Research Article

Construction of Mathematical Model of Enterprise Marketing Economic Analysis Based on Neutral Analytic Hierarchy Process

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With the gradual opening of the market, the overall development of Chinese enterprises is "rapid development, gradual improvement of industry status, and promising prospects." Not only the development of Chinese local enterprises is getting better and better, but also a large number of foreign-funded enterprises are pouring into the domestic market, and the competition pressure on domestic enterprises is increasing. The purpose of this study is to study the effect of neutral AHP on the establishment of the mathematical model of enterprise marketing economic analysis and to use the method of structural judgment matrix and hierarchical structural model to put forward a concrete practical analysis of enterprise marketing cost and business performance. The experimental results of this study show that the establishment of an enterprise marketing economic mathematical model based on AHP can help group companies maintain an annual revenue growth rate of more than 5.8%, while the annual revenue economic growth rate is less than 5% for companies that establish a mathematical model.

1. Introduction

Enterprise management is an important activity to promote the development of the socialist market economy. It plays a very important role in improving people's quality of life, safeguarding national security, and promoting social and economic development and progress. It is an important part of the market economy. At this stage, our country's major small and medium-sized enterprises are showing a development trend of "fast development, steady growth, and good prospects." However, the rapid development of large and medium-sized enterprises is also accompanied by problems such as a large number of enterprises, small scale, lack of concentration, strong innovation ability, market chaos, and low profits. The main reason is that the enterprise marketing model is outdated and relies on an extensive imitation and development model, which leads to the occurrence of market chaos and commercial bribery in the industry. On the other hand, more and more large foreign enterprises have entered the Chinese market, the competitiveness of local enterprises

is insufficient, and the competitive pressure on Chinese enterprises is gradually increasing. The transition of the economy from a stage of high-speed growth to a stage of high-quality development is a distinctive feature of socialism with Chinese characteristics entering a new era, and it is also a historic change ushered in by China's economic development. In order to regulate the market behavior of Chinese enterprises and effectively improve industrial problems, the Chinese government has issued the latest market economic system reform policy. The implementation of the new market economy system reform policy will promote the optimization and upgrading of Chinese enterprises, and the reform from organizational structure to business strategy will be fully implemented.

The main content of the new economic system is as follows: on the basis of centralized leadership and departmental management, we expand the autonomy of enterprises in operation and production, adopt the method of combining economics and administration to manage the economy, and gradually transition to economic

management, economic strengthening of the role of economic leverage, and material stimulus.

With the reform of China's market economy system, more and more enterprises use AHP to study the economic development of enterprises. At present, the overall situation of China's economic development is good. The economic growth has changed from policy stimulus to independent growth in an orderly manner and continues to develop in the expected direction of macrocontrol. The AHP emerged as a system analysis method in the 1970s. This method is mainly suitable for analyzing complex systems, especially those that are difficult to describe. At present, the domestic enterprises' research on the establishment of the mathematical model of enterprise marketing economic analysis is not perfect. This thesis is mainly based on the research on Chinese enterprises, using AHP to establish a systematic and scientific mathematical model of business marketing economics to help Chinese enterprises improve the competitiveness of their production and operation activities.

With the continuous development of society, more and more people have studied the mathematical model of constructing business marketing economic analysis. Among them, most choose to use AHP to study such large-scale mathematical models. Felber et al. developed a self-administered questionnaire using the analytic hierarchy process (AHP) in a medical study. Data collection was carried out in group discussions using a paper questionnaire supported by an item response system. To evaluate patient-related outcomes, an eigenvector approach was applied [1]. In one experiment, Al Qubaisi et al. established a standard weight and developed a method commonly referred to as school inspection by comparing the output of the school inspection with the model output in a sample of schools by using an AHP-based framework in the experiment, school performance system. [2]. In the practical application of the neutrosophic analytic hierarchy process, Neumaier S takes full advantage of the neutrosophic analytic hierarchy process (AHP) to promote the integration of various data quality dimensions and end-user preferences and develops an open data portal quality (ODPQ) framework, enabling end users to easily and realistically evaluate/rank open data portals [3]. In terms of disaster prevention, Wang et al. developed a new evaluation model based on fractal theory and improved the analytic hierarchy process (IAHP) to predict the possibility of water inrush, thus greatly reducing the damage of sudden water inrush to enterprises and work and causing serious injury to personnel [4], of course, not only in disasters but also in the application of grading methods in urban construction. The Ahmed et al. study proposes an objective-based AHP process in which pairwise comparison values are assigned based on field data collected from the Mumbai road network, which consists of 28 road segments. The final ranking table of candidate road segments takes into account the priority weights of candidate road segments and reflects road conditions. This research method largely solves the problem of inaccurate subjectivity of urban road maintenance prioritization [5]. Of course, the accuracy and advancement of the method in the actual process provide an important guarantee for our practice, but a correct and

advanced mathematical model is also more conducive to the success of our practice. Zagzoule and Marc-Vergnes established a mathematical model of the cerebral circulation and applied this model to simulate the network of the entire cerebrovascular system, including the carotid and vertebral arteries to the sinuses and jugular veins. This model is also used to study autoregulation during arterial hypotension, so as to obtain the close relationship between cerebral blood flow and capillary pressure [6]. Not only that, in enterprise production, in order to effectively and accurately control the influence of tipping paper, and tipping paper and cigarette paper parameters on cigarette tar rate, Yin et al. established a mathematical prediction model of projection tracking regression (PPR). It is compared with a traditional multiparameter regression model. Finally, practical comparisons show that the PPR model is more accurate than the traditional model [7]. Mathematical models are scientific or engineering models constructed using mathematical logic methods and mathematical language. Although experts and scholars have adopted the state-of-the-art methods and techniques in the above practices, these techniques have long iterative update times and are not fully applicable to most of our practices.

For the economy to develop, enterprises must go first. In China, the business activities of enterprises are the embodiment of the prosperity of China's market economy. The innovation of this study is that the company uses the analytic hierarchy process to study the construction of the mathematical model of enterprise marketing economic analysis. This approach is neither the ordinary use of high-level mathematical thinking, nor it is solely derived from the behavior and logical reasoning. Mathematical modeling is a process by which pure mathematicians (referring to mathematicians who only know mathematics but do not understand the application of mathematics in practice) become physicists, biologists, economists, and even psychologists. The AHP is more about combining multiple methods to decompose a large and incomprehensible system, which is more conducive to acceptance. Moreover, this method can also decompose difficult problems into multilevel monocular problems and then achieve relatively simple calculations through simple data comparison. The calculation is simple, and the obtained results are simple and clear, which is convenient for decision-makers to understand and master.

2. Construction of the Mathematical Model of Business Marketing Economic Analysis Based on Neutral AHP

2.1. N-Neutrosophic AHP Process. The AHP incorporates complex and multipurpose decision-making problems into the system, divides them into multiple benchmarks, decomposes some benchmarks, obtains some goals and benchmarks after decomposition, and finally obtains the hierarchical order through fuzzy quantification and a systematic approach to determine the meaning of the target [8]. The AHP mainly decomposes the decision-making problems

required by various hierarchical structures such as main objectives, secondary objectives, evaluation criteria, and specific investment plans. After the various hierarchical structures are split, the method of solving the inherent vector of the determined matrix is used to obtain the priority between different levels. Finally, the one with the highest weight is considered the best solution [9].

2.1.1. Construct Judgment Matrix.
For a goal, we compare the programs within it and then rank them according to the degree of importance achieved. The division of grades is conducive to quantitative evaluation, and also makes the cultivation and development oriented. Generally speaking, it is more common to divide an indicator into 4–5 grades.

$$a(xy) = \frac{1}{a(xy)}. \tag{1}$$

Among them, $a(xy)$ is the result of comparing the importance of element x and element y.

2.1.2. Hierarchical List Sorting and Its Consistency Check.
Carbon monoxide is a carbon-oxygen compound with a chemical formula of CO and a molecular weight of 28.0101. It is usually a colorless, odorless, and tasteless gas. The consistency index is calculated in CO, and the smaller the CO, the greater the consistency. The consistency index is defined as follows:

$$CO = \frac{\lambda - n}{n - 1}. \tag{2}$$

Among them, CO = 0, and there is 100% consistency; CO is close to 0, and there is greater consistency; and the greater the CO, the lower the consistency. To measure the size of CO, a random consistency index RI is introduced in the following:

$$RI = \frac{CI_1 + CU_2 + \cdots + CI_n}{n}. \tag{3}$$

Because the reasons for the smaller consistency may be caused by chance, in the method of verifying whether the judgment matrix has the larger consistency, the CO and TY should also be compared to obtain the consistency of the test. For the coefficient OP, the formula is as follows:

$$OP = \frac{CO}{TY}. \tag{4}$$

2.1.3. Zhongzhi AHP Hierarchical Model.
The first problem to be solved by the AHP is to establish a hierarchical model of the decision-making problem and, through some investigations, clarify the relationship between the scope of the decision-making problem and the objectives and various factors [10]. Then, elements of the same category are grouped according to the relevant criteria. Then, through other criteria, the unclassified factors are sorted and aggregated according to relevant rules [11]. The following plans are the ones that decision-makers must choose, and

the central plan represents several intermediate links. Analytic hierarchy processes usually start from the high level of the hierarchical process, go through multilevel benchmarks and low-level benchmarks, and reach the lowest level of the program level [12]. In a layered model, action lines represent connections between upper and lower layers, as shown in Figure 1.

2.2. Mathematical Model

2.2.1. Mathematical Model Expression Based on AHP.
The AHP model mainly solves evaluation problems. Evaluation problems can be solved in a form of scoring, which will involve weights. This weight can be understood by the degree of importance. In the end, the sum of the weights of all solutions is 1. The weights are normalized. Under the relevant conditions of a certain area, different types of customers have their own characteristics, and their sales concepts will also have different preferences due to individuals, resulting in a large number of text messages often containing various concepts. To make the classification of customers more difficult [13], and to better represent the user's mathematical model, the weights of topics in documents are calculated. In this section, we label each record in the data as Y, which can be represented by the following formula:

$$Y = \{(x1, y1m)(x2, y2m)(x3, y3m) \ldots \ldots (xi, yim)\}. \tag{5}$$

Among them, xi represents the keyword abstract extracted from m. The meaning of yim is the relative importance of keywords in m. For Y, the importance of the subject heading can be recorded as follows:

$$xfv = \frac{freqv}{\max i(freqv)}. \tag{6}$$

In the formula, $freq$ represents the number of times the ordinal a is in the interest class y. max ($freq$) represents the maximum term frequency of the subject term in y. The frequency of occurrence of the subject word a in a document can be calculated by the following formula:

$$fa = \log \frac{Wa}{wa}. \tag{7}$$

In the above formula, Wa refers to the number of evaluation records in the dataset, and wa refers to the number of data items containing the subject word a. Therefore, the relative importance of feature word a in the entire data record can be formalized as follows:

$$Pv = afv * fa. \tag{8}$$

Using cosine similarity to calculate the similarity of two pieces of information, we use the formula to express the following:

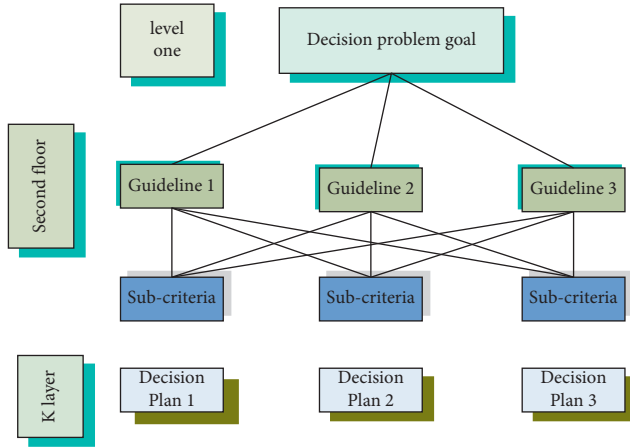$$\cos(\theta) = \frac{a * b}{\|a\| * \|b\|}. \tag{9}$$

FIGURE 1: AHP hierarchical model.

The formula performs a normalization process in the model, assigns a value of 1 or 0 to the target layer, and then uses this value as a weight to assign to different factors. The weight of the corresponding factor represents the importance of the factor in the entire selection process.

2.2.2. Enterprise Product Attribute Modeling. We propose modeling based on the features of each attribute of enterprise products [14]. For all users who visit the company's experience store or online store, it is worthwhile for the relationship between them to lead to the user's interest, which means that if user A is very interested in a product, a product that is very similar to this product will make the customer favored [8]. M finds the nearest candidate set recommended by the top according to the nearest-neighbor function. The nearest-neighbor learning is not to estimate the objective function in the whole sample space at one time but to make a local objective function approximation or estimation for each sample to be tested, as shown in Figure 2.

2.3. Corporate Marketing. Corporate marketing refers to the business activities of a company to sell its own products or merchandise to customers. Enterprise marketing also needs to spend a certain amount of marketing costs on the production activities of the enterprise [15].

2.3.1. The Marketing Cost Is Divided into Two Aspects: The Total Marketing Cost and the Cost of Each Marketing Activity. The basic fitting multiple linear regression model includes the following two forms:

$$PF = \alpha + \beta_1 MC + \beta_2 Scale + \beta_3 Socon + \varepsilon,$$

$$PF = \alpha + \beta_1 AD + \beta_2 PR + \beta_3 PS + \beta_4 Scale + \beta_5 Scale + \beta_6 Socon + \varepsilon.$$

(10)

The PF is corporate performance. MC is the total marketing cost. AD is advertising expense. PR is PR cost. BP is the cost of business promotion. PS is the cost of sales of personnel. Size is the size of the company. Socon is the ownership concentration, and α is the model. The intercept and β are the regression coefficients for the corresponding study variables, and ε is the error value [16].

2.3.2. Marketing Costs and Operating Performance of the Company. From the test results in Table 1, we can see that a company's total marketing costs have a positive impact on operating income. Through marketing activities, companies can improve their business performance to a certain extent. Therefore, enterprises should attach great importance to marketing strategies in their daily operations. We develop a scientific and reasonable marketing budget [17].

3. Experimental Process and Result Analysis

3.1. Economic Analysis of Enterprise Marketing. Usually, enterprises should classify the internal simulation marketing market-binding indicators and comprehensive expansion indicators on a monthly basis, conduct internal analysis and evaluation every month, and identify problems and causes within a certain period of time [18]. The completion analysis of marketing economic quantity mainly compares the actual completed quantity, the accumulated basic marketing economic quantity, and the marketing economic quantity index of the planned overall expansion, confirms whether the planning is completed, and makes some types of comparisons [19]. Categorized marketing economic quantity and indicators: the classified marketing economic quantity determines the status of each classified marketing economic quantity to complete the planned task, the reasons that affect the total marketing economic volume, the planned task or the unfinished task, and then the monthly marketing. The study found that economic plans will provide decision-making reference and a basis for business managers [20].

3.2. Growth of Marketing Economic Volume of Classified Enterprises. The market economic growth analysis is mainly to determine the growth of the total market economy and marketing categories by comparing the actual completed market economic aggregate and category market economy this month with the same period last year [21].

Table 1 shows the growth of the market economy for a company over a two-year period. The company can judge the future development direction of the company by the market economic growth in the past two years [22]. At the same time, data analysis can also be used to find out the problems existing in the process of enterprise development and formulate solutions in time. The specific data are shown in Table 2.

In the marketing process, companies often market in a variety of ways. Through the comparison of the proportion of marketing classification, it can well show the marketing advantages of the company in various aspects and provide a more effective reference for the distribution of the company's marketing methods. As shown in Figure 3, the proportion of a company's product marketing volume is as follows.

It can be concluded by analyzing Figure 3. The company accounts for a large proportion of live broadcast marketing,
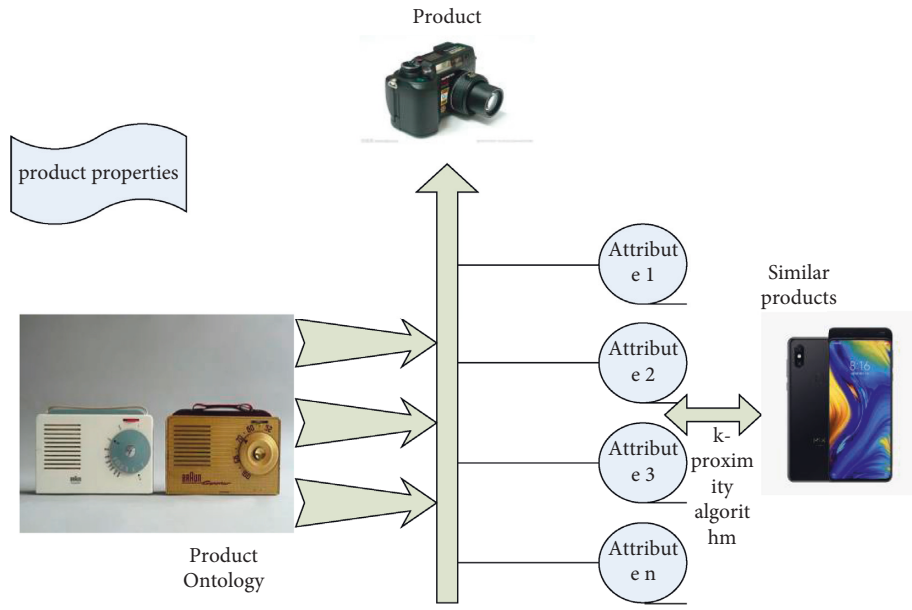
FIGURE 2: Enterprise product attributes.

TABLE 1: Whole sample analysis.

Independent variable	Model (1)	VIF
MC	$0.33^{\wedge\wedge\wedge}$ (14.96)	1.14
Scale	$0.68^{\wedge\wedge\wedge}$ (29.49)	1.03
Sokon	0.03 (1.42)	1.08
R^*R	0.85	
Adjust $-R^*R$	0.85	
F-statistic	$874.39^{\wedge\wedge\wedge}$	
Observe the sample	468	

$^{\wedge\wedge\wedge}$, $^{\wedge\wedge}$ and $^{\wedge}$represent the significance levels of 2%, 6%, and 12%, respectively; () is the estimated m value of the parameter.

and the company can increase its live broadcast efforts to promote the sales of the company's products.

3.3. The Changing Trend of Marketing Economic Quantity Based on AHP. By comparing the marketing economic volume data of a company this year and judging the changing trend of the marketing economic volume in the current month, we can roughly understand the evolution of the marketing economic volume this year. In addition, by comparing the data trend of the same period, compared with the data of the same period last year, we can know the monthly growth of the market economy, as shown in Figure 4.

Through the analysis of the results in Figures 4 and 5, it can be concluded that due to the rapid development of online shopping and live streaming, especially some large e-commerce companies are often affected by the activities of online shopping platforms, and the market economy of these companies often fluctuates. Therefore, large-scale online e-commerce companies should always pay attention to market changes, implement online sales platform policies, and prescribe the right medicine to achieve the goal of sustainable growth in supply and sales. At the same time,

with the deepening of the reform of the national market economic system, most of the enterprises in our country are prosperous, and their economic income is also increasing year by year.

4. Discussion

4.1. Average Unit Price of Enterprise Marketing Economy. The average unit price of an enterprise's market economy is an important indicator that affects the economic benefits of an enterprise. The average unit price of an enterprise's marketing economy reflects the average price of the entire enterprise's products and is closely related to economic indicators such as product sales, sales revenue, and sales profits. The average unit price of the company's market economy has certain influences and constraints on the company's product revenue and benefits, and comprehensively reflects the company's operating level. Product manufacturers and sales prices of enterprise products must conform to the catalog product prices uniformly formulated by the State Price Bureau. Similar to other countries in the world, our country has also implemented a product classification system for a long time. The corresponding selling price of the product varies with the number of buyers and the quality level of the product. The easy way to sell prices is as follows: customers who do a single catalog product sale price buy the product at a price equal to the price specified in the catalog. It is also very complicated: the price of implementing staged product pricing is different from the price of a single catalog product. The average product price = (flat segment price × flat segment number + peak segment price × peak segment number + valley segment price × valley segment number + basic sales price) price × billing capacity + interest rate adjustment price)/ (number of flat segments + number of peak segments + number of valley segments). Although catalog products for all product categories are uniform and constant,

TABLE 2: Growth of a company's marketing economy.

| Marketing	This month		Cumulative this month		Value added		Growth rate (%)		Part (%)	
	This year	Last year	This year	Last year	This Moon	Grand total	This month	Grand total	Cumulative this year	Cumulative last year
Online store	20	19	560	520	12	56	1.25	0.58	12.45	11.5
On-site delivery	35	25	692	800	20	83	20.5	15.8	37.55	45.5
Physical store	159	150	658	726	64	80	2.5	1.58	25.8	12.7
Group buy	123	105	596	714	63	72	2.9	4.5	24.2	27.3
All	337	299	2506	2760	159	291	27.15	2.46	100	100
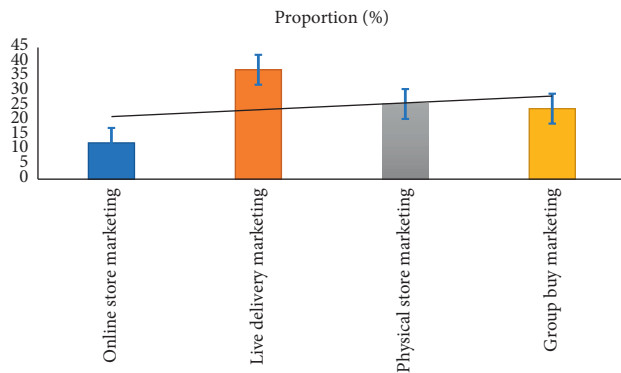
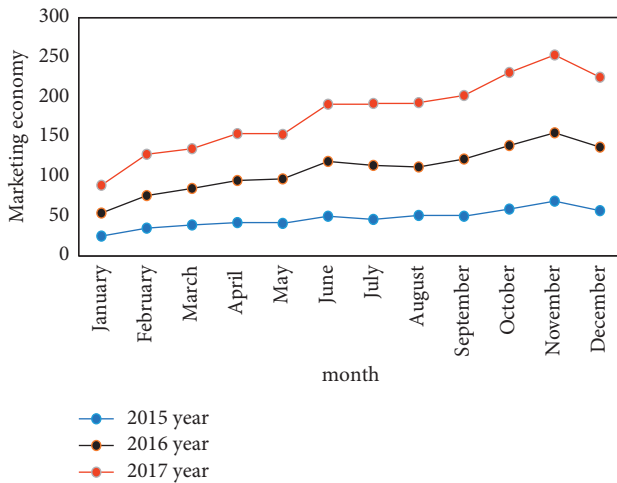FIGURE 3: The proportion of product marketing volume classification.

FIGURE 4: A company's 2015–2017 marketing economic trend chart.

in reality, for product manufacturers, the price of each buyer's product varies with the purchase of customers in that category. At the same time, the total average unit price of products sold varies on a case-by-case basis for each customer. Therefore, when analyzing the average unit price of product marketing, it is very necessary to analyze the classified selling price, unified selling price, and their impact on the average unit price of the entire product marketing. The product marketing revenue and product marketing average unit price mentioned in this study are based on comparable standards.
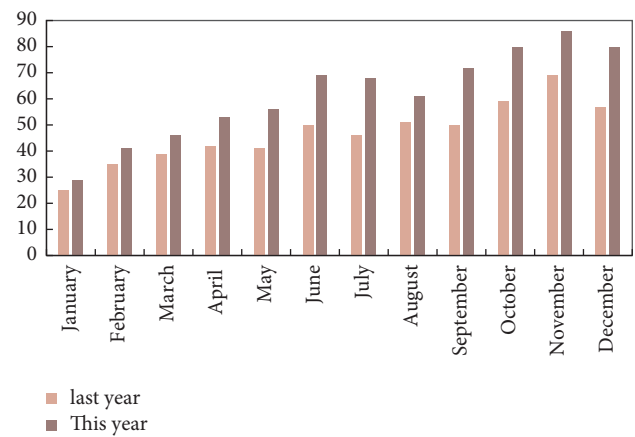

FIGURE 5: Comparison table of marketing economic quantity of enterprises in the same period.

4.2. The Impact of Changes in Product Sales Composition on the Average Unit Price of Products. The formula for the impact of changes in product sales composition on the average unit price of products is as follows:

$$K_{ai} = \Delta ai * (P_{I0} - P_0). \tag{11}$$

From the impact formula, it can be seen that the impact of changes in product sales composition on the average unit price of products depends on the degree of change in the proportion of the sales price of classified products, and the second is the difference in product sales composition, the sales price of the classified products, and the average unit price of the products in the same period. When the sales price of a product in the same period is higher than the average unit price of the product in the same period, the change in the sales ratio of the product will affect the average unit price of the product, and vice versa.

5. Conclusions

A case study of an enterprise shows that using the AHP to analyze the market economy of the enterprise and establish the corresponding mathematical model can not only help the enterprise to further expand the scope of production and operation, but also help the enterprise avoid the problems in daily marketing activities. Some unknown risks further pushed the company to develop in the direction of "higher, farther, and stronger." This study mainly uses the data in the

daily production and operation of the enterprise to make a level comparison, so as to obtain a more scientific and accurate mathematical model, and guide the enterprise to develop in a better direction. Of course, with the continuous progress of the society and the continuous development of the market economy, the marketing activities of enterprises are also facing more and more difficulties, which also guide enterprises to embark on a more scientific and sustainable development path.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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