

## Research Article

# Application of Numerical Deconstruction in Enterprise Economic Management

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The rapid development of the global economy has provided new opportunities for all walks of life and enabled enterprises to develop in an all-round way. Under the multi-faceted competition, enterprises need to improve their comprehensive capabilities, so they need to effectively manage the enterprise economy in the process of enterprise operation. The traditional enterprise economic management model mainly predicts the future enterprise economy by analyzing the enterprise economic status of the previous period, but there are defects such as poor prediction accuracy and low management efficiency. Numerical analysis is the analysis and processing of numerical problems through techniques such as computers. By comparing with traditional management methods, numerical analysis is applied to enterprise economic management. The experimental results show that in terms of employee technical training time and reward innovation, the accuracy of enterprise economic forecasting under the binary regression method is 98%, and the accuracy under the univariate regression method is 61.7%. And the economic benefit brought by the optimal solution under the binary regression analysis is 45.8% higher than that of the single regression method, and the economic management efficiency of the enterprise is 23.5% higher. In terms of enterprise cost input and employee distribution, the method of binary regression applied to enterprise economic management is superior to the univariate regression method in terms of the accuracy of enterprise economic forecasting, the economic benefits, and the efficiency of enterprise economic management. Therefore, the application of numerical analysis in enterprise economic management can predict the development trend of the enterprise economy, ensure the economic benefits of the enterprise, and improve the management efficiency of the enterprise economy.

## 1. Introduction

With the development of social economy, the competition among enterprises is very fierce. If an enterprise wants to have a better development, it must have an excellent enterprise economic management system. Enterprise economic management mainly includes employee management, enterprise technology management, and enterprise economic investment issues. Reasonable and effective enterprise economic management can effectively improve the economic benefits of enterprises, but traditional enterprise economic management often only analyzes the economic trends in the previous period of time. Partial analysis leads to problems such as inaccurate economic forecast trends, slack management, and corporate economic decline. Numerical analysis is an analysis method with

mathematical functions as the main body, and it has a wide range of applications in the fields of predictive analysis, optimal solution, and differentiation. Combine numerical analysis and enterprise economic management, and analyze the indicators in enterprise economic management that affect the economic benefits of enterprises or affect the efficiency of enterprise economic management through numerical analysis. And corresponding countermeasures can be made according to the results of the analysis to improve the efficiency of enterprise economic management and the economic benefits of enterprises. Therefore, this paper has research significance.

With rapid economic development and fierce competition among enterprises, the development of enterprises depends on the economic management of enterprises, and relevant researchers conduct research on the economic

management of enterprises. Among them, Kai's research shows that enterprise economic management can accelerate the speed of economic development of enterprises and better adapt to the competition among enterprises in the new era [1]. Harbar et al. pointed out that enterprise economic management can affect the marketing strategy of enterprises, thereby improving the economic benefits of enterprises [2]. Pasko's research shows that enterprise economic management can make enterprises develop better and stand out in the environment of enterprise competition [3]. Che and Gao have achieved effective economic growth by implementing enterprise economic management measures for enterprises [4]. Zhuravel and Mamontenko set the enterprises with enterprise economic management as the experimental group. He found that in the same time period, the economic growth of the experimental group was faster than that of the enterprises without enterprise economic management [5]. Reasonable enterprise economic management can improve the efficiency of management and make the enterprise develop faster, but it lacks the accurate analysis of computer methods.

Numerical analysis is a way of using computers to solve mathematical problems, applying numerical analysis to enterprise economic management, and analyzing employees, technology, and management models of enterprises. Among them, Wang et al. applied the ant colony algorithm to enterprise economic management, which accelerated the processing of enterprise economic management data and effectively improved the enterprise's ability to integrate resources [6]. Pineyro and Viera used the method of numerical analysis in enterprise economic management for data analysis, which made the data analysis of enterprise economic management more accurate [7]. Li and Hedman pointed out that the method of numerical analysis can maximize the use of internal resources of enterprises, and rational allocation of resources can improve the economic benefits of enterprises [8]. Yang et al. used recursive algorithm to reduce the complexity of enterprise economic management data during the period of enterprise economic management, which can make it easier to analyze the enterprise economy [9]. Renna and Izzo conducted numerical modeling analysis on enterprise economic management to ensure the rational use of enterprise resources and maximize the economic benefits of enterprises [10]. Numerical analysis can well analyze the economic management of enterprises and improve the economic benefits of enterprises, but the methods used in numerical analysis are not optimal.

This paper applies the method of numerical analysis to enterprise economic management, uses regression analysis to clarify the relationship between the evaluation index of enterprise economic management and enterprise economy and enterprise management, and makes numerical and reasonable prediction of enterprise economy. The innovations of this paper are as follows: (1) research on the way of applying numerical analysis to enterprise economic management. (2) Contrast and analyze the traditional enterprise economic management mode and the enterprise economic management mode based on numerical analysis.

## 2. Method of Numerical Deconstruction in Enterprise Economic Management

Enterprise economic management is a management strategy made by enterprises in the face of changing markets and fierce competition among enterprises. Through the data analysis of all aspects of the enterprise, formulate corresponding policies, organize and coordinate the development of all aspects of the enterprise, to reduce enterprise costs, optimize enterprise resource management, and improve enterprise economic benefits [11]. Enterprise economic management is the core of enterprise development. It is very important to develop enterprise economic management. Numerical analysis is a method to solve data problems through computer calculation. Applying numerical analysis to enterprise economic management can improve the management efficiency of enterprise economy. The application model of numerical analysis in enterprise economic management is shown in Figure 1.

As can be seen from Figure 1, the application of numerical analysis to the economic management of enterprises can improve the competition of enterprises in the industry market by changing the management strategies of enterprises. The application of numerical analysis in enterprise economic management requires modeling and analysis of enterprise economic management.

## 3. Enterprise Economic Management Modeling

Enterprise economic management modeling is to analyze the system data source of enterprise economic management, and the impact of enterprise economic management caused by system data changes [12].

*3.1. Enterprise Economic Modeling.* Use gray theory to model and analyze the economic situation of enterprises. Gray theory is a method to study system uncertainty, which can well study the uncertain factors in enterprise economic management. Gray system is divided into white system, black system, and gray system. Since all the data of the enterprise economic management model of the white system are transparent, it is not necessary to establish formulas for it. Model and analyze the enterprise economy of the black system and the enterprise economy of the gray system.

*3.1.1. Enterprise Economic Modeling of Black System.* The structure and state of the enterprise economy of the black system cannot be seen from the outside of the enterprise, which is similar to a black box model. It can only see the input of the system and the output of the change, but cannot observe the data changes within the system and the processing of the system. The steps of enterprise economic modeling of black system are to test the system with large-scale data and study the external input and model output rules of the enterprise economic model by observing the output changes of the enterprise economic system.

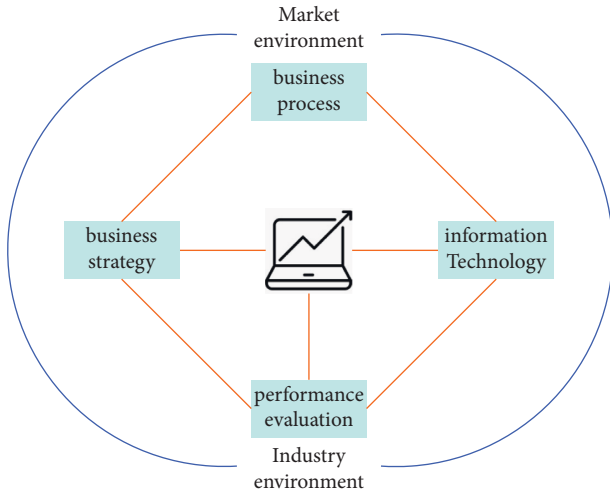


FIGURE 1: Application model figure of numerical analysis in enterprise economic management.

**3.1.2. Enterprise Economic Modeling of Gray System.** Part of the system structure and part of the state of the enterprise economic modeling of the gray system are invisible from the outside, but part of the data of the system can still be observed quantitatively. The enterprise economic management system is just suitable for the analysis of the gray system. Data input to the system can be done by observing the changes in the output, and numerical analysis can be performed on the unknown state and the output of the system. This evaluates the influence of unknown states on the system output [13].

**3.2. Enterprise Economic Management Model.** The structure of enterprise economic management system is diverse, but in a large range, the applicable market of enterprise economic management can be either the international market or the domestic market. There are many input conditions affecting enterprise economic management, such as employee technology and enterprise funds. The output changes of enterprise economic management are product information, enterprise economic benefits, and enterprise management efficiency. The main object of enterprise economic management is the employees of the enterprise. Therefore, the structure of the enterprise economic management model is shown in Figure 2.

## 4. Numerical Deconstruction Techniques

Numerical analysis is the way computer mathematics solves practical problems. It can well analyze the complex data in enterprise economic management. Numerical analysis is a scoped concept, and different mathematical methods are used to deal with different problems. The general numerical analysis methods include iterative method, regression analysis, and differential formulas [14].

In the enterprise economic management model, the main research is the influencing factors within the enterprise and the economic changes of the enterprise. The method of

regression analysis can be used to study the economic management model of enterprises. Regression analysis has an economic form to deal with changes in the enterprise economy, and the regression analysis model is shown in Figure 3.

The steps of regression analysis of enterprise economic management are as follows:

Let the quadratic regression formula of enterprise economic management be expressed as

$$\hat{y} = a_0 + \sum_{j=1}^n a_j s_j + \sum_{i \leq j=1}^n a_{ij} s_i s_j. \quad (1)$$

In formula (1),  $a_0$  represents the constant,  $a_j$  represents the coefficient of the primary variable,  $s_i$  and  $s_j$  represent the influencing factors in the enterprise economic management system, and  $n$  represents the number of influencing factors.

Partial derivative processing of each influencing factor in the enterprise economic management system:

Deal with the first influencing factor of enterprise economic management:

$$\frac{\partial y}{\partial s_1} = a_1 + \left( 2a_{11} + \sum_{j=2}^n a_{1j} \right) s_1 \quad (2)$$

In formula (2),  $s_1$  represents the first influencing factor of enterprise economic management.

Deal with the second influencing factor of enterprise economic management:

$$\frac{\partial y}{\partial s_2} = a_2 + \left( 2a_{22} + \sum_{j=1}^n a_{2j} \right) s_2 \quad (3)$$

Process the  $n$ th enterprise economic management influencing factor:

$$\frac{\partial y}{\partial s_n} = a_n + \left( 2a_{nn} + \sum_{j=1}^{n-1} a_{nj} \right) s_n. \quad (4)$$

Let the partial derivatives of the economic management factors of each enterprise be zero, that is,

$$a_1 + \left( 2a_{11} + \sum_{j=2}^n a_{1j} \right) s_1 = 0, \quad (5)$$

$$a_2 + \left( 2a_{22} + \sum_{j=1}^n a_{2j} \right) s_2 = 0, \quad (6)$$

$$a_n + \left( 2a_{nn} + \sum_{j=1}^{n-1} a_{nj} \right) s_n = 0. \quad (7)$$

Combining formula (2)–formula (7), a set of solutions that optimize the output of enterprise economic management can be obtained.

The traditional linear regression formula is

$$y = as + b. \quad (8)$$

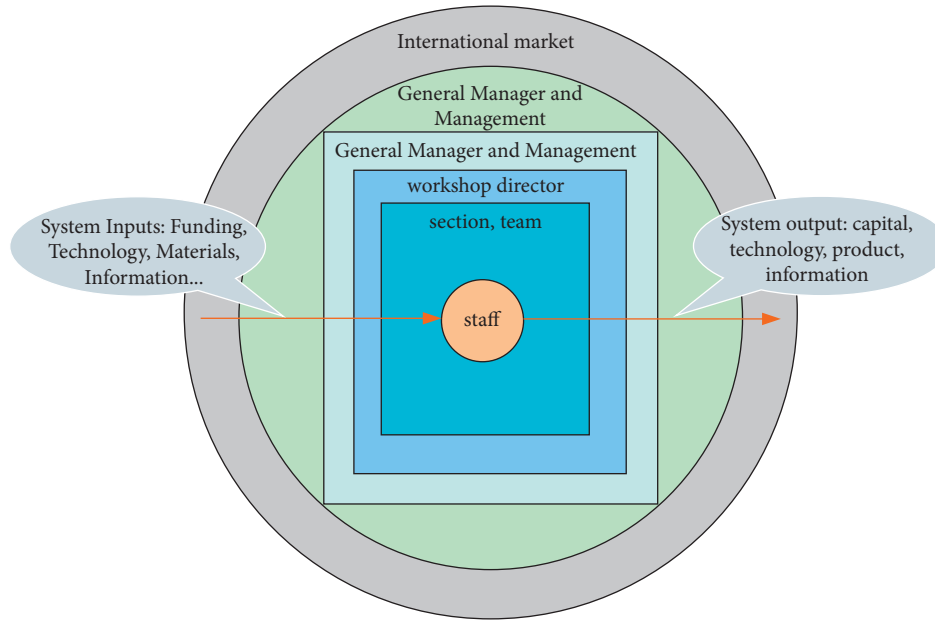


FIGURE 2: Structure figure of the enterprise economic management model.

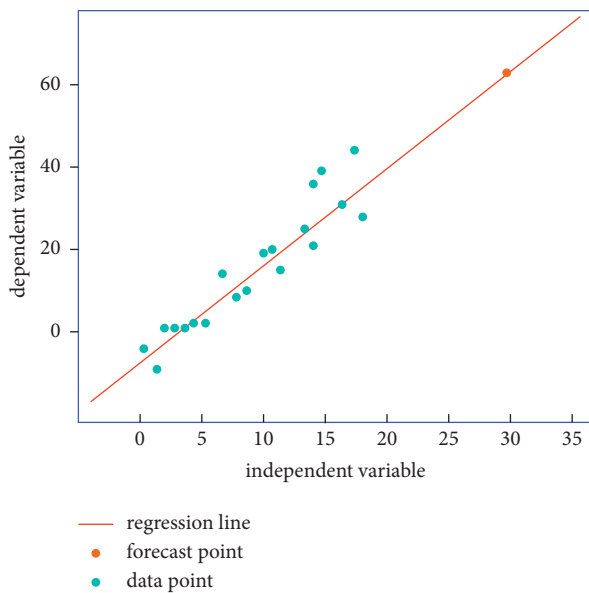


FIGURE 3: Regression analysis model figure.

In formula (8),  $a$  and  $b$  represent regression parameters.

The traditional linear regression formula is prone to local regression due to too few reference factors, resulting in a wrong judgment on the output of the system [15].

## 5. Experimental Design and Results' Analysis

**5.1. Experimental Data.** In order to verify the application of regression analysis in enterprise economic management, the experiment will establish a quadratic regression model and a primary regression model for enterprise economic management, and compare the predictive ability of the two models in enterprise economic management, the economic

benefits brought by the enterprise, and the improved enterprise economic management efficiency [16].

Analyze the influencing factors in enterprise economic management, mainly from the aspects of enterprise employees, enterprise technology, and so on. The experiment randomly selected 50 people to investigate the influencing factors of enterprise economic management. The results of the investigation are shown in Table 1.

In Table 1, the most influential factor is the degree of reward innovation, followed by the time of technical training and the allocation of employees. The working hours of employees and the working environment of employees account for less than 50%. Therefore, the experiment will analyze the factors of enterprise economic management of technical training time, the degree of reward innovation, the investment of cost, and the distribution of employees [17].

In order to fully prove the role of regression analysis in enterprise economic management, the experiment needs to establish indicators for evaluating enterprise economic management capabilities. The experiment randomly selected 30 enterprises of different sizes, and conducted a questionnaire survey on the employees and managers of the enterprises. The index results of the survey and evaluation of enterprise economic management ability are shown in Table 2.

A survey of indicators for evaluating enterprise economic management was conducted on enterprises of different scales. The results in Table 2 show that the average influence ability of enterprise economic benefits in the surveyed enterprises is 81.3%, and the average influence ability of enterprise economic management ability is 83.3%. However, the average influence ability of enterprise investment cost and enterprise technology capability is less than 60%. Therefore, the economic efficiency of enterprises and the ability of enterprise economic management are taken as indicators to evaluate the economic management of enterprises.

TABLE 1: Influencing factors in enterprise economic management.

Serial number	Influencing factors	Number of people	Proportion (%)
1	Technical training time	40	80
2	Reward for innovation	41	82
3	Cost input	38	76
4	Staff allocation	40	80
5	Employee's working hours	20	40
6	Employee's work environment	23	46

TABLE 2: Indicators for evaluating the economic management capabilities of enterprises.

Evaluation indicators	Large-scale enterprise (%)	Medium-sized enterprises (%)	Small business (%)
Enterprise economic benefits	80	82	82
Enterprise economic management ability	89	78	83
Business investment cost	43	35	47
Enterprise technical ability	56	45	62

5.2. *Experimental Design.* The experiment will compare and analyze the enterprise economic management (control group) of univariate regression analysis and the enterprise economic management (experimental group) of multiple regression analysis [18].

The research factors of the experiment are technical training time, the degree of reward innovation, the amount of cost input, and the distribution of employees. The evaluation factors of the experiment are enterprise economic benefit and enterprise economic management ability. The experiment was set up to compare and analyze the control group and the experimental group.

The experimental standard of the experimental group is as follows: carry out binary regression analysis on the factors affecting the economic management of enterprises. The main analysis is the enterprise economic benefit and enterprise economic management efficiency under the regression analysis.

The experimental standard of the control group is as follows: carry out a single regression analysis on the factors that affect the economic management of enterprises.

The experiment analyzed 30 enterprises of different sizes, including 10 large-scale enterprises, 10 medium-scale enterprises, and 10 small-scale enterprises. Two regression analysis methods are used to study the ability of influencing factors to enterprise economic management.

## 6. Results' Analysis

Accuracy of Firm Economic Forecasts for Employee Technical Training Time and Reward Innovation: The technical level of employees and the innovation ability of employees are the key factors to improve the economic development of enterprises. By training employees of enterprises, employees can acquire more skills and implement a reward system for employees, so that employees can work more actively. Through the analysis of the two influencing factors, the experimental group determined the ratio of the two factors to maximize the economic benefits of the enterprise [19]. For this experiment, different staff technical training time and incentives were set up. Table 3 shows the

results of the economic benefits of the employees' technical training time and the degree of reward innovation.

Bring the data in Table 3 into formulas (2)–(7) to obtain the regression parameters of the experimental group, it can be got:  $a_0 = 5.6$ ,  $a_1 = 1.4$ ,  $a_2 = 1.9$ ,  $a_{11} = -1.4$ ,  $a_{22} = -0.9$ ,  $a_{12} = 1.4$ .

The regression formula of the experimental group is obtained as

$$\hat{y} = 5.6 + 1.4s_1 + 1.9s_2 + 1.4s_1s_2 - 1.4s_1^2 - 0.9s_2^2. \quad (9)$$

The control group data can be analyzed to obtain

$$a = 1.3, b = 1.5. \quad (10)$$

The regression formula of the experimental group is obtained as

$$\hat{y} = 1.3s + 1.5. \quad (11)$$

Bring the employee data into formulas (9) and (11), respectively, to obtain the prediction accuracy of enterprise economic benefit obtained by two different regression methods. The prediction results are shown in Figure 4.

As can be seen from Figure 4, in the first four sets of data, the experimental group predicts 100% of the company's economic accuracy, and the latter two sets of data are 98%, which has a very high accuracy of corporate economic prediction. The accuracy in the control group fluctuated greatly, and the accuracy was not high, with an average prediction accuracy of only 61.7%. Therefore, the binary regression analysis based on multiple factors has higher prediction accuracy, which is more conducive to the economic forecasting of enterprises.

Business Economics of Employee Technical Training Time and Rewards for Innovation: In order to analyze the maximization of enterprise economic benefits brought by the time of employee technical training and the degree of reward innovation, it is necessary to compare the economic benefits under the two regression analyses [20]. By solving formulas (9) and (11), it is concluded that the training time of employees in the case of the highest economic benefit of the experimental group is 4.5 hours per week. The reward

TABLE 3: Enterprise economic benefit table.

Serial number	Training period (h)	Reward strength (yuan)	Enterprise economic benefits (million)
1	0	0	1.5
2	8.2	0	1.5
3	0	10.2	2.5
4	3.5	4.3	5
5	8.1	7	6.9
6	5.6	10	7.5

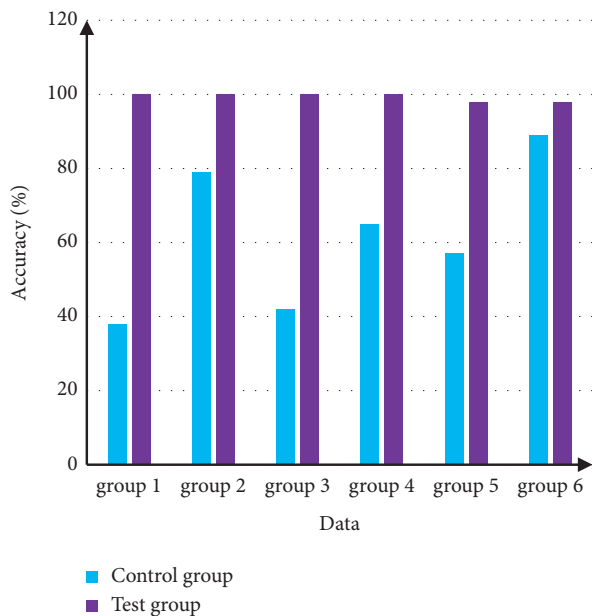


FIGURE 4: Accuracy figure of enterprise economic benefit forecast.

level is 1 yuan per regulation, while the training time of employees in the control group with the highest economic benefit is every 8.1 hours, and the reward level is 7 yuan per regulation. The economic benefits and management efficiency results of the two regression methods are shown in Figure 5.

From the data in Figure 5, it can be seen that under the analysis of the experimental group, the economic benefits of the employee training time and the degree of reward innovation continue to increase. The economic benefits can increase by 72% within six months. While the economic benefit of the control group is not high, with an average of 26.2%. In terms of the economic management efficiency of enterprises, the average efficiency of the experimental group is 63%, while the average economic management efficiency of the control group is 39.5%.

**Accuracy of Enterprise Economic Forecasting of Cost Input and Employee Allocation:** The input of enterprise cost and the distribution of employees are the key to enterprise decision-making. The economy of the enterprise will increase with the increase of cost input, but at the same time, the cost input cannot be wasted [21, 22]. The distribution of employees also needs to be distributed just right. How many employees are configured in a group can make the work efficiency of the enterprise the highest. The experiment sets different gradients of cost input and employee allocation to

observe the changes in the economic benefits of enterprises under different conditions. Table 4 shows the enterprise economic benefits of cost input and employee allocation.

Bring the data in Table 4 into formulas (2)–(7) to obtain the regression parameters of the experimental group, it can be got,  $a_0 = 2.6$ ,  $a_1 = 1.4$ ,  $a_2 = 1.8$ ,  $a_{11} = -0.8$ ,  $a_{22} = -0.6$ ,  $a_{12} = 2.4$ .

The regression formula of the experimental group is obtained as

$$\hat{y} = 2.6 + 1.4s_1 + 1.8s_2 + 2.4s_1s_2 - 0.8s_1^2 - 0.6s_2^2. \quad (12)$$

The analysis of the data from the control group yields

$$a = 1.4, b = -0.4. \quad (13)$$

The regression formula of the experimental group is obtained as

$$\hat{y} = 1.3s - 0.4. \quad (14)$$

Substitute the employee data into two different regression methods to obtain the prediction accuracy of enterprise economic benefits. The prediction results are shown in Figure 6.

It is obvious from Figure 6 that the prediction accuracy of the enterprise economy of the experimental group is much higher than that of the enterprise economy of the control group. The accuracy of the prediction of the business economy of the experimental group was 98.7% on average, while the accuracy of the prediction of the business economy of the control group was only 56.5%.

**Enterprise Economic Benefits of Cost Input and Employee Allocation:** In order to make the investment of the enterprise cost and the distribution of employees to bring the maximum economic benefits to the enterprise, it is necessary to solve the peak value of economic benefits for the two regression methods. By solving formulas (12) and (14), it is concluded that the enterprise cost input when the economic benefit of the experimental group is the highest is 5 million yuan, and the allocation of employees is 7 people in each group. The cost input of the enterprise that maximizes the economic benefits of the control group is 6 million yuan, and the distribution of employees is 10 people in each group. The results of the economic benefits of the enterprise and the management efficiency of the enterprise under the two optimal solutions are shown in Figure 7.

From the data in Figure 7, it can be seen that in the case of the optimal solution of the investment amount of enterprise cost and the allocation degree of employees in the experimental group, the economic benefits of the enterprise

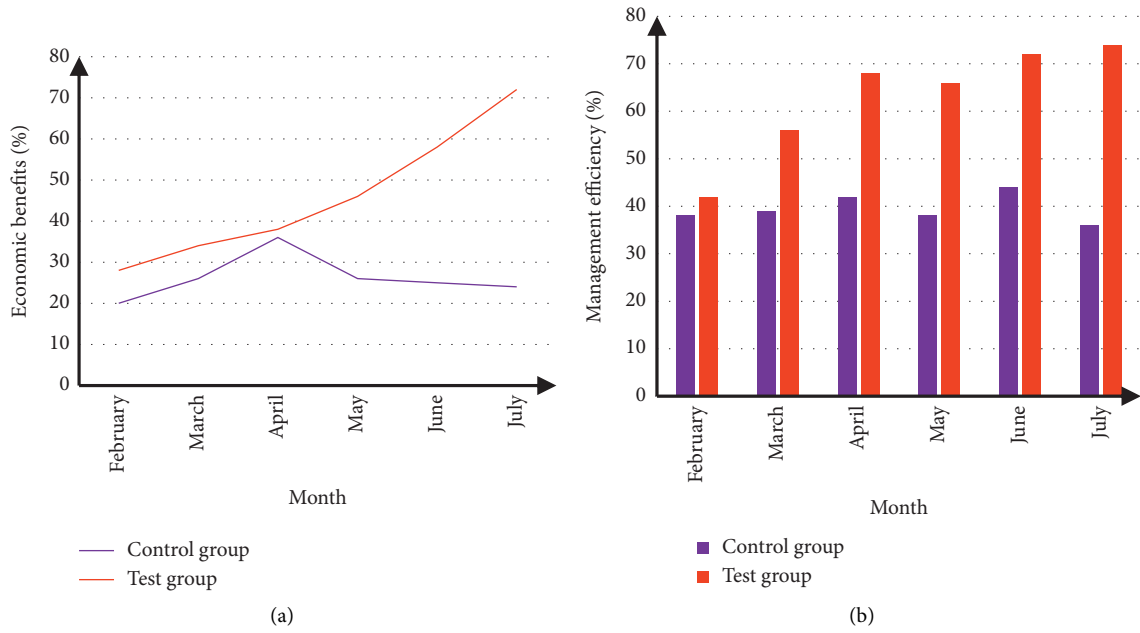


FIGURE 5: Business economics figure of employee technical training hours and rewards for innovation. (a) Enterprise economic efficiency. (b) Enterprise economic management efficiency.

TABLE 4: Enterprise economic benefit table of cost input and employee allocation.

Serial number	Cost input (million)	Staff allocation (person/group)	Enterprise economic benefits (million)
1	1.4	5	1.5
2	1.8	4	1.5
3	2	6	3
4	3	8	5
5	5	7	6
6	6	10	8

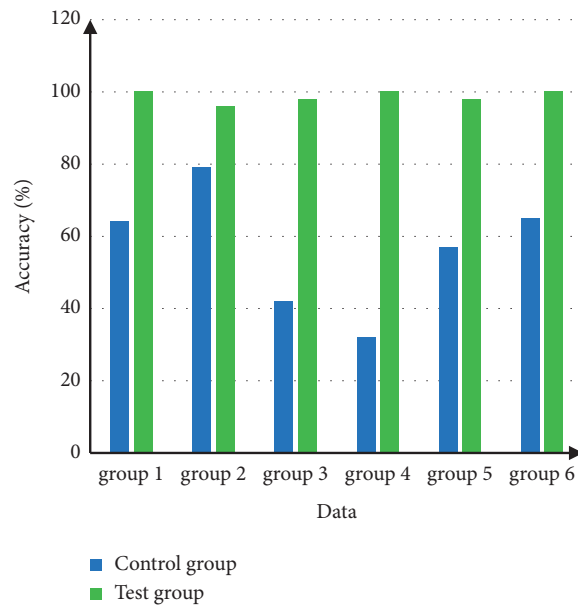


FIGURE 6: Prediction accuracy of enterprise economic benefit under cost input and employee allocation.

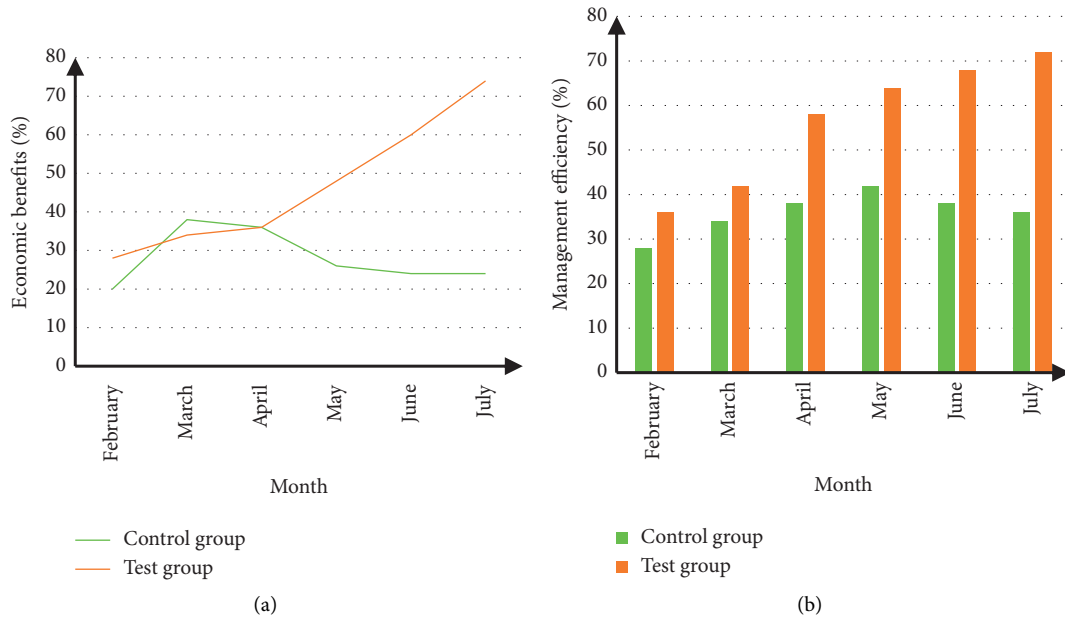


FIGURE 7: Enterprise economic benefit figure of cost input and employee allocation. (a) Enterprise economic efficiency. (b) Enterprise economic management efficiency.

continued to increase in six months, and the increasing trend became larger and larger. The average enterprise economic benefit was 46.7%, while the average economic benefit of the control group was only 28%. In terms of enterprise economic management efficiency, the average enterprise economic management efficiency of the experimental group and the control group is 56.7% and 36%, respectively. Therefore, the application of binary regression method to enterprise economic management can bring more economic benefits and improve the management efficiency of enterprise economic management.

## 7. Conclusion

In this paper, an experimental group is set up to compare the binary regression method and the univariate regression method applied to enterprise economic management. By comparing the economic management of enterprises in four aspects, the time of technical training, the degree of reward innovation, the input of cost, and the distribution of employees are compared. The test results show that the accuracy of enterprise economic forecasting of employee technical training time and reward innovation degree under the two regression methods is 98% and 61.7%, respectively. And the economic benefits and management efficiency of the optimal solution under the binary regression analysis are far better than those of the single regression analysis method. In terms of enterprise cost input and employee allocation, the accuracy of enterprise economic forecasting of the two regression methods is 98.7% and 56.5%, respectively. The economic benefit brought by the optimal solution under the binary regression method is 18.7% higher than that of the single regression method, and the economic management efficiency of the enterprise is 20.7% higher. The application

of binary regression method to enterprise economic management can ensure the economic benefit of the enterprise and improve the management efficiency of the enterprise, but there are not many numerical analysis methods used in this experiment. Therefore, expanding different numerical analysis methods to apply to enterprise economic management will be the direction of future research.

## Data Availability

The data used to support the findings of this study are available from the author upon request.

## Conflicts of Interest

The author declares no conflicts of interest.

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