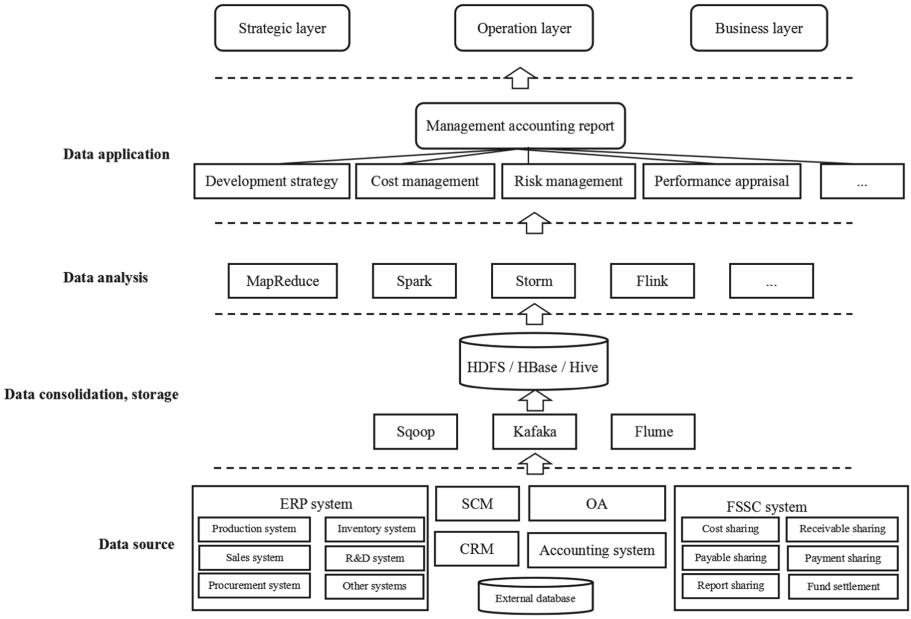

Fig. 3. Overall architecture diagram of enterprise management accounting information system.

enterprise management accounting information system is divided into data application layer, data analysis layer, data storage layer and data source layer, as shown in Fig. 3. On the data application layer, different Users can log in to the system through user registration. The key code is shown in Fig. 4, in which the user name and password input rules are defined by defining the user function, and the prompt words are displayed in the input box of the registration interface. When the user fails to complete the input according to the prompt, the system will automatically give a prompt to help the user complete the adjustment and modification of the input content. Different users use different system functions according to different permissions to complete human-computer interaction and visual viewing of the final data analysis report. On the data analysis layer, the data analysis and processing algorithm architecture of big data is deployed. On the data integration and storage layer, it can complete the collection and cleaning operations of various enterprise data, and realize the deployment of data capture tools and extensible memory. The visual display of final results and reports is made by using ECharts under the Web framework of JSP, and the visualization and control of report data are completed in the client with JavaScript, with diversified chart styles to meet the needs of different users. The final data will be persisted and stored in MySQL database for subsequent viewing and calling.

```
/*User name can only consist of numbers or letters*/
function User(){undefined
var value = document.getElementById("user").value;
var curretuser=/^[A-Za-z0-9]+$/;
if(curretuser.test(value)){undefined
}else {undefined
window.alern("Please enter letters or numbers!!!");
}
}
/*The password can only consist of numbers or letters, with a length of 6~12 digits*/
function Password(){undefined
var value = document.getElementById("password").value;
var curretuser = /^[A-Za-z0-9]{6,12}$/;
if(curretuser.test(value)){undefined
}else {undefined
window.alert("Error! The password can only consist of numbers or letters, with a length of 6-12
digits!!");
/*Two passwords must be the same*/
function TestPassword(){undefined
var value = document.getElementById("pasword").value;
var value1 = document.getElementById("passwor2").value;
if(value==value 1){undefined
}else {undefined
window.alert("The password entered twice must be the same!!!");
}
}
```

Fig. 4. Key code of user registration in enterprise management accounting information system.

4 Detailed Function Realization

4.1 Development Strategy

The development strategy module is mainly aimed at enterprise managers or decision-makers users. Under this function module, users can obtain internal and external data of enterprises in a specific time period through the query and screening function in the system. This function relies on Flume to capture data from log files of various systems under big data technology, and Sqoop to transmit data from various business systems, financial systems, management systems, accounting systems and external databases. It also relies on the web crawler program of Scrapy framework to capture and collect unstructured data content. When the data is collected and stored in the distributed file system HDFS, it is waiting for the subsequent data analysis and processing. After analysis and calculation by calculation engines such as MapReduce or Spark, the corresponding data analysis results are formed, and finally the report contents are presented in the user interface by visual data charts. Under the enterprise management accounting system, the report forms obtained by users at the strategic level are strategic management report, comprehensive performance report, business analysis report, market change report and industry competitor analysis report, etc. According to the report contents, users can conduct enterprise development strategy analysis, strategy formulation and decomposition, strategy implementation and control and final strategy evaluation.

4.2 Cost Management

The cost management module is mainly aimed at business operators, which is mainly divided into three sub-functional modules, namely, pre-cost management, in-process cost

management and post-event cost management. Pre-cost management involves the enterprise budget management module, that is, the operators sort out the business processes with low economic benefits and low value density in the current business activities of the enterprise by sorting out, processing and analyzing the current business cost data of the enterprise, and optimize and improve the business processes according to the comprehensive budget report and profit analysis report provided by the system, so as to ensure that each business process can contribute to the economic performance of the enterprise, create a value chain with high benefits and reflect the value of cost management. [1] In-process cost management is mainly to monitor and reflect the actual cost information of various business activities of enterprises in real time. Operators will continue the data collection point from the design and production of products to the after-sales service, so as to realize the data response and record of the whole life cycle cost of products. According to the cost management report of the management accounting system, find out valuable information and present it through the system in time. Post-event cost management mainly analyzes and evaluates the actual cost of each business of the enterprise, and further forms a cost analysis report and a cost assessment report according to the data analysis results.

4.3 Risk Management

The risk management module is mainly aimed at business operators, and its function is to complete comprehensive identification, real-time monitoring, accurate response, analysis and evaluation of various risks faced by enterprises, and form risk management reports to assist enterprises in decision-making. [9] According to the historical data of market risks in the past, users set the corresponding risks early warning. In the face of unknown risks, it is even more necessary to collect, analyze and mine the development data of industries and markets and the internal operation data of enterprises under the big data technology to complete the risk prediction. When the risk comes, the risk management report issued by the system can timely push the risk warning signal to managers at all levels of enterprises, and adjust the risk response measures timely according to the risk management objectives to avoid risks.

4.4 Performance Appraisal

Performance appraisal is aimed at users at all levels of the enterprise, organically integrating enterprise strategy, resource utilization, business activities and organizational behavior. By paying equal attention to performance evaluation and incentives, it vigorously mobilizes employees' execution of budget targets, fully implements the optimal utilization of resources in various business activities, and promotes the achievement of strategic targets. [3] Different users can query, extract, convert and integrate the relevant performance data in each management system of the enterprise in real time by using the data collection and grabbing tools in the system, and synchronously present the completion level of each performance index of the enterprise to managers at all levels through visualization technology, so as to realize real-time tracking of the achievement of performance targets. According to the performance evaluation standards of different

levels of enterprises, analyze and count the performance evaluation results, form a performance evaluation report, put forward improvement measures for those who fail to meet the standards, and reward those who have reached the standards.

5 Conclusions

Based on big data technology, an enterprise management accounting information system is built under Hadoop framework, and the big data technology is innovatively applied to enterprise management accounting. This can continuously, systematically, comprehensively and comprehensively reflect and supervise the business situation of enterprises, and promote the development of traditional financial accounting towards the direction of precise management requirements, information data and scientific decision-making, highlighting the importance of management accounting in internal control of enterprises. The management accounting information system based on big data technology uniformly captures, summarizes, analyzes and processes the data of massive business, finance, management and other systems of enterprises, and forms a multi-type analysis report of data results visualization, which breaks the data island form of various departments under the traditional financial accounting, realizes the goal of enterprise data, industry and finance integration, improves the refined control of internal control, effectively improves the economic management efficiency of enterprises, conforms to the current trend of development, and provides reference for the networked, digitized and intelligent construction of enterprise management accounting.

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