

Research on budget management under IT environment

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ABSTRACT: IT technology has become a key element of core competitiveness of enterprises, and also the basis for its daily operation. The budget is a management process of forecasting and planning of the future operation and financial activities under the guidance of the strategic objectives, and completion of the strategic objectives to a maximum extent. Whether both of them can be effectively combined with is the key to effective implementation of the budget. Through analysis of the existing problems of the traditional budget of the enterprise and the budget under the information technology environment, analysis of the internal and external influencing factors of the budget management of the large and medium sized enterprises under the current environment with SWOT, factor quantization and weight with AHP, development of the strategic program according to the priority of weight, and finally verification with a case, this paper concludes that, the budget management work can be more strategic and forward-looking through combination with AHP and SWOT analysis.

Keywords: IT environment; budget management; SWOT analysis; AHP

1 INTRODUCTION

Budget management is a major method of internal management and control of the enterprises, and also a modern management mode integrated with systematic, strategic and human - oriented concept^[1]. No matter in the enterprises or public institutions, international or domestic countries, budget management plays an extremely important role in promoting overall economic activities and avoiding the economic crisis, and strengthening the financial management of the enterprise. From the perspective of micro financial management of the enterprise, with the development of the modern finance and financial theory, budget management is gradually developed from initially only owning the function of planning and coordination of the production development to an operational mechanism with comprehensive implementation of the corporate strategic policy, integrated with the functions of control, motivation, evaluation and so on, thus locating at the core position of internal control system of the enterprise. In recent years, with the rapid development of information technology, the degree of integration with information technology and internal management and accounting work of the enterprise becomes higher and higher, and shortcomings of the traditional budget

management become increasingly prominent, mainly manifested in the poor accuracy of the budget preparation, relatively large difficulty in real-time control and real time adjustment, delay in budget evaluation and analysis. Many enterprises view the budget data as a furnishing. The budget amount can be randomly altered if the adjustment is necessary, so that the budget fails to play its true role.

In fact, in order to improve the efficiency of budget implementation in the enterprise, the domestic and foreign scholars carried out the relevant researches of the budget management in the early period. The foreign scholar, Decosta believes that, "the budget is a plan of future activities by the use of amount"^[2]; Karp Lander believes that, "the budget is a plan of official activities or a specific program of activities with digital representation"^[3]; Robert N. Anthony believes that, the budget control mode is divided into "tight control" and "loose control"; the research of R. Alan Webb show that, the reliability of the budget will affect the reputation of the manager, while the degree of influence depends on the importance of the budget in the planning and control process in the organization^[4]. The research of Chinese scholars, Mao Hongtao, Cheng Jun, Deng Bofu and so on shows that, the improvement of the budget participation of the enterprise

grassroots staff will improve the decision value of the budget report^[5]; Huang Jinliang (2012) believes that the source of the predicament in the budget management of the enterprise is inaccurate positioning of the budget function, and he verifies the influencing factors of budget positioning by the use of empirical analysis method, and proposes that the problems of predicament in the budget management should be started from the budget preparation tools and implementation process^[6]; Liao Minxia (2013) analyzes the existing problems of the budget management in China, and believes that the future development trend of the overall budget management should be oriented to the information technology, strategic and humane development^[7]; JiMingyi proposes that the implementation of the overall budget management is beneficial to the improvement of overall management level of the enterprise, and also plays an extremely important significance on the establishment and improvement of the modern enterprise system, improvement of the internal constraint mechanism of the enterprise, standardization of the enterprise management behavior, and improvement of the enterprise management level^[8]; XieZhihua elaborates the functions of budget management from the perspective of budget management mechanism, and believes that the budget system is a security mechanism of the objectives of preserving or increasing values for the investors, and also a coordination mechanism of the investors and operators or enterprise benefits.

In summary, the theoretical research in the field of budget management is very rich, but there are few theories applicable for the budget management under the current information technology background. Accordingly, this paper implements the following work: (1) analyze the existing problems in the budget management work; (2) analyze the internal and external environmental factors of the large and medium-sized enterprises under the information technology environment with SWOT; (3) weight the above factors with AHP, and provide decision information for the decision-making level. Finally, this paper verifies the reasonableness of this method by taking a company as an example.

2 EXISTING PROBLEMS OF TRADITIONAL BUDGET AND BUDGET MANAGEMENT UNDER IT ENVIRONMENT

2.1 *Existing problems of the traditional budget management*

Traditional budget management is also the overall budget management often said by the managers, including the enterprise operating budget, investment budget, financial budget, investment budget, financing budget and so on. In such a large system, there are certainly some problems:

(1) Budget preparation: in terms of budget preparation, currently, the overall budget management of the large and medium-sized enterprises is only limited to the budget preparation. "It generally just stipulates the overall indicators or a small number of basic indicators"^[9], and pays too much attention to income, and just considers the profit contribution level, without realizing the overall budget. The management responsibilities and objectives are not clear, performance assessment standards are too simple, and there is also a lack of salary reward mechanism that can mobilize the human enthusiasm. The cost expense control is lagging behind, and the accounts are worked out afterwards, and the cost expense is disordered and lack of planning, so that the managers are unable to control the management of increasing income and reducing expenditure for the cost expense.

(2) Budget execution: the large and medium-sized enterprises have mixed budget execution plans, and the pace of different departments is inconsistent, and there is a lack of a good budget follow-up mechanism, so that the budget control department may not smoothly carry out summary and analysis of the overall budget management. For example: incomplete information of the budget execution and unguaranteed time may cause that the formation time of the budget analysis report in most cases is much later than the progress of budget time, so as not to really play a role of the budget.

(3) Budget assessment: in the annual objective planning and implementation and assessment program developed by the enterprise, the budget management is included in the assessment, but it fails to really play a role in the budget evaluation. The assessment is not strict, and the assessment results are not linked to the staff salary. The budget management does not play a role of constraints and incentives, so the budget assessment basically loses its significance. It is mainly because most of enterprises do not have a comprehensive understanding of the overall budget management, and believe that the relevant systems of the overall budget management are just a form, without much practical relations, which are lack of unified execution, and fail to guarantee the realization of the objectives.

(4) Budget organization system: the enterprise is generally lack of budget management organization system guarantee in the process of budget management, and the budget management of the enterprise is just prepared and implemented by the Finance Department. As an important part of the budget management organization system, the Finance Department has a better understanding of the budget preparation of the enterprise and actual execution of various budget items in the operating activities, but the promotion of the budget management only depending on the Finance Department will reduce the authority of budget management to a certain extent, and is not conducive to deal with the relationship between various departments. The vacancy of the Budget Management

Committee in the budget management will cause the Board of Directors unable to effectively supervise and control the rights and responsibilities of all levels and departments, weaken the integration role of the budget management, and the role of control and resource allocation.

2.2 *Problems of budget management under IT environment*

In today's information age, the application of information technology has been penetrated into all areas and all levels of the national economic and social development, almost covering the manufacturing, circulation, finance, hospitals, publishing, film and television, education and even government management and all fields. Modern enterprises are under the global, information technology, and financial environment. All internal and external aspects of the enterprise are affected by information technology. In particular, information technology of the enterprise promotes significant changes in the enterprise organizational form and management system, and brings a new challenge to the internal control management of the enterprise. Thus, under such an environment, the budget management also has some problems:

(1) Combination with budget and information technology: many enterprises have combined information technology with daily work, but the budget is also prepared by the Finance Department through their own ERP software. The Finance Department just performs data statistics, and finally makes data via ERP software. The authenticity and accuracy of the data is difficult to meet the requirements. The data is randomly added in case of inadequate budget, while the amount is randomly reduced in case of excessive budget.

(2) Requirements of budget on information system: different enterprises have different development situations and different requirements on information, so that different enterprises have different requirements on a new system. How to choose the information focus is also different for choice of different enterprises.

(3) Budget information security: before the enterprise realizing information technology, computer, Internet and data security issues are not included in the environmental elements of internal control of the enterprise. After realization of information technology, they must be included. How to improve the budget data security also reserves to be discussed.

3 SWOT ANALYSIS AND WEIGHT OF BUDGET MANAGEMENT OF LARGE AND MEDIUM-SIZED ENTERPRISE UNDER IT ENVIRONMENT

The above analysis indicates that the combination with the budget management work and information tech-

nology of the domestic large and medium-sized enterprises under the information technology environment is not satisfactory, and it is also unable to grasp the degree of importance of the internal data and external influencing factors in the budget preparation. Therefore, this paper proposes to analyze the internal and external factors of the enterprise with SWOT, and then weight various factors through establishment of judgment matrix with AHP, and determine the priority of various factors considered when the decision makers make decision.

3.1 *Introduction of SWOT analysis*

SWOT is an abbreviation of Strengths, Weaknesses, Opportunities and Threats. SWOT analysis is a common tool used to analyze internal and external environment. Its objective is to determine the strengths and weaknesses of the organization, and development opportunities and threats of the surrounding environment. On the basis of specifying these factors, the enterprise management layer carries out the strategic planning, in order to strengthen strengths, make up for weaknesses, seize opportunities and avoid risks. Among them, the strengths and weaknesses are the internal evaluation of the organization, while opportunities and threats are the examination and evaluation of the external surrounding environment of the organization. The internal evaluation mainly aims at determining the strengths and weaknesses of the enterprise, while the external evaluation mainly involves in external environment and other conditions.^[10]

When SWOT analysis is used to analyze the budget management of the enterprise under the information technology environment, the external environment conditions mainly involve in the background of IT development in current society, domestic and foreign specified criteria and domestic network popularity conditions; the internal environment conditions mainly involve in the technology of internal staff, enterprise cost and other involved risks.

On the other hand, the development of SWOT method depends on the weighting and subdivision of internal and external factors. Through weighting of each factor, there is a need of corresponding analysis to discover the importance of each factor.

3.2 *SWOT analysis of budget management of Chinese enterprise under IT environment*

Currently, the network popularity rate in Chinese enterprises is wide, but the large and medium sized enterprises also have their own ERP software, and rarely use it. The development of annual budget is an exhausting and hard work. Some senior managers cost much time in development of budget, accounting for 30% of the entire annual working time. In the annual year-end budget meeting, the vast majority of enterprises fail to play a real role of management. The an-

nual budget wastes manpower and money, and due to inaccurate data obtained, too much data and large workload, it impossible to monitor, resulting in the failure of budget management.

The failure of budget management may be caused by inaccurate data. The major mid-level leaders cope with it due to too much real data, and too much workload. Therefore, currently, it is very necessary to enhance the accuracy of budget by the use of information technology. How to improve the accuracy of the information, and what the influencing factors of implementation of budget management for the enterprise will be analyzed.

First, SWOT analysis can be given to the budget management of large and medium-sized Chinese enterprises under the information technology environment:

<p>Strengths -S</p> <ol style="list-style-type: none"> 1. The management layer gradually attaches importance to combination with the information technology and budget management, in order to promote the enterprise to establish a more comprehensive budget management system. 2. The enterprise develops budget with the information technology under its strategic guidance, so that the enterprise can be more effective to develop a long-term decision. 3. The budget assessment system is more complete, with corresponding salary incentive mechanism.
<p>Weaknesses -W</p> <ol style="list-style-type: none"> 1. The enterprise has corresponding demands on the hardware and software, and the cost has corresponding increase. 2. The internal data information of the enterprise has disclosure risks. 3. The human-machine integration and data processing is not enough, and the budget management work requires a lot of workload.
<p>Opportunities -O</p> <ol style="list-style-type: none"> 1. The domestic and foreign countries have corresponding information security guidelines. 2. The enterprise has corresponding information technology hardware conditions, with appropriate technical personnel and wide network popularity. 3. China has corresponding internal control systems and implementation measures, thus providing convenience to develop more effective budget management rules under the information technology environment.
<p>Threats-T</p> <ol style="list-style-type: none"> 1. The budget management work of the large and medium-sized enterprises is not up to standard. 2. China does not have corresponding budget implementation standards under IT environment 3. There is no special budget group. The Finance Department collects data for budget.

Through SWOT analysis of the budget management of large and medium-sized Chinese enterprises under the information technology environment, we can make use of the enterprise strengths and opportunities to make up for the weaknesses and threats. There is a need to weight the influencing factors of the imple-

mentation of such work, thus developing the relevant strategies.

3.3 Weight of AHP for factor analysis

3.3.1 Introduction of AHP

In the 1970s, the operations researcher of the United States proposed AHP, and issued “modeling of unstructured decision-making issues- Analytic Hierarchy Process”. This method is a model of combination with quantitative analysis and qualitative analysis. The whole process embodies the basic features of analysis, judgment and integration of human beings in the activity of decision-making thought.

The basic idea of AHP: first, to find out major factors of solutions, and constitute these factors as a hierarchical model according to the association and subordination relationship, and determine the relative importance of various factors through pairwise comparison of various factors at all levels, and then make comprehensive judgments to determine overall ranking levels of the relative importance of the evaluation objects.

The decision-making problems can be decomposed into decision-making factors with AHP, thus constructing a hierarchical decision-making plan. To make pairwise comparison of the degree of importance of decision-making factors, and then follow the hierarchical ranking; use the mathematical method to obtain the quantitative values of pairwise comparison.

3.3.2 Analysis of factors with AHP

The advantage of AHP is the combination with qualitative analysis and quantitative analysis. The elements in SWOT are analyzed with AHP, aiming at evaluation of elements, and evaluation of the priority number of these elements with the same criteria. There is a need to make pairwise comparison of the elements and apply the eigenvalue method for analysis, and strengthen the ability of SWOT analysis in the strategic decision-making applications. After a series of comparison, the management layer can grasp the decision-making information under the new environment, whether there are something of special concern, and disadvantages and weaknesses to be concerned.

First, there is a need to make pairwise comparison of the elements in SWOT group. During comparison, there is a need to concern about: (1) among two comparative elements, which one is more important strength, opportunity, weakness or threat; (2) how much important than the other. Then, the eigenvalue method can be used to calculate the priority number of these elements. These priorities reflect the consideration and understanding of the decision makers on the degree of importance of relevant elements.

Then, there is a need to make pairwise comparison of four SWOT groups and overall hierarchical ranking.

The element with the highest priority in each group is extracted to represent this group. Then, there is a need to compare and calculate the degree of priority of four elements.

Finally, the results are obtained from the strategic planning and evaluation process. Correlation values of these elements can play a role in the strategic planning process. The matrix can be established at the beginning of pairwise comparison of SWOT elements. In this matrix, the element $a_{ij}=1/a_{ji}$. When $i=j$, $a_{ij}=1$. The variation range of w_i value is from 1 to 9. 1/1 represents that two elements have an equal importance. 9/1 represents that the former element is extremely and absolutely important.

$$A = \begin{pmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \\ a_{41} & a_{42} & a_{43} & a_{44} \end{pmatrix} = \begin{pmatrix} 1 & w1/w2 & K & w1/wn \\ w2/w1 & 1 & K & w2/wn \\ M & M & K & M \\ wn/w1 & wn/w2 & L & 1 \end{pmatrix}$$

In the comparison, the comparison inconsistency is inevitable. In $(A-\lambda_{max}I)q=0$, λ_{max} is the maximum characteristic root of the matrix A; q is a normalized eigenvector corresponding to λ_{max} , whose component is the weight of corresponding single ranking of information; I is n-order unit matrix.

The consistency of judgment matrix can be tested by the index CI, of which $CI = \frac{\lambda_{max} - n}{n - 1}$. When the matrix has complete consistency, $CI = 0$; the greater $\lambda_{max} - n$ is, the worse the consistency of judgment matrix is.

In the index CI, n has a great impact on the value of CI. In order to measure the impact of different n on the satisfactory consistency of judgment matrix, there is a need to calculate the average random consistency index of the judgment matrix (RI), and then determine the random consistency ratio (CR) according to the ratio of CI index and RI index of the matrix, that is, $CR = \frac{CI}{RI}$. When CR is less than 10%, it is believed

that the judgment matrix has a relatively satisfactory consistency, and the analysis results with AHP are reasonable; if CR is greater than 10%, there is a need to re-adjust the judgment matrix, and give re-assignment to each element, in order to achieve more reasonable data.

The corresponding data can be obtained from the comparison results. According to the data size, the weight number of each factor in SWOT can be determined, and the priority number of each factor in other factors can be determined. The enterprise decision-makers can decide the improvement to be done for the budget management under IT environment according to the priority number. The corresponding development strategy is developed for a high priority number, while the corresponding prevention strategy is developed for a low priority number; there is a need

to attach importance to the existing chances and opportunities, and develop factors beneficial to the enterprise; for inherent threats and weaknesses, the decision can be made according to the weight number, which can be solved immediately or delayed.

4 APPLICATION OF QP COMPANY

QP Company is a machine parts processing and manufacturing industry, which has completed the reform of company system in 2013, and began to implement overall budget management, and also owned its own ERP system. However, the degree of combination with budget and information technology is not enough, and just remains in superficial preparation and implementation of the budget, and the incentive mechanism is not complete, which could not mobilize the active participation of the whole enterprise staff. However, in today's information age, such a degree is obviously inadequate. In today's IT environment, how to implement budget management is to be researched.

The above-mentioned SWOT analysis is approved by the enterprise management layer. Through the field research and interviews of the enterprise, and rating of the enterprise experts for factors in each group, the judgment matrix of the enterprise with SWOT analysis at the present stage is listed:

Strengths group	S ₁	S ₂	S ₃
S ₁	1	1/5	1
S ₂	5	1	8
S ₃	1	1/8	1

Weaknesses group	W ₁	W ₂	W ₃
W ₁	1	1	1/4
W ₂	1	1	1/6
W ₃	4	6	1

Opportunities group	O ₁	O ₂	O ₃
O ₁	1	1/4	1/3
O ₂	4	1	1/8
O ₃	3	8	1

Threats group	T ₁	T ₂	T ₃
T ₁	1	1/4	1
T ₂	4	1	5
T ₃	1	1/5	1

The above is SWOT judgment matrix of QP Company. Next, the largest eigenvalue method can be used to calculate the total largest eigenvalue of factors in each group, and then the factors in each group can be combined with the eigenvector for ranking, and finally the largest eigenvalue can be combined with the eigenvector for total ranking. Through calculation, the largest eigenvalues of each group are respectively 3.0246, 3.0183, 3.0173 and 3.0055. Other weight number is shown in the following Table 1.

As it can be seen from Table 1, CR in each group is

Table 1. QP Companies within the group factor weight table

SWOT group	Priority number of each group	Elements within the group	CR	Priority number of factors within each group	Total priority number
Strengths	0.4527	The management layer gradually attaches importance to combination with the information technology and budget management, in order to promote the enterprise to establish a more comprehensive budget management system.	0.0236	0.1312	0.0594
		The enterprise develops budget with the information technology under its strategic guidance, so that the enterprise can be more effective to develop a long-term decision.		0.7564	0.3424
		The budget assessment system is more complete, with corresponding salary incentive mechanism.		0.1123	0.0508
Weaknesses	0.1565	The enterprise has corresponding demands on the hardware and software, and the cost has corresponding increase.	0.0176	0.1560	0.0244
		The internal secret of the enterprise has disclosure risks.		0.1364	0.0213
		The human-machine integration and data processing is not enough, and the budget management work requires a lot of workload.		0.7075	0.1107
Opportunities	0.2934	The domestic and foreign countries have corresponding information security guidelines.	0.0167	0.1268	0.0372
		The market has corresponding information technology hardware conditions, with appropriate technical personnel and wide network popularity.		0.2312	0.0678
		China has corresponding internal control systems and implementation measures, thus providing convenience to develop more effective budget management rules under the information technology environment.		0.6419	0.1883
Threats	0.0974	The budget management work of the large and medium-sized enterprises is not up to standard.	0.0054	0.1606	0.0156
		China does not have corresponding budget implementation standards under IT environment.		0.6902	0.0672
		There is no special budget group. The Finance Department collects data for budget.		0.1492	0.0145

less than 10%, so the consistency of judgment matrix of QP Company is desirable, and the analysis results are also relatively desirable. The analysis results in the table indicate that, the strengths group and opportunities group of QP Company occupy a relatively important position, while the weaknesses group and threats group occupy the secondary important position.

Therefore, it is possible to formulate S-O development strategy and W-T prevention strategy:

S-O strategy: the domestic and foreign countries have information security guidelines. China also has corresponding inner control system. QP Company can develop a series of operation guidelines and security guidelines for implementation of information budget management under such a background, and upgrade the original information system, train the staff with poor technology, and enhance the enterprise soft power. Through the development of a relatively complete budget evaluation mechanism, the staff salary can be related to the assessment indicators. The reward and punishment can allow the enterprise staff to know that

the budget management work is related to everyone, in addition to the Finance Department.

W-T strategy: QP Company should upgrade and replace aging hardware in the enterprise, and set up the appropriate budget management department, of which includes some representatives of other departments. The preparation personnel shall not prepare budget for granted according to data. They need to develop a feedback mechanism, and really change the budget management to dynamic budget, and associate the data required by budget with the information management system of the enterprise. The source of each part of budget data can be found in the system, and the staff can sign a confidentiality agreement on the confidentiality of enterprise data, so that the budget data security can be guaranteed.

In summary, QP Company should attach more importance to their own strengths and opportunities, establish a more comprehensive budget management information system under the existing hardware conditions in accordance with the requirements specified in the relevant regulations, effectively combine with

dynamic budget and static budget, and also pay attention to their own weaknesses and threats, the corresponding cost issues and training of the enterprise staff, enhance the entire enterprise awareness on the budget management, so that the budget management work can be more strategic and forward-looking under the information technology background.

5 CONCLUSION

A good analysis method is very important for the enterprise competition strategic decisions, which will be more authoritative to convert the analyzed influencing factors into data analysis. This paper analyzes the internal and external budget environment of the enterprise under today's information technology environment through the method of combination with SWOT analysis and AHP. The priority weight value of the factors with AHP is more accurate, so that the factors obtained from SWOT analysis are more accurate, and the results are more referential, thus reducing the blindness of analysis. Through comparison of the priority number, the group with a high priority number can be combined to form the corresponding development strategy, while the group with a low priority number can be combined to form the prevention strategy, so that the enterprise is more targeted to implement the budget management work under the information technology environment.

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