

# Analysis of Obstacles in Marketing of Small and Medium-sized New Energy Enterprises Based on Fuzzy-DEMATEL Model

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**Abstract.** With the vigorous development of technological revolution and industrial transformation, new energy enterprises have undergone historic changes. In order to speed up the transformation of small and medium-sized new energy enterprises and improve their market competitiveness, this paper studies the marketing obstacles of small and medium-sized new energy enterprises. Through literature review and investigation, this paper determines 22 indicators that affect the marketing of China's new energy enterprises, constructs the method of Fuzzy-DEMATEL (Fuzzy Decision Laboratory Analysis), reduces the defects of subjective scoring through Fuzzy method, and calculates the relationship between the influencing factors in the index system based on DEMATEL. The results show that the key factors hindering the marketing of new energy enterprises are the irrationality of making relevant decisions, the lack of a complete system of marketing management, the lack of awareness of marketing management, and the imperfect marketing system.

**Keywords:** New energy enterprises, Marketing obstacles, Fuzzy, DEMATEL, Factor analysis.

## 1. Introduction

Under the background of energy transformation, countries and regions all over the world regard the development of new energy as an important measure to conform to the trend of science and technology and promote the adjustment of industrial structure. For small and medium-sized enterprises, participating in the new energy track is an excellent opportunity for development. However, there are obstacles in the process of marketing for small and medium-sized new energy enterprises. Therefore, it is of great significance to analyze the marketing obstacles of small and medium-sized new energy enterprises and related solutions. Nowadays, there are many researches in this field.

Sun [1] proposed an improvement based on the 4P marketing mix, and constructed a multi-objective decision-making process model for the marketing mix of small and medium-sized enterprises on the basis of AHP (Analytic Hierarchy Process). Allred [2] evaluated the impact of collaboration on operations and corporate performance through surveys and interviews, proposed cross-functional and supply chain collaboration. Based on the perspective of adaptive marketing capability. Tang [3] empirically tested the influencing factors of marketing performance of e-commerce social platforms through online survey. In the current price competition environment, Bo and Xu [4] measure and analyze the influencing factors of online marketing performance of cross-border e-commerce enterprises, construct the influencing factor system model, and analyze the data through BP (neural network method).

In the past, the research mainly focused on the influence factors of marketing and the analysis of marketing continuity. There are few studies on marketing obstacles, especially on small and medium-sized new energy enterprises. This paper adopts Fuzzy number to express the most value and risk degree of marketing obstacles of related enterprises. The matrix is defuzzified to obtain the centrality and cause degree after fuzzification. Statistical analysis of the interaction between various factors by expert scoring method ; by using the DEMATEL model to construct the influence matrix, and the

effective analysis of the nonlinear relationship between the factors of the complex system is realized, so that the decision makers can further understand the correlation between the internal factors of the complex system, and provide reference for small and medium-sized new energy enterprises to make decisions and better development at the marketing level.

## **2. Construction of Marketing Obstacles System for Small and Medium-sized New Energy Enterprises**

### **2.1. Marketing personnel**

In the comprehensive quality of marketing staff [5], China and other developing countries are generally not high, the development of marketing and marketing strategy implementation will be affected. In the incentive mechanism [6], the salary of marketing personnel is low, and the promotion of cadres is not valued. In the responsibility training, enterprises on-the-job training of marketing staff to reduce employee benefits. Enterprises lack a sound marketing team and the awareness of marketing management is shallow.

### **2.2. Marketing environment**

Initially, the industry resources have not been fully developed and utilized [7]. Secondly, in terms of competitors [8], the defects of R & D cost, experimental conditions, R & D process and production threshold of small and medium-sized enterprises will lead to product price and innovation difficulty. Once more, SMEs understands insufficiently to the market information, grasps inadequately to customer's demand. In addition, the complexity of international relations under the pandemic can lead to weak consumption [9].

### **2.3. Enterprise marketing concept and marketing strategy are backward**

The relevant strategies developed by SMEs in developing countries are unreasonable [7]. It is difficult for SMEs to ensure the synchronization of marketing model and marketing mechanism. Marketing simplification problem: the promotion and application of e-commerce has a serious impact on the traditional marketing activities. Some enterprises lack brand awareness [8].

### **2.4. Internal management mode of enterprises**

Most of the small and medium-sized enterprises are lack of coordination among departments. At this stage, some small and medium-sized enterprises in developing countries have not established sound and independent marketing sectors [8] In addition, the lack of some small and medium enterprises on marketing awareness. Small and medium-sized enterprises fail to innovate their own management mode [10]. SME marketing management system is not perfect.

### **2.5. Service level obstacles**

For some small and medium-sized enterprises, the possibility of introducing advanced technology and high-end equipment is small, resulting in backward technology level, which makes the product quality and service follow-up to solve the problem. In the specific marketing links of enterprises, small and medium-sized enterprises are prone to problems such as too much emphasis on immediate interests and lack of attention to service quality [9].

To sum up, this paper constructs the small and medium-sized new energy enterprise marketing obstacle factors system is shown in Table 1:

**Table 1.** Small and medium-sized new energy enterprise marketing obstacles analysis table

| Grade 1 indicators                       | Secondary indicators                                           | Code     | Explanatory notes                                                                               | References |
|------------------------------------------|----------------------------------------------------------------|----------|-------------------------------------------------------------------------------------------------|------------|
| Marketing personnel                      | Low comprehensive quality of marketing personnel               | $S_1$    | Due to the level of education, career choice and other issues                                   | [5]        |
|                                          | Insufficient incentive mechanism                               | $S_2$    | Marketing staff wages are low, cadre selection is not taken seriously                           | [6]        |
|                                          | Responsibility training not valued                             | $S_3$    | Insufficient funds, on-the-job training is difficult to guarantee                               | [7]        |
|                                          | Lack of team building                                          | $S_4$    | Poor level of coordination and cooperation                                                      | [7], [10]  |
|                                          | Marketing management consciousness shallow                     | $S_5$    | Low loyalty of marketing managers                                                               | [5]        |
| Marketing environment                    | Insufficient development and utilization of industry resources | $S_6$    | Enterprise resources between different industries have not been effectively linked and utilized | [7]        |
|                                          | Competitors under pressure                                     | $S_7$    | Domestic Related Large Industries and Pressure from Developed Countries                         | [7]        |
|                                          | Lack of understanding of market information                    | $S_8$    | Less access to information                                                                      | [10]       |
|                                          | Low efficiency of marketing channels                           | $S_9$    | Small scale, difficult to establish partnerships                                                | [11]       |
|                                          | Weak consumption, financing difficulties                       | $S_{10}$ | In the Context of International Epidemic                                                        | [9]        |
| Marketing Concept and Marketing Strategy | Irrationality of Enterprises Making Relevant Decisions         | $S_{11}$ | Less personnel, unclear division of labor                                                       | [5]        |
|                                          | Marketing management does not constitute a complete system     | $S_{12}$ | Asynchronous Marketing Mode and Marketing Mechanism                                             | [7]        |
|                                          | Time issues                                                    | $S_{13}$ | The impact of E-commerce                                                                        | [5], [10]  |
|                                          | Lack of Brand Awareness in Some Enterprises                    | $S_{14}$ | The actual operation more concerned about the survival and development of enterprises           | [8]        |
| Enterprise internal management mode      | Lack of departmental coordination                              | $S_{15}$ | The personnel responsibility is unknown                                                         | [7]        |
|                                          | Lack of independent marketing department                       | $S_{16}$ | Marketing work confused with other jobs                                                         | [8]        |
|                                          | The marketing system is not perfect enough                     | $S_{17}$ | Seriously inadequate scientific and operational                                                 | [8]        |
|                                          | Lack of innovation in management mode                          | $S_{18}$ | Marketing strategy cannot be formulated according to actual situation                           | [10]       |
| Service level                            | Backward technical level                                       | $S_{19}$ | The introduction of advanced technology is unlikely                                             | [8]        |
|                                          | Poor problem handling ability                                  | $S_{20}$ | Performance in product quality and so on                                                        | [12]       |
|                                          | Lack of Attention and Improvement of Service Quality           | $S_{21}$ | Value immediate interests in specific marketing links                                           | [5]        |
|                                          | Marketing methods are out of touch with social needs           | $S_{22}$ | The pertinence and accuracy of product positioning cannot be guaranteed                         | [7]        |

### 3. Fuzzy numbers

Triangular fuzzy number is a method proposed by Zadeh in 1956 to transform fuzzy uncertain linguistic variables into deterministic values. It is mainly used to solve practical problems such as quality management, risk management and fuzzy programming. Applying triangular fuzzy number to evaluation method can solve the contradiction that the evaluated object can only be evaluated by

natural language and cannot be measured accurately. The triangular fuzzy number is defined as follows:

Define a fuzzy number in the real number field, define a membership function:  $\mu_A(x):R \rightarrow [0, 1]$ , for any  $x \in R$ , there is a number  $\mu(x) \in [0, 1]$  corresponding to it. The expression of membership function  $\mu_A(x)$  is as follows:

$$\mu_A(x) = \begin{cases} 0, & x \leq a \\ \frac{x-a}{b-a}, & a < x \leq b \\ \frac{c-x}{c-b}, & b < x \leq c \\ 0, & x > c \end{cases} \quad (1)$$

The triangular fuzzy number  $A$  is denoted as  $A = (a, b, c)$ , where the real number  $a$ 、 $b$ 、 $c$  represents the minimum possible value, the most possible value and the maximum possible value of the enterprise marketing obstacles; the expected value of the triangular fuzzy number  $A$  is  $E(A) = \frac{m_1 a + m_2 b + m_3 c}{m_1 + m_2 + m_3}$ , where  $m_1$ 、 $m_2$ 、 $m_3$  denotes the risk degree of the enterprise marketing obstacles. After introducing the fuzzy number into the comprehensive influence matrix, the fuzzy comprehensive influence matrix  $M$  is obtained. By calculating the expected value of each item of matrix  $M$ , the inverse fuzzy processing is carried out on the matrix, and then the centrality and cause degree after fuzzification are obtained [13].

#### 4. DEMATEL model construction

DEMATEL (Decision Making Laboratory) is a complex system model proposed by American scholars Fontela and Gabus in the 1970s, which uses graph theory and matrix theory to analyze factors. This method qualitatively judges the interaction between factors in complex systems, and then constructs a direct influence matrix and a comprehensive influence matrix, and calculates the influence degree, influence degree, cause degree and centrality of each factor, so as to reveal the causal relationship of internal factors in the system and identify the key factors in the systems. [14-15]

The operation steps of DEMATEL are as follows:

STEP1: Establish a direct influence matrix

First of all, this paper will analyze the mutual influence relationship between various factors through the scoring method of marketing-related experts, use triangular fuzzy numbers to process semantic variables, and transform fuzzy data into clear scores, to construct a direct impact matrix:

$$V = \begin{bmatrix} 0 & v_{12} & \cdots & v_{1n} \\ v_{21} & 0 & \cdots & v_{2n} \\ \vdots & \vdots & & \vdots \\ v_{n1} & v_{n2} & \cdots & 0 \end{bmatrix} = (v_{ij})_{n \times n} \quad (2)$$

In the formula:  $v_{ij}$  is the direct influence of factor  $i$  on factor  $j$ ;  $i$  is an integer, and the value range is  $1 \leq i \leq n$ ;  $j$  is an integer, the value range is  $1 \leq j \leq n$ , if  $i = j$ , then  $v_{ij} = 0$ .

STEP2: Establishing a comprehensive impact matrix

In the process of using the DEMATEL method to calculate the influence of various factors, the indirect influence part between the factors also needs to be calculated. Therefore, the direct influence matrix  $V$  should be normalized. After obtaining the normalized direct influence matrix  $X$ ,  $X$  is finally added to obtain the comprehensive influence matrix  $Z$ . The steps are as follows:

$$X = \frac{1}{\max_{1 \leq i \leq n} \sum_{j=1}^n v_{ij}} \cdot V(i, j = 1, 2, \dots, n) \quad (3)$$

$$T = X(1 - X)^{-1} = (t_{ij}) \quad (4)$$

STEP3: Calculating impact and impact

$F_i$  is the sum of the rows of the comprehensive influence matrix  $T$ , and  $G_i$  is the sum of the columns of the comprehensive influence matrix  $T$ . The influence degree  $F$  and the influenced degree  $G$  are obtained by row column operation.

STEP4: Computing centrality and cause a degree

The centrality  $M$  represents the importance of the factor in the system, which is equal to the sum of the influence degree  $F$  and the influenced degree  $G$  of each element in the comprehensive influence matrix  $T$ . The reason degree  $N$  represents the degree of causal logic relationship between the factor and other factors, which is equal to the difference between the influence degree and the influenced degree in the comprehensive influence matrix  $T$ . If  $M > 0$ , it represents that the factor has a great influence on other factors, which is called the cause factor; if  $M < 0$ , it means that the factor is greatly influenced by other factors, which is called the resulting factor.

## 5. Empirical analysis

### 5.1. Data collection

There may be mutual influence between the various influencing factors that hinder the development of new energy for small and medium-sized enterprises. This paper invites 10 experts in the field of marketing to fill out the questionnaire online and uses the Delphi method [16] to score the degree of mutual influence of various factors in the form of a matrix. According to the questionnaire score and the triangular fuzzy number, the matrix is constructed, and the CFCFS (Converting Fuzzy numbers into Crisp Scores) method is used to denazify the direct influence matrix (see table 2). Finally, the comprehensive influence matrix (see Table 3), influence degree, influenced degree, centrality, and reason degree are obtained through the direct influence matrix to find out the key factors.

### 5.2. Calculation of fuzzy numbers

Based on the previous construction of table 3, this paper calculates the fuzzy data and the clear value after defuzzification, and finally obtains the direct influence matrix, as shown in table 2:

**Table 2.** Direct influence matrix of new energy SMEs marketing obstacles

| factor   | $S_1$ | $S_2$ | $S_3$ | $S_4$ | $S_5$ | $S_6$ | $S_7$ | $S_8$ | $S_9$ | $S_{10}$ | $S_{11}$ | $S_{12}$ | $S_{13}$ | $S_{14}$ | $S_{15}$ | $S_{16}$ | $S_{17}$ | $S_{18}$ | $S_{19}$ | $S_{20}$ | $S_{21}$ | $S_{22}$ |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| $S_1$    | 0.042 | 0.128 | 0.570 | 0.625 | 0.671 | 0.581 | 0.125 | 0.640 | 0.561 | 0.173    | 0.150    | 0.663    | 0.150    | 0.453    | 0.430    | 0.430    | 0.523    | 0.477    | 0.063    | 0.443    | 0.593    | 0.715    |
| $S_2$    | 0.883 | 0.042 | 0.453 | 0.330 | 0.150 | 0.500 | 0.083 | 0.096 | 0.625 | 0.150    | 0.383    | 0.353    | 0.267    | 0.083    | 0.477    | 0.063    | 0.285    | 0.523    | 0.383    | 0.648    | 0.407    | 0.360    |
| $S_3$    | 0.671 | 0.430 | 0.042 | 0.267 | 0.337 | 0.570 | 0.300 | 0.535 | 0.617 | 0.083    | 0.497    | 0.535    | 0.220    | 0.477    | 0.744    | 0.121    | 0.597    | 0.558    | 0.063    | 0.671    | 0.523    | 0.453    |
| $S_4$    | 0.648 | 0.208 | 0.195 | 0.042 | 0.603 | 0.337 | 0.308 | 0.403 | 0.243 | 0.103    | 0.539    | 0.500    | 0.150    | 0.523    | 0.580    | 0.603    | 0.523    | 0.593    | 0.593    | 0.407    | 0.535    | 0.523    |
| $S_5$    | 0.648 | 0.383 | 0.604 | 0.243 | 0.042 | 0.500 | 0.183 | 0.477 | 0.657 | 0.150    | 0.648    | 0.383    | 0.267    | 0.383    | 0.128    | 0.580    | 0.500    | 0.523    | 0.250    | 0.670    | 0.693    | 0.943    |
| $S_6$    | 0.477 | 0.308 | 0.430 | 0.430 | 0.477 | 0.042 | 0.057 | 0.561 | 0.539 | 0.580    | 0.477    | 0.430    | 0.430    | 0.570    | 0.208    | 0.640    | 0.063    | 0.042    | 0.593    | 0.523    | 0.498    | 0.383    |
| $S_7$    | 0.104 | 0.360 | 0.220 | 0.173 | 0.195 | 0.383 | 0.042 | 0.128 | 0.173 | 0.547    | 0.383    | 0.083    | 0.398    | 0.063    | 0.042    | 0.104    | 0.290    | 0.042    | 0.063    | 0.042    | 0.430    | 0.128    |
| $S_8$    | 0.195 | 0.042 | 0.420 | 0.547 | 0.523 | 0.403 | 0.080 | 0.042 | 0.607 | 0.443    | 0.494    | 0.240    | 0.033    | 0.593    | 0.407    | 0.383    | 0.523    | 0.593    | 0.580    | 0.535    | 0.715    | 0.407    |
| $S_9$    | 0.375 | 0.042 | 0.407 | 0.360 | 0.398 | 0.543 | 0.033 | 0.313 | 0.042 | 0.648    | 0.360    | 1.663    | 0.250    | 0.208    | 0.528    | 0.240    | 0.500    | 0.195    | 0.477    | 0.842    | 0.285    | 0.337    |
| $S_{10}$ | 0.197 | 0.150 | 0.173 | 0.033 | 0.243 | 0.603 | 0.243 | 0.104 | 0.290 | 0.042    | 0.513    | 0.243    | 0.063    | 0.197    | 0.128    | 0.173    | 0.477    | 0.220    | 0.693    | 0.033    | 0.220    | 0.383    |
| $S_{11}$ | 0.673 | 0.535 | 0.687 | 0.617 | 0.567 | 0.520 | 0.193 | 0.477 | 0.383 | 0.570    | 0.042    | 0.535    | 0.285    | 0.360    | 0.715    | 0.693    | 0.606    | 0.580    | 0.648    | 0.648    | 0.842    | 0.491    |
| $S_{12}$ | 0.523 | 0.664 | 0.523 | 0.430 | 0.521 | 0.603 | 0.173 | 0.500 | 0.497 | 0.547    | 0.715    | 0.042    | 0.208    | 0.169    | 0.330    | 0.580    | 0.674    | 0.547    | 0.208    | 0.715    | 0.500    | 0.383    |
| $S_{13}$ | 0.357 | 0.104 | 0.523 | 0.477 | 0.547 | 0.453 | 0.360 | 0.353 | 0.709 | 0.500    | 0.173    | 0.407    | 0.042    | 0.083    | 0.105    | 0.263    | 0.500    | 0.558    | 0.640    | 0.715    | 0.420    | 0.570    |
| $S_{14}$ | 0.443 | 0.430 | 0.430 | 0.360 | 0.453 | 0.603 | 0.100 | 0.617 | 0.353 | 0.593    | 0.580    | 0.535    | 0.083    | 0.042    | 0.042    | 0.535    | 0.671    | 0.240    | 0.033    | 0.569    | 0.863    | 0.640    |
| $S_{15}$ | 0.453 | 0.208 | 0.430 | 0.593 | 0.443 | 0.558 | 0.173 | 0.125 | 0.407 | 0.220    | 0.267    | 0.150    | 0.063    | 0.083    | 0.042    | 0.360    | 0.290    | 0.154    | 0.105    | 0.477    | 0.500    | 0.128    |
| $S_{16}$ | 0.693 | 0.430 | 0.670 | 0.627 | 0.427 | 0.842 | 0.360 | 0.603 | 0.337 | 0.113    | 0.715    | 0.477    | 0.267    | 0.353    | 0.243    | 0.042    | 0.674    | 0.383    | 0.127    | 0.243    | 0.523    | 0.516    |
| $S_{17}$ | 0.513 | 0.547 | 0.547 | 0.674 | 0.651 | 0.330 | 0.290 | 0.500 | 0.383 | 0.447    | 0.715    | 0.539    | 0.125    | 0.285    | 0.285    | 0.337    | 0.042    | 0.593    | 0.197    | 0.750    | 0.617    | 0.640    |
| $S_{18}$ | 0.570 | 0.547 | 0.547 | 0.430 | 0.670 | 0.430 | 0.173 | 0.453 | 0.477 | 0.570    | 0.497    | 0.430    | 0.197    | 0.430    | 0.477    | 0.593    | 0.648    | 0.042    | 0.443    | 0.500    | 0.663    | 0.383    |
| $S_{19}$ | 0.640 | 0.042 | 0.640 | 0.308 | 0.197 | 0.443 | 0.073 | 0.420 | 0.613 | 0.173    | 0.285    | 0.128    | 0.477    | 0.173    | 0.383    | 0.715    | 0.360    | 0.550    | 0.042    | 0.231    | 0.563    | 0.383    |
| $S_{20}$ | 0.042 | 0.330 | 0.063 | 0.337 | 0.383 | 0.497 | 0.073 | 0.477 | 0.570 | 0.558    | 0.693    | 0.217    | 0.383    | 0.580    | 0.430    | 0.500    | 0.539    | 0.250    | 0.535    | 0.042    | 0.614    | 0.603    |
| $S_{21}$ | 0.217 | 0.477 | 0.510 | 0.750 | 0.240 | 0.407 | 0.080 | 0.337 | 0.693 | 0.383    | 0.557    | 0.375    | 0.220    | 0.813    | 0.104    | 0.240    | 0.470    | 0.330    | 0.220    | 0.539    | 0.042    | 0.500    |
| $S_{22}$ | 0.535 | 0.243 | 0.033 | 0.197 | 0.520 | 0.750 | 0.237 | 0.267 | 0.267 | 0.617    | 0.829    | 0.539    | 0.750    | 0.243    | 0.250    | 0.580    | 0.629    | 0.783    | 0.063    | 0.547    | 0.197    | 0.042    |

The direct influence matrix is normalized, and the obtained matrix is brought into formula (4). Finally, the comprehensive influence matrix is obtained, as shown in table 3:

**Table 3.** Comprehensive influence matrix of new energy SMEs marketing obstacles

| factor   | $S_1$ | $S_2$ | $S_3$ | $S_4$ | $S_5$ | $S_6$ | $S_7$ | $S_8$ | $S_9$ | $S_{10}$ | $S_{11}$ | $S_{12}$ | $S_{13}$ | $S_{14}$ | $S_{15}$ | $S_{16}$ | $S_{17}$ | $S_{18}$ | $S_{19}$ | $S_{20}$ | $S_{21}$ | $S_{22}$ |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| $S_1$    | 0.131 | 0.104 | 0.167 | 0.172 | 0.182 | 0.192 | 0.06  | 0.17  | 0.18  | 0.126    | 0.159    | 0.188    | 0.084    | 0.142    | 0.133    | 0.157    | 0.183    | 0.158    | 0.099    | 0.185    | 0.198    | 0.194    |
| $S_2$    | 0.179 | 0.073 | 0.136 | 0.126 | 0.116 | 0.158 | 0.046 | 0.104 | 0.161 | 0.103    | 0.146    | 0.139    | 0.081    | 0.091    | 0.122    | 0.104    | 0.136    | 0.139    | 0.109    | 0.174    | 0.154    | 0.139    |
| $S_3$    | 0.185 | 0.128 | 0.12  | 0.144 | 0.155 | 0.19  | 0.073 | 0.16  | 0.184 | 0.119    | 0.183    | 0.176    | 0.089    | 0.142    | 0.159    | 0.131    | 0.187    | 0.162    | 0.099    | 0.203    | 0.193    | 0.171    |
| $S_4$    | 0.184 | 0.109 | 0.138 | 0.121 | 0.175 | 0.171 | 0.074 | 0.15  | 0.153 | 0.118    | 0.186    | 0.169    | 0.084    | 0.145    | 0.144    | 0.171    | 0.181    | 0.166    | 0.14     | 0.178    | 0.193    | 0.177    |
| $S_5$    | 0.195 | 0.131 | 0.18  | 0.151 | 0.136 | 0.198 | 0.068 | 0.166 | 0.198 | 0.133    | 0.209    | 0.176    | 0.102    | 0.144    | 0.118    | 0.178    | 0.192    | 0.172    | 0.122    | 0.214    | 0.217    | 0.223    |
| $S_6$    | 0.162 | 0.109 | 0.149 | 0.148 | 0.156 | 0.136 | 0.051 | 0.156 | 0.17  | 0.15     | 0.173    | 0.159    | 0.103    | 0.143    | 0.109    | 0.166    | 0.137    | 0.115    | 0.139    | 0.179    | 0.181    | 0.159    |
| $S_7$    | 0.069 | 0.072 | 0.074 | 0.07  | 0.073 | 0.098 | 0.023 | 0.063 | 0.077 | 0.096    | 0.097    | 0.067    | 0.066    | 0.052    | 0.048    | 0.063    | 0.087    | 0.058    | 0.052    | 0.071    | 0.103    | 0.073    |
| $S_8$    | 0.141 | 0.092 | 0.15  | 0.16  | 0.162 | 0.17  | 0.053 | 0.111 | 0.177 | 0.142    | 0.178    | 0.146    | 0.071    | 0.148    | 0.127    | 0.148    | 0.176    | 0.161    | 0.138    | 0.183    | 0.201    | 0.162    |
| $S_9$    | 0.158 | 0.095 | 0.151 | 0.147 | 0.156 | 0.186 | 0.051 | 0.14  | 0.13  | 0.162    | 0.171    | 0.261    | 0.09     | 0.116    | 0.139    | 0.14     | 0.177    | 0.132    | 0.132    | 0.212    | 0.168    | 0.158    |
| $S_{10}$ | 0.095 | 0.066 | 0.087 | 0.074 | 0.094 | 0.134 | 0.049 | 0.077 | 0.102 | 0.065    | 0.126    | 0.097    | 0.049    | 0.076    | 0.068    | 0.087    | 0.119    | 0.088    | 0.113    | 0.089    | 0.106    | 0.11     |
| $S_{11}$ | 0.218 | 0.157 | 0.206 | 0.2   | 0.201 | 0.221 | 0.077 | 0.182 | 0.197 | 0.18     | 0.176    | 0.204    | 0.112    | 0.157    | 0.18     | 0.205    | 0.221    | 0.193    | 0.169    | 0.232    | 0.252    | 0.206    |
| $S_{12}$ | 0.186 | 0.154 | 0.174 | 0.166 | 0.179 | 0.205 | 0.068 | 0.167 | 0.186 | 0.164    | 0.214    | 0.142    | 0.095    | 0.126    | 0.135    | 0.177    | 0.205    | 0.173    | 0.122    | 0.217    | 0.202    | 0.178    |
| $S_{13}$ | 0.152 | 0.094 | 0.156 | 0.151 | 0.163 | 0.173 | 0.076 | 0.138 | 0.184 | 0.146    | 0.15     | 0.158    | 0.069    | 0.104    | 0.101    | 0.136    | 0.172    | 0.157    | 0.143    | 0.196    | 0.174    | 0.174    |
| $S_{14}$ | 0.167 | 0.129 | 0.156 | 0.151 | 0.163 | 0.194 | 0.058 | 0.167 | 0.163 | 0.16     | 0.194    | 0.175    | 0.079    | 0.105    | 0.101    | 0.164    | 0.194    | 0.139    | 0.099    | 0.194    | 0.219    | 0.188    |
| $S_{15}$ | 0.126 | 0.079 | 0.117 | 0.131 | 0.121 | 0.142 | 0.048 | 0.09  | 0.124 | 0.091    | 0.119    | 0.102    | 0.054    | 0.078    | 0.067    | 0.111    | 0.117    | 0.092    | 0.073    | 0.138    | 0.141    | 0.102    |
| $S_{16}$ | 0.196 | 0.133 | 0.183 | 0.18  | 0.169 | 0.219 | 0.082 | 0.173 | 0.169 | 0.126    | 0.209    | 0.178    | 0.098    | 0.139    | 0.125    | 0.127    | 0.201    | 0.157    | 0.11     | 0.176    | 0.201    | 0.184    |
| $S_{17}$ | 0.184 | 0.145 | 0.174 | 0.185 | 0.189 | 0.183 | 0.077 | 0.166 | 0.176 | 0.155    | 0.214    | 0.185    | 0.088    | 0.136    | 0.131    | 0.158    | 0.15     | 0.177    | 0.119    | 0.219    | 0.211    | 0.198    |
| $S_{18}$ | 0.19  | 0.145 | 0.177 | 0.167 | 0.19  | 0.192 | 0.068 | 0.163 | 0.185 | 0.165    | 0.196    | 0.178    | 0.094    | 0.147    | 0.146    | 0.179    | 0.204    | 0.128    | 0.139    | 0.2      | 0.216    | 0.179    |
| $S_{19}$ | 0.165 | 0.081 | 0.157 | 0.131 | 0.125 | 0.16  | 0.049 | 0.135 | 0.165 | 0.108    | 0.145    | 0.126    | 0.1      | 0.104    | 0.116    | 0.161    | 0.149    | 0.146    | 0.08     | 0.145    | 0.173    | 0.147    |
| $S_{20}$ | 0.127 | 0.112 | 0.119 | 0.141 | 0.148 | 0.176 | 0.052 | 0.147 | 0.171 | 0.15     | 0.191    | 0.141    | 0.099    | 0.143    | 0.125    | 0.155    | 0.174    | 0.131    | 0.135    | 0.136    | 0.189    | 0.175    |
| $S_{21}$ | 0.141 | 0.124 | 0.153 | 0.172 | 0.137 | 0.167 | 0.052 | 0.136 | 0.179 | 0.135    | 0.179    | 0.156    | 0.085    | 0.162    | 0.101    | 0.132    | 0.168    | 0.137    | 0.108    | 0.181    | 0.138    | 0.166    |
| $S_{22}$ | 0.174 | 0.112 | 0.125 | 0.137 | 0.169 | 0.204 | 0.07  | 0.138 | 0.155 | 0.162    | 0.209    | 0.173    | 0.133    | 0.121    | 0.117    | 0.168    | 0.189    | 0.181    | 0.103    | 0.19     | 0.165    | 0.134    |

### 5.3. DEMATEL Calculation and Analysis

According to the new energy small and medium-sized enterprise marketing obstacles comprehensive influence matrix to calculate the influence degree of each factor, the degree of influence, centrality and original factors and their rankings, see Table 4.

**Table 4.** DEMATEL calculation index value

|          | D value of influence | ranking | Value of influence C | ranking | Centrality D + C value | ranking | Causation D-C value (R) | ranking |
|----------|----------------------|---------|----------------------|---------|------------------------|---------|-------------------------|---------|
| $S_1$    | 3.367                | 7       | 3.525                | 8       | 6.891                  | 9       | -0.158                  | 15      |
| $S_2$    | 2.737                | 19      | 2.444                | 20      | 5.182                  | 18      | 0.293                   | 7       |
| $S_3$    | 3.354                | 9       | 3.251                | 11      | 6.605                  | 13      | 0.104                   | 12      |
| $S_4$    | 3.329                | 11      | 3.224                | 12      | 6.553                  | 14      | 0.105                   | 11      |
| $S_5$    | 3.621                | 4       | 3.358                | 10      | 6.979                  | 7       | 0.263                   | 8       |
| $S_6$    | 3.153                | 15      | 3.870                | 3       | 7.022                  | 6       | -0.717                  | 19      |
| $S_7$    | 1.554                | 22      | 1.327                | 22      | 2.881                  | 22      | 0.227                   | 9       |
| $S_8$    | 3.199                | 13      | 3.098                | 15      | 6.297                  | 15      | 0.101                   | 13      |
| $S_9$    | 3.271                | 12      | 3.585                | 7       | 6.857                  | 10      | -0.314                  | 17      |
| $S_{10}$ | 1.973                | 21      | 2.956                | 16      | 4.928                  | 20      | -0.983                  | 22      |
| $S_{11}$ | 4.145                | 1       | 3.823                | 4       | 7.968                  | 1       | 0.321                   | 5       |
| $S_{12}$ | 3.633                | 3       | 3.497                | 9       | 7.130                  | 3       | 0.135                   | 10      |
| $S_{13}$ | 3.167                | 14      | 1.925                | 21      | 5.092                  | 19      | 1.242                   | 1       |
| $S_{14}$ | 3.361                | 8       | 2.721                | 17      | 6.082                  | 16      | 0.639                   | 2       |
| $S_{15}$ | 2.261                | 20      | 2.611                | 18      | 4.872                  | 21      | -0.350                  | 18      |
| $S_{16}$ | 3.532                | 6       | 3.216                | 13      | 6.748                  | 12      | 0.316                   | 6       |
| $S_{17}$ | 3.621                | 4       | 3.72                 | 5       | 7.341                  | 2       | -0.100                  | 14      |
| $S_{18}$ | 3.646                | 2       | 3.165                | 14      | 6.811                  | 11      | 0.481                   | 3       |
| $S_{19}$ | 2.868                | 18      | 2.543                | 19      | 5.411                  | 17      | 0.325                   | 4       |
| $S_{20}$ | 3.138                | 16      | 3.914                | 2       | 7.052                  | 5       | -0.776                  | 20      |
| $S_{21}$ | 3.110                | 17      | 3.997                | 1       | 7.108                  | 4       | -0.887                  | 21      |
| $S_{22}$ | 3.330                | 10      | 3.598                | 6       | 6.928                  | 8       | -0.268                  | 16      |

### 5.3.1 Relationship between impact

As shown in Table 4,  $S_5, S_{11}, S_{12}, S_{16}, S_{18}$  and so on are the causal factors in the index system of marketing hindering factors of small and medium-sized new energy enterprises.  $S_{11}$  (the irrationality of enterprises to make relevant decisions) has strong initiative and ranks first in the influence degree. Therefore, if small and medium-sized new energy enterprises cannot pay attention to the formulation of relevant decisions of enterprises, it will greatly affect other factors. Similarly  $S_{18}$  (lack of innovation in management mode),  $S_{12}$  (marketing management does not constitute a complete system),  $S_{16}$  (some enterprises lack an independent marketing department),  $S_5$  (marketing management awareness is shallow) also have a strong degree of influence and low degree of being affected, influence and degree of being affected ranked 2nd and 14th, 3rd and 9th, 6th and 13th, 4th and 10th, have a strong initiative, can affect other risk factors.

$S_6, S_9, S_{20}, S_{21}$  belong to the result factors.  $S_{21}$  (lack of attention and improvement of service quality) has the highest degree of influence and the ranking of influence is relatively low. It has strong passivity and is most affected by other factors.  $S_{20}$  (poor problem-solving ability),  $S_6$  (insufficient development and utilization of industry resources), and  $S_9$  (low efficiency of marketing channels) ranked 2nd and 16th, 3rd and 15th, 7th and 12th, respectively. The passivity is relatively large and is more susceptible to other factors.

While  $S_7$  (pressure from large-scale industries in developed and developing countries),  $S_2$  (lack of incentive mechanism),  $S_{19}$  (backward technology),  $S_{10}$  (weak consumption, financing difficulties),  $S_{15}$  (lack of departmental coordination),  $S_{13}$  (keep pace with the times), and so on are less influential and influenced, and have less relationship with other risk factors.

### 5.3.2 Identification of key factors

$S_{11}$  influence degree, centrality ranked first, the reason degree also ranked top, shows that it can strongly influence other risk factors, is the most critical risk factors.,  $S_{12}, S_5$  centrality and impact rankings were 3rd and 3rd, 7th and 4th, is a key factor. The centrality ranking of  $S_{17}$  (marketing system is not perfect) is 2. Although its cause is less than 0, its influence ranking is 4th, which has a certain influence on other risk factors, so it can be listed as a key factor.  $S_{21}$  although the centrality ranked 4th, because of its impact ranked 1st, the impact of ranking 17, it can not be listed as a key factor. In addition, there are  $S_6, S_{20}$  (poor problem handling ability) factors.

To sum up, in the small and medium-sized new energy enterprise marketing obstacle factors index system, the key risk factors for  $S_1$  (marketing personnel comprehensive quality is low),  $S_3$  (responsibility training does not attach importance to),  $S_4$  (lack of team building),  $S_5$  (marketing management consciousness is shallow),  $S_8$  (lack of understanding of market information),  $S_{11}$  (enterprises to make relevant decisions unreasonable),  $S_{12}$  (marketing management does not constitute a complete system),  $S_{14}$  (some enterprises lack brand awareness),  $S_{16}$  (some enterprises lack independent marketing department),  $S_{17}$  (marketing system is not perfect),  $S_{18}$  (Lack of innovation in management mode),  $S_{22}$  (Marketing and social needs out of line).

## 6. Conclusion

From the four perspectives of marketing personnel, marketing environment, marketing concept and marketing strategy, enterprise internal management mode and service level, this paper divides the marketing obstacles of new energy enterprises into 22 indicators, introduces the concept of fuzzy number, establishes a comprehensive influence matrix, calculates the influence degree, influence degree, centrality degree, original factors and their rankings of each factor, and uses DEMATEL method to obtain the mutual influence degree of each factor and its importance in the index system. The conclusions are as follows:

(1) Through the identification of key factors, it is concluded that the four most important factors are the irrationality of making relevant decisions (4.145, 3.823, 7.968, 0.321), marketing management does not constitute a complete system (3.633, 3.497, 7.13, 0.135), marketing management awareness

(3.621, 3.358, 6.979, 0.263), marketing system is not perfect (3.621, 3.72, 7.341, -0.1). Therefore, in solving the marketing problems of small and medium-sized new energy enterprises, we should focus on these four obstacles and allocate enterprise resources reasonably according to the importance of other factors.

(2) In order to speed up the transformation and upgrading of small and medium-sized new energy enterprises, according to the marketing obstacles identified in this paper, enterprises should make reasonable marketing decisions, establish and improve the marketing system, make the marketing management system more perfect. At the same time, enterprises should pay attention to the training of marketing personnel, improve the comprehensive quality and responsibility consciousness of marketing personnel, and strengthen the construction of marketing team. This research can provide reference for the direction of enterprise marketing decision-making, and make the marketing of new energy enterprises more efficient.

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