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Research Article

Supply Chain Flexibility Evaluation Based on Matter-Element Extension

Xiaochun Luo[1,2] **Zilong Wang,**[1] **Lin Lu**[2] **and Yan Guan**[2]

[1]*College of Economics and Management, Nanjing University of Aeronautics and Astronautics, Nanjing, China*
[2]*College of Economics and Management, Guangxi Normal University, Guilin, China*

Correspondence should be addressed to Lin Lu; lulin355@163.com

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Flexibility is an important indicator to consider the uncertain information processing ability of the supply chain comprehensively. It is a powerful way to improve the efficiency and quality of supply chain operation by evaluating the level of supply chain flexibility effectively. The traditional method is used to decompose the supply chain flexibility evaluation indicators from the perspective of system structure or cost saving, but these indicators cannot truly describe the dynamics of the supply chain operation. Otherwise, supply chain flexibility evaluation is a typical multiobjective evaluation; there are some incompatibilities between these flexible evaluation indicators, and the common evaluation methods are difficult to deal with such contradictions. In this paper, the dynamic characteristics of supply chain operation are considered, and the evaluation system of supply chain flexibility is designed from the perspective of operation efficiency. The matter-element analysis theory is used to create the comprehensive appraisal model of supply chain flexibility. The matter-element matrix solves the uncertainty and incompatibility of the evaluated factors used to assess supply chain flexibility. The paper evaluates the performance of four autoservice companies and concludes that the evaluation grades of the four companies are in line with the reality, indicating that the evaluation system and the method are effective and credible.

1. Introduction

Internet information technology has promoted tremendous changes in the functions and roles of market participants. Consumers have gradually replaced producers and enterprises as the main force of economic operation, which is the core force of promoting production and market reform. Under the influence of information technology, the consumer market environment has distinct characteristics of the times: diversification, speediness, individuation, and to a greater extent, it is easy to be influenced by the herd effect. Unpredictable changes in the market environment increase the risk of business operation and investment, so the "horizontal integration" mode of thinking came into being, that is, for the flow of logistics, capital flow, information flow, and other elements among enterprises in the supply chain, to carry out efficient, integrated, seamless, real-time, and effective management, so as to promote the organic cooperation between enterprises and enhance the competition of the whole supply chain strive to maximize the performance of the whole supply chain. The uncertainty of the market environment and the existence of risk factors make the supply chain enterprises to respond to the unexpected situation of market environment quickly. Supply chain flexibility is an important tool for dealing with uncertain information. Improving the level of supply chain flexibility plays a very positive role in improving the overall operation efficiency of the supply chain and maintaining the core competitiveness of the enterprise. It is an important way to improve the operation quality of the supply chain.

In the supply chain management environment, flexibility refers to the ability of supply chain managers to quickly and effectively reconfigure the internal supply chain in order to adapt to the changing market demand, so as to cope with the uncertainty of the internal and external environment [1, 2]. With the increasing dynamic and uncertainty of business environment and the shortening of product life cycle, the ability to respond quickly to changes becomes more and more important for core enterprises and the whole supply chain [3]. Supply chain flexibility can not only show the ability of quick response to environmental changes but also has a certain strategic role [4], such as helping enterprises to make profits and meet customers' changing needs [5].

The research on the dimensions of the supply chain flexible system mainly includes the dimensions of supply flexibility and manufacturing flexibility [6], process flexibility and holding product inventory [7], flexible structure deployment information technology [8], supply chain contract [9], order fulfillment flexibility [10], and operation and organization absorption flexibility [11]. The evaluation indicators of supply chain flexibility are diversified. From the perspective of performance, they are divided into four primary indicators: supply chain re-engineering flexibility, supply chain collaboration flexibility, supply chain flexibility, and the establishment of supply chain risk management culture [12]. From the perspective of supply chain agility, they can be divided into 25 evaluation indicators such as organizational structure flexibility, production flexibility, market scheduling flexibility, quality control flexibility, organizational flexibility, operation flexibility, customer service flexibility, organizational structure flexibility, effective prediction flexibility, and logistics management flexibility [13], or they can be divided into 22 evaluation indicators, such as supplier flexibility, coordination flexibility among supply chain members, fast response ability, fast conversion ability, information transparency, design flexibility, production and delivery flexibility, labor flexibility, quality level, innovation degree, etc. [14]. From the perspective of organizational hierarchy, they can be divided into operational flexibility (workshop and resource level) [15], strategic flexibility (company level) [16], tactical flexibility (plant level) [17], and supply chain flexibility (network level) [18]. It is impossible to measure the flexibility of the whole supply chain by a single standard. An analysis method [19] that can evaluate the flexibility of the supply chain comprehensively and continuously is needed, such as AHP [20] and sensitivity analysis [21].

Most of the existing literature mainly focus on the supply chain model, supply chain integration, supply chain flexibility measurement, supply chain flexibility strategic level planning, and tactical level implementation and rarely involve the coexistence of incompatible indicators in the supply chain flexibility evaluation, as well as the integration of qualitative and quantitative evaluation; in addition, the traditional evaluation methods are single; only considering the results caused by a single factor cannot reflect the results caused by multiple factors, and supply chain flexibility may be accumulated through internal factors. In view of the above limitations, this paper puts forward the matter-element extension theory, which can completely and comprehensively reflect the different characteristics of the evaluation research object and overcome the disadvantages of the traditional evaluation method which can only select one-sided factors and may lead to the accidental results. At the same time, extension theory can flexibly change the evaluation indicator according to the actual characteristics of the evaluation object, and the application of the model will not be rigid. Using this method to solve the complex problem of the incompatibility of service supply chain flexibility and to make a reasonable distinction between the level of service supply chain flexibility can effectively achieve the compatibility of multiple evaluation indicators.

2. Construction of the Supply Chain Flexibility Evaluation Indicator System

According to the connotation of supply chain flexibility, by analyzing the actual operation management of the supply chain and referring to the existing literature research results, this paper expands and extends the flexibility indicator according to the characteristics of dynamic operation of the supply chain. Supply network, operation system, internal and external organizational structure design, and information system are considered as an indispensable part of the supply chain. From the perspective of these parts, the supply chain flexibility is decomposed into ten primary indicators, such as service category and quantity flexibility, human resource flexibility, capital flexibility, logistics flexibility, and partner flexibility, each of which can be decomposed into several secondary indicators.

2.1. Service Category and Quantity Flexibility. Service category and quantity flexibility can measure the range of service category that an organization or enterprise can operate under the condition of profit, which is often related to the variety and quantity of service products that an organization can provide and the cost change brought by such change. There are four secondary indicators under such flexible indicators, including customer order missing rate (mainly involving service product inventory, demand, and shortage), average delayed order rate (mainly involving order urgency, service production capacity, service resource inventory level, and service delivery capacity), average early delivery service rate (reflecting that customers are within the acceptable time range, the ability of the enterprise to submit service first), and average customer waiting rate (mainly related to order quantity, production capacity, and service product delivery path).

2.2. Human Resource Flexibility. Human resource flexibility includes two secondary indicators: skill flexibility and behavior flexibility. Skill flexibility refers to that employees have a wealth of knowledge and skills and that enterprises can provide employees with a large number of learning and training time and opportunities so that employees can obtain the skills needed for multiple posts and different services, so as to flexibly respond to the changes of the working environment and work requirements. It mainly involves the mastery and application of skills, skill training, job rotation, job enrichment and expansion, and the adaptation of skills acquired by employees to the environment. Behavior flexibility refers to the long-term professional training of behavior or service skills, which enables employees to flexibly use a variety of preset and prepared behavior script sets to deal with emergencies in the process of work. It mainly involves the behaviors of employees at work, as well as the adaptation of these behaviors to environmental changes and new work contents.

2.3. Capital Flexibility. Capital flexibility includes three secondary indicators: financing capacity flexibility, profitability flexibility, and price flexibility. Among them, the flexibility of financing ability is reflected by the financing cost rate, the flexibility of profitability is reflected by the operating profit rate, and the flexibility of price reflects the adjustable price space that the product can expand when the enterprise realizes the profit.

2.4. Logistics Flexibility. For the supply chain, reducing the cost of transportation, purchasing, and inventory is the key. Logistics flexibility mainly includes three secondary indicators: inventory turnover, diversity of transportation channels available, and distribution accuracy. The high indicator of inventory turnover indicates that the supply chain has a high level of flexibility. Diversity of transportation channels available reflects the ability of the supply chain to quickly select different transportation channels and modes in case of emergency. Distribution accuracy can reflect the ability of zero error distribution of raw materials, semifinished products, spare parts, and other necessary products from the upstream of the supply chain. This indicator is particularly important when the external environment changes.

2.5. Partner Flexibility. The increasingly fierce market competition makes the organic cooperation of all links in the supply chain more important. Partner flexibility is reflected in the ability of enterprises to change and adjust their partners in time when the external environment changes. Partner flexibility includes three secondary indicators: trust mechanisms' build capacity, knowledge sharing rate, and the number of partners that can be selected in time. The more willing and knowledge sharing partners are, the more partners can be adjusted in time and the higher the flexibility level of the supply chain.

2.6. Production Equipment Flexibility. Production equipment flexibility includes three secondary indicators: production equipment trouble-free continuous operation efficiency, maintenance rate of production equipment, and actual productivity of production equipment.

2.7. Technical Flexibility. Technical flexibility is the difficulty of the process of original technology updating and leaping over to new technology, including two secondary indicators of original technology and new technology.

2.8. Time Flexibility. Time flexibility reflects the time needed for the supply chain to respond to customers' needs in time, including two secondary indicators: degree of timely response and delivery flexibility. The higher the degree of timely response, the shorter the response time and the higher the level of supply chain flexibility. Delivery flexibility reflects the ability of the supply chain to respond to changes when delivery time changes.

2.9. Service Supply Flexibility. Service supply flexibility includes two dimensions: hybrid flexibility and new service supply flexibility.

Hybrid flexibility can not only measure the maximum range of different kinds of services that enterprises can produce or provide in a specific time but also measure the response time that service providers need to change the service product mix, including two secondary indicators: hybrid flexibility range and hybrid flexibility time.

New service supply flexibility reflects the degree of difficulty for enterprises to produce or introduce new service products. On the one hand, it considers the time needed for new service products to be introduced into the existing supply system, and on the other hand, it considers the cost needed for the existing service supply system to introduce new service products, including two secondary indicators: new service flexibility time and new service flexibility cost.

2.10. Information Response Flexibility. Information response flexibility of the supply chain is embodied in the ability of members of the supply chain to accept and take action in time to process business information, including three secondary indicators: information response time, information response range, and information distribution accuracy. Information response time is the time taken by each entity in the supply chain to receive and respond to business information. Information response range is the range that the information system can accept and respond to information at the same time. Information distribution accuracy can reflect the ability of the supply chain information system to deal with uncertainty.

According to the above content, the supply chain flexible evaluation indicator system is constructed, which is divided into primary indicators, secondary indicators, secondary indicator description, and indicator nature. The quantitative indicators in secondary indicators are expressed by the calculation formula according to the indicator meaning and data availability. The evaluation standard division of qualitative indicators can be referred to previous studies or yearbook data related to indicators, as shown in Table 1.

3. Construct the Matter-Element Model of Supply Chain Flexibility Evaluation

Extension theory was founded by Chinese scholar Cai [22] in the 1980s. It combines matter-element theory with extension set theory, studies matter-element and its changing trend, and studies and solves the changing law of complex problems in a qualitative and quantitative way. The important feature of this theory is that it provides an effective tool to solve the problem of incompatibility. Based on the matter-element model, extension set, and correlation function theory of extension science, the method of multi-indicator

Table 1: Supply chain flexibility evaluation indicator system.

Primary indicators	Secondary indicators	Secondary indicator description	Indicator nature	
Service category and quantity flexibility, p_1	Customer order missing rate, c_1	Number of service delivery failures/total number of service products available	Quantitative	Negative
	Average delayed order rate, c_2	Number of delayed services/total number of service products available	Quantitative	Negative
	Average early delivery service rate, c_3	Number of services provided in advance/total number of service products available	Quantitative	Positive
	Average customer waiting rate, c_4	Number of customers waiting for service/total number of times to receive service products	Quantitative	Negative
Human resource flexibility, p_2	Skill flexibility, c_5	The classification of evaluation criteria can be referred to the previous studies, for example, it can be divided according to the following dimensions: (1) The number of effective skills currently possessed by human resources (2) The speed of human resources learning new and effective skills (3) The ability to quickly reintegrate and reconfigure multiple skill value chains	Qualitative	Positive
	Behavioral flexibility, c_6	The classification of evaluation criteria can be referred to the previous studies, for example, it can be divided according to the following dimensions: (1) The ability of human resources to "script" beneficial behaviors (2) The ability to coordinate and integrate multiple behavioral "scripts"	Qualitative	Positive
Capital flexibility, p_3	Financing capacity flexibility, c_7	Fund use fee/(total amount of financing − financing expenses)	Quantitative	Negative
	Profitability flexibility, c_8	Operating profit/sales revenue	Quantitative	Positive
	Price flexibility, c_9	Average market price of products − product actual cost	Quantitative	Positive
	Inventory turnover, c_{10}	Cost of sales/average inventory balance	Quantitative	Positive
Logistics flexibility, p_4	Diversity of transportation channels available, c_{11}	The division of the evaluation criteria can be referred to the China statistical yearbook on transportation, for example, it can be divided into the following sections: (1) Be able to select five modes of transportation to cope with the change of service demand, scoring range (2) Be able to select more than three modes of transportation to cope with the change of service demand, scoring range (3) Only two or more modes of transportation can be selected to cope with the change of service demand, scoring range (4) Single transportation channel, only able to meet the most basic needs of customers, scoring range	Qualitative	Positive
	Distribution accuracy, c_{12}	Number of orders delivered correctly/number of delivered orders	Quantitative	Positive

Table 1: Continued.

Primary indicators	Secondary indicators	Secondary indicator description	Indicator nature	
Partner flexibility, p_5	Trust mechanisms' build capacity, c_{13}	The evaluation criteria can be divided according to the previous studies, for example, they can be divided into the following intervals: (1) Have a common strategic goal and can share risks in a complex environment (2) In the event of divergence of interest, it is necessary to resolve the conflict through consultation and discussion (3) It has a normal cooperative relationship on the premise of not violating the signed contract or contract (4) There are often disagreements and contradictions in the decision-making of key issues	Qualitative	Positive
	Knowledge sharing rate, c_{14}	The amount of knowledge shared by enterprises in time and accurately/the amount of knowledge enterprises should share	Quantitative	Positive
	Number of partners that can be selected in time, c_{15}	Number of partners with fast access + number of partners that can exit quickly	Quantitative	Positive
Production equipment flexibility, p_6	Production equipment trouble-free continuous operation efficiency, c_{16}	Production equipment trouble-free operation time/ total operation time of production equipment	Quantitative	Positive
	Maintenance rate of production equipment, c_{17}	Number of production equipment actually maintained/ total production equipment	Quantitative	Negative
	Actual productivity of production equipment, c_{18}	Actual capacity of production equipment/maximum capacity of production equipment	Quantitative	Positive
Technical flexibility, p_7	Original technology, c_{19}	The classification of evaluation criteria can refer to previous studies, for example, it can be divided according to the following dimensions: (1) The degree to which a product and/or service can be added (2) Scope of application to a variety of products and technologies (3) It helps to improve customers' sense of identity with products and technologies	Qualitative	Positive
	New technique, c_{20}	The classification of evaluation criteria can refer to the previous studies, for example, it can be divided according to the following dimensions: (1) Ability to develop new technologies (2) The ability to introduce new technology into enterprise activities (3) Innovation and transformation ability of new technology	Qualitative	Positive
Time flexibility, p_8	Degree of timely response, c_{21}	Response time of the supply chain to customer's demand/average response time of other supply chains in the same industry to customer demand	Quantitative	Negative
	Delivery capability, c_{22}	Delivery time that can be shortened/total time required to complete delivery	Quantitative	Positive
Service supply flexibility, p_9	Hybrid flexible range, c_{23}	Types and quantities of products that can be provided by enterprises in each link of the supply chain in a certain period of time	Quantitative	Positive
	Hybrid flexibility time, c_{24}	The transition time required to change from one product mix type to another	Quantitative	Negative
	New service flexibility time, c_{25}	Time required to introduce a new service portfolio	Quantitative	Negative
	New service flexibility cost, c_{26}	Cost of introducing new service products	Quantitative	Negative
Information response flexibility, p_{10}	Information response time, c_{27}	Information acquisition time + processing time + feedback time	Quantitative	Negative
	Information response range, c_{28}	The total number of information that an enterprise can respond effectively/number of members that an enterprise can connect to	Quantitative	Positive
	Information distribution accuracy, c_{29}	Number of accurate information/number of all information	Quantitative	Positive

extension comprehensive analysis is a new method of multivariate data quantitative decision-making. In this study, matter-element is used to describe the level and object of supply chain flexibility, extension set, and correlation function which are used to establish the evaluation criteria and the degree of supply chain flexibility, and a multi-attribute evaluation model is established to represent the level of supply chain flexibility.

3.1. Matter-Element Model of Supply Chain Flexibility. Suppose the supply chain flexibility is N, and its quantitative value about feature C is V; then, this ternary ordered group is called the fundamental element of things, referred to as matter-element, denoted as $R = (N, C, V)$. N, C, and V are called the three elements of matter-element R. If the supply chain flexibility has n characteristics, it is denoted as $c_1, c_2, c_3, \ldots, c_n$, and the corresponding characteristic value is denoted as $v_1, v_2, v_3, \ldots, v_n$; then, R is denoted as n-dimensional matter-element, which can be expressed as the following formula [22, 23]:

$$R = (N, C, V) = \begin{bmatrix} N & c_1 & v_1 \\ & c_2 & v_2 \\ & \vdots & \vdots \\ & c_n & v_n \end{bmatrix}. \quad (1)$$

3.2. Evaluation Model of Supply Chain Flexibility

3.2.1. Classical Domain, Node Domain, and Object to Be Evaluated of Supply Chain Flexibility. Classical domain refers to the value range of each supply chain flexibility evaluation indicator under different levels of supply chain flexibility. There are m supply chain flexibility levels $N_1, N_2, \ldots, N_m$, and the corresponding matter-elements are established as shown in the following formula [22, 23]:

$$R_j = \left(N_j, c_i, v_{ij}\right) = \begin{bmatrix} N_j & c_1 & v_{1j} \\ & c_2 & v_{2j} \\ & \vdots & \vdots \\ & c_n & v_{nj} \end{bmatrix} = \begin{bmatrix} N_j & c_1 & \langle a_{1j}, b_{1j} \rangle \\ & c_2 & \langle a_{2j}, b_{2j} \rangle \\ & \vdots & \vdots \\ & c_n & \langle a_{nj}, b_{nj} \rangle \end{bmatrix}, \quad (2)$$

where N_j represent the divided $j\,(j = 1, 2, \ldots, m)$ supply chain flexible grades, $c_i\,(i = 1, 2, \ldots, n)$ represent the N_j characteristics of the supply chain flexible grades, v_{ij} represents the quantitative value range of c_i specified by N_j, that is, the numerical range of each supply chain flexible grade with respect to the corresponding characteristics represented by $v_{ij} = \langle a_{ij}, b_{ij} \rangle$, a_{ij} and b_{ij} are the upper and lower limits of the classical domain, respectively, and R_j is the classical domain of supply chain flexibility.

Its nodal domain R_p is constructed by the classical domain, and $R_p = R_j$, as shown in the following formula [22, 23]:

$$R_p = \left(N_p, c_i, v_{ip}\right) = \begin{bmatrix} N_p & c_1 & v_{1p} \\ & c_2 & v_{2p} \\ & \vdots & \vdots \\ & c_n & v_{np} \end{bmatrix} = \begin{bmatrix} N_p & c_1 & \langle a_{1p}, b_{1p} \rangle \\ & c_2 & \langle a_{2p}, b_{2p} \rangle \\ & \vdots & \vdots \\ & c_n & \langle a_{np}, b_{np} \rangle \end{bmatrix}, \quad (3)$$

where N_p represents the total supply chain flexibility level and v_{ip} is the range of values taken by N_p with respect to c_i represented by $v_{ip} = \langle a_{ip}, b_{ip} \rangle$, a_{ip} and b_{ip} are the upper and lower limits of the node domain, respectively.

For the object to be evaluated, the evaluation indicator information is represented by matter-element, which is called the flexible object of the supply chain to be evaluated, as shown in the following formula [22, 23]:

$$R_o = \left(P_o, c_i, t_i\right) = \begin{bmatrix} P_o & c_1 & t_1 \\ & c_2 & t_2 \\ & \vdots & \vdots \\ & c_n & t_n \end{bmatrix}, \quad (4)$$

where P_o is the matter-element to be evaluated and t_i is the measurement value of P_o with respect to c_i, that is, the actual measurement value of the indicator of the object to be evaluated.

3.2.2. Calculate the Correlation Degree of Supply Chain Flexibility. The correlation degree of each supply chain flexibility level of the object to be evaluated is calculated by the correlation function. The value of the $i\,(i = 1, 2, \ldots, n)$-th indicator belongs to the correlation function of the $j\,(j = 1, 2, \ldots, m)$-th supply chain flexibility level, as shown in the following formula [22, 23]:

$$K_j\left(t_i\right) = \begin{cases} \dfrac{\rho\left(t_i, v_{ij}\right)}{\rho\left(t_i, v_{ip}\right) - \rho\left(t_i, v_{ij}\right)}, & t_i \notin v_{ij}, \\[2ex] \dfrac{-\rho\left(t_i, v_{ij}\right)}{\left|v_{ij}\right|}, & t_i \in v_{ij}, \end{cases} \quad (5)$$

where $K_j(t_i)$ is the correlation degree of each supply chain flexibility indicator with respect to each evaluation level, $\rho(t_i, v_{ij})$ is the distance between t_i and $v_{ij} = \langle a_{ij}, b_{ij} \rangle$ in a finite interval, and $\rho(t_i, v_{ip})$ is the distance between t_i and $v_{ip} = \langle a_{ip}, b_{ip} \rangle$ in a finite interval, and the distance calculation formulae are shown in formulae (6) and (7) [22, 23]:

$$\rho\left(t_i, v_{ij}\right) = \left| t_i - \frac{1}{2}\left(a_{ij} + b_{ij}\right) \right| - \frac{1}{2}\left(b_{ij} - a_{ij}\right), \quad (6)$$

$$\rho\left(t_i, v_{ip}\right) = \left| t_i - \frac{1}{2}\left(a_{ip} + b_{ip}\right) \right| - \frac{1}{2}\left(b_{ip} - a_{ip}\right). \quad (7)$$

3.2.3. Calculate the Weight of the Evaluation Indicator. The supply chain flexibility is regarded as a system, and each evaluation indicator is a subsystem. The value of each evaluation object under the indicator can be regarded as the possible result of the subsystem, and the entropy weight of the indicator can be calculated according to its probability. According to the definition of entropy, the entropy of m evaluation objects and n indicators is calculated as shown in the following formula [24]:

$$E_i = -\frac{\sum_{j=1}^{m} T_{ij} \ln T_{ij}}{\ln m}, \quad i = 1, 2, \ldots, n; j = 1, 2, \ldots, m, \tag{8}$$

where $T_{ij} = (t_{ij}/\sum_{j=1}^{m} t_{ij})(T_{ij} \neq 0)$ and $T_{ij} = ((1 + t_{ij})/\sum_{j=1}^{m}(1 + t_{ij}))(T_{ij} = 0)$, t_{ij} is the value of the i-th indicator of the j-th evaluation object. The calculation formulae of entropy weight λ_i and weight W of evaluation indicators are shown in formulae (9) and (10) [24]:

$$\lambda_i = \frac{1 - E_i}{\sum_{i=1}^{n}(1 - E_i)}, \tag{9}$$

$$W = (\lambda_i)_{1\times n}. \tag{10}$$

3.2.4. Calculation of Comprehensive Correlation Degree and Evaluation of Grade. The correlation degree between each evaluation indicator and the grade standard is weighted and summed to get the comprehensive correlation degree, as shown in the following formula [22, 23]:

$$K_j(R_o) = \sum_{i=1}^{n} \lambda_i K_j(t_i). \tag{11}$$

If $K_j(R_o) = \max\{K_j(R_o)\}(j = 1, 2, \ldots, m)$, then the supply chain flexibility grade is j.

4. Example Analysis

In recent years, the automobile service industry has been developing rapidly in China, and its supply chain flexibility is representative. In this paper, four automobile service companies (A, B, C, and D) in N city of China are selected as research objects to evaluate and analyze their supply chain flexibility.

4.1. Supply Chain Flexibility Classification. In order to better reflect the level of supply chain flexibility, it is necessary to classify the level of supply chain flexibility of the automobile service industry. The supply chain flexibility level is divided into four levels according to industry reports over the years such as China's automobile service industry market status survey and development prospect analysis report (2019–2025) and China's automobile service industry development status survey and development trend analysis report (2018–2024). The level of supply chain flexibility from superior to inferior corresponds to I (excellent), II (good), III (medium), and IV (poor), and the meaning of each level of supply chain flexibility is shown in Table 2. By using the concept of the extension set, the gradual classification relationship of $\{\text{excellent} \longrightarrow \text{good} \longrightarrow \text{medium} \longrightarrow \text{poor}\}$ is extended from qualitative description to quantitative description, so as to identify the hierarchical relationship of this concept. The evaluation of supply chain flexibility is expressed as $P = \{\text{excellent} \longrightarrow \text{good} \longrightarrow \text{medium} \longrightarrow \text{poor}\}$, $\text{I} = \{\text{excellent}\}$, $\text{II} = \{\text{good}\}$, $\text{III} = \{\text{medium}\}$, and $\text{IV} = \{\text{poor}\}$, I, II, III, IV $\in P$. For any $p \in P$, it is judged that it belongs to I, II, III, or IV.

4.2. Determination of Classical Domain, Nodal Domain, and Weight. To autoservice industry based on the above cognizance of flexible supply chain hierarchies, combined with years of China's autoservice industry market research report, in reference to the China N city area actual situation on the basis of the background value and expert advice, determine range of supply chain flexible evaluation of each indicator hierarchy standard, the resulting classical domain and joint domain value interval values, and by formulae (8)~(10) to determine evaluation indicator weights, and the results are shown in Table 3.

4.3. Determination of Matter-Element to Be Evaluated. To evaluate the supply chain flexibility level of four automobile service companies (company A, company B, company C, and company D) in N city, China, it is necessary to determine the actual value of each company's supply chain flexibility to be evaluated, that is, t_i in formula (4). The evaluation indicator system constructed in this paper has 29 secondary indicators, including 23 quantitative indicators and 6 qualitative indicators. The acquisition of quantitative indicator data is mainly through the collection of the original data of each company, including the company's operation report, financial report, annual report, and field research data. The qualitative indicator data were obtained mainly by means of self-filled questionnaire and structured interview, and a seven-level Likert scale was designed for experts and staff to evaluate and score the indicator and quantify the qualitative indicator. After the positive indicator is quantified, the higher the score is, the higher the flexibility level of the indicator is. According to this, the supply chain flexible matter-element models of four automobile service companies are constructed.

4.4. Calculation of Correlation Degree and Determination of Evaluation Grade. According to the volume value t_i of each evaluation indicator c_i of the automobile service company and formulae (5)~(7), the correlation degree $K_j(t_i)$ of each company's supply chain flexibility evaluation secondary indicator with respect to the evaluation grade can be obtained, respectively. By judging the degree that the actual volume value t_i in the object to be evaluated R_o tends to the adjacent grade N_j, it can reflect a trend of the level change of the object to be evaluated. If $K_j(t_i) < -1$, it means that the supply chain flexibility does not belong to grade j and does not have the conditions to meet the grade standard; the smaller the value is, the larger the gap is; if $-1 \leq K_j(t_i) \leq 0$, it means that the supply chain flexibility does not belong to grade j but has the conditions to convert to the grade; the larger the value is, the easier to convert; and if $K_j(t_i) > 0$, it means that the supply chain flexibility meets the

Table 2: Classification of supply chain flexibility in the automobile service industry.

Grade	Characterization of supply chain flexibility grade
I (excellent)	(1) The specialty of the supply chain, the adaptability, and flexibility of service are strong (2) On the basis of specialization, it tends to be more personalized (3) It has a strong ability to effectively respond to changes in demand, a strong ability to respond to service supply chain, and a high level of flexibility
II (good)	(1) The specialty of the supply chain, the adaptability, and flexibility of service are stronger (2) On the basis of specialization, it can be more personalized (3) The ability to effectively respond to the change of demand is stronger, the response ability of service supply chain is stronger, and the level of flexibility is higher
III (medium)	(1) The specialty of the supply chain, the adaptability, and flexibility of service are general (2) The flow efficiency of information exchange among the main parts of the supply chain is general. (3) The ability to effectively respond to changes in demand is general, the response ability of the supply chain is general, and the level of flexibility is general
IV (poor)	(1) The specialty of the supply chain, the adaptability, and flexibility of service are weak (2) The flow efficiency of information exchange among the main parts of the supply chain is low (3) The ability to deal with the change of demand effectively is weak, the response ability of the supply chain is weak, and the level of flexibility is low

Table 3: Classic domain, node domain, and weight of supply chain flexibility evaluation indicators of the automobile service industry.

Indicators	Classical domain value interval				Node domain value interval	Weight
	I (excellent)	II (good)	III (medium)	IV (poor)		
c_1	[0, 0.056)	[0.056, 0.166)	[0.166, 0.222)	[0.222, 0.333]	[0, 0.333]	0.0886
c_2	[0.053, 0.156)	[0.156, 0.215)	[0.215, 0.315)	[0.315, 0.421]	[0.053, 0.421]	0.0151
c_3	[0.85, 0.94]	[0.75, 0.85)	[0.65, 0.75)	[0.55, 0.65)	[0.55, 0.94]	0.0079
c_4	[0, 0.166)	[0.166, 0.253)	[0.253, 0.368)	[0.368, 0.588]	[0, 0.588]	0.0065
c_5	[6, 7]	[4, 6)	[2, 4)	[1, 2)	[6, 7]	0.0014
c_6	[6, 7]	[5, 6)	[3, 5)	[1, 3)	[6, 7]	0.0003
c_7	[0.1, 0.3)	[0.3, 0.4)	[0.4, 0.5)	[0.5, 0.7]	[0.1, 0.7]	0.0882
c_8	[0.17, 0.25]	[0.15, 0.17)	[0.04, 0.15)	[0.01, 0.04)	[0.01, 0.25]	0.0383
c_9	[279, 360]	[200, 279)	[119, 200)	[87, 119)	[87, 360]	0.0805
c_{10}	[5.54, 7.29]	[3.13, 5.54)	[0.95, 3.13)	[0.65, 0.95)	[0.65, 7.29]	0.1416
c_{11}	[6, 7]	[4, 6)	[2, 4)	[1, 2)	[1, 7]	0.1280
c_{12}	[0.94, 1]	[0.79, 0.94)	[0.62, 0.79)	[0.38, 0.62)	[0.38, 1]	0.0124
c_{13}	[6, 7]	[4, 6)	[2, 4)	[1, 2)	[1, 7]	0.1282
c_{14}	[0.82, 0.94]	[0.64, 0.82)	[0.49, 0.64)	[0.23, 0.49)	[0.23, 0.94]	0.0476
c_{15}	[17, 20]	[14, 17)	[9, 14)	[5, 9)	[5, 20]	0.0656
c_{16}	[0.71, 0.98]	[0.63, 0.71)	[0.51, 0.63)	[0.32, 0.51)	[0.32, 0.98]	0.0033
c_{17}	[0.11, 0.23)	[0.23, 0.41)	[0.41, 0.57)	[0.57, 0.72]	[0.11, 0.72]	0.0107
c_{18}	[0.9, 1]	[0.8, 0.9)	[0.7, 0.8)	[0.6, 0.7)	[0.6, 1]	0.0013
c_{19}	[6, 7]	[5, 6)	[4, 5)	[3, 4)	[3, 7]	0.0142
c_{20}	[6, 7]	[5, 6)	[4, 5)	[3, 4)	[3, 7]	0.0019
c_{21}	[0.37, 0.48)	[0.48, 0.51)	[0.51, 0.65)	[0.65, 0.98]	[0.37, 0.98]	0.0077
c_{22}	[0.76, 0.85]	[0.59, 0.76)	[0.29, 0.59)	[0.09, 0.29)	[0.09, 0.85]	0.0429
c_{23}	[20, 30]	[15, 20)	[11, 15)	[5, 11)	[5, 30]	0.0078
c_{24}	[1, 2)	[2, 3)	[3, 6)	[6, 7]	[1, 7]	0.0025
c_{25}	[1, 2)	[2, 3)	[3, 4)	[4, 5]	[1, 5]	0.0197
c_{26}	[7, 9)	[9, 13)	[13, 17)	[17, 24]	[7, 24]	0.0181
c_{27}	[3, 5)	[5, 7)	[7, 9)	[9, 14]	[3, 14]	0.0073
c_{28}	[0.8, 0.9]	[0.7, 0.8)	[0.5, 0.7)	[0.3, 0.5)	[0.3, 0.9]	0.0071
c_{29}	[0.84, 0.92]	[0.77, 0.84)	[0.6, 0.77)	[0.42, 0.6)	[0.42, 0.92]	0.0052

requirements of grade j, the higher the value is. Tables 4 and 5 show the secondary indicator correlation and evaluation grade of supply chain flexibility evaluation of four automobile service companies.

By substituting the weight of each indicator in Table 3 and the correlation degree $K_j(t_i)$ of each secondary indicator in Table 4 into formula (11), the correlation degree and comprehensive correlation degree of the primary indicators of supply chain flexibility evaluation from company A to company D can be obtained, respectively, so as to evaluate the correlation degree of each company's primary indicators of supply chain flexibility and the level of each company's supply chain flexibility. The calculation results are shown in Tables 6–8.

Table 4: Secondary indicator correlation degree and grade of supply chain flexibility evaluation of companies A and B.

Indicators	Company A				Grade	Company B				Grade
	I	II	III	IV		I	II	III	IV	
c_1	0.0607	−0.0607	−0.6831	−0.7631	Excellent	−0.3187	0.4473	−0.3663	−0.5261	Good
c_2	−0.2571	0.0763	−0.0278	−0.3989	Good	−0.0169	0.0305	−0.3531	−0.6000	Good
c_3	−0.7283	−0.5925	−0.1850	0.1850	Poor	−0.2869	0.3940	−0.2074	−0.4807	Good
c_4	−0.3964	−0.2397	0.3017	−0.1199	Medium	−0.5822	−0.4737	−0.1986	0.1986	Poor
c_5	−0.3503	0.4150	−0.2767	−0.5660	Good	−0.3848	0.1650	−0.1100	−0.4660	Good
c_6	−0.3322	0.0100	−0.0050	−0.5025	Good	−0.3408	−0.0327	0.0350	−0.4825	Medium
c_7	0.0105	−0.0105	−0.3403	−0.5053	Excellent	0.3290	−0.3290	−0.5527	−0.6645	Excellent
c_8	−0.4825	−0.4086	0.4800	−0.3894	Medium	−0.2475	−0.1387	0.1745	−0.4324	Medium
c_9	−0.8177	−0.6903	0.0370	−0.0789	Medium	−0.1955	0.3291	−0.3313	−0.5560	Good
c_{10}	−0.9425	−0.8867	−0.0630	0.0630	Poor	−0.3044	0.4350	−0.2520	−0.5092	Good
c_{11}	−0.8600	−0.7667	−0.3000	0.3000	Poor	−0.3077	0.4000	−0.4000	−0.6400	Good
c_{12}	−0.6802	−0.5632	−0.2538	0.2538	Poor	−0.4005	0.1953	−0.1395	−0.5245	Good
c_{13}	−0.8235	−0.7059	−0.1176	0.1176	Poor	−0.2730	0.3006	−0.4663	−0.6798	Good
c_{14}	−0.7429	−0.6300	−0.4165	0.4165	Poor	−0.1618	0.1594	−0.5043	−0.6696	Good
c_{15}	−0.9167	−0.8889	−0.7500	0.2500	Poor	−0.2857	0.3333	−0.1667	−0.5455	Good
c_{16}	0.2267	−0.2267	−0.4034	−0.5557	Excellent	0.3411	−0.3411	−0.4917	−0.6215	Excellent
c_{17}	−0.4286	−0.0968	0.1875	−0.3171	Medium	−0.5714	−0.3226	0.3750	−0.2222	Medium
c_{18}	−0.1984	0.3290	−0.3355	−0.5570	Good	0.0890	−0.0890	−0.5445	−0.6963	Excellent
c_{19}	−0.3214	0.1000	−0.0500	−0.3667	Good	−0.5667	−0.3500	0.3000	−0.1875	Medium
c_{20}	−0.2500	0.5000	−0.2500	−0.5000	Good	0.0400	−0.0400	−0.5200	−0.6800	Excellent
c_{21}	−0.8732	−0.8651	−0.8079	0.1921	Poor	−0.5534	−0.5249	−0.3233	0.3233	Poor
c_{22}	−0.9651	−0.9532	−0.8830	0.1170	Poor	−0.8245	−0.7648	−0.4120	0.4120	Poor
c_{23}	−0.0833	0.2000	−0.2667	−0.4211	Good	−0.2000	0.4000	−0.1429	−0.3333	Good
c_{24}	−0.8400	−0.8000	−0.2000	0.2000	Poor	−0.8800	−0.8500	−0.4000	0.4000	Poor
c_{25}	−0.4333	−0.1500	0.3000	−0.2917	Medium	−0.5000	−0.2500	0.5000	−0.2500	Medium
c_{26}	−0.4167	−0.1250	0.2500	−0.3000	Medium	−0.3333	0.5000	−0.3333	−0.6000	Good
c_{27}	−0.3750	−0.1667	0.5000	−0.1667	Medium	−0.5556	−0.4286	−0.2000	0.2000	Poor
c_{28}	−0.5118	−0.3898	0.2205	−0.1530	Medium	−0.3514	−0.0770	0.0910	−0.4545	Medium
c_{29}	−0.7381	−0.6857	−0.3889	0.3889	Poor	−0.6667	−0.6000	−0.2222	0.2222	Poor

4.5. Data Analysis. It can be seen from Table 8 that the comprehensive evaluation grade of company A is transformation to poor, company B is good, company C is medium, and company D is transformation to poor. It can be seen that company B has the highest rating among the four companies, which reflects its professional supply chain, strong ability to effectively respond to demand changes, and high flexibility. Company A and company D have weak adaptability, weak response ability, and low flexibility in the supply chain. The supply chain of company C is generally flexible.

The data in Tables 6 and 7 are used to analyze the results in Table 8, that is, the supply chain flexibility level of each company is analyzed one by one. Among the primary indicators of company B, there are one excellent, five good, two medium, one poor, one transformation to poor, 80% of which are above medium, and 60% of which are above good. Therefore, the indicators to be concerned are p_6 production equipment flexibility and p_7 technology flexibility, and the key indicators are p_8 time flexibility and p_{10} information response flexibility. In the same way, company C accounts for 70% of the indicators above the medium level (including transformation to medium), while company C accounts for only 20% of the indicators above the good level. This shows that the supply chain flexibility of the company is in general in most aspects, and there is a huge room for improvement. Company A and company D account for 60% of the indicators above the medium level (including transformation to medium). The difference is that company D accounts for 40% of the indicators above the good level (including transformation to good). It also shows that the performance of p_3 capital flexibility, p_5 partner flexibility, p_6 production equipment flexibility, and p_8 time flexibility, which is currently poor, is the focus of future work improvement of the company. Through the overall analysis of the primary indicators, we can see that the four companies' indicator p_2 human resource flexibility has reached a good level, and the performance of indicator p_9 service supply flexibility is also good, reaching above the medium level, but p_8 time flexibility of the four companies is in a poor grade.

By analyzing the data in Table 4, we can get the secondary indicators that affect the supply chain flexibility level of each company. Taking company D as an example, because p_3 capital flexibility, p_5 partner flexibility, p_6 production equipment flexibility, and p_8 time flexibility are the four primary indicators that need to be focused on, combined with the secondary indicator correlation in Table 4, it is found that the secondary indicators c_7 under p_3, c_{13}, c_{15} and c_{15} under p_5, c_{17}, under p_6, c_{21}, and c_{22} under p_8 are all in poor grades. Based on the further analysis of the investigation of company D, c_7 financing capacity flexibility is poor mainly because the development of the

Table 5: Secondary indicator correlation degree and grade of supply chain flexibility evaluation of companies C and D.

Indicators	Company C				Grade	Company D				Grade
	I	II	III	IV		I	II	III	IV	
c_1	−0.3993	−0.0036	0.0107	−0.2498	Medium	−0.3852	0.1455	−0.0964	−0.3243	Good
c_2	−0.2812	−0.0408	0.0720	−0.3542	Medium	−0.3547	−0.1699	0.3500	−0.2754	Medium
c_3	0.3078	−0.3078	−0.6721	−0.7852	Excellent	−0.2632	0.5000	−0.2632	−0.5172	Good
c_4	−0.4953	−0.3642	−0.0318	0.0318	Poor	−0.6597	−0.5713	−0.3473	0.3473	Poor
c_5	−0.3634	0.3350	−0.2233	−0.5340	Good	−0.3387	0.4750	−0.3167	−0.5900	Good
c_6	−0.3512	−0.0763	0.0900	−0.4550	Medium	−0.3175	0.1300	−0.0650	−0.5325	Good
c_7	−0.2953	−0.0603	0.1810	−0.2251	Medium	−0.8855	−0.8473	−0.7710	0.2290	Poor
c_8	0.2950	−0.2950	−0.4360	−0.7314	Excellent	−0.1633	0.0300	−0.0060	−0.5267	Good
c_9	−0.4375	−0.0442	0.0617	−0.4130	Medium	−0.9583	−0.9292	−0.7500	0.2500	Poor
c_{10}	−0.6596	−0.3289	0.3741	−0.4505	Medium	−0.3203	0.3528	−0.2044	−0.4780	Good
c_{11}	−0.6500	−0.4167	0.3750	−0.3000	Medium	0.2400	−0.2400	−0.7467	−0.8480	Excellent
c_{12}	−0.4460	−0.2410	0.4253	−0.1903	Medium	−0.4112	0.0740	−0.0529	−0.4766	Good
c_{13}	−0.3799	0.2095	−0.1396	−0.4838	Good	−0.8414	−0.7356	−0.2069	0.2069	Poor
c_{14}	−0.4725	−0.2410	0.3413	−0.1413	Medium	−0.6585	−0.5085	−0.2250	0.2250	Poor
c_{15}	−0.5833	−0.4444	0.2000	−0.1667	Medium	−0.7500	−0.6667	−0.2500	0.2500	Poor
c_{16}	−0.1425	0.3275	−0.0749	−0.3111	Good	0.2456	−0.2456	−0.4180	−0.5666	Excellent
c_{17}	−0.7347	−0.5806	−0.1333	0.1333	Poor	−0.8163	−0.7097	−0.4000	2.0000	Poor
c_{18}	−0.3286	0.0410	−0.0205	−0.3470	Good	−0.2961	0.2740	−0.1370	−0.4247	Good
c_{19}	−0.9000	−0.8500	−0.7000	0.3000	Poor	−0.4333	−0.1500	0.3000	−0.2917	Medium
c_{20}	0.4000	−0.4000	−0.7000	−0.8000	Excellent	−0.1875	0.3000	−0.3500	−0.5667	Good
c_{21}	−0.5066	−0.4751	−0.2524	0.2524	Poor	−0.3892	−0.3500	−0.0713	0.0706	Poor
c_{22}	−0.7546	−0.6712	−0.1780	0.1780	Poor	−0.8361	−0.7804	−0.4510	0.4510	Poor
c_{23}	−0.1429	0.4000	−0.2000	−0.3684	Good	0.3000	−0.3000	−0.5333	−0.6316	Excellent
c_{24}	−0.6800	−0.6000	0.2000	−0.2727	Medium	−0.8600	−0.8250	−0.3000	0.3000	Poor
c_{25}	−0.2222	0.4000	−0.3000	−0.5333	Good	−0.1875	0.3000	−0.3500	−0.5667	Good
c_{26}	−0.4667	−0.2727	0.2500	−0.1111	Medium	−0.6000	−0.4545	−0.1429	0.1429	Poor
c_{27}	−0.5222	−0.3857	−0.1400	0.1400	Poor	−0.6667	−0.5714	−0.4000	0.4000	Poor
c_{28}	−0.3236	0.0830	−0.0415	−0.5208	Good	−0.2922	0.2970	−0.1485	−0.5743	Good
c_{29}	−0.5476	−0.4571	0.0588	−0.0500	Medium	−0.4000	−0.2727	0.4706	−0.2500	Medium

Table 6: Primary indicators' correlation degree and grade of supply chain flexibility evaluation of companies A and B.

Indicators	Company A				Grade	Company B				Grade
	I	II	III	IV		I	II	III	IV	
p_1	−0.0580	−0.0886	−0.5115	−0.6175	Transformation to poor	−0.2924	0.3395	−0.3447	−0.4926	Good
p_2	−0.4052	0.2566	−0.7414	−1.1726	Good	−0.6696	0.4704	−0.4297	−0.9614	Good
p_3	−0.4027	−0.3484	−0.0419	−0.3181	Transformation to medium	0.0185	−0.0379	−0.3321	−0.5794	Excellent
p_4	−0.8935	−0.8179	−0.1790	0.1790	Poor	−0.3101	0.4085	−0.3142	−0.5692	Good
p_5	−0.8329	−0.7406	−0.3484	0.2125	Poor	−0.2545	0.2817	−0.3924	−0.6413	Good
p_6	−0.2670	−0.0898	0.0158	−0.3888	Medium	−0.3184	−0.3073	0.1105	−0.3482	Medium
p_7	−0.3129	0.1480	−0.0740	−0.3827	Good	−0.4939	−0.3128	0.2017	−0.2465	Medium
p_8	−0.9511	−0.9398	−0.8716	0.1284	Poor	−0.7833	−0.7284	−0.3985	0.3985	Poor
p_9	−0.3913	−0.1175	0.1630	−0.2902	Medium	−0.4083	0.1066	0.0351	−0.3614	Good
p_{10}	−0.5205	−0.3847	0.1637	−0.0146	Medium	−0.5113	−0.3471	−0.1009	−0.0303	Transformation to poor

company is in the transition stage from introducing innovation to independent innovation, the innovation work in all aspects is not mature enough, and the cost of capital invested at the current stage is high, resulting in high capital use fee, thus improving the financing cost rate. c_{13} trust mechanism build ability, c_{14} knowledge sharing rate, and c_{15} number of partners that can be selected in time are rated as poor grades mainly due to the limited efficiency of information transfer between suppliers and all parties, the weak ability to enhance their own competitive strength with the help of partners, the poor communication and cooperation between the main parts of the supply chain, and the low efficiency of information transfer, resulting in low supply flexibility level of the chain. The main reason for the poor c_{17} maintenance rate of production equipment is that the training of professional skills of the company's employees is not in place, and the employees are not proficient in the use of equipment. The poor grade of c_{21}

Table 7: Primary indicators' correlation degree and grade of supply chain flexibility evaluation of companies C and D.

Indicators	Company C				Grade	Company D				Grade
	I	II	III	IV		I	II	III	IV	
p_1	−0.3422	−0.0486	−0.0294	−0.2834	Transformation to medium	−0.3883	0.0892	−0.0642	−0.2939	Good
p_2	−0.7034	0.2155	−0.1988	−0.8038	Good	−0.7234	0.5048	−0.3375	−0.8740	Good
p_3	−0.2414	−0.0975	0.0206	−0.3918	Medium	−0.7803	−0.7170	−0.6214	0.0975	Poor
p_4	−0.6458	−0.3648	0.3768	−0.3707	Medium	−0.0701	0.0715	−0.4438	−0.6458	Good
p_5	−0.4534	−0.0570	0.0475	−0.3301	Medium	−0.7805	−0.6721	−0.2222	0.2222	Poor
p_6	−0.5723	−0.3318	−0.1113	−0.0030	Transformation to poor	−0.5424	−0.5274	−0.3822	1.2414	Poor
p_7	−0.7441	−0.7960	−0.7000	0.1681	Poor	−0.4039	−0.0960	0.2221	−0.3246	Medium
p_8	−0.7170	−0.6414	−0.1893	0.1893	Poor	−0.7683	−0.7151	−0.3934	0.3932	Poor
p_9	−0.3251	0.0949	−0.0508	−0.3341	Good	−0.2984	−0.1400	−0.2993	−0.2652	Transformation to good
p_{10}	−0.4572	−0.2355	−0.0518	−0.1488	Transformation to medium	−0.4609	−0.1789	−0.0787	−0.1238	Transformation to medium

Table 8: Comprehensive correlation degree and grade of supply chain flexibility evaluation of each company.

Company	I	II	III	IV	Grade
A	−0.6301	−0.5511	−0.2380	−0.0579	Transformation to poor
B	−0.2624	0.1675	−0.3085	−0.5014	Good
C	−0.4642	−0.1924	0.0922	−0.3065	Medium
D	−0.4932	−0.3352	−0.3536	−0.1257	Transformation to poor

degree of timely response and c_{22} delivery flexibility is due to the company's relatively lagging response to market changes or changes in customer demand, the long time taken to respond to changes and uncertainties, the low sensitivity of delivery time, and the difficulty of shortening and changing the delivery service time at any time.

5. Conclusion

The development of each industry is faced with the uncertainty and risk brought by the external market environment. The flexibility level of the supply chain affects the market competitiveness and market position of enterprises. The results show that the improvement of supply chain flexibility depends on the efficient operation of the information system. Enterprises should find the information system suitable for their own business development needs, scientifically combine the business and data processing in actual work, realize the seamless connection between online and offline, and improve the ability of employees to use the information system and information platform. In addition, enterprises should balance the input of innovation resources. In addition to strengthening the innovation of product manufacturing technology, they should also pay attention to the sharing of information resources in the supply chain and strengthen the ability of obtaining internal and external information and identifying value information in the supply chain. In addition to the information system, the intelligent and high-tech service auxiliary equipment should also include the storage management and the provision of additional services in the customer waiting area. It is also very important to strengthen the cooperation with the internal and external enterprises of the supply chain. The enterprises in each link of the supply chain need to correctly handle the relationship between competition and cooperation, rationalize the division of labor, strengthen flexible cooperation, so as to jointly improve the ability to deal with market risks.

This paper designs a comprehensive and feasible evaluation system for supply chain flexibility research from the perspective of enterprise dynamic management and uses the matter-element evaluation method to effectively solve the problems of possible incompatibility of flexible indicators and multi-objective evaluation so that the evaluation results are more scientific and comprehensive, the key indicators affecting the evaluation results are more easily identified, and different evaluations of different research samples are made. The contrast and gap between the results are clearer. In the matter-element evaluation method, the construction of the matter-element extension evaluation model is the key to the research. The setting of classical domain and nodal domain and the design of correlation function have great room for improvement, which will be the future research direction.

Data Availability

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

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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