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Enterprise cost accounting and control based on job costing method

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ABSTRACT

In enterprise cost accounting and control research, traditional activity-based costing (ABC) relies on detailed activity tracking data and complex cost allocation models, which makes data acquisition difficult, has low-cost allocation accuracy, ignores dynamic changes, and has the problem of insufficient flexibility. This paper constructs an improved ABC application framework, builds an activity-driven cost accounting model, analyzes the daily activity data of the enterprise, determines the key factors related to cost, and establishes a mapping relationship between activity and cost. This paper introduces a dynamic adjustment mechanism to adjust the weights and parameters in the cost accounting model in real time according to changes in the external environment and internal operations, thereby improving the flexibility and accuracy of cost accounting. It can integrate the ERP (Enterprise Resource Planning) system with the cost accounting model, integrate the company's financial data, production data and sales data, use information tools to automatically update activity costs, and provide timely feedback to the cost control system; it can closely combine cost accounting and control, monitor and adjust costs in real time during the accounting process, and take timely control measures when abnormalities occur. Experiments show that in terms of cost allocation accuracy, the average SE (Standard Error) of the improved ABC in enterprises with different employee sizes is 2.1, and the average MSE (Mean Squared Error) is about 5.5. It is more stable when processing enterprise data and can better reflect the actual cost allocation. The response time of the improved ABC is 5.7 seconds when the raw material price increases by 25%. It can make adjustments faster, with better flexibility and dynamic adaptability; the experiment proves the effectiveness of this paper in the research of enterprise cost accounting and control.

Keywords: Enterprise Cost Accounting, Activity-based Costing, Cost Accounting Model, Enterprise Resource Planning, Dynamic Adjustment Mechanism

1. Introduction

In economics, cost is not only a way to measure the consumption of resources, but also reflects the decision-making process of how to maximize economic benefits through the effective use of limited

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resources [1]. Cost accounting reflects the decision-making process of how to maximize economic benefits by using limited resources, in which the basic concept of cost accounting should not be simply understood as the amount of accounting and accumulation, but needs to be combined with corporate strategy, market environment and internal control and other multi-dimensional factors, which with the help of fine analysis, reveals the possibility of cost control, the path to optimize resource allocation, and evaluation of the enterprise's business operations. It reveals the possibility of cost control, the path to optimize resource allocation, and the criteria for evaluating business performance with the help of fine analysis [2-3]. Cost control is based on cost accounting, through a variety of means and methods, management and control of costs in the production process, in order to achieve the purpose of reducing costs and improving efficiency [4]. By comparing and analyzing the "actual cost report" with the "standard cost report" when carrying out cost accounting and control, enterprises can find problems in cost control and take corresponding measures to adjust and improve in a timely manner to improve cost-effectiveness and business performance [5-8]. At the same time, this kind of comparative analysis can also provide important reference for enterprise decision-making, and help enterprises to develop more scientific and reasonable cost control strategies.

Cost accounting and control is a necessary process for enterprise development. 1) Through cost accounting and control, the cost and profit of a product can be accurately calculated, so as to assess the profitability of the product, which helps the enterprise to understand the profitability of a certain product or service, and whether it needs to be improved, and provides an important basis for the enterprise to make decisions, and to further determine the direction of business and strategy [9-11]. 2) Cost accounting and control can also help enterprises to determine whether they need to adjust the price of their products, to understand the demand and competition in the market, as well as to formulate a more reasonable pricing strategy to improve the competitiveness of their products and market share [12-13]. Of course, in addition to cost accounting and control, it is also necessary to comprehensively consider other factors, such as sales revenue, market share, customer satisfaction, etc., to comprehensively assess the business performance of the enterprise. Through the comprehensive analysis of various indicators, it can help enterprises find problems and opportunities in a timely manner, and make corresponding adjustments and decisions to promote the sustainable development of enterprises [14-15]. 3) Through the accounting and analysis of costs, the business performance of enterprises can be assessed. Through the refined management of costs, bottlenecks and problems in the production and operation of the enterprise can be found, which can help the enterprise to take improvement measures, improve the overall efficiency of the enterprise and increase competitiveness [16-18]. 4) Cost accounting and control is not only to help enterprises assess product profitability and business performance, but also to provide support for enterprise management. Through the accounting and analysis of costs, we can understand the management level of enterprises and existing problems, help enterprises to take improvement measures to improve the management level and competitiveness of enterprises, and then enhance the operating efficiency and market position of enterprises [19-21]. 5) Cost accounting and control can also help enterprises to better resource allocation and decision-making, optimize the production process and supply chain management, improve operational efficiency and resource utilization [22-24]. It can be seen that the sustainable development of enterprises is subject to the constraints of cost accounting and control, so how to carry out cost accounting and control of enterprises has become a key topic of economic management.

This paper constructs an improved ABC application framework, integrating dynamic adjustment mechanisms and information technology to improve the flexibility, accuracy and real-time performance of enterprise cost accounting. The study constructs an activity-driven cost accounting model to accurately analyze and identify key activities related to costs, so that each activity and its corresponding cost can be matched and tracked in real time and accurately. In order to enhance the

adaptability of traditional ABC, the study introduced a dynamic adjustment mechanism, which flexibly adjusts the weights and parameters in the cost accounting model according to changes in the external environment and internal operations of the enterprise, and reflects the changes in costs during the production process in real time. This mechanism improves the accuracy of cost accounting and can also help enterprises make timely decision adjustments in the face of market changes. The study also integrates the ERP system with the cost accounting model to achieve automated integration and updating of financial, production and sales data. This information integration method can ensure that when performing cost accounting, the company not only relies on static data, but can also update operational data in real time, making the company's cost control more refined, timely and comprehensive. Using these innovations, this paper provides enterprises with a more efficient and flexible cost management tool to help them improve their cost control level, optimize resource allocation, and enhance their overall market competitiveness.

2. Methods

2.1. Building an Activity-driven Model

The various activities of an enterprise and their corresponding cost drivers can be identified to build an activity-driven cost accounting model. This paper collects and analyzes the daily activity data of the enterprise, identifies the key factors related to cost, and establishes a mapping relationship between activities and costs; this model provides a basis for subsequent cost allocation and control.

2.1.1. Activity Identification and Cost Driver Analysis. The first step in building an activity-driven cost accounting model is to accurately identify and analyze the various activities of the enterprise and their corresponding cost drivers. The various operational activities of the enterprise involve production links, as well as sales, procurement, supply chain management, quality control and other aspects. This study adopted a detailed data analysis method based on enterprise resources and production processes to comprehensively obtain all activities that may affect costs; after collecting the company's historical operating data, combined with multi-dimensional information such as production plans, order execution records, resource consumption, and labor input, activity identification was performed; after data cleaning and organization, key activities closely related to costs were extracted. Here, a weighted clustering algorithm is used to classify similar activities and rank them according to their contribution to the cost; the integrated data of the system and the cost accounting model are shown in Table 1.

Table 1. Integrated data of the system and the cost accounting model

Data Source	Data Type	Sample Size	Data Integration Method
Financial Data	Numeric Data	5743 records	Link each transaction and expense to activities
Production Data	Time Series Data	3926 records	Associate production line activities with resource consumption in real time
Sales Data	Quantity, Amount Data	4577 records	Match with customer orders and market dynamics
Supply Chain Management Data	Text, Numeric Data	1394 records	Integrate inventory, procurement plans, and logistics data
Inventory and Equipment Data	Numeric, Status Data	2578 records	Monitor equipment usage in real time and update the model

The cost drivers of an activity are closely related to factors such as resource consumption, time consumption, and labor costs, and these drivers need to be quantitatively analyzed. The study uses the multivariate regression analysis method to explore the relationship between each activity and its cost drivers, and quantify the influence weight of each driver in the cost formation process; set an activity matrix $A=\{a_1,a_2,\ldots,a_i\}$, the cost a_i of each activity is jointly determined by several cost drivers, and the relationship between each activity and the cost driver is adopted as follows:

$$C(a_i)=\sum_{k=1}^{m} d_k \cdot x_{ik} \tag{1}$$

$C(a_i)$ represents the cost of the i-th activity, d_k is the weight coefficient of the k-th cost driver, and x_{ik} represents the degree of association between the i-th activity and the k-th driver. On this basis, data analysis methods can be used to accurately quantify the cost structure of each activity, providing basic data for subsequent cost allocation and control. Analyzing the drivers of different activities can clarify which factors play a key role in cost fluctuations and effectively determine which activities should be prioritized for cost control.

2.1.2. Establishing the mapping relationship between activities and costs. After completing activity identification and cost driver analysis, the key task is to establish a mapping relationship between activities and costs, so that the costs of various activities can be accurately attributed to the correct cost center. In this phase, regression analysis and machine learning algorithms were used to model the relationship between activities and costs. Based on the historical operating data of the enterprise, a weighted regression model was used to accurately calculate the cost of each activity by combining the nonlinear relationship between activities and costs. For each activity, a weighted regression model was set to represent its cost structure:

$$C_{total}=\sum_{i=1}^{n} w_i \cdot \left(\sum_{j=1}^{m} \beta_{ij} \cdot X_j\right) \tag{2}$$

C_{total} is the total cost of the activity, w_i is the weight coefficient of the activity, β_{ij} is the regression coefficient between the i-th activity and the j-th cost driver, and X_j is the actual value of the j-th driver. The regression coefficient β_{ij} represents the sensitivity between each activity and the cost driver, reflecting the responsiveness of different activities under each cost driver.

The study combines the neural network algorithm in deep learning to further improve the accuracy of the model, uses a multi-layer perceptron to model the complex nonlinear relationship between activities and costs, performs back propagation optimization on the model parameters, and accurately adjusts the cost forecast value of each activity. The regression coefficient can be used to adjust the cost calculation model in real time according to the changes in the enterprise's operating data, thereby improving the flexibility and accuracy of cost accounting.

This study also introduces the interdependence between activities, taking into account that some activities may affect the cost of other activities, production line downtime, supply chain disruptions, etc. In the construction of activity mapping relationships, multivariate causal analysis methods are used to model the causal relationship between activities and obtain the cross-effects of multiple cost drivers. Through accurate modeling of the costs and influencing factors of each activity, the study realized an activity-driven cost accounting model, making the cost allocation of each activity more transparent and providing strong support for enterprise cost control.

Using the above steps, an activity-driven cost accounting model was constructed, which fully considered the specific circumstances of various activities within the enterprise. After complex data analysis and modeling technology, the mapping relationship between various activities and costs was accurately identified. This model provides a scientific basis for subsequent cost control and optimization, and can effectively improve the accuracy and flexibility of enterprise cost accounting.

Figure 1 shows the cost accounting and control framework of an enterprise based on the activity-driven model. Resources A, B, and C represent various types of resources used by the

enterprise in the production and operation process. These resources are consumed by different activity centers. Each activity center uses specific resources to perform production tasks, generating cost drivers related to them. These cost drivers reflect the impact of resource consumption on costs and are the key factors connecting activities and products. Products are the final cost results calculated through the mapping relationship between each activity center and cost drivers. This model provides the basis for enterprises to accurately allocate and control costs under different resource consumption, activity execution and external change conditions, which helps to optimize the cost structure and improve the real-time and reliability of cost accounting.

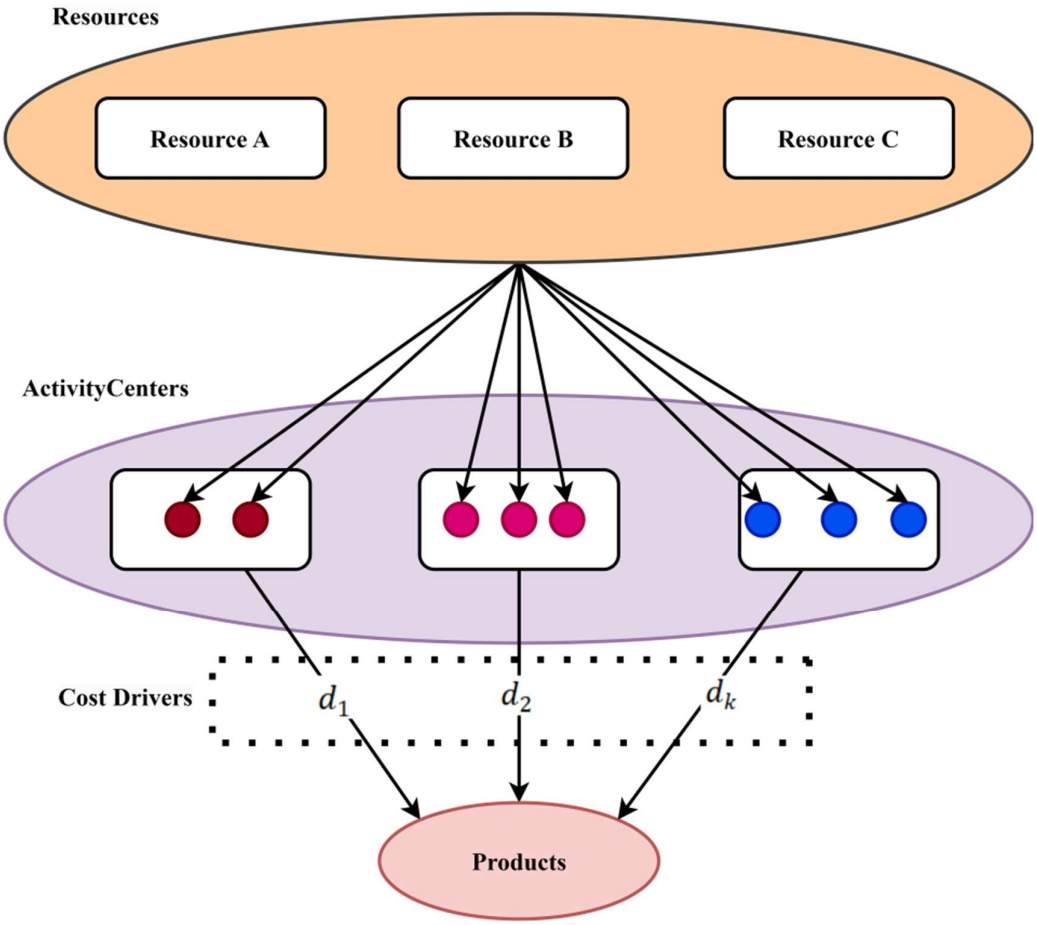

Fig. 1. Activity-driven model framework

2.2. Introducing a Dynamic Adjustment Mechanism

In order to overcome the shortcomings of traditional ABC, this paper introduces a dynamic adjustment mechanism to adjust the weights and parameters in the cost accounting model in real time according to changes in the external environment and internal operations. Through real-time monitoring of market changes, production processes and resource consumption, the cost allocation model is adjusted in a timely manner to improve the flexibility and accuracy of cost accounting.

2.2.1. Real-time impact modeling of external and internal factors. Regarding the lack of flexibility of traditional ABC, the study designed a dynamic adjustment mechanism, which introduced real-time monitoring of external environmental changes and internal operating data to automatically adjust various parameters and weights in the cost accounting model. External environmental factors include market demand fluctuations, raw material price changes, policy adjustments, etc., and internal operational data include production process efficiency, resource consumption changes,

personnel flow, etc., which can directly affect the allocation and calculation of costs. The model needs to be able to respond to these dynamic changes in real time to ensure the accuracy and timeliness of cost accounting.

The core of the dynamic adjustment mechanism is to establish a multivariate impact model, and form dynamic responsive adjustment rules through real-time monitoring of these factors. The impact coefficients of various cost drivers are adjusted dynamically as the environment and operating conditions change. When market demand changes, it can affect the capacity load and unit cost. When production efficiency improves, the variable cost per unit product can be reduced. At a certain moment, the market demand index is $D(t)$ and the production efficiency index is $E(t)$. The relevant weights can be adjusted according to these factors:

$$w_i(t) = w_i(0) \cdot (\gamma_1 \cdot D(t) + \gamma_2 \cdot E(t)) \tag{3}$$

$w_i(t)$ is the adjusted weight of activity i at time t, $w_i(0)$ is the initial weight, γ_1 and γ_2 are the influence coefficients, reflecting the influence of market demand and production efficiency on cost allocation; using this method, the weight can be automatically updated according to real-time data, so that cost accounting has a certain degree of accuracy and flexibility in a dynamic environment.

2.2.2. Optimization of cost allocation model by dynamic adjustment mechanism. Based on the dynamic adjustment mechanism, the study optimizes the key parameters in the cost accounting model in real time. The cost drivers of various activities are regularly evaluated, and the cost allocation proportion of each activity is adjusted in a timely manner in combination with changes in the external market and internal production environment to ensure the accuracy and fairness of cost allocation under different operating conditions.

The cost of each activity in the cost accounting model is determined by multiple factors. After setting the mapping relationship between activities and cost drivers and introducing a dynamic adjustment mechanism, the cost calculation formula for the activity is:

$$C_{adjusted}(a_i, t) = \sum_{k=1}^{m} d_k(t) \cdot x_{ik}(t) \cdot a_k(t) \tag{4}$$

$C_{adjusted}(a_i, t)$ is the adjusted cost of activity a_i at time t, $d_k(t)$ represents the dynamic value of the k-th cost driver at time t, $x_{ik}(t)$ is the strength of association between activity a_i and driver d_k, and $a_k(t)$ is the adjustment coefficient of each driver. By real-time monitoring of factors affecting costs, these adjustment coefficients can be automatically updated according to specific changes, making cost allocation more accurate and avoiding errors caused by static parameter settings in traditional ABC.

The study combines cost control indicators to further improve adjustment accuracy, and the model can also set up a real-time feedback mechanism. After each accounting cycle, the weights and coefficients of various parameters in the model are adjusted according to the deviation between the actual cost and the expected cost. When the actual cost exceeds the preset threshold, the adjustment mechanism is automatically activated, and the weights of the cost drivers in the weighted correction model are used to ensure that the cost allocation of subsequent cycles is more accurate:

$$\Delta w_i(t) = \eta \cdot \left(C_{\text{actual}}(a_i, t) - C_{\text{target}}(a_i, t) \right) \tag{5}$$

$\Delta w_i(t)$ is the adjustment amount of activity a_i at the t weight at the moment, $C_{\text{actual}}(a_i, t)$ is the actual cost, $C_{\text{target}}(a_i, t)$ is the target cost, and η is the adjustment coefficient. With this adjustment, the model can flexibly respond to cost overruns and avoid cost allocation distortion caused by environmental fluctuations or internal changes; the cost adjustment feedback mechanism parameters are shown in Table 2.

Table 2. Cost adjustment feedback mechanism parameters

Feedback Parameter	Initial Value	Adjustment Threshold	Adjustment Range	Feedback Method
Cost Difference	5%	5%-10%	0-5%	Adjust the weight coefficients of cost drivers
Cost Overrun Condition	10%	10%-20%	0-10%	Trigger warning and adjust activity weights
Severe Cost Overrun	20%	20%-30%	0-10%	Trigger warning and reassess production processes

Through the above dynamic adjustment mechanism, the cost accounting model constructed in this paper can flexibly adapt to the rapid changes in the internal and external environment of the enterprise, improve the adaptability and accuracy of the model in actual operations, and provide more effective tools and methods for the enterprise's cost control.

Figure 2 shows the cost accounting process after the introduction of dynamic adjustment mechanism, showing how the parameters in the cost accounting model are adjusted in real time according to changes in external and internal factors to ensure its flexibility and accuracy. The system collects relevant data by monitoring external market demand and internal factors such as production efficiency changes. Based on these changes, the system dynamically adjusts the cost driver weights of each activity to accurately reflect the current operating status. The adjusted activity costs can be recalculated and compared with the preset target costs. If large cost differences are found, the system can trigger an adjustment mechanism to optimize the cost accounting model, update the weights of cost drivers and other relevant parameters, so that cost accounting remains accurate in a changing environment; the updated parameters can be applied to subsequent cost accounting to enhance the company's dynamic control over costs. This process improves the flexibility of cost accounting and enhances its adaptability to changes in the market and production environment.

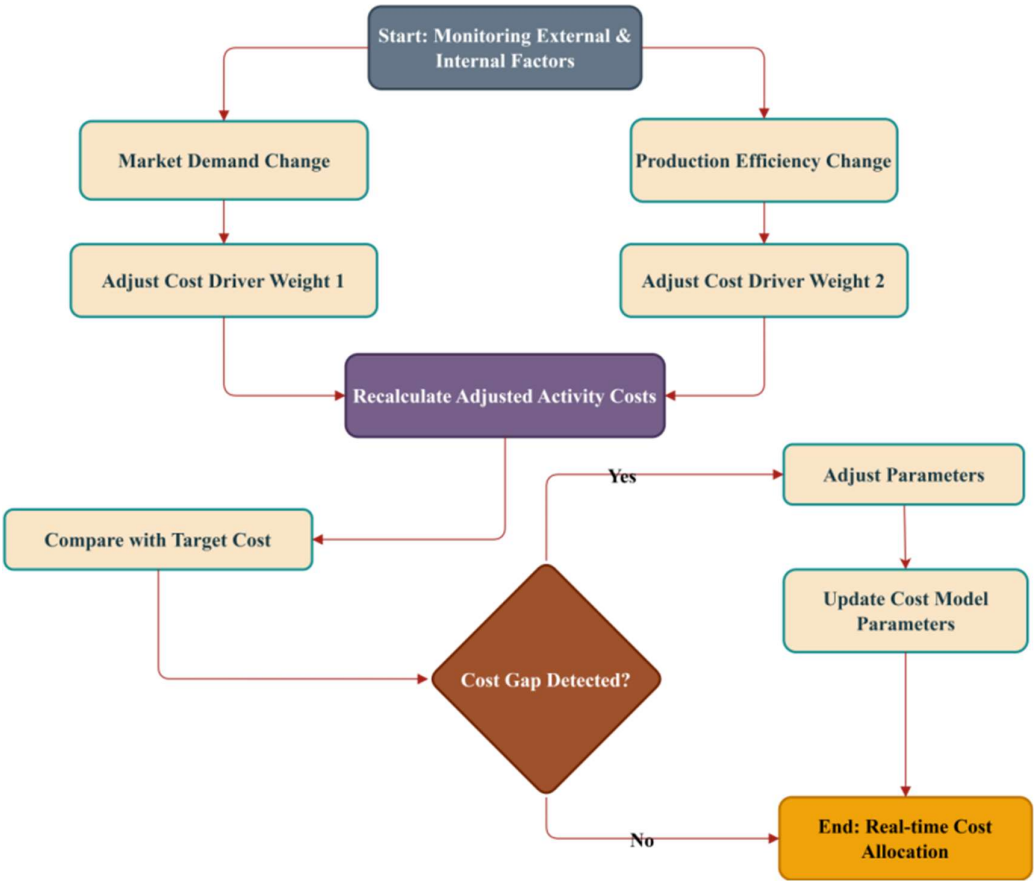

Fig. 2. Cost accounting process after the introduction of dynamic adjustment mechanism

2.3. Integrated Information Management Tools

With the help of information technology, this paper studies the integration of ERP system and cost accounting model to achieve real-time data collection and automated processing. The company's financial data, production data and sales data can be integrated, and the activity cost can be automatically updated using information tools, and timely feedback to the cost control system.

2.3.1. Real-time data collection and cost update mechanism. In the daily operation of an enterprise, the collection and update of real-time data is a crucial part of cost accounting. The study deeply integrated the ERP system with the cost accounting model, allowing various types of data such as finance, production, and sales to be transmitted in real time and automatically update cost information.

The API (Application Programming Interface) is used to seamlessly connect the financial data, production data, and sales data in the ERP system. Financial data includes various cost items and fixed costs, production data involves material consumption and labor hours in each production link, and sales data includes product shipments, sales revenue, order changes, etc.; using these data sources, the system can collect dynamic information related to costs in a timely manner.

The cost accounting model updates the cost parameters of related activities based on these data; resource consumption and labor costs in the production process can be affected by production volume and production efficiency. The relationship between production hours and resource consumption can be set in the system to dynamically adjust the production cost model when the consumption of a certain resource changes. The system can directly adjust the cost of the activity based on real-time data to avoid errors caused by data lag in traditional cost accounting; after each data update, the cost model can execute the following formula to ensure the timeliness of the data:

$$C_{\text{updated}}(a_i) = \sum_{k=1}^{n} (Data_k(t) \cdot Factor_k(a_i)) \quad (6)$$

$Data_k(t)$ is the k data collected at time t, and $Factor_k(a_i)$ is the relationship coefficient between the data and activity a_i; the formula ensures that after each data update, the relevant costs can reflect the data changes in a timely manner, ensuring the accuracy of activity cost accounting; Table 3 shows the basic data sources in the ERP system.

Table 3. Basic data sources in the ERP system

Data Source	Parameter Name	Description
Financial Data	Raw Material Cost	Cost associated with raw material consumption
	Labor Cost	Labor cost related to production
	Indirect Costs	Indirect costs (e.g., management expenses, depreciation)
Production Data	Production Hours	Hours consumed by each production activity
	Resource Consumption	Amount of resources consumed for each activity
	Production Quantity	Quantity of products produced per production cycle
Sales Data	Sales Quantity	Quantity of products sold
	Sales Revenue	Revenue generated from sales

2.3.2. Cost monitoring and control feedback mechanism. The purpose of integrating ERP system is to collect data in real time, and to use the real-time feedback mechanism to achieve effective cost control. One of the key innovations of the research is to closely integrate real-time monitoring with the cost control system to form a closed-loop feedback mechanism. If the actual cost of an activity deviates, the system can respond immediately and trigger control measures to avoid excessive cost fluctuations.

In the design of the feedback mechanism, the system can automatically analyze the deviations against the established cost budget based on the real-time monitored cost data. When the cost of an activity is abnormal, the system can trigger the automatic warning mechanism. The system can handle abnormal costs according to the cost control threshold set by the enterprise. When the resource consumption of an activity exceeds expectations, the system can adjust the relevant parameters in the activity cost model. The adjustment formula is as follows:

$$\Delta C_{\text{activity}}(t) = \alpha \cdot (\text{Deviation}(t)) \quad (7)$$

$\Delta C_{\text{activity}}(t)$ represents the adjustment of activity cost at time t. α is the adjustment coefficient, which reflects the importance of the deviation; $\text{Deviation}(t)$ is the deviation value, which is calculated as the difference between the actual cost and the budgeted cost. With this mechanism, when the activity cost exceeds the budget, the system can automatically start the adjustment to avoid excessive cost overruns.

Integrated information management tools also provide real-time monitoring data visualization functions. Management can directly observe the cost change trends of various activities through charts, reports, etc. This visual real-time data monitoring can help managers detect anomalies in a timely manner, make timely decisions, and improve the accuracy and response speed of cost control.

The deep integration of the ERP system and the cost accounting model realizes the automation of data collection and cost calculation. The real-time feedback mechanism enables cost control to adapt

to the dynamically changing operating environment, ensuring that the company's cost management in a complex environment is more efficient and accurate.

2.4. Integration of Cost Accounting and Control

In the cost accounting and control integration part, the study is based on the activity-driven cost accounting model, and combined with the actual operation situation, the integration mechanism of cost accounting and control is introduced to improve the accuracy and operability of cost accounting. In a complex and dynamically changing environment, a variety of methods are used to refine the cost accounting, and strict control processes are used to ensure that the cost is effectively managed.

Cost accounting adopts an activity-driven cost accounting model, which integrates activity data from multiple links such as production, sales, and procurement, and uses precise cost driver analysis to achieve cost accounting for each activity. The cost driver of each activity is determined using data analysis methods, and the weights of these cost drivers are dynamically adjusted based on the importance of the activity and resource consumption. A weight allocation method based on multivariate regression analysis is introduced to allow the cost of each activity to accurately reflect the actual situation of resource consumption.

Combined with the dynamic adjustment model, the real-time feedback mechanism corrects the cost of each activity. The model adjusts the weight coefficient of the cost driver in real time based on factors such as changes in external market demand, production plan adjustments, and raw material price fluctuations. The weighted least squares method is used to optimize the weight allocation process. When facing market fluctuations, the cost accounting model can respond quickly and avoid the lag and inflexibility in the traditional cost accounting model.

In order to improve the effectiveness of cost control, the research combines the feedback control mechanism. After each production cycle, the system starts an automatic adjustment mechanism based on the deviation between actual cost and expected cost; it compares the difference between actual cost and target cost, calculates the deviation value and corrects it. The model uses a weighted correction method to adjust the allocation ratio of the cost of each activity. When the cost deviation of an activity exceeds the preset threshold, the system can automatically adjust the relevant parameters. This mechanism improves the accuracy of cost accounting and enhances the company's ability to respond to emergencies.

This study emphasizes data integration in production and operations, combines information technology, integrates the ERP system and the cost accounting model, and uses automated data collection and real-time update mechanisms to ensure the timeliness and accuracy of cost accounting information.

By using the above integration measures, cost accounting has a high degree of flexibility and can adapt to changes in various factors in the production process of enterprises. The study further verified the effectiveness of this integrated model, proving that it can improve cost control efficiency while ensuring the accuracy of cost accounting. The implementation of the model provides enterprises with a dynamic cost allocation method to achieve the purpose of reducing costs and improving resource utilization efficiency.

3. Method Effect Evaluation

3.1. Impact of Market Demand and Production Efficiency on Controllable Fluctuation Adjustment Costs and Enterprise Cost Trend Analysis

Figure 3 shows the impact of market demand and production efficiency on adjusted costs. With the changes in market demand and production efficiency, the cost curve shows a clear fluctuation trend; as market demand increases, costs show an upward trend, and fluctuate significantly under different production efficiencies. This shows that changes in market demand have a greater impact on

corporate costs. When production efficiency is low and market demand is high, companies face greater cost pressure. When production efficiency increases, the fluctuation range of costs decreases. Improving production efficiency can effectively alleviate the cost pressure caused by market demand fluctuations. The volatility in Figure 3 also reflects the dynamic changes in the external market environment and internal production conditions. It shows that after the introduction of the dynamic adjustment mechanism, the cost accounting model can respond to these changes more flexibly; the surface reflects the adaptability of cost accounting in an uncertain market and production environment.

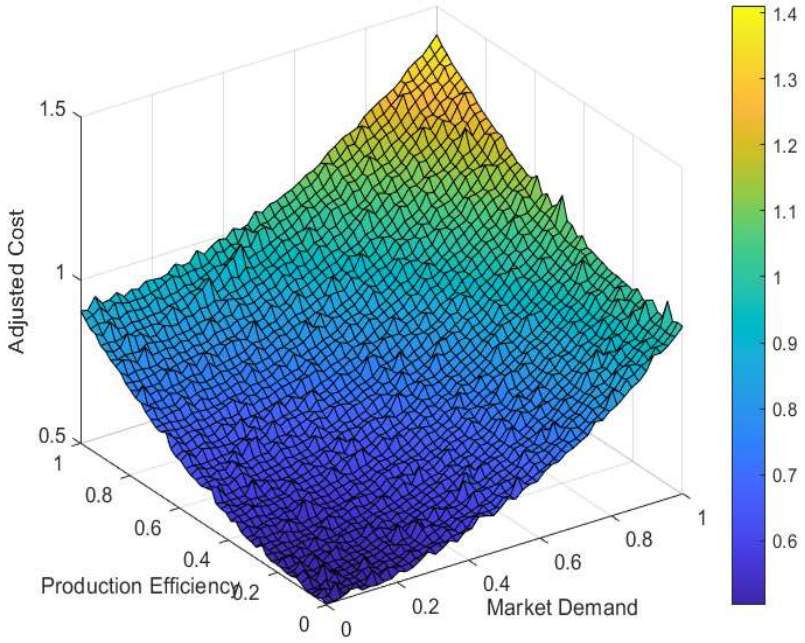

Fig. 3. The impact of market demand and production efficiency on controllable fluctuation adjustment costs

Figure 4 shows the changes in production costs, sales costs and management costs of an automobile manufacturing company within 12 months. The production cost curve fluctuates greatly, reflecting the impact of changes in resource demand during the production process on costs. Costs may fluctuate significantly with the influence of factors such as production scale and changes in raw material prices. The sales cost curve fluctuates less, mainly related to factors such as sales activities, advertising expenses and channel management; the management cost curve changes the least, indicating that management expenses are relatively fixed. Figure 4 shows the fluctuation trend of the three cost items over time, providing companies with information on the changes in various costs in different months, helping management identify potential sources of cost fluctuations and make corresponding controls and adjustments. By using real-time monitoring and adjustment, resource allocation can be effectively optimized and unnecessary cost waste can be reduced.

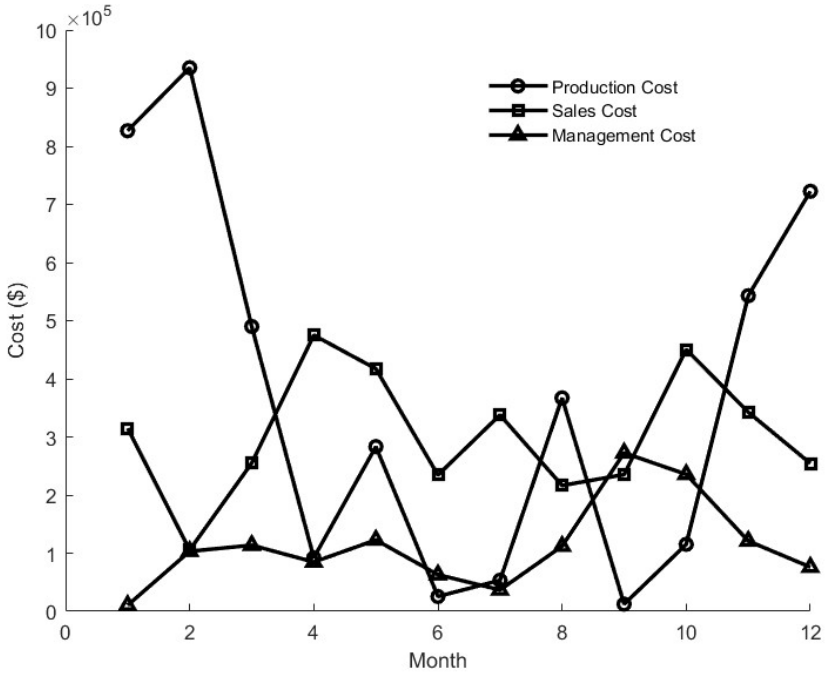

Fig. 4. Enterprise Cost Trend Analysis

3.2. Cost Allocation Accuracy

When evaluating the accuracy of improved ABC in cost allocation, SE and MSE are used to compare the allocation accuracy of the improved model with that of traditional ABC and direct cost method. In the evaluation phase, the allocation criteria for each cost object are determined, data from multiple enterprises of different sizes are collected, and three methods are used to allocate the cost data of the same batch according to their respective cost allocation rules.

Based on the improved ABC, the cost drivers of each activity are determined, its costs are dynamically adjusted, and the allocation errors of each cost object are calculated. For traditional ABC and direct cost methods, the corresponding cost allocation values are calculated based on their respective cost allocation standards. The errors between the actual cost and the allocation results can be compared, and the standard error and mean square error can be calculated to measure the allocation accuracy of each method under different enterprise sizes. The standard error is used to evaluate the stability of the model under data fluctuations, and the mean square error helps measure the overall accuracy and operability of each allocation method in practical applications.

Figure 5 shows the comparison of SE and MSE between improved ABC, traditional ABC and direct costing in enterprises with different employee sizes. Figure 5(a) shows the comparison of SE, and Figure b shows the comparison of MSE.

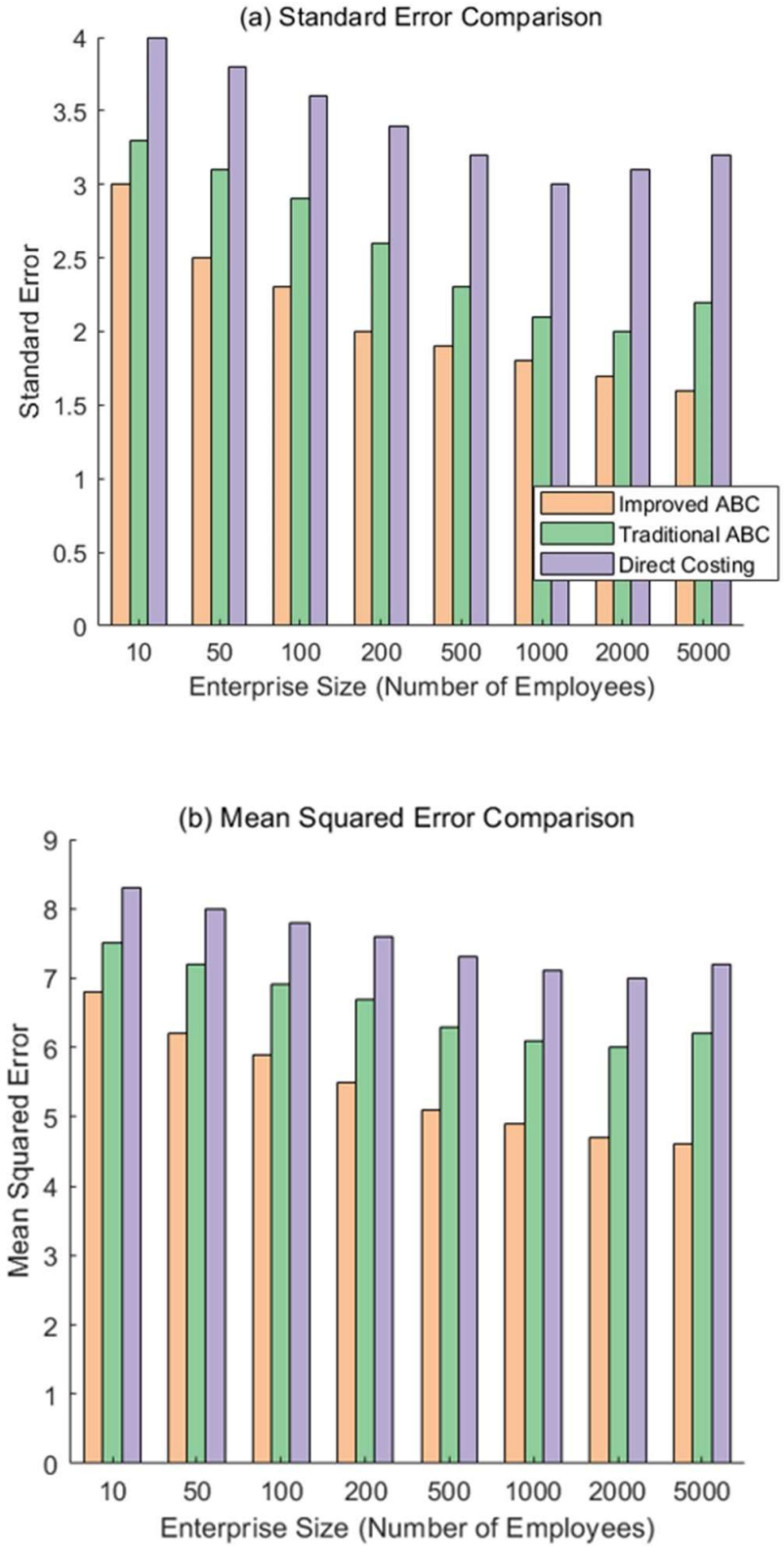

Fig. 5. Comparison of cost allocation accuracy

Figure 5(a) shows that the improved ABC shows a lower error in all sizes of enterprises, and the calculated SE average is 2.1, indicating that it has a higher accuracy in cost allocation. The traditional ABC and direct cost method have larger errors, especially in smaller enterprises. The comparison

chart of MSE also shows a similar trend. Improved ABC shows a lower mean square error in enterprises of different sizes, with an average of about 5.5, indicating that it is more stable when processing enterprise data and can better reflect the distribution of actual costs. The SE of each method tends to increase in large-scale enterprises. Overall, the SE of each method decreases as the scale of the enterprise increases. In small enterprises, data acquisition may be limited and the allocation error is large. Improved ABC always maintains a relative advantage.

3.3. Flexibility and Dynamic Adaptability

The performance of improved ABC in responding to dynamic changes in the enterprise can be evaluated, and different market environment change scenarios can be simulated. It can simulate the fluctuation of raw material prices. At each fluctuation range, the improved model can adjust the weights and parameters in the cost accounting in real time to cope with these changes.

The evaluation process is carried out in a standardized environment, using the improved ABC for initial cost accounting and recording the cost allocation values. In changing scenarios, the system uses a dynamic adjustment mechanism to quickly respond to external and internal changes, adjusts cost parameters and recalculates costs. The response speed of the improved ABC in this paper and the traditional ABC and direct cost method in the same changing scenario can be compared, and the adjustment time of each model in the face of environmental changes can be monitored to evaluate its flexibility and adaptability. The evaluation indicator is the response time required for adjustment, which measures the performance of each method in a dynamic environment.

Figure 6 shows the comparison of response time of three cost accounting methods under different raw material price fluctuations. The increase in raw material prices ranges from 5% to 25%, simulating five different price market scenarios. The response time records the calculation time of each method under different fluctuation conditions.

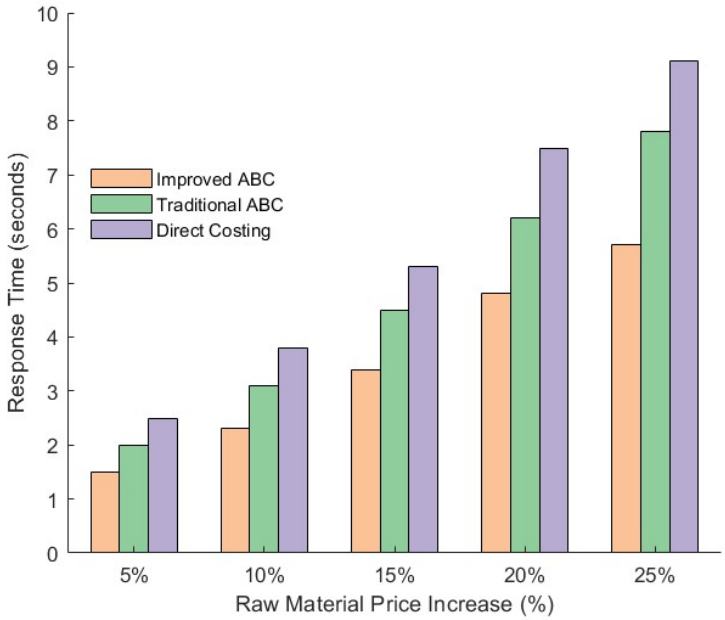

Fig. 6. Comparison of response time of different cost accounting methods

As the price fluctuations of raw materials increase, the response time of each method generally increases, which reflects that the complexity and time required for cost accounting can increase when the price fluctuations intensify. Improved ABC has the shortest response time under all fluctuations and has high flexibility and adaptability. When the raw material price increases by 25%,

the response time is 5.7 seconds. The response time of traditional ABC and direct cost method is relatively long, especially in the situation of large price fluctuations, the response speed is obviously delayed, affecting the real-time and accuracy of cost accounting; improved ABC performs better in a dynamic market environment, can make adjustments faster, and improve the efficiency of cost control and decision-making accuracy.

4. Conclusions

Based on the shortcomings of traditional ABC, this study constructed an improved ABC framework, which achieved more efficient and flexible cost accounting and control by integrating dynamic adjustment mechanism, information management tools and cost control system. Compared with traditional methods, this paper verifies the advantages of improved ABC in many aspects, which are reflected in cost allocation accuracy, flexibility and the ability to adapt to dynamic changes in enterprises. The improved ABC shows significant advantages in cost allocation accuracy, and introduces an activity-driven dynamic adjustment mechanism, which enables cost accounting to be adjusted in a timely manner according to actual operating conditions and external market changes, greatly reducing cost errors caused by data lag or static parameters. This mechanism improves the applicability of large-scale enterprises in complex environments, and also enhances the ability of small and medium-sized enterprises to make decisions based on accurate data when resources are limited. The improved model shows greater flexibility and dynamic adaptability. In the face of rapidly changing market and production environments, the model can quickly respond to fluctuations in the internal and external environment of the enterprise by adjusting cost parameters in real time, maintaining a high level of cost accounting accuracy. Compared with traditional ABC, the improved model can significantly shorten the adjustment time and reduce the imbalance of cost control caused by market changes or internal operational problems. Integrated information management tools effectively improve the automation level of enterprise cost accounting, and use the seamless connection between ERP system and cost model to ensure real-time update and efficient processing of data, so that cost control and accounting can be executed more accurately and quickly in an information environment. This integrated framework optimizes the application of traditional ABC and also provides enterprises with a modern cost management tool with higher responsiveness and accuracy.

The improved ABC constructed in this paper can effectively make up for the deficiencies of traditional ABC in flexibility, accuracy and dynamic adaptability, provide enterprises with more accurate and efficient cost control means, and has important practical significance for improving the cost management level of enterprises. With the further development of big data and artificial intelligence technology in the future, improved ABC is expected to achieve more intelligent and automated cost accounting and control, provide enterprises with more accurate and real-time decision support, and promote the comprehensive optimization and innovation of cost management.

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