

Analysis of Corporate Financial Management System under the Model of Multi-Level Decision-Making Model

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Abstract

With the rapid development of information technology and network, the modern enterprise management model is also undergoing tremendous changes. Companies must adapt to the development direction of the financial management networking and informatization. Based on the principle of the establishment of the indicator evaluation system, the paper has made in-depth analysis on the corporate financial management from the aspects of operating management factors, market factors, financial factors, product factors and technical factors, and has constructed an indicator evaluation system that includes five sub-systems and 33 factors, on this basis, making use of AHP methodology (Analytic Hierarchy Process) to determine the indicator weight, and point out that in different stages of development the indicators have various weights, at the same time, making use of gray system theory to carry out system evaluation on the enterprise financial management system, for the establishment of a multi level gray evaluation model. Based on the research and analysis made on the enterprise financial management system, it is decided to adopt the design model with the combination of the advanced J2EE development platform and the MVC model, which has realized the development of the enterprise financial management system.

Keywords: CORPORATE FINANCIAL MANAGEMENT, MULTI MIXED MODEL, EVALUATION MODEL, MVC MODEL

1. Introduction

Financial management system is for the effective management of company's financial information, including the unity, planning, controlling of information and so on. It also has played a major role in the aspects of the financial operations and financial supervision[1]. Every business has its own financial information management systems, and some private small businesses may even have the traditional manual financial management mode, and all the accounting audit process is done by hand, which not only has very large amount of workload, with a lot of time consumption, the timeliness is also poor and cannot provide statistics, analysis and other functions[2]. However, most of the enterprises have already realized the informatization of the financial management, so as to provide management control and decision

making support for the company's management level, and to provide effective real-time financial condition; check the distribution of funds and earnings situation, to improve capital turnover and usage; real-time statistics of all kinds of data, unify the planning of the financial flows of various departments, and effectively reduce the costs and expenses and so on[3]. Financial management system can effectively help enterprises to meet the requirements of the modernization of financial management[4].

In the new financial management system ERP System, the financial management module has shifted from the traditional financial data collection and reflection to the processing of financial management information, so as to carry out financial analysis, management control and support the decision making[5-6]. There are some foreign researchers who ha-

ve done investigation and research on Oracle company's financial modeling and analysis module (Financial Analyzer) in details, the function of this financial system is mainly reflected in the fact that the users can quickly and easily set up the financial management model, and obtain the appropriate analysis module which is corresponding to the modeling[7]. This function has greatly supported the production and management of large domestic enterprises. With the diversification and globalization of the enterprise operation model, the corporate structure worldwide has changed, and the corporate business processes have become more and more complicated. All changes pose the requirement on the information management system to be competent to perform statistics, analyze the financial information of the business that occurs in the shortest possible time. The integrated management software SAP R/3 of the German System Application Product Company (System Application Product, SAP) has provided an intelligent information system to multinational corporations with global operations[8]. With the development of information technology and the continuous development and innovation of the financial information management system of the business management in the country, the operating platform of the financial management information system has also shifted from the original DOS operating system to Windows, Vista and the diversification of Unix, Linux and other platforms, and the financial management information system backend database is also developed from the early dBASE, Access, FoxPro to currently popular SQL Server, Oracle and other large databases, and the software structure of the system has also become the mixed market of C/S structure and B/S structure, and the combination of both structures. More and more enterprises have applied the financial management system to replace the traditional manual accounting books for the financial management. With the tremendously powerful data analysis capabilities of modern large-scale database systems, the financial management information system in our country therefore has more powerful analysis functions, and the financial management information system of some of the enterprises can provide the control and decision making support capabilities to the management of the enterprise, and thus has been gradually integrated into the financial management subsystems with relatively sound functions under the new ERP management system.

Many domestic scholars have done a lot of work on the application research of enterprise financial management system, and have carried out detailed

study on the development of the financial management information system in our country. However, the existing enterprise financial management system has the existing problems that the model evaluation is not accurate enough, and the business process model of enterprise is not standardized enough. This paper starts from the multi model of financial management, adopts the gray system to establish the multi level model, and achieves highly efficient enterprise financial management system analysis and design.

2. The determination of the weight of the financial system indicator

In the indicator system, the importance of various indicators to the target is different, when the indicators are measured on the contribution to the target, they should be given different weights, and important indicators should be given greater weight. Indicator weight is the quantitative way that reflects the proportion of role of all kinds of indicators in the comprehensive evaluation. Therefore, whether the determination of the weight is scientific or reasonable directly affects the accuracy of the assessment', is an extremely important factor in the evaluation process. The weight can be determined by individuals, but in order to make the results more authoritative and reasonable, this paper adopts the expert investigation method, on the basis of the combination of the scoring of the special conditions of our country, and adopts AHP method to determine the weight.

2.1. Reason for the Choice of AHP Analysis to Assess the Venture Capital Investment Project

AHP (Analytical Hierarchy Process, AHP), is a set of guidelines of Multi-Criteria decision-making process theory developed by Professor Saaty at the University of Pittsburgh in the 1970s when he did research for the US Department of Defense on the strain planning, mainly applicable in the decision making in the scenario with uncertain factors and multiple assessment factors. It is a multi-objective decision-making method with the combination of qualitative analysis and quantitative calculation.

As mentioned earlier in this article, during the process of evaluation process of venture capital, since the project itself has a lot of uncertainties, it is difficult for venture capital investors to accurately calculate the return on investment and investment and the risk of the project through a rigorous quantitative method. Each project has its own venture capital characteristics, for different industries, and different stages of development of investment projects, the focus of the assessment also vary. Therefore, venture capitalists tend to rely more on personal experience, using qualitative analysis methods to evaluate these investment

projects. Assessment of risk of investment projects is a multi-objective, multi-level, complex structure systematic work, relying solely on personal experience of venture capital investors, with the inevitable trade-off; while with the use of the combination of qualitative analysis and quantitative calculation method, it can make full use of the advantages of the venture capital investor's personal experience and the quantitative analysis tools, the improvement in the scientific and accurate evaluation of the decision making can be achieved. Analytic Hierarchy Process is a suitable for multi-target, multi-level system assessment method, it will break down complicated problems into several constituent elements, in turn govern the relationship between these factors by grouping the hierarchical

structure formed by pair wise comparison to determine the relative importance of various factors in the hierarchy, and comprehensive judgment of policy makers determine the ranking of the relative importance of the decisions in the total project. For the analytic hierarchy process of venture capital investment project evaluation and decision making, the investor's subjective judgment is expressed by the number of forms and processes, which greatly improves the effectiveness and reliability of the decision making.

2.2. General Procedures of the Analytic Hierarchy Process

Analytic Hierarchy Process (AHP) application process is as follows:

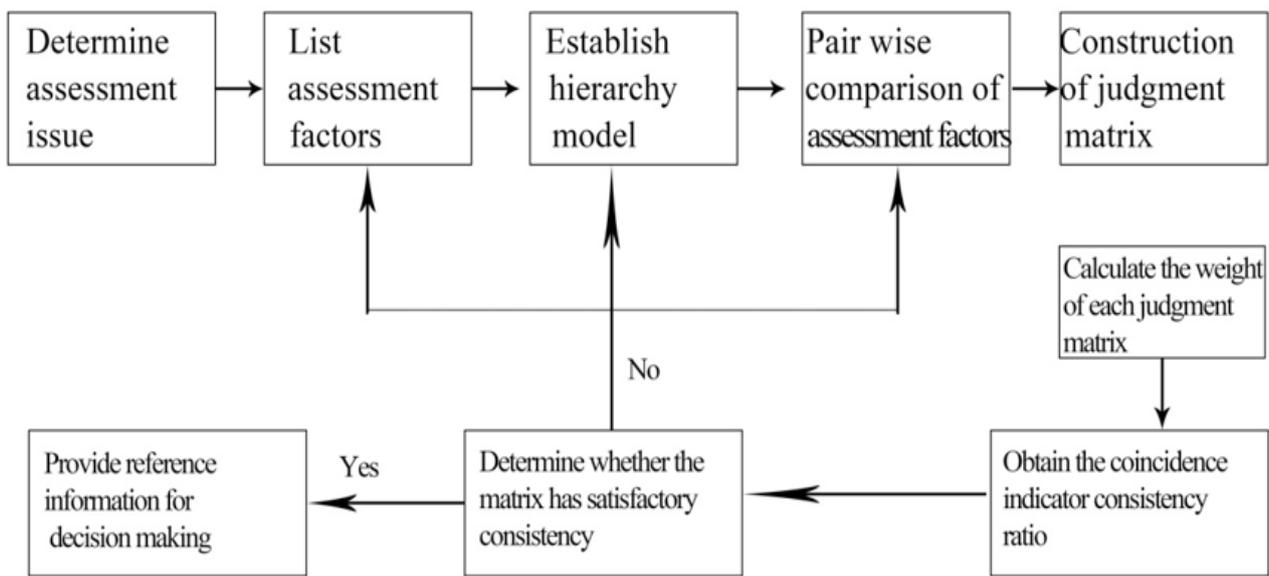


Figure 1. AHP Application Flowchart

After in-depth analysis of the problems, the factors included in the problems are divided into different levels (such as target level, criterion level and indicator level, project level, measure level, etc.), the use of formal specification level block diagram Hierarchical subordinate relationship between structure and factors. When a hierarchy contains many factors, the level can be further divided into several sub-levels, the indicator system has a total of three levels: the top (target W), the intermediate level (Level I Evaluation Indicator = 1,2,3, 4) and the lowest level, Level II Evaluation Indicator ($U_{ij}, i = 1,2,3,4, j = 1,2, \dots, 6$).

Judgment matrix refers to the upper level, the relative importance of the present level and the factors relating to the level, for example, U_{21}, U_{22}, U_{23} and U_{24} in the market factors are linked, the judgment matrix construction is as follows:

Table 1. The Relative Importance of Each Element of U_{2i} in the Matrix

U_2	U_{21}	U_{22}	U_{23}	U_{24}
U_{21}	b_{11}	b_{12}	b_{13}	b_{14}
U_{22}	b_{21}	b_{22}	b_{23}	b_{24}
U_{23}	b_{31}	b_{32}	b_{33}	b_{34}
U_{24}	b_{41}	b_{42}	b_{43}	b_{44}

Value determination matrix elements reflect the people's understanding of the relative importance of each factor, generally use the numbers 1-9 and the scaling method countdown. When the importance of

factors compared with each other can be represent by the ratio of meaningful explanation, the value of the judgment matrix can take this ratio.

2.3. Calculate the Weight of Judgment Matrix and Conduct the Consistency Test

Table 2 RI Value

(1) Calculate the product of the elements in each row of the judgment matrix M_i

$$M_i = \prod_{j=1}^n b_{ij} \quad (i=1,2,\dots,n) \tag{1}$$

(2) Calculate the n-th root \bar{W}_i of M_i

$$\bar{W}_i = \sqrt[n]{M_i} \quad (i=1,2,\dots,n) \tag{2}$$

(3)Standardize vector $\bar{W} = (\bar{W}_1, \bar{W}_2, \dots, \bar{W}_n)^T$ to obtain

$$W_i = \frac{\bar{W}_i}{\sum_{j=1}^n \bar{W}_j} \quad (i=1,2,\dots,n) \tag{3}$$

Then $W = (W_1, W_2, \dots, W_n)^T$ is the required feature vector

(4) Calculate the judgment matrix to obtain the maximum characteristic root λ_{max}

$$\lambda_{max} = \sum_{i=1}^n \frac{(BW)_i}{nW_j} \tag{4}$$

Where $(BW)_i$ represents the first element of vector BW

i.e.

$$BW = \begin{bmatrix} b_{11} & b_{12} & \dots & b_{1n} \\ b_{21} & b_{22} & \dots & b_{2n} \\ \vdots & \vdots & \dots & \vdots \\ b_{n1} & b_{n2} & \dots & b_{nn} \end{bmatrix} \begin{bmatrix} W_1 \\ W_2 \\ \vdots \\ W_n \end{bmatrix} = \begin{bmatrix} (BW)_1 \\ (BW)_2 \\ \vdots \\ (BW)_n \end{bmatrix}$$

(5)Consistency test

$$\text{When } CR = \frac{CI}{RI} < 0.10, \tag{5}$$

It can be considered that the judgment matrix has satisfactory consistency, or else, need to adjust the value of the elements in the matrix.

$$CI = \frac{\lambda_{max} - n}{n - 1} \tag{6}$$

Where: CI is the consistency indicator

RI is the average random consistency indicator for the 1-9 judgment matrix, the respective RI values were:

Order n	1	2	3	4	5	6	7	8	9
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45

To obtain the final evaluation of the weight of the Level I evaluation indicator U_1 is $W = (W_1, W_2, W_3, W_4)$ where $W \geq 0, \sum_{i=1}^4 W_i = 1$. The weight set of the Level II evaluation indicator U_{ij} is $W_i = (W_{i1}, W_{i2}, \dots, W_{ij})$ where $W_i \geq 0, \sum_{j=1}^m W_{ij} = 1$.

The analytic hierarchy process combines the advantages of the integration of the personal experiences of the venture capital investors and quantitative analysis tools, but do not rely solely on one aspect. The data of this method is originated from the judgment of the venture capital investors and related personnel based on personal experience, as well as the results of the calculation of the venture capital investors who need to be flexible depending on the circumstances. It can be said that the analytic hierarchy process to determine the indicator weight of the process is the unity of science and art.

2.4. Grey Hierarchy Evaluation Model

In the objective world, there is often incomplete information system, such as parameter information is not complete, the structure of incomplete information, incomplete information and other relations. This system with both clear and unclear parts is gray sys-

tem. And the probability of "random uncertainty" statistical and research "cognitive uncertainty" fuzzy math is different from the study of gray system theory "Part of the information is known, some information is unknown," with the "small sample", "poor information" uncertain system. It is not from within the system to study the system of special laws, but to mathematical treatment by observations of the level, to achieve understanding of trends within the system at a higher level, the mechanism of mutual relations and control processes. Specific steps of Grey multi level evaluation method are as follows:

(1) Determine the Grade

Evaluation indicator U_{ij} is qualitative indicators, will it into quantitative indicators through the development of standard rating scale evaluation to achieve. Consider the maximum you can distinguish human thinking ability, as well as a higher venture capital investment project risk characteristics of the evaluation U_{ij} . The risk classification of low-risk, general risk • relatively high risk • high risk, extremely high risk 5, default value of 1 minute, '2,3,4,5 points, indicators rank between two adjacent grade, the corresponding

rates for the 1.5,2.5,3.5,4.5 points.

(2) Determine the Weight of Evaluation Indicator U_i And U_{ij}

In this paper, AHP method determines the weight of each indicator

The weight set of the Level I evaluation indicator U_i is $W = (W_1, W_2, W_3, W_4)$, where $W \geq 0, \sum W_i = 1$. The weight set of the Level II evaluation indicator U_{ij} is $W_i = (W_{i1}, W_{i2}, \dots, W_{ij})$, where $W_i \geq 0, \sum W_{ij} = 1$.

(3) Organization of Evaluation Expert to Conduct Rating

Organize evaluation expert $k, k = 1, 2, \dots, m$, that is, m as the evaluation of the experts. M an expert evaluation organized the first press x investment projects evaluation U . Grading standard scoring and evaluation specialists to fill the score sheet.

(4) Determine the evaluation sample matrix

Rating matrix:

$$D^{(x)} = \begin{matrix} \begin{matrix} d_{111}^{(x)} & d_{112}^{(x)} & \dots & d_{11m}^{(x)} \\ d_{121}^{(x)} & d_{122}^{(x)} & \dots & d_{12m}^{(x)} \\ \vdots & \vdots & \vdots & \vdots \\ d_{211}^{(x)} & d_{212}^{(x)} & \dots & d_{21m}^{(x)} \\ \vdots & \vdots & \vdots & \vdots \\ d_{461}^{(x)} & d_{462}^{(x)} & \dots & d_{46m}^{(x)} \end{matrix} & \begin{matrix} U_{11} \\ U_{12} \\ \vdots \\ U_{21} \\ \vdots \\ U_{46} \end{matrix} \end{matrix} = d_{ijk}^{(x)} \quad 21 \times m \quad (7)$$

(5) Overview

Carry out comprehensive evaluation for the first x -th item of the evaluation index U_{ij} , the result of its comprehensive evaluation is recorded as $B_i^{(x)}$, then:

$$B_i^{(x)} = W_i \times Q_i^{(x)} = (b_{i1}^{(x)}, b_{i2}^{(x)}, b_{i3}^{(x)}, b_{i4}^{(x)}, b_{i5}^{(x)}) \quad (8)$$

From the comprehensive evaluation result $B_i^{(x)}$ of U_{ij} , the x -th evaluation item U_i indicator is obtained for each evaluation class Grey evaluation weight coefficient matrix $Q^{(x)}$.

$$Q^{(x)} = \begin{matrix} \begin{matrix} B_1^{(x)} \\ B_2^{(x)} \\ \vdots \\ B_5^{(x)} \end{matrix} & \begin{matrix} \left| \begin{matrix} b_{11}^{(x)} & b_{12}^{(x)} & b_{13}^{(x)} & b_{14}^{(x)} & b_{15}^{(x)} \\ b_{21}^{(x)} & b_{22}^{(x)} & b_{23}^{(x)} & b_{24}^{(x)} & b_{25}^{(x)} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ b_{51}^{(x)} & b_{52}^{(x)} & b_{53}^{(x)} & b_{54}^{(x)} & b_{55}^{(x)} \end{matrix} \right| \end{matrix} \end{matrix} \quad (9)$$

Then, carry out comprehensive evaluation on the x -th of each evaluation item U_i indicator, which comprehensive evaluation result is recorded as $B^{(x)}$ then:

$$B^{(x)} = W \times Q^{(x)} = (b_1^{(x)}, b_2^{(x)}, b_3^{(x)}, b_4^{(x)}, b_5^{(x)}) \quad (10)$$

3. The overall system design

The system functional requirements analysis, the main function modules include system management, basic data management, credentials management, treasury management, deal with cheap management, accounts receivable management, wage management and statistical reporting management. The overall system functions are shown in Figure 2:

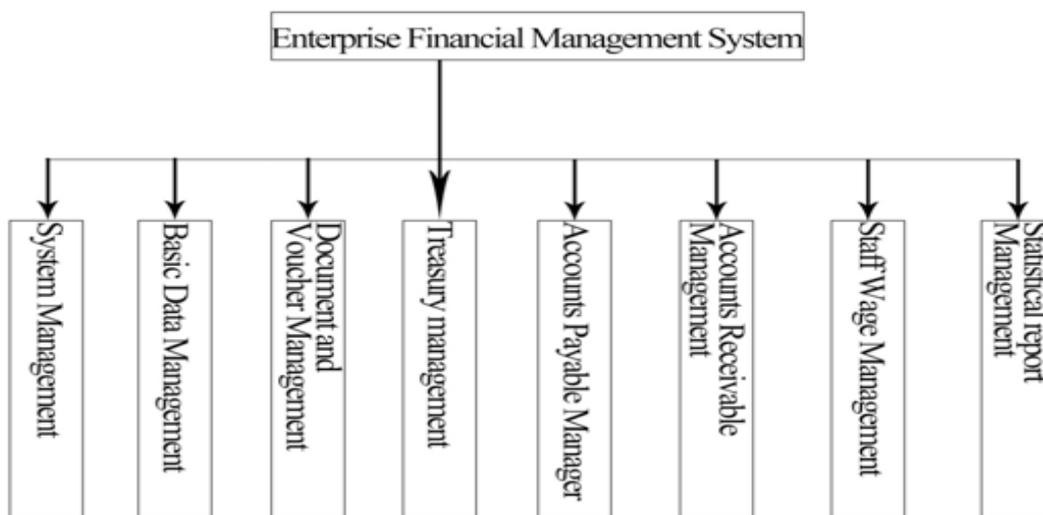


Figure 2. System Function Chart

The system is based on Windows XP platform preclude the use the eclipse as software development tools, back-end database using SQL Server. Processor hardware environment for the Intel Core 2 Duo, clocked at 2.53GHz, memory is 3GB, hard disk capacity of 500GB. After entering the system platform operators, select the appropriate module, and then en-

ter the system interface, the operator can delete the contents of them, add, modify, query, set and other operations, results are saved to the database, and then return the results to the operator interface. Operator maintenance base data sequence diagram shown in Figure 3:

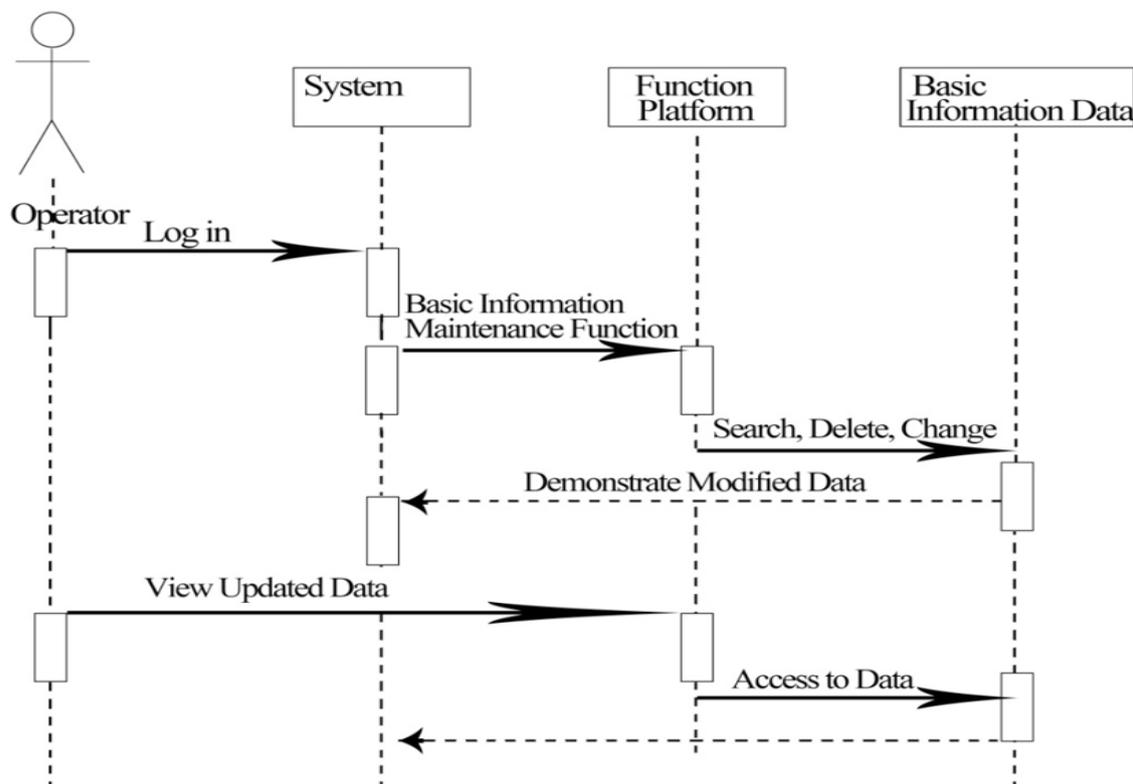


Figure 3. Diagram of Operator Maintenance of Base Data Sequence

Corporate finance business and sales department has a close relationship, accounts receivable management module is to resolve the sales department sales documents. First landing system financial officers, sales of single-function input selection, input sales order information, prepare sales provisional credentials until after approval Treasurer; the system automatically generates a sales document. Choose payment processing function, entering the payment information, saving data to the database and return information to the system interface receivables for financial officers viewing. The specific functions are as follows:

Financial officers first login, select the purchase order entry function, enter purchase information documents, the preparation of interim certificates until after approval Treasurer, the system automatically generates credentials. Choose payment processing function, enter payment information, saving data to the database and return the payment information to the system interface, for financial officers viewing.

Input wage, the first thing to do is to select department and month, and then enter a specific amount of wages, then the system automatically calculate wages according to the formula, and finally save the amount of final salary, wages entry order. Staff wage inquiry process is to first need to enter the query interface,

and then click on the Enquiry button, the system parameters of the query sent to the server, and the server executes the query logic to get data from the database server and returns the results to the client terminal, and the result is displayed on the page.

After the financial staff login system platform, select the statistics module, and enter the conditional access business data, statistical reports of the results returned to the system interface, for financial staff for analysis. Statistics report management is a part of the financial management system indispensable statistical report management module, financial managers can define their own variety of reports, queries various financial data, various reports can also be managed, including financial statements, cash flow meter, trial balance sheets, income statements, balance sheets and the like.

Database Design

For business needs of financial management systems and data flow analysis, corporate financial management should have the following main data items and data structures.

User (user ID, user name, login password, user type, remarks)

Employee Information (employee number, name, job, property, sex, age, contact information, length of service, home address)

Sales Invoice (invoice number, customer sales, invoice total, exchange rate, invoice date, invoice summary)

Purchase Invoice (invoice number, vendor, invoice number, invoice total, exchange rate, invoice date, invoice summary)

Voucher (voucher number, voucher date, the total amount of vouchers, Voucher summary, attached several vouchers, entry clerks, auditors)

Bank deposits (Account, currency, bank opening balances, bank Ending balance).

4. System test

4.1. Test Principle

Software testing cannot be the blind attempts, there must be certain test principles and test methodologies, so as to effectively save time costs and overhead costs, and the principles of software testing include the following points:

1). Sequence of the test procedures: Due to the limited number of test systems and methods, and therefore need to be treated test content importance degree program, a high degree of importance to begin testing the test object, such as landing and some of the main functional blocks of the system sign and other relatively high degree of importance.

2). Test methodology: The test is good software testing indispensable requirements of software testing should be a reasonable choice of test methods, test method should avoid improper system error and so on, and should also be planned test.

3). Test standard selection: The testing process should comply with the software requirements spe-

cification, and the test content cannot exceed what the specification requires.

4). Test input principles: System testing should get users who have absolutely no contact with similar systems as the tested system before, and there should be absolutely no format restrictions for the user-entered information, which can often achieve better test results. Therefore, in the test, the comprehensiveness of the input should be taken into account.

5). Test results forecast: Pre-judge the results of the test, the ability to respond quickly to problems.

6). Test correction principle: System deficiencies found during testing, the test must be repeated changes until the software is designed so far.

4.2. Performance Testing

Enterprise financial management system performance test is very heavy workload as a task, users throughout the enterprise, including internal employees, these employees work in different places, the network involved is very different, so when you access the system, the system different employees will have to make a big difference in response time, in order to ensure the system for enterprises to improve stable, secure, reliable, real-time service, to ensure that users of the system can wait until the correct operation of the request within a certain allowable range response. This section provides only part of the function module performance test, the use of the landing system performance testing as a sample shows. Login system performance test application template is shown in Table 3:

Table 3. Login System Performance Test Application Template

No.		1		
Name		Login Test		
Test Time		2014-1-30		
Test Content		Response Time to Log in the System		
Test Environment		1. No base time point is set 2. The average response time refers to the time from the beginning of the login operation to log in the system time successfully which shows on the main interface.		
Number of concurrent users	Number of failed logins	The minimum response time	The average response time	The maximum response time
10	0	0.677	0.764	0.942
40	0	0.723	0.814	1.023
100	0	0.956	1.035	1.543

The system also input, modify, delete, query employee information, account information, credential information a lot performance of test data, the

performance of some of the features of the response time test results are shown in Table 4.

Table 4. System features page should noon time results

Name of the Operation	The corresponding response time to execute 1000 records (unit: second)
Input employee information	4.2
Modify employee information	3.2
Delete employee information	3.1
Check employee information	5.2
Input account information	5.8
Modify account information	4.7
Delete account information	3.8
Check account information	4.3
Input voucher information	5.8
Modify voucher information	4.5
Delete voucher information	3.8
Check voucher information	4.2
Check wage information	5.2
Check report information	6.3

5. Conclusion

This paper establishes a fuzzy comprehensive evaluation model of the golf tournament marketing effectiveness in our country. Based on the evaluation indicator system of marketing effectiveness of golf tournament in our country, it adopts AHP and fuzzy comprehensive evaluation model to build the fuzzy comprehensive evaluation model of golf tournament marketing effectiveness of our country under the condition of sponsor autonomous marketing and entrusted professional institutes marketing.

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