Research on Material and Supplier Classification Method of Core Supporting Equipment Contractor

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Abstract. For the supplier classification method used by the military equipment core supporting equipment manufacturing unit mainly based on the civilian product market, it is unable to grasp the characteristics of the military industry and reflect the current situation of the military's focus. In this paper, the Kraljic Matrix method is used to establish a rapid classification index system of materials and suppliers suitable for military items, and the weight of the influence factors is determined by the analytic hierarchy process to optimize the classification of purchased materials and suppliers for a marine military equipment project. The classification results not only conform to the Pareto principle, but also effectively reflect the key and difficult points of supply and supplier management, and meet the actual needs of military project management.

Keywords: Core equipment contractors · Kraljic Matrix · Materials · Suppliers · Classification

1 Introduction

Modern supply chain management is a strategic management thinking, which is applicable to the field of military equipment supply chain management with great strategic significance. Supply chain management can effectively solve the problems of quality and efficiency, which is the core of the military equipment supply chain. In terms of form, the military equipment supply chain is no different from the market commodity supply chain, so the construction and management experience of the market supply chain can be fully used for reference and application [1, 2]. The supplier is the foundation of the supply chain and the participant, builder and manager of the supply chain. With the progress of science and technology, the intensification of international competition and the ever-changing demand for military equipment, military suppliers have an increasing impact on the military supply chain, which directly affects the operational quality of the military supply chain in terms of meeting the needs of combat training, military scientific and technological innovation, military equipment production, and emergency mission

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support. The scientific development, selection and use of military suppliers suitable for future war needs and military transformation and development requirements, and the establishment of long-term strategic alliance and partnership with them, have become the primary strategic issue in military supply chain management [3].

In China's military equipment supply chain, there are such enterprises, which are mainly engaged in the civilian market and have a high industrial position and market competitiveness in their respective industrial chains. At the same time, they have contracted many key and important supporting equipment in the military market as second-round or third-round supporting enterprises. Generally, they have the qualification of Class A equipment contractor. The author calls them the core supporting equipment contractor of military equipment. Due to the historical heritage, as well as the national politics, economy, national defense security and other reasons, the vast majority of these enterprises are state-owned holding enterprises, which are not only strong but also large in number, and have become the backbone of the military equipment industry. In the supply chain of military products and equipment, these enterprises mainly face the general assembly enterprise or system integration enterprise of the military industry group, and the Party B mainly faces the numerous suppliers of its civilian products market, so they are at the key node of connecting the preceding and the following and military-civilian integration. In view of its special role in the military equipment supply chain, the management of these enterprises and their suppliers is of great significance to the construction of the entire military equipment supply chain. At present, there are many studies on supplier management of traditional military and civilian enterprises at home and abroad, but there are few studies on how to carry out supplier management for military projects of core supporting equipment manufacturers.

2 The Importance of Static Classification for Military Equipment Items

Supplier management is the core of supply chain management and procurement management. Supplier management mainly includes supplier classification, development, selection, assessment and relationship management, among which supplier classification is the leading link and work basis of supplier management [4–6]. With the development and wide application of big data, Internet and other technologies, more and more enterprises pay more attention to dynamic classification and ignore static classification, resulting in deviation in the supplier positioning at the initial stage of the project, resulting in incorrect management strategies, poor cooperation between suppliers and suppliers, low supplier loyalty, and frequent supply chain risks. Each new project must be analyzed on a case-by-case basis. It cannot completely copy the model of other projects, nor completely rely on the performance data of other projects. Compared with dynamic classification, static classification can carry out category analysis on required suppliers at the beginning of the project, thus laying the foundation for subsequent sourcing, selection and other processes.

The ideal model of supply chain management is to form a long-term and stable supply chain partnership between enterprises and suppliers, taking suppliers as a part

of enterprises [7]. This management concept is very suitable for the needs of long-term and stable cooperation between military equipment supply chain enterprises. The smooth and stable supply chain of military products will greatly improve the military production capacity, which requires a stable cooperative supplier group. In view of the great significance of military equipment to national defense and security, restricted by many requirements such as progressiveness of technology, consistency of status, quality reliability, task confidentiality, market closeness, etc., the threshold of military supply chain access is high, and the switching cost of suppliers is far higher than that of the civilian market. Once the supplier is determined, it will have a long-term impact on the scientific research, production and support of equipment, especially for strategic and special equipment. Therefore, the initial selection of military suppliers is particularly important. It can be said that a good selection of suppliers is half the success. The purchaser must do a good job in the static classification of materials and suppliers at the early stage of the military product project, so as to manage by category and have a clear target. The principles and methods of classification must be based on the industry characteristics, the actual situation of enterprises and specific projects, which is conducive to grasping the classification principles, distinguishing key and difficult points, and improving management efficiency.

3 The Applicability of Karajack Matrix to the Classification of Military Equipment and Materials

As a special project, military equipment products should be classified in a way that is more suitable for military products management in combination with the characteristics of the industry. In the relationship between purchase and supply, material demand is fundamental. Especially in the military supply chain, quality reliability, risk controllability and delivery efficiency are more important than price. Doing a good job in analyzing the key points, difficulties and risks of the required materials procurement is the basis for the classification of materials and suppliers. Kraljic matrix divides the purchased materials into strategic materials, leverage materials, general materials and bottleneck materials from two dimensions of profit potential and supply risk, so as to clarify the key and difficult points of material management; It also points out the direction for material procurement and supplier management, improves procurement efficiency, reduces supply risks and changes material types by taking reasonable strategies, as shown in Fig. 1. Therefore, both for enterprises that pay more attention to profits and for the military that pay more attention to quality reliability and supply risk, they are suitable for the procurement management of military items.

3.1 Classification Status of Material Suppliers Purchased by H Company

Company H undertakes to manufacture the key supporting equipment of a certain ship. Despite its strong financial and technical strength, it has rich and high-quality supplier resources. In most cases, it is in the leading position in the relationship with suppliers. However, as an enterprise focusing on the civilian product market, there are still some

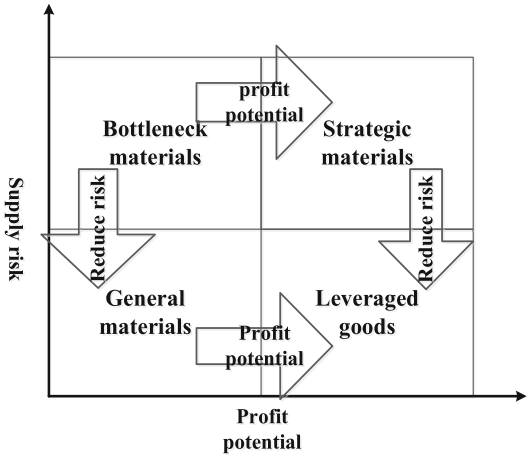

Fig. 1 Karajack Matrix

problems to be solved on how to make full use of these supplier resources and complete the military product project.

First, there are a wide variety of materials and suppliers. The technical structure of core supporting equipment is complex, the number of parts and components is up to tens of thousands, and nearly 400 kinds of materials are used. According to the preliminary estimate of similar products in the civil product market, the number of suppliers required will be up to nearly 100. Some of the materials provided by suppliers are high-tech products, which monopolize the supply market by virtue of proprietary technology. Some materials are limited by safety, environmental protection and other policies, and there are few alternative channels. Some materials have strong versatility, mature market and fierce competition.

Second, category classification is not suitable for military items. Company H distinguishes the importance of materials according to business impact and purchase amount, and divides them into three categories: I, II, and III. The corresponding material suppliers are called Class I, II, and III material suppliers. According to the proportion of annual purchase amount, various material suppliers are divided into three levels: A, B, and C. Both the classification methods I, II and III and the ABC classification method focus on the value of materials, especially the purchase amount. This is very convenient for grasping the value of materials and suppliers to the company as a whole, but it ignores the fact that the importance of the same material in different project products is different. It is easy to be affected by the material or supplier category (level), resulting in some materials that are not important to the project being magnified in the management, and on the contrary, some important or military special materials are seriously insufficient in the management. At the same time, this supplier classification method cannot fully reflect the importance of the materials provided by the supplier and the complexity of the supplier market, nor the contribution of the supplier to the project and the urgency of the purchaser's supply demand for the supplier [8].

The fuzzy clustering analysis method has the advantages of both fuzzy set theory and traditional clustering method. It quantifies the qualitative factors, constructs the fuzzy matrix according to the attributes of the research object, and determines its classification relationship according to a certain degree of membership. In the commonly used fuzzy cluster analysis method, when determining the similarity coefficient of the sample, it is usually natural to assume that each index has the same weight, but in the actual decision-making, the importance of each factor affecting the decision-making is different. Based on this characteristic, this paper classifies suppliers on the basis of improving the traditional fuzzy clustering method.

Step 1: Determine the weight of the evaluation index by using the analytic hierarchy process. Purchasers and experts familiar with the business determine the relative importance of the above indicators by comparing them in pairs, and construct a judgment matrix to obtain the final weight coefficient of each indicator.

Step 2: Standardize the original data. Set x_{ij} as the j index of the i sample, the mean and standard deviation of the j indicator are $\overline{x_j}$ and s_j respectively. The data after standardization is:

$$x'_{ij} = \frac{x_{ij} - \overline{x_j}}{s_j} \tag{1}$$

$$\overline{x_j} = \frac{1}{n}\sum_{j=1}^{n} x_{ij} \tag{2}$$

$$s_j = [\frac{1}{n-1}\sum_{i=1}^{n}(x_{ij} - \overline{x_j})^2]^{1/2} \tag{3}$$

Step 3: Calculate the fuzzy similarity matrix. The methods for calculating the similarity coefficient include correlation coefficient method, maximum-minimum method, arithmetic mean minimum method, geometric mean minimum method, absolute index method, absolute value subtraction method, included angle cosine method and Euclidean distance method. When doing cluster analysis, select appropriate methods according to the characteristics of the problem. In this paper, the included angle cosine method is used. Let the two sample evaluation index vectors be $x_i = \{x_{i1}, x_{i2}, \ldots, x_{in}\}$, $x_j = \{x_{j1}, x_{j2}, \ldots, x_{jn}\}$. According to the weight of the two indicators, the weighted similarity coefficient is obtained from the cosine of the included angle of the two vectors:

$$C_{ij} = \frac{\sum_{k=1}^{n} w_k x_{ik} \times w_k x_{jk}}{\sqrt{(\sum_{k=1}^{n} w_k x_{ik})^2 (\sum_{k=1}^{n} w_k x_{jk})^2}} \tag{4}$$

where w_k is the weight of the k indicator, and $\sum_{k=1}^{n} w_k = 1$.

Make changes $r_{ij} = \frac{1+C_{ij}}{2}$,

Make r_{ij} compressed into the interval of [0,5] to form a fuzzy similarity matrix $R = (r_{ij})$.

Step 4: Establish the fuzzy equivalence matrix. According to the fuzzy theory, only the fuzzy equivalence relationship can correspond to the ordinary equivalence relationship. Generally, the fuzzy similarity matrix R only satisfies reflexivity and symmetry, while the fuzzy equivalence matrix also requires transitivity. Therefore, the square method should be used to transform the fuzzy similarity matrix and calculate the transitive closure matrix. Convolution calculation of fuzzy similarity matrix: $R \to R^2 \to R^4 \to \cdots \to R^{2k}$, after finite convolution, a natural number k must be found to satisfy $R^{2k} = R^{2k+1}$, and the fuzzy equivalent relation matrix R^{2k} is obtained.

Step 5: cluster and select. The appropriate λ in [0,5], and get the required classification from the cut matrix. In particular, at that time, each sample was of its own type. It should be pointed out in particular that when $\lambda = 2.5$, each sample will form a class of its own. With the gradual decrease of the λ, it will gradually merge from fine to coarse.

3.2 Material Classification Index System

In order to realize the rapid classification of suppliers, the manufacturing unit and the relevant military representative office have established the classification index system of materials and suppliers, developed the scoring methods and standards, and realized the scientific and rapid classification of materials and suppliers by using the Karajack matrix idea.

The static classification at the beginning of the project is not to carry out specific supplier evaluation and optimization, but to lay the foundation for subsequent management work such as classification and sourcing, classification and optimization, classification and evaluation. Therefore, classification indicators need not be detailed and comprehensive, but should focus on basic principles, conciseness and scientificity, and macro-comparability, so as to improve classification efficiency. On the one hand, indicators should be able to measure the value of materials provided by suppliers to products, i.e. performance impact, purchase amount, etc.; On the other hand, it can also examine the supply risks of materials, such as the number of suppliers, supply cycle, substitutability, etc. The classification index system is shown in Fig. 2.

The material value dimension mainly takes into account the impact of materials on the performance of equipment and the proportion of the purchase amount to the total purchase amount of the project. Impact on equipment performance: according to the classification of product characteristics specified in GJB190 Characteristic Analysis, the purchased materials are divided into three grades according to whether they contain key characteristics, important characteristics and general characteristics. The higher the grade, the greater the value. The proportion of material procurement amount in the project: the proportion of the quantity of Class I materials is about 20%, and the proportion of material value in the total value of purchased materials is about 80%; The quantity of Class II materials accounts for about 10%, and the value of materials accounts for about 10% of the total value of purchased materials; the quantity of Class III materials accounts for about 70%, and the value of materials accounts for about 10% of the total value of purchased materials.

The supply risk dimension mainly considers the number of effective suppliers, material supply cycle and material substitutability. Number of effective suppliers: The number of effective suppliers for each material of Company H is generally 3, and the maximum

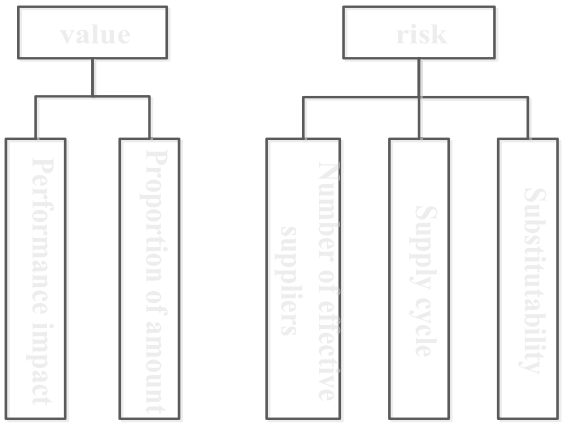

Fig. 2 Material classification index system

number is not more than 5. The greater the number of material suppliers, the higher the degree of market competition, and the lower the supply risk of materials, which are divided into three levels: 1, 2, and 3–5. Supply cycle: referring to the average supply cycle of the civil product market, the longer the cycle, the greater the supply risk, which is divided into three levels: within 1 month, 1 month to 2 months, and more than 2 months. Material substitutability: an indicator to measure the degree of substitutability of a material. The more difficult the material is to substitute, the higher the risk of supply. It is divided into three levels: irreplaceable material, 1 alternative material (replaceable if necessary), 2 or more alternative materials (replaceable). When considering the substitutability index, we should not simply look at the types and quantities of materials available on the market, but also consider the requirements of equipment system integration, that is, whether the superior manufacturing unit allows substitution, which will directly reduce the substitutability of materials.

The impact factors of the two dimensions of material value and supply risk are divided and scored according to three levels, as shown in Table 1.

3.3 Weight of Influence Factors

The military representative office and each department of the company score the impact factors of the material value dimension and the supply risk dimension. At the same time, in order to ensure the scientificity and rationality of the weight value of each impact factor, the double-tier equity structure of the enterprise - the same share with different rights, that is, each department and the military of the enterprise have the right to evaluate and score, but the right of discourse for the evaluation of a certain impact factor will be different. The weights of each department, enterprise and military of the enterprise on the evaluation of the impact factors are calculated by the analytic hierarchy process. When calculating the score weight value of a factor, the judgment matrix and represent

Table 1 Classification and scoring of impact factors

	Value dimension		**Risk dimension**			
Dividing indicators	Proportion of price	Performance impact	Number of suppliers	Supply cycle	Material substitutability	Score
Partition interval	I	Key parts	1	(60, +∞)	Irreplaceable	5
	II	Important parts	2–3	(31, 60]	1	3
	III	General parts	4 or more	(0, 30]	2 or more	1

the relative importance value of the two departments of the enterprise.

$$P = \begin{Bmatrix} u_{11} & u_{12} & \cdots & u_{1n} \\ u_{21} & u_{22} & \cdots & u_{2n} \\ \vdots & \vdots & & \vdots \\ u_{n1} & u_{n2} & \cdots & u_{nn} \end{Bmatrix} \tag{5}$$

where, $u_{ij} > 0$, $u_{ij} = 1/u_{ji}(i, j = 1, 2, \cdots, n)$. Satty's 1–9 scale is usually used as the quantitative value of qualitative grade. Solve the eigenvector corresponding to the largest eigenvalue $\lambda_{\max}$ of the judgment matrix,

$$P\omega = \lambda_{\max}\omega \tag{6}$$

The normalized vector elements rank the importance of each department of the enterprise for a certain influencing factor score, namely weight distribution. At the same time, it is necessary to verify the rationality of the weight distribution, that is, to check the consistency of the judgment matrix,

$$CR = CI/RI \tag{7}$$

where, CR is the random consistency ratio of the judgment matrix, $CI = (\lambda_{\max} - n)/(n - 1)$

Compared with the average random consistency index of the judgment matrix of order 1–9, when the judgment matrix is $CR < 0.1$ or $\lambda_{\max} = n$,$CI = 0$, it is considered that the weight value distribution is reasonable, otherwise, it is necessary to adjust the elements in order to make it have satisfactory consistency.

The military representative office and each department of the company will score the weight of the impact factors of the material value dimension and the supply risk dimension, and after the consistency test and correction, the weight of each impact factor will be finally determined. See Tables 2 and 3 for details.

3.4 Validate Supplier Classification Model

Nearly 400 items of materials are purchased according to the part drawing number. However, considering the actual procurement strategy, enterprises will purchase materials of the same type, material and specification in a centralized manner to ensure the scale advantage, reduce the procurement cost and improve the delivery efficiency. Therefore, in combination with the procurement strategy, category supply and demand requirements and the actual situation of the market, first try to synthesize 47 materials with similar material specifications, and sort out the purchase amount of 47 materials, as shown in Table 4. If classified according to the proportion of purchase amount, the serial numbers 1–9 are Class I materials, the serial numbers 10–15 are Class II materials, and the serial numbers 16–47 are Class III materials. Then, according to the proportion of purchase amount, performance impact, number of effective suppliers, supply cycle and substitutability, 47 materials are scored in two dimensions according to the new indicator system, and the comprehensive score of value and risk is calculated according to the weight of impact factors. See Table 4 for details. Figure 3 shows the comprehensive score results of 47 materials more clearly in the form of a combination of bar chart and dotted line chart.

Table 2 Weights of influence factors of material value dimension

Influence factor	Military representatives	Enterprise						Calculation results
		Quality Department	Procurement Department	Technology Department	Process Department	Production Department	Marketing Department	
Performance impact	70%	65%	40%	60%	55%	60%	45%	56%
Proportion of amount	30%	35%	60%	40%	45%	40%	55%	44%

Table 3 Weight of influence factors of supply risk dimension

Influence factor	Military representatives	Enterprise						Calculation results
		Quality Department	Procurement Department	Technology Department	Process Department	Production Department	Marketing Department	
Number of suppliers	30%	40%	35%	35%	35%	30%	45%	36%
Supply cycle	50%	40%	40%	35%	35%	45%	35%	40%
Material substitutability	20%	20%	25%	30%	30%	25%	20%	24%

Table 4 Material Scoring and Comprehensive Scoring Table

Serial number	Material type	Texture of material	Specifications	Price score	Impact rating	Comprehensive score of value	Score supplier quantity	Scoring of supply cycle	Substitutability score	Comprehensive risk score
1	HP seamless steel pipe	12Cr1MoVG	Φ20 × 2.5	5	5	5	3	3	5	3.48
2	Alloy steel	L907A	δ10	5	3	3.88	5	5	5	5.00
3	Expansion joint			5	1	2.76	1	3	3	2.28
4	Anti-corrosion material			5	1	2.76	5	1	5	3.40
5	Boiler plate	DIWA353	δ35	5	5	5	1	5	5	3.56
6	HP seamless steel pipe 2	12Cr1MoVG	Φ530 × 40	5	5	5	3	5	5	4.28
7	HP seamless steel pipe 3	20G	Φ25 × 3	5	3	3.88	3	3	3	3.00
8	HP seamless steel pipe 4	20G	Φ57 × 3.5	5	5	5	3	3	3	3.00
9	Packing box	Pine		5	1	2.76	1	3	1	1.80
10	Round steel	12Cr1MoV	Φ100	3	3	3	1	1	5	1.96

(*continued*)

Table 4 (*continued*)

Serial number	Material type	Texture of material	Specifications	Price score	Impact rating	Comprehensive score of value	Score supplier quantity	Scoring of supply cycle	Substitutability score	Comprehensive risk score
11	Stainless steel plate	06Cr18Ni11Ti	δ1	3	1	1.88	1	1	1	1.00
12	Stainless steel plate	16Cr25Ni20Si2	δ1	3	1	1.88	3	3	3	3.00
13	A fastening			3	1	1.88	1	1	1	1.00
14	Welding wire	ER50-6	Φ0.8	3	1	1.88	1	1	1	1.00
15	Round steel	20	Φ100	3	1	1.88	1	1	1	1.00
16	High temperature resistant paint			1	1	1	1	1	3	1.48
17	Structural plate	Q235B	δ12	1	1	1	1	1	1	1.00
18	Protective paint			1	1	1	1	1	1	1.00
19	Structural plate	20	δ10	1	1	1	1	1	1	1.00
20	Cobalt glass			1	1	1	1	1	1	1.00
21	Alloy steel	Q345-B	δ36	1	1	1	1	1	1	1.00

(*continued*)

Table 4 (*continued*)

Serial number	Material type	Texture of material	Specifications	Price score	Impact rating	Comprehensive score of value	Score supplier quantity	Scoring of supply cycle	Substitutability score	Comprehensive risk score
22	Stainless steel plate	06Cr25Ni20	δ3	1	1	1	1	3	1	1.80
23	Round steel	25Cr2MoVA	Φ100	1	1	1	1	3	1	1.80
24	Thermal insulation dressing			1	1	1	1	1	1	1.00
25	Round steel	16Cr25Ni20Si2	Φ16	1	1	1	1	1	3	1.48
26	Round steel	15CrMo	Φ200	1	3	2.12	1	1	5	1.96
27	HP seamless steel pipe 5	20G	Φ10 × 2	1	3	2.12	1	3	3	2.28
28	Special welding materials			1	3	2.12	5	3	5	4.20
29	Argon			1	1	1	1	1	3	1.48
30	HP seamless steel pipe 6	20G	Φ114 × 7	1	3	2.12	3	3	3	3.00
31	Steel plate	Q245R	δ44	1	1	1	1	1	1	1.00
32	Copper plate	H62	8	1	1	1	3	1	3	2.20
33	CO_2 gas			1	1	1	1	1	1	1.00

(*continued*)

Table 4 (*continued*)

Serial number	Material type	Texture of material	Specifications	Price score	Impact rating	Comprehensive score of value	Score supplier quantity	Scoring of supply cycle	Substitutability score	Comprehensive risk score
34	Medium and low pressure seamless steel pipe	20	Φ219 × 30	1	1	1	1	1	1	1.00
35	Round steel	35	Φ50	1	1	1	1	1	1	1.00
36	Round steel	45	Φ100	1	1	1	1	1	1	1.00
37	Equilateral angle steel	Q235B	∠50 × 50 × 5	1	1	1	1	1	1	1.00
38	Round steel	25	Φ60	1	1	1	1	1	1	1.00
39	Round steel	35CrMo	Φ30	1	1	1	1	1	1	1.00
40	Round steel	35Cr	Φ75	1	1	1	1	1	1	1.00
41	Stainless steel plate	06Cr13	δ6	1	1	1	1	1	1	1.00
42	Round steel	12Cr13	Φ24	1	1	1	1	1	1	1.00
43	Stainless steel pipe	1Cr18Ni9Ti	Φ114 × 4	1	1	1	1	3	3	2.28
44	Round steel	T10	Φ110	1	1	1	1	1	3	1.48
45	Round steel	06Cr13	Φ50	1	1	1	1	1	1	1.00
46	Round steel	Q215AF	Φ3.2	1	1	1	3	1	1	1.72
47	Round steel	3Cr13	Φ30	1	1	1	1	1	1	1.00

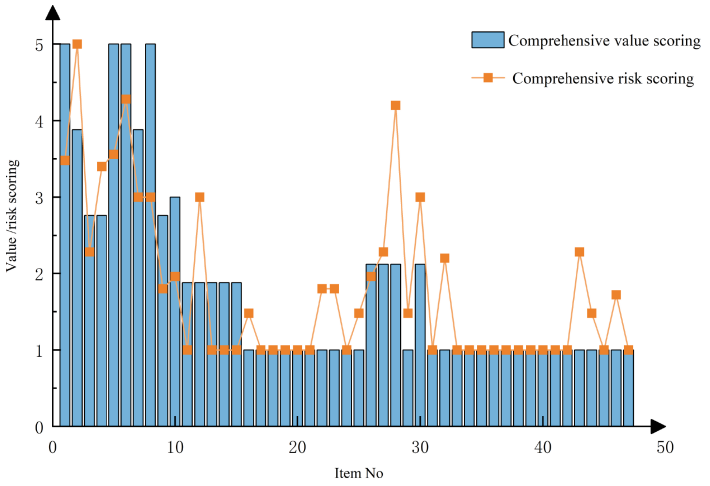

Fig. 3 Material comprehensive score display

3.5 Carry Out Material Classification

Based on half of the highest score of the two dimensions of the matrix, i.e. 2.5 points, the materials are divided into four categories: core materials, leverage materials, general materials, and bottleneck materials. The supplier classification results are obtained according to the material classification results, as shown in Fig. 4.

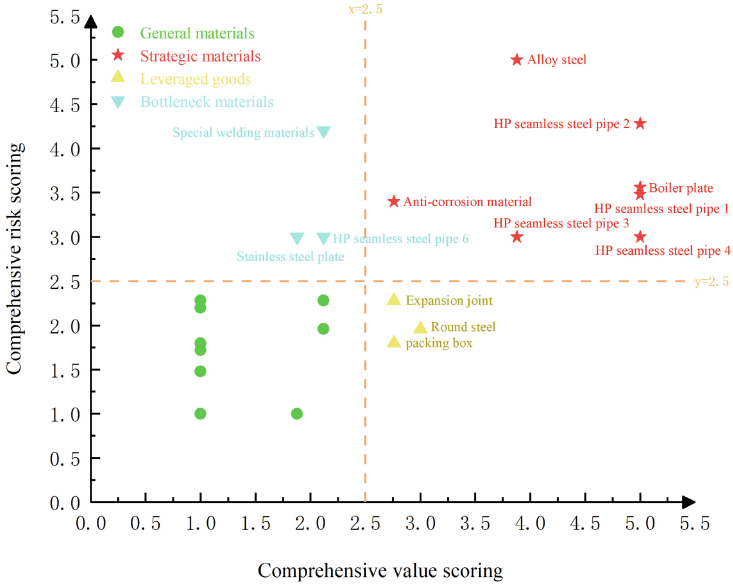

Fig. 4 Material classification results

4 Result Analysis

In terms of the overall distribution, there are 10 high-value materials, accounting for 21.3% of the total number of materials, and 10 high-risk materials, also accounting for 21.3% of the total number of materials. Both value distribution and risk distribution are in line with the 2/8 principle, which shows that this classification method is reasonable. We can clearly see that the classification method based on Kraljic matrix has obvious differences and advantages compared with the classification methods I, II and III.

(1) Due to the difference of performance impact characteristics and risk factors, the materials originally belonging to the same category according to the proportion of purchase amount are divided into different categories, and the key and difficult points of management are more clear. For example, the 907A steel plate of 2 # material and the expansion joint of 3 # material are both Class I materials according to the proportion of the purchase amount, but the 907A steel plate has only one supplier, which is a core material with high value and high risk, while the expansion joint is a leverage material with high value and low risk. The 12Cr1MoV round steel of 10 # material and the 16Cr25Ni20Si2 stainless steel plate of 12 # material belong to Class II material, but the round steel has important quality characteristics, so its comprehensive value is high, and the supply risk is low, so it is classified as lever material; On the contrary, stainless steel is classified as bottleneck material due to its low comprehensive value and high comprehensive risk. Special welding materials and ordinary welding materials are Class III materials, but there is only one supplier of special welding materials, which has high comprehensive risk and belongs to bottleneck materials, while ordinary welding materials belong to general materials.
(2) Low-value and high-risk materials can get enough attention and will no longer be ignored. For example: 28 # special welding materials, 30 # materials $\Phi 114 \times 7$ HP seamless steel pipes are all Class III materials according to the proportion of purchase price, but due to their high comprehensive risk, they are all bottleneck materials, which need to be focused on in order to prevent "small losses" in the process of project progress.
(3) The particularity of the project will change the traditional classification of materials, so the procurement strategy should be adjusted in time. For example, 4 # material anti-corrosion materials and 9 # material packaging boxes are materials used for product protection, and are not part of the product body. The proportion of the purchase amount in the general civil product project is relatively low, but in the military product project, they become high-value materials due to special protection requirements. This reminds enterprises to make full use of market competition to improve procurement efficiency. 13 # material fasteners are basically national standard products, with various specifications and models, and fierce market competition. They are cheap III materials, which are generally supplied by multiple manufacturers. However, after integration, they are found to be II materials according to the proportion of the total amount. The new classification method also classifies them as leverage materials. This reminds enterprises to adopt centralized procurement to form scale advantage.

5 Conclusion

For the core supporting equipment manufacturing units that focus on the civilian product market, the classification of purchased materials and suppliers based on the Kraljic matrix at the initial stage of the military project can better reflect the supplier classification principle with material demand as the core, and reflect the focus of the military and enterprises, which is more in line with the actual needs of military project management. Examples have proved that scientific selection, definition, quantification and scoring of indicators in the two dimensions of value and risk can clearly define the key and difficult points of supply and supplier management, and improve the pertinence and effectiveness of military project material procurement management.

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