

Research on identification and prevention of supply chain financial risk of small and medium-sized energy enterprises based on the ISM-MICMAC model

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Abstract. It is very important to identify the main influencing factors of supply chain finance risk of small and medium-sized energy enterprises, analyze its action mechanism, and build the influencing factor system for this enterprise's supply chain finance risk management. First, based on the status of SMEs, financing assets, and supply chain operation, this paper analyzes the influencing factors of supply chain financial risk; This paper uses the interpretative structural model (ISM) method to establish the interaction between 17 risk factors, and finally uses the cross-influence matrix multiplication (MICMAC) analysis to classify these risk variables. Finally, the results showed that: Small and medium-sized enterprise operation ability, profitability, development ability, supply chain production performance, accounts receivable characteristics, product quality competitiveness of the driving power is low, and strong dependence power, which is an important cause of supply chain finance risk; Enterprise scale, innovation ability, credit quality, debt paying ability and supply chain cooperation degree have strong driving power and weak dependence power, which are the most fundamental factors that constitute supply chain financial risk.

Keywords: ISM-MICMAC; Financial supply chain; Small and medium-sized energy enterprises; Risk path identification.

1. Introduction

Compared with developed countries, China, as a developing country, has a short development time in small and medium-sized energy enterprises, with a low overall level, and some key constraints have not been broken. Moreover, most of the small and medium-sized new energy enterprises have accumulated fewer funds, their credit level is relatively imperfect, the financial system is not perfect, and the organizational framework of enterprises is lack rigorous, In addition, due to the high financing conditions in the external capital market and the lack of effective financing channels, most small and medium-sized new energy enterprises have difficulties in financing. In this era of multi-party financing obstacles, small and medium-sized energy enterprises through supply chain financing revitalize business, achieve product services, and constantly optimize and transfer the core competitiveness of enterprises.

Under the traditional methods of risk identification, there are many models of enterprise credit risk assessment under supply chain finance. For example, Zhu et al.^[1] used the integrated machine learning method to construct the supply chain financial credit risk assessment model, and found that the model had good performance in dealing with small samples; Liu et al.^[2] proposed an integrated SNM model to solve the credit risk assessment under the supply chain finance, and proposed a new noise filtering scheme based on fuzzy clustering and principal component analysis, which improved the accuracy of the model evaluation. Fan^[3] analyzes the credit risk of small and medium-sized enterprises under the mode of supply chain finance through the method of multi-objective decision-making level analysis. It thinks that the credit risk mainly comes from the factors of small and medium-sized enterprises, and the essence of its financing risk is the risk of the real economy. Through empirical analysis,

Zhang[4] refers to the model of supply chain financial risk assessment at the present stage. Although it is extensive, it lacks the construction of a data-driven supply chain financial risk control system.

In the literature on supply chain financial risk mentioned above, the risk status, financing methods, and risk control of supply chain financing are comprehensively discussed, but the content of using ISM-MICMAC to evaluate and analyze the risk of supply chain finance is not involved, especially the evaluation and analysis of a certain industry credit risk is lacking. This paper attempts to use this model to comprehensively identify the risk of supply chain finance of small and medium-sized energy enterprises. Based on the hierarchical method, this paper identifies 17 risk factors of supply chain finance of small and medium-sized energy enterprises by combing relevant literature and analyzes the hierarchical relationship and category distribution of these influencing factors by using an interpretative structural model (ISM) and cross-influence matrix multiplication (MICMAC) model. Finally, according to the structural relationship of the financial risk factors in the supply chain of small and medium-sized energy enterprises, it is of great theoretical significance and practical value to put forward preventive suggestions to realize the sustainable development of small and medium-sized energy enterprises.

2. Index system construction of supply chain financial risk for small and medium-sized energy enterprises

2.1 Status of SMEs

As the direct beneficiaries of supply chain finance, SMEs' situation is the basis of supply chain finance credit risk, which mainly includes two aspects. The first is the basic information of the enterprise. The basic situation of an enterprise reflects the strength and potential of the enterprise at the current stage, such as the scale of the enterprise, the life cycle of the enterprise, the innovation ability of the enterprise, and the credit quality. The better the basic performance of an enterprise, the lower the possibility of default, and the smaller the credit risk faced by financial institutions.

The second is the operation ability of the enterprise. Generally speaking, the ability of enterprises to repay loans depends largely on their financial situation. The better the financial performance, the more likely it is to repay the debt on time, and the lower the credit risk. Specific performance for the operation of enterprises, debt repayment, profitability, and development capabilities.

2.2 Status of financing assets

The risk attribute of financing assets has a direct impact on credit risk avoidance, mitigation, and even default loss of supply chain finance. Investigating the risk attributes of financing assets is the basic work of supply chain financial credit risk management. For the loan of small and medium-sized enterprises in the supply chain, financial institutions need to evaluate the material characteristics or accounts receivable of financing enterprises. Under the mode of accounts, receivable financing accounts receivable as collateral is very important. Its quality, accounting period, account age and the buyer's return records, and other factors may lead to the failure to repay the credit business in time. In the actual transaction, due to the unequal economic status, small and medium-sized enterprises are forced to extend the accounting period and even accept unequal transaction conditions to reach a transaction. The situation that accounts receivable can't be recovered on time often occurs. For banks, once this situation occurs, it means that small and medium-sized enterprises rely solely on the "trade self-compensation" of business to guarantee repayment. The price stability of material characteristics should be fully considered.

2.2 Supply chain operation

The production performance of the supply chain is the evaluation of the overall operation of the supply chain, which can reflect the management ability and production level of the enterprise from the side. It is measured by the following indicators: enterprise product cost, enterprise product production cycle rate, and supply chain total profit margin. The degree of cooperation between the

upstream and downstream enterprises of the supply chain will affect the credit rating of banks. If the closer the relationship between enterprises is, the more cooperation they will establish a long-term and stable supply-demand relationship. The closer their relationship is, the more weak the SMEs will be. The measurement index is mainly the degree of cooperation between upstream and downstream enterprises.

Similarly, the degree of informatization directly reflects whether the communication between enterprises in the supply chain is smooth, thus reflecting the degree of enterprise information sharing. It can have a direct impact on each step of the supply chain. The main index is the degree of information sharing. The longer the core competitiveness of enterprises can be judged through the cooperation of enterprises, the longer the core competitiveness of enterprises can be determined. The main indexes are product quality competitiveness and customer satisfaction.

Table 1. Index system

Primary indicators	Secondary indicators	Third level index	Factor labeling	Literature sources
The situation of small and medium-sized enterprises	Basic information	Enterprise scale	S_1	[2]
		Life cycle	S_2	[3]
		Enterprise innovation ability	S_3	[4]
		Credit quality	S_4	[5]
	Operational capacity	The turnover rate of total assets	S_5	[8]
		Solvency	S_6	[9]
		Profitability	S_7	[10]
	Capacity development	Net profit growth rate	S_8	[11]
		Material characteristics	S_9	[1]、[3]
		Price stability	S_9	[1]、[3]
Status of financing assets	Characteristics of accounts receivable	Provision for bad debts	S_{10}	[1]、[3]
Supply chain operation	Production performance	Enterprise product cost	S_{11}	[13]
		Production cycle rate of enterprise products	S_{12}	[14]
		The total profit margin of the supply chain	S_{13}	[14]
	Supply chain cooperation	The degree of cooperation between upstream and downstream enterprises	S_{14}	[12]
		Information level	S_{15}	[13]
	competitive power	Product quality competitiveness	S_{16}	[13]
		Customer satisfaction rate	S_{17}	[12]、[14]

3. ISM Method

Interpretative structural modeling (ISM) is a method proposed by Professor Warfield JW in 1974 to solve the institutional problems of complex social and economic systems. Mei and Zhang built the ISM-MICMAC model to analyze the important driving factors^[6]that promote the reasonable sharing of PPP projects in China; Chen used the ISM model to screen out the key factors affecting the maturity of supply chain finance. The model decomposes the complex system into several subsystems, determines the interaction among the elements of each subsystem by combining the professional knowledge and practical experience of experts, and constructs a multi-level hierarchical structural model with the aid of a computer. The model makes the relationship of elements hierarchical and

orderly, which makes those factors have good and intuitive readability and reference. Therefore, the calculation steps of ISM are as follows:

Step1: construct the structure self-interaction matrix (SSIM). Before the construction of the adjacency matrix, it is necessary to clarify the relationship of factors and establish the structure self-interaction matrix (SSIM) to reflect the internal relationship among them. In the ISM method, V, A, X, and O are used to represent the relationship among factors, which means as follows:

$$S = \begin{cases} V : \text{Indicates that row factor } S_i \text{ affects column factor } S_j; \\ A : \text{Indicates that column factor } S_j \text{ affects row factor } S_i; \\ X : \text{Represents the interaction between row factor } S_i \text{ and row factor } S_j; \\ O : \text{Indicates that there is no influence between row factor } S_i \text{ and row factor } S_j; \end{cases} \quad (1)$$

Step2: construct adjacency matrix A. The structure of SSIM is quantified and the adjacency matrix is established to reflect the relationship between the above factors. The adjacency matrix is binary. Therefore, the quantitative relationship is represented by a matrix of 1 and 0. The adjacency matrix is named A and the mathematical method is defined as follows:

$$a_{ij} = \begin{cases} 1, & S_i \text{ affects } S_j \\ 0, & S_i \text{ has no effect on } S_j \end{cases} \quad (2)$$

Step3: construct reachability matrix B. Reachability matrix is a matrix that can be connected between various factors, reflecting the degree of arrival between each node. The reachable matrix is obtained by calculating the adjacency matrix according to the law of progression and the operation rules of Boolean algebra

Use I represents the identity matrix, it can be calculated according to the operation rules of Boolean algebra:

If the adjacency matrix a satisfies the condition:

$$(A + I)^{k-1} \neq (A + I)^k = (A + I)^{k+1} = B \quad (3)$$

Then B is the reachable matrix of adjacency matrix A.

Step4: hierarchically distribute the reachability matrix. The hierarchy distribution of the reachability matrix decomposes the influencing factors into different levels. Firstly, the determined set is $R(S_i)$ the antecedent set $Q(S_i)$, the common set C . And reachable set $R(S_i)$. In the reachability matrix B i . The set of elements with a row value of 1 is a set of factors that interact with each other and have a similar influence, representing factors S_i Elements of arrival. Antecedent set $Q(S_i)$. The set of elements with a row value of 1, including reachable factors, subordinate influencing factors, and mutual influencing factors. A common set $C = R(S_i) \cap Q(S_i)$ is the -same factor of the reachable set $R(S_i)$ and the antecedent set sum $Q(S_i)$. As a result, the hierarchical relationship between the factors can be clearer. The top-level system is the ultimate goal, and the lower level is the reason for the upper level.

Secondly, according to the common set of the highest level influencing factors N The level of extraction. According to the judgment, conditions $N = R(e_i)$. Determine the top level L_1 . The factor set of L_1 . The factors are proposed from the factor table and determined according to the above judgment principles L_2 . The set of factors is cycled in this way until the last level of factors is determined.

Step5: draw the structural model. According to the hierarchical distribution of the reachability matrix, the factors of each level are determined, and the related structure model diagram is drawn to construct the ISM model.

4. MICMAC Method

Cross influence matrix multiplication (Micmac) is a factor classification method proposed by Duperrin and God. Through the ISM-MICMAC model, Hong constructed the influencing factor model^[7] of international logistics and supply chain talent competency; Peng uses Micmac to determine the key factors that affect the integration of stall economy into urban governance. Based on the reachability matrix, this model analyzes the driving power and dependence power of each factor and presents the final results through two-dimensional coordinates. The MICMAC method further clarifies the relationship and importance of various factors, on the whole, to analyze and improve the factors of different importance and types. The calculation steps of Micmac are as follows:

Stepr1: classify the calculated driving power and dependence power. Before classifying the factors, we need to calculate the driving force and dependence of each factor according to the reachability matrix, and the reachable set of each factor in the reachability matrix $R(S_i)$ As the driving force, the antecedent set of each factor $Q(S_i)$ As a dependence, its mathematical calculation is as follows:

$$\text{Driving Power} = \text{The element corresponds to the sum of all values "1" in the row} \quad (4)$$

$$\text{Dependence Power} = \text{The element is the sum of all values "1" in the corresponding column} \quad (5)$$

Stepr2: risk factors. According to the driving force and dependence of each factor, the influencing factors are divided into four categories: spontaneous risk factors, dependent risk factors, linkage risk factors, and independent risk factors.

Stepr3: draw the Micmac matrix. The analysis results of the MICMAC method are shown by a quadrant diagram, in which the horizontal axis represents the dependence and the vertical axis is the driving force. Therefore, the first quadrant is the linkage quadrant, the second quadrant is the independent quadrant, the third quadrant is the spontaneous quadrant, and the fourth quadrant is the dependence quadrant.

5. Case analysis

5.1 Construction of risk ISM model

5.1.1 Adjacency matrix A

Based on the index system constructed above, referring to the domestic scholars' research on the supply chain financial risk of small and medium-sized energy enterprises, using the methods of literature research and risk event report analysis, industry experts make a reasonable and reliable evaluation of the above indicators based on their cognitive ability and rich experience, According to the maximum subordination principle, the direct influence relationship between 17 risk factors is confirmed and transformed into an adjacency matrix A.

$$A = \begin{bmatrix} 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 0 & 1 & 1 & 1 & 1 & 0 & 0 & 1 & 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 0 \end{bmatrix} \quad (6)$$

5.1.2 Reachability matrix B

Because adjacency matrix A can only show the direct relationship between factors, but not the indirect relationship between factors, it is necessary to establish reachability matrix B to reflect the direct and indirect relationship between various factors and the transitivity between them. utilize Matlab software, according to the formula⁽³⁾ The reachability matrix B is obtained.

$$B = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 0 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 1 & 1 & 1 & 1 & 1 & 0 & 0 & 0 & 1 & 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 1 & 0 & 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 0 \\ 1 & 0 & 1 & 1 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 1 & 1 & 0 & 0 \\ 1 & 0 & 1 & 1 & 0 & 1 & 1 & 1 & 0 & 0 & 1 & 0 & 1 & 1 & 1 & 0 & 0 \\ 1 & 0 & 1 & 1 & 1 & 1 & 1 & 1 & 0 & 0 & 0 & 1 & 0 & 1 & 1 & 0 & 0 \\ 1 & 0 & 1 & 1 & 0 & 1 & 1 & 1 & 0 & 0 & 0 & 1 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 1 & 0 & 1 & 1 & 1 & 0 & 0 & 0 & 1 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 1 \end{bmatrix} \quad (7)$$

5.1.3 Hierarchy of risk factors

The purpose of dividing the risk factors into different levels is to divide the factors that affect the supply chain financial risk of small and medium-sized energy enterprises into different levels, to facilitate the subsequent analysis. Firstly, it is necessary to determine the reachable set R and the antecedent set Q of the risk factor set, and the intersection between them $R \cap Q$ It is represented by C, as shown in Table 2.

Table 2. Reachable sets $R(S_i)$ Antecedent set $Q(S_i)$ And intersection $C(S_i)$

S_i	$R(S_i)$	$Q(S_i)$	$C(S_i)$
S_1	1,4,14,15	1,2,5,7,8,10,11,12,13,16	1
S_2	1,2,3,4,5,6,7,8,11,12,13,14,15	2	2
S_3	3,15	2,3,5,7,8,10,11,12,13,16	3
S_4	4	1,2,4,5,6,7,8,9,10,11,12,13,16	4
S_5	1,3,4,5,6,7,8,12,14,15	2,5,12	12,5
S_6	4,6	2,5,6,7,8,9,10,11,12,13,16	6
S_7	1,3,4,6,7,8,14,15	2,5,7,11,12,13,16	7
S_8	1,3,4,6,8,14,15	2,5,7,8,10,11,12,13,16	8
S_9	4,6,9	9	9
S_{10}	1,3,4,6,8,10,14,15	10	10
S_{11}	1,3,4,6,7,8,11,13,14,15	2,11	11
S_{12}	1,3,4,5,6,7,8,12,14,15	2,5,12R	12,5
S_{13}	1,3,4,6,7,8,13,14,15	2,11,13,16	13
S_{14}	14,15	1,2,5,7,8,10,11,12,13,14,16,17	14
S_{15}	15	1,2,3,5,7,8,10,11,12,13,14,15,16,17	15
S_{16}	1,3,4,6,7,8,13,14,15,16	16	16
S_{17}	14,15,17	17	17

After getting the highest level elements, cross them out of the table, and repeat the above steps to get the grade distribution of the remaining elements until the last level elements are divided. The final iteration result is: the first level is S_4 , S_{15} ; The second level is S_3 , S_6 , S_{14} ; The third level is S_1 , S_9 , S_{17} ; The fourth level is S_8 ; The fifth level is S_7 , S_{10} ; The sixth level is S_5 , S_{12} , S_{13} ; The seventh level is S_{11} , S_{16} ; The eighth level is S_2 .

5.1.4 ISM model analysis

According to table 3, the influencing factors of 8 layers can be divided into 3 categories, namely: direct factors (L_6 、 L_7 、 L_8) Indirect factors (L_3 、 L_4 、 L_5) And deep factors (L_1 、 L_2).

Direct factors include L_6 、 L_7 、 L_8 . According to statistics, three main factors affect SMEs' ability to pay off their supply chain, especially their own supply chain risk. From the hierarchical relationship diagram (see Figure 1), it can be seen that the scale and innovation ability of enterprises, credit quality, price stability of financing materials, customer satisfaction rate, asset-liability ratio, information sharing degree, and cooperation degree of upstream and downstream enterprises are the direct factors causing the outbreak of financial risks in the supply chain of small and medium-sized energy enterprises, so the direct factors are the key factors for enterprises to prevent risks.

Indirect factors include L_3 、 L_4 、 L_5 . There are six factors in the three layers, which indirectly affect the enterprise's situation, thus resulting in risks. The indirect impact mainly includes the profitability, operation, and development ability of the enterprise, such as sales profit rate, net profit growth rate, total asset turnover rate, etc., coupled with the supply chain production performance and the characteristics of accounts receivable in financing assets, all of which are the indirect causes of supply chain financial risk. Such as production cycle rate, total profit margin of the supply chain, and bad debt provision. Therefore, enterprises should enhance the profitability and operation ability, and at the same time, improve the production performance of the supply chain to prevent the occurrence of risks.

Deep factors include L_1 、 L_2 . There are three factors in the second layer. This kind of factor is often ignored by enterprises because it is not easy to be detected, but the deep-seated factors often lead to the outbreak of direct and indirect factors, so we must be careful about such factors. The deep-seated factors include product cost, product quality competitiveness, and the life cycle outside the enterprise. In many cases, the occurrence of risk is often due to the product failure of the enterprise, which leads to the lack of profitability, and finally affects the solvency, so that the supply chain financial risk occurs. Therefore, it is of great practical significance to strengthen the competitiveness of enterprise products and reduce costs to prevent the occurrence of financial risks in the supply chain.

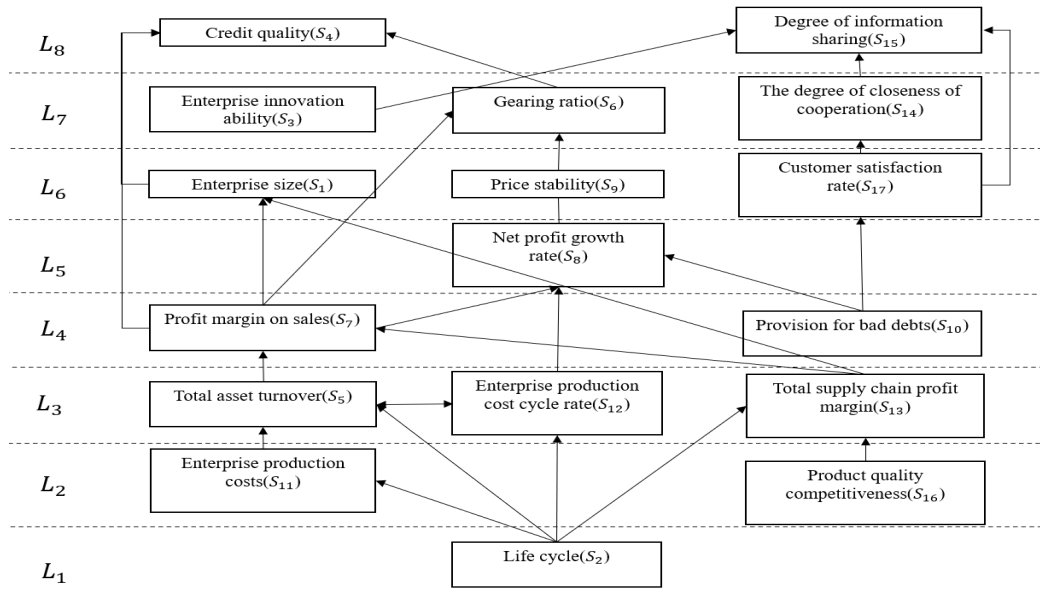


Figure 1. Explain the structural model

5.2 MICMAC analysis

5.2.1 MICMAC analysis method

The basic data of reachable matrix B is used in Matlab, The driving force and dependence of financial risk factors in the supply chain of small and medium-sized energy enterprises are calculated,

and then the classification chart of driving force and dependence of risk factors is drawn (see Fig. 2) for the analysis of risk factors.

5.2.2 MICMAC result analysis

Through Micmac analysis of supply chain financial risk factors of small and medium-sized energy enterprises, 17 risk factors are divided into the following four categories.

1) Spontaneous factors include: S_2 、 S_{15} 、 S_{17} 、 S_9 . These factors have a low driving force and low dependence, which belong to the most surface factors, but have an impact on the shallow and deep factors.

2) Independent factors include: S_3 、 S_6 、 S_{14} 、 S_1 、 S_4 . Is the fundamental factor of the enterprise supply chain. These kinds of influence factors have a high driving force and low dependence, which are not easy to control, and once these factors are destroyed, there will be a series of chain reactions, so we should focus on prevention.

3) The linkage factors are highly unstable and difficult to control. There are no such factors in this study, which shows that there are no risk factors with high dependence and driving force in the financial risk of small and medium-sized energy supply chain.

4) The dependent factors include: S_8 、 S_7 、 S_{13} 、 S_5 、 S_{12} 、 S_{11} 、 S_{16} 、 S_{10} . This kind of factor has high dependence and low driving force, which can be controlled by strengthening other factors that have an impact on it, to prevent the occurrence of supply chain financial risk.

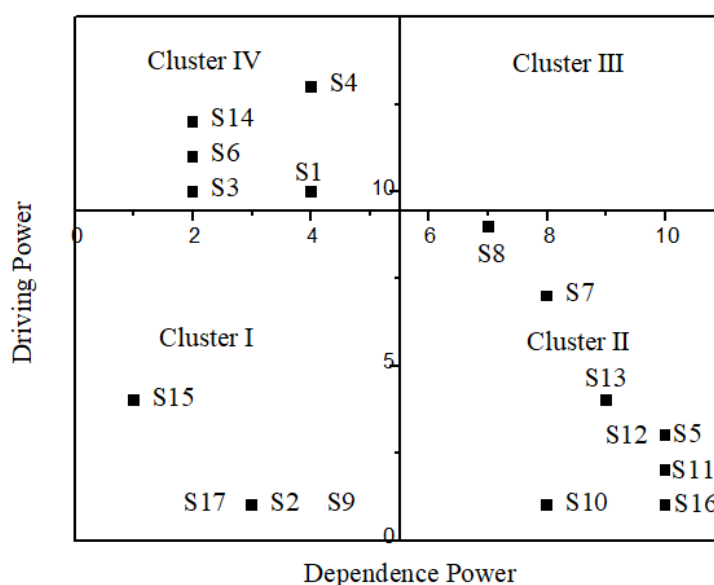


Figure 2. Classification of influencing factors "driving force dependence"

To sum up, according to the ISM model and MICMAC analysis, there are different degrees of correlation between financial risk factors of SME's supply chain. To better prevent risks, the following suggestions are put forward for small and medium-sized energy enterprises.

1) No matter what kind of life cycle an enterprise is in, it is necessary to maintain the stability of product price as far as possible, control the fluctuation in a reasonable range; To improve customer satisfaction, to establish a long-term cooperative relationship; It is necessary to strengthen the information sharing degree of the supply chain to avoid the occurrence of the risk.

2) While expanding the scale and investing a large amount of capital, enterprises should always maintain their credit quality level, improve their innovation ability, and strengthen the close cooperation with upstream and downstream enterprises to ensure that the enterprises have sufficient solvency. Never blindly expand the scale and neglect the cash flow of enterprises, thus leading to the occurrence of supply chain financial risks.

3) Based on meeting the debt paying ability, the enterprise should continuously enhance its operation ability, profitability, and development ability, improve its product quality competitiveness

and reduce bad debt reserves, to avoid a series of problems such as insufficient solvency, price fluctuation and customer dissatisfaction caused by the lack of the above conditions.

6. Conclusion

Small and medium-sized energy enterprises' supply chain financial risk is mainly affected by their situation. Due to lack of funds and low solvency, small and medium-sized energy enterprises have greater supply chain financial risks. The scale, innovation ability, debt-paying ability, credit quality, and the close cooperation between upstream and downstream enterprises are the fundamental factors that cause the financial risk of the supply chain of small and medium-sized energy enterprises.

The profitability, operation, and development ability of enterprises, the production performance of the supply chain, and the accounts receivable in financing assets indirectly affect the situation of enterprises themselves, thus resulting in financial risks affecting the supply chain of small and medium-sized energy enterprises. To prevent the financial risks of the supply chain of small and medium-sized energy enterprises, joint efforts should be made from various aspects and levels.

The production cost, competitive advantage, and life cycle of enterprise products are the deep-seated factors of supply chain financial risk. These factors affect the direct and indirect factors of enterprise supply chain financial risk. To prevent supply chain financial risk, we must enhance the competitive advantage of products and improve the production efficiency of products.

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