Production Enterprise Operation Information Decision Analysis Based on Data Feature Analysis

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Abstract. With the advent of the era of big data, digital technologies such as the industrial Internet, big data, artificial intelligence, and cloud computing have been popularized. Digitalization and technological innovation have injected new impetus into economic and social development, have greatly improved information processing capacity and efficiency of information use, and have become a new engine driven by innovation. Manufacturing enterprises need to make operational information decisions to eliminate externalities and uncertainties when carrying out technological innovation activities. It needs to constantly increase financial support, and establish and improve R & D support system to improve the ability of independent innovation of enterprises. However, the low conversion rate and low efficiency of resource utilization are still the problems faced in the process of technological innovation. By analyzing the characteristics of data information in the operation of manufacturing enterprises, this paper matches the characteristics of operation indicators with the characteristics of enterprise products and completes the decision-making and positioning prediction of products. It analyzes the market from the index weight, integrates the advantage index, and accurately locates the market target. Let the market position optimize the product characteristics twice. The experimental analysis verifies that the model studied in this paper can be evaluated according to the enterprise operation data and operation indicators, and the corresponding index weights are given. Through this evaluation system, we can grasp the information of enterprise operations and better serve enterprises, so that products and services can have their space and value in a specific target market.

Keywords-Production enterprise, Operation index, Digital model, Characteristic index

1. Introduction

The development of the digital economy has brought new changes to the economic environment. As a new factor of production, data has been integrated into production, breaking the circulation barriers of traditional factors in different regions. Meanwhile, it also intensifies market competition and changes the management mode of enterprises. The high requirements of digital technology on laborers and the application of digital technology are conducive to optimizing the human capital structure of enterprises, accelerating the operation efficiency of enterprises. It also realizes the comprehensive improvement of the production and operation efficiency and R&D efficiency of enterprises [1]. Industrial policy changes managers' behavioral preferences mainly by influencing market hot spots, which is to change the direction of enterprise

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management. Driven by speculative psychology, some enterprises will change their original business decisions according to the changes in industrial policies in order to obtain more social resources. As a supply-oriented industrial policy, government subsidies provide direct subsidies or indirect policy support for enterprises, which can stimulate enterprises to increase R&D input and expand production. It has a direct positive promoting effect on enterprise business performance [2].

The core concept of enterprise operation information decision-making is service intelligence, which refers to the continuous improvement of business processes related to customer relationships, such as pre-sales customer service, technical support, precise customer service, personalized solutions, after-sales service implementation, remote online management and offline after-sales service, through in-depth mining of key data and big data analysis [3]. Literature [4] holds that enterprise operation information decision-making means that "through continuous in-depth communication with customers, enterprises understand the direct and potential needs of customers and influence the final behavior of customers through professional guidance, which is to obtain more potential customers, retain more existing customers and establish highly dependent customers." It also creates a more abundant profit space for customers. The enterprise operation information decision management system is a key tool for the company to implement customer relationship management and customer transaction-related strategies. The market value provided by the enterprise operation information decision management system for the company can be analyzed under the framework of the company's marketing customer relationship management strategy. Literature [5] holds that when a company implements customer relationship management, it can adopt the following two strategies-differentiation competition strategy and cost leadership strategy so as to improve customer satisfaction and marketing effectiveness. Reference [6] establishes customer relationship management. Taking economic value as the primary factor to screen customers, the purpose of enterprise operation information decision-making is to screen out customers with high economic value, distinguish customers with low economic value or even shield customers without economic value.

In view of the manufacturing enterprises with a large base of operation information and huge total indicators, this paper uses data characteristics to analyze the impact of enterprise operation information on its business performance. Through the huge amount of information brought by the enterprise operation information decision-making system, the Internet data mining function of big data analysis and customer service, precision marketing, and other aspects can be realized. It intends to play a more active role in improving efficiency, increasing enterprise performance, and improving customer satisfaction.

2. Enterprise operation information feature model

In this paper, the enterprise adopts the data characteristic analysis system as the exogenous shock to construct the double difference method (DID) model, as shown in Figure 1.

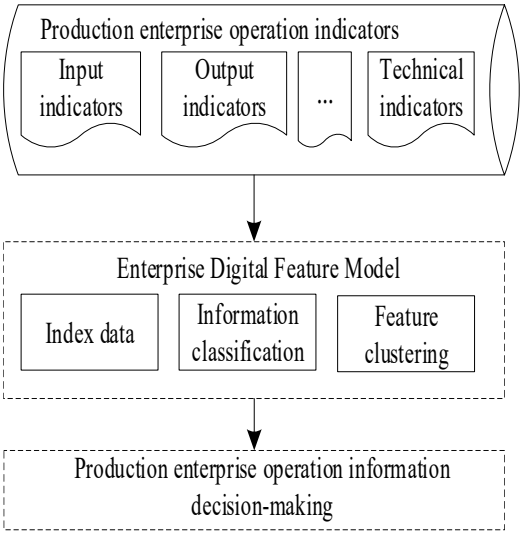

Figure 1 Enterprise operation information feature model

To identify the impact of data characteristic analysis system on enterprise performance, considering that the adoption time of different enterprises is not consistent, this paper constructs a progressive DID model to reveal the causal relationship between the two:

$$\lambda_{fn} = x_1 + x_1 \mu_{fn} + \theta_{fn} \tag{1}$$

Where, λ_{fn} is the performance of enterprise f in time period n. x_1 is the dummy variable, which indicates the data characteristic analysis system adopted by the enterprise, otherwise, it indicates that it is not adopted in year t. μ_{fn} is the control variable. This paper mainly selects corporate financial indicators and corporate governance indicators [6]. Considering that the multi-level economic development and the degree of informatization will have an impact on corporate performance and whether to adopt data characteristic analysis, this paper also controls some control variables at the municipal level. θ_{fn} is the fixed effect at the individual level of the enterprise. It is used to control the influence of the factors that do not change over time at the individual level of the enterprise on the enterprise performance [7]. If the coefficient is greater than 0, it means that the customer relationship management system improves the enterprise's performance compared with the enterprises that do not adopt the customer relationship management system.

An important prerequisite for using the double-difference method is to satisfy the assumption of parallel trend, that is, before implementing the data characteristic analysis system, the changing trend of enterprise performance of the treatment group enterprises and the reference group enterprises is consistent. To test whether the parallel trend can be realized, we refer to the existing articles and expand the model through the event analysis method., which is to establish a dynamic difference-in-differences model [8]. The model can not only test the parallel trend of enterprise performance of the reference group and the treatment group before the

implementation of data characteristic analysis, but also observe the dynamic effect on enterprise performance after the implementation of data characteristic analysis. The specific model is constructed as follows:

$$\lambda_{fn} = \alpha 1 + \sqrt{\theta_n^{t-1}}^{fn} + \sqrt{\mu_n^{t-1}}^{fn} + \eta_{fn}^{t} + \phi_{fn} \tag{2}$$

Where, $\sqrt{\mu_n^{t-1}}^{fn}$ is the antecedent of period $t-1$. The purpose of setting the antecedent is to test whether the enterprise performance of the treatment group and the reference group has the same change trend before the implementation of the data characteristic analysis system. If ϕ_{fn} is not significant, it means that there is no significant systematic difference between them before the implementation of the data characteristic analysis. The parallel trend hypothesis is established [9]. If ϕ_{fn} is significant, it means that the enterprise still has an impact on the enterprise performance after the implementation of the $t-1$ phase of the data characteristic analysis system. Other variables are set to be consistent with the model.

3. Simulation test analysis

3.1. Simulation environment parameters

In this paper, the impact of the cost characteristic quantity borne by the product owner in the operation of the manufacturing enterprise on the manufacturing enterprise in different market situations includes the impact analysis and discussion of the optimal decision and performance of the sales price, market demand, sales price and sales quantity of the product market [10]. The public parameter settings are displayed in Table 1.

Table 1 Setting of experimental parameters

Index	parameter
x	$[0,1]$
μ	0.5
θ	$[0,t]$
ϕ	3

Therefore, to meet the market situation that the production enterprise only owns the product and does not provide product sales in the product market but all for product sales, the impact of cost characteristic quantity on the number and profit of production enterprises is analyzed [11].

3.2. Analysis of experimental results

(1) The impact of the manufacturing metrics data feature

The calculation results of manufacturing index data are displayed in Figure 2.

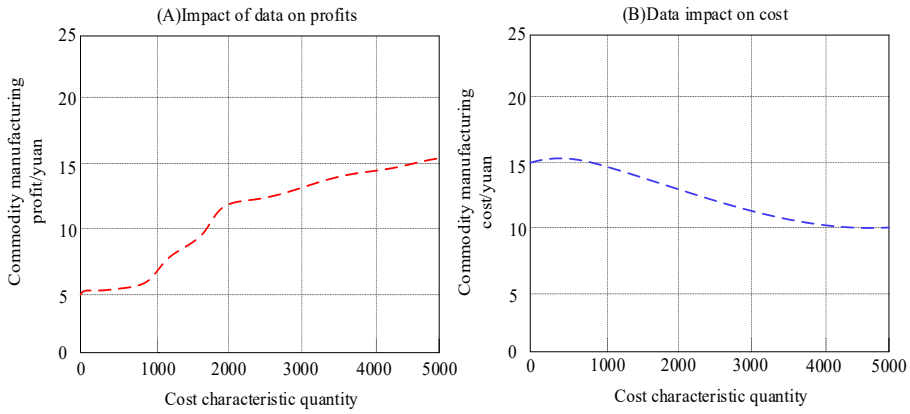

Figure 2 Manufacturing metrics data impact results

In Figure 2, with the increase of the operation characteristic quantity of the production enterprise, the sales amount of the product gradually increases, and the manufacturing cost of the product input by the production enterprise gradually decreases [12]. Therefore, the characteristics of financial data will lead to the proportional impact of product cost and profit, which has a decisive impact on business operation decisions.

(2) Influence of market supply and demand index data characteristics

Manufacturing enterprises only have the product market. Through calculation, the market situation of all products for sale is provided. The impact of market supply and demand index data characteristics on the product sales of manufacturing enterprises is analyzed. Figure 3 describes the impact of changes in the characteristics of market supply and demand data on the sales changes of manufacturing enterprises in the market. See Figure 3.

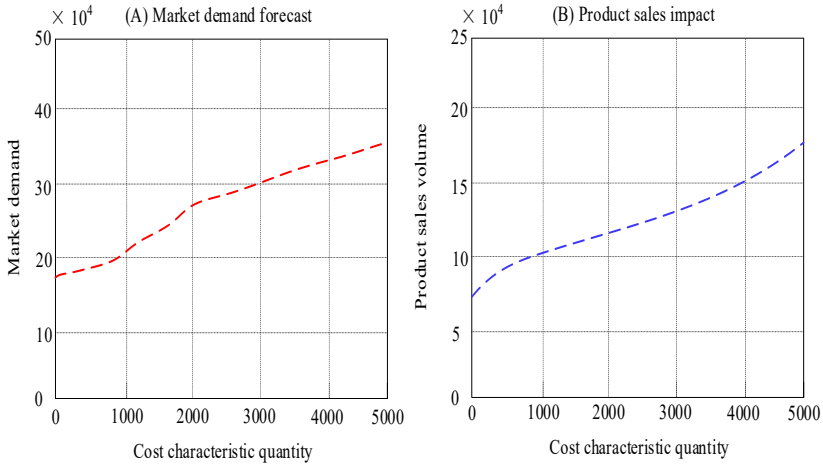

Figure 3 Impact of market sales index data

In Figure 3, the impact of changes in market supply and demand data characteristics on product market demand is that the product market demand of manufacturing enterprises will increase with the increase of market supply and demand data characteristics. When the output of products is increased, the change in sales price will be caused to a certain extent, which will further affect the subjective evaluation of consumers on the products sold, and make them choose more products from their enterprises.

4. Conclusion

In this paper, the numerical simulation of the manufacturing industry market model results is carried out. According to the research needs combined with the literature, reasonable parameter values are set. By changing the size of the relevant parameter values, the change curve of the key parameters of operational decision-making is simulated. Theorems and inferences are verified. The impact of relevant parameters on optimal decision-making and performance is analyzed so as to test the rationality and accuracy of the model. The setting of model parameters should not only meet the requirements of model assumptions, but also be related to reality and have practical reference significance.

This paper only analyzes the impact of operational information decision-making on technological innovation efficiency from the overall perspective of production enterprises through the panel data model. Data decision analysis will have spatial effects on the efficiency of technological innovation of manufacturing enterprises. In future work, the study can try to introduce spatial econometric methods to analyze the spatial effects of various information characteristics of enterprises in depth.

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