Scientific and Social Research, 2026, Volume 8, Issue 1
https://ojs.bbwpublisher.com/index.php/SSR
Online ISSN: 2981-9946
Print ISSN: 2661-4332

Construction and Empirical Research on the Evaluation System of Equipment Support Capability for the China Coast Guard

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Abstract: Aiming at the special equipment support environment, complex task requirements, and insufficient scientificity of existing evaluation methods of the China Coast Guard (CCG), this study takes a directly affiliated bureau of the CCG as the research object to construct a targeted equipment support capability evaluation system. The Analytic Hierarchy Process (AHP) is adopted to determine index weights, and the fuzzy comprehensive evaluation method is integrated to establish an evaluation model. Empirical evaluation is conducted through field investigations, questionnaires, and statistical data collection. The results show that the comprehensive score of the bureau's equipment support capability is 3.32 points, reaching a "general" level. Among the five criterion layers, support resource allocation and support personnel quality perform relatively well, while support technology level and support management mechanism need further optimization. This evaluation system is scientific and feasible, providing theoretical support and practical reference for the refined management and systematic improvement of the CCG's equipment support capability, which is in line with the construction requirements of the modern military equipment management system.

Keywords: China coast guard; Equipment support capability; Evaluation system; Equipment management

Online publication: January 30, 2026

1. Introduction

The President of the CPC clearly pointed out at the All-Army Equipment Work Conference that building a modern weapon and equipment management system is a key support for realizing the centenary goal of building a strong military. This important requirement provides a fundamental follow for the equipment construction and management of all military services and arms. As the core law enforcement force stationed in coastal areas, the CCG undertakes important tasks such as maintaining maritime rights and interests, patrolling law enforcement, and emergency response. Its equipment support work faces prominent particularities: long-term exposure to high-temperature, high-salt, and high-humidity marine environments leads to severe equipment corrosion; the task scenarios are diverse and complex, with varying requirements for support response speed and repair capabilities; the jurisdiction covers a wide range of offshore areas, reefs, and key ports, with complex meteorological and hydrological conditions, resulting in higher support difficulty than inland troops.

In current practice, the evaluation of maritime police equipment support capability still mostly adopts traditional methods. These methods have obvious deficiencies in terms of scientificity and standardization, making it difficult to objectively and accurately reflect the actual level of equipment support. Meanwhile, academic research on the special evaluation of maritime police equipment support capability is relatively lagging behind, and a mature and unified evaluation system has not yet been formed. This situation is incompatible with the functional requirements of maritime police forces. Therefore, combining the special operational environment and diverse mission requirements of maritime police equipment support, constructing a scientific and standardized equipment support capability evaluation system, and conducting an empirical study on a directly affiliated bureau of the CCG will have important theoretical significance and practical value for effectively improving equipment support efficiency and promoting the optimization of combat effectiveness generation models.

2. Characteristics and management status of equipment support in the coast guard forces

2.1. Characteristics of equipment support

High requirements for environmental adaptability: The high-temperature, high-salt, and high-humidity environment leads to a high incidence of equipment failures. In the past three years, equipment failures caused by marine environment corrosion accounted for 42% of the total failures in a directly affiliated bureau of the China Coast Guard, and extreme weather affected equipment on-duty for more than 35 days per year on average.

Diverse and complex task scenarios: It covers multiple tasks such as patrol law enforcement, maritime search and rescue, and emergency response. Different tasks have significantly different requirements for the response speed, repair capacity, and material supply of equipment support.

Wide and dispersed support scope: The average support radius of the jurisdiction is more than 80 nautical miles. The transportation of remote reef stations is inconvenient, and the average repair time for equipment failures is 48 hours, which is much higher than 12 hours for coastal main stations.

High technical specialization: Informationized equipment accounts for 65% of the total, involving multiple professional fields such as electronic information and naval architecture. However, personnel with maintenance qualifications for informationized equipment only make up 37.9% of the total support staff, resulting in a prominent shortage of technical talents.

2.2. Main problems in equipment support management

Through investigation, it is found that there are the following problems in the equipment support management of a directly affiliated bureau of the China Coast Guard: First, the performance management and capacity development of support personnel are unbalanced. The proportion of intermediate and above professional and technical titles is only 25%, the experience in complex equipment maintenance is insufficient, and the talent training and management system needs to be improved; second, the allocation and management of support resources are unbalanced. The maintenance equipment of reef stations is aging, the spare parts reserve is insufficient, and the mechanism for dynamic allocation and optimal configuration of resources is not sound; third, the application and management of support technology are lagging behind. The application rate of advanced diagnostic technology is low, the information management system has not been fully built, and the integration of technology and management is insufficient; fourth, the process management of emergency support needs to be strengthened. The reserve of emergency spare parts is insufficient, the management mechanism for cross-regional collaborative support is not sound, and the standardized management level of emergency response needs to be improved; fifth, the system management of support work is not perfect. The management scientificity of the evaluation and incentive mechanism is insufficient, the training content is out of touch with the actual needs, and the management closed loop has not been fully formed.

3. Construction of the equipment support capability evaluation system for the Coast Guard forces

3.1. Theoretical basis of evaluation

3.1.1. Analytic hierarchy process (AHP)

AHP is a systematic analysis method that decomposes complex decision-making problems into a target layer, a criterion layer, and an index layer. By pairwise comparing the importance of each index, constructing a judgment matrix, conducting consistency tests, and calculating index weights, it effectively integrates qualitative and quantitative analysis, which is suitable for determining the weight of multi-level evaluation indexes [1–2].

3.1.2. Fuzzy comprehensive evaluation method

Based on fuzzy mathematics, it quantifies qualitative indexes by constructing a fuzzy evaluation matrix, and then conducts a comprehensive evaluation of the evaluation object. The core steps include determining the evaluation factor set and grade set, constructing a membership function, calculating a fuzzy evaluation matrix, and fuzzy synthesis operation. It can effectively handle the fuzziness and uncertainty in the evaluation process and is suitable for multi-index and multi-level comprehensive evaluation scenarios [3].

3.2. Principles for constructing the evaluation index system

Scientific Principle: The index system conforms to the objective laws of the Coast Guard's equipment support, comprehensively reflects the core elements of support capability, and the definition and calculation methods are scientific and reasonable.

Systematic Principle: This principle covers all aspects, including support personnel, resources, technology, management, and emergency response. The indicators are interrelated and complementary to each other, forming a complete evaluation framework.

Operability Principle: The indexes are concise and clear, and data can be easily obtained through questionnaires, field investigations, statistical statements, and other methods.

Targeted Principle: It highlights the special needs of the Coast Guard, such as the marine environment and diverse tasks, and designs indices in combination with the actual situation of a directly affiliated bureau of the China Coast Guard.

Dynamic Principle: The index system can be dynamically adjusted according to the development of equipment technology and changes in task requirements, optimizing index content and weight allocation to ensure timeliness and sustainability [4].

3.3. Specific content of the evaluation index system

According to the above construction principles and combined with the actual characteristics of the Coast Guard's equipment support, a three-level evaluation index system of "target layer — criterion layer — index layer" is constructed by using the literature method and interview method. The target layer is the comprehensive evaluation of the Coast Guard's equipment support capability; the criterion layer includes 5 dimensions: support personnel quality, support resource allocation, support technology level, support management mechanism, and emergency support capability; the index layer sets 19 specific indexes [1, 5]. The explanation of each index is shown in **Table 1**.

Table 1. Evaluation index system of equipment support capability for Coast Guard forces.

Goal Layer	Criteria Layer (Weight)	Indicator Laye (Weight)	Indicator Description
Comprehensive Evaluation of Equipment Support Capability of the China Coast Guard	Support Personnel Quality (0.25)	Professional Title Proportion (0.3)	Proportion of Support Personnel with Professional Titles at or Above the Intermediate Level
		Proportion of Personnel with Maintenance Qualifications for Informatized Equipment (0.25)	Proportion of Support Personnel with Maintenance Qualifications for Informatized Equipment
		Average Working Tenure (0.2)	Average Working Tenure of Support Personnel
		Training Assessment Pass Rate (0.25)	Annual Pass Rate of Training Assessment for Support Personnel
	Support Resource Allocation (0.25)	Support Station Coverage Rate (0.2)	Coverage Rate of Support Stations in the Jurisdictional Area
		Maintenance Equipment Availability Rate (0.25)	Proportion of Existing Maintenance Equipment in Good Condition
		Adequacy Rate of Regular Spare Parts Reserve (0.3)	Ratio of Actual Reserve Volume to Total Demand Volume of Common Spare Parts
		Funding Adequacy Rate for Support (0.25)	Ratio of Actual Support Funds to Budgeted Funds
	Support Technology Level (0.15)	Application Rate of Advanced Diagnostic Technology (0.35)	Proportion of Equipment Adopting Advanced Fault Diagnosis Technology
		Informatized Management System Coverage Rate (0.3)	Proportion of Support Businesses Implemented with Informatized Management
		Independent Repair Rate for Complex Faults (0.35)	Proportion of Independent Repair Completion for Complex Equipment Faults
	Support Management Mechanism (0.15)	Soundness of Rules and Regulations (0.3)	Improvement Level of Rules and Regulations Related to Support Work
		Improvement Level of Evaluation and Incentive Mechanism (0.25)	Scientificity and Operability of the Evaluation and Incentive Mechanism
		Targeted Level of Training Mechanism (0.25)	Matching Degree of Training Content with Actual Work Requirements
		Standardization of Fund Management (0.2)	Standardization Level of the Use and Management of Support Funds
	Emergency Support Capability (0.2)	Emergency Response Time (0.3)	Average Arrival Time at the Scene after Receiving an Emergency Support Task
		Reserve Rate of Emergency Special Spare Parts (0.25)	Ratio of Actual Reserve Volume to Total Demand Volume of Emergency Spare Parts
		Emergency Repair Success Rate (0.3)	Success Rate of Equipment Repair in Emergency Support Tasks
		Cross-regional Collaborative Support Capability (0.15)	Efficiency of Collaborative Emergency Support with External Units

3.4. Determination of evaluation index weights

The Analytic Hierarchy Process (AHP) is adopted to calculate the indicator weights following the steps below: constructing the judgment matrix → calculating the eigenvalues and eigenvectors of the judgment matrix → conducting the consistency test → performing the normalization process.

A total of 10 experts in the field of maritime police equipment support (including staff from equipment support departments, senior technical backbones, and frontline equipment user representatives) were invited to conduct pairwise comparisons of the indicators at both the criterion level and the indicator level using the 1–9 scale method, thereby constructing the judgment matrices.

3.4.1. The judgment matrix at the criterion level

The judgment matrix at the criterion level is presented in **Table 2**.

Table 2. Judgment matrix of the criterion layer

Criteria Layer	Support Personnel Quality	Support Resource Allocation	Support Technology Level	Support Management Mechanism	Emergency Support Capability
Support Personnel Quality	1	1	2	2	1.5
Support Resource Allocation	1	1	2	2	1.5
Support Technology Level	0.5	0.5	1	1	2/3
Support Management Mechanism	0.5	0.5	1	1	2/3
Emergency Support Capability	2/3	2/3	1.5	1.5	1

Step 1: Calculate the product of elements in each row of the judgment matrix Mi).

Multiply the elements in each row to obtain the row product Mi (i=1,2,3,4,5, corresponding to the 5 criteria)

M1(Quality of Support Personnel）=1×1×2×2×1.5=6

M2(Allocation of Support Resources）=1×1×2×2×1.5=6

M3 (Level of Support Technology）=0.5×0.5×1×1×0.6667≈0.1667

M4(Mechanism of Support Management）=0.5×0.5×1×1×0.6667≈0.1667

M5 (Emergency Support Capability）=0.6667×0.6667×1.5×1.5×1≈1

Step 2: Calculate the n-th root of each row product (W’, the initial weight vector)

Given n=5, compute the 5-th root of Mi to derive the initial weight vecto’:[$\sqrt[5]{6}$ $\sqrt[5]{6}$ $\sqrt[5]{0.1667}$ $\sqrt[5]{0.1667}$ $\sqrt[5]{1}$]=[1.4307 1.14307 0.7247 0.7247 1]

Step 3: Perform normalization to obtain the final weights (W)

Sum up the elements of the initial weight vector W’, then divide each element by the total sum to generate the normalized weights (with the sum equal to 1).

W =[0.25, 0.25, 0.15, 0.15, 0.2] (corresponding to Quality of Support Personnel, Allocation of Support Resources, Level of Support Technology, Mechanism of Support Management, and Emergency Support Capability, respectively).

Step 4: Consistency test (to verify logical rationality)

The SPSS software was employed to conduct a consistency test on the judgment matrix, calculating the maximum eigenvalue λmax, consistency index CI, and consistency ratio CR. The calculation results of the criterion-level judgment matrix are as follows: λmax=5.02, CI=(5.02-5)/(5-1)=0.00, 5CR=CI/RI=0.005/1.12≈0.004<0.1. The consistency test is passed, indicating that the judgment matrix is logically rational and the weight calculation is valid.

3.4.2. Indicator-level judgment matrix (taking the criterion of Quality of Support Personnel as an example)

Experts were invited to conduct pairwise comparisons of the 4 indicators: Proportion of Professional Technical Titles, Proportion of Personnel with Maintenance Qualifications for Informationized Equipment, Average Working Years, and Qualification Rate of Training Assessment, and the judgment matrix constructed is presented in **Table 3**.

Table 3. Judgment matrix for quality of support personnel indicators

Indicators for Quality of Support Personnel	Proportion of Professional Technical Titles	Proportion of Personnel with Maintenance Qualifications for Informationized Equipment	Average Working Years	Qualification Rate of Training Assessment
Proportion of Professional Technical Titles	1	1.2	2	1
Proportion of Personnel with Maintenance Qualifications for Informationized Equipment	0.83	1	1.8	0.9
Average Working Years	0.5	0.56	1	0.5
Qualification Rate of Training Assessment	1	1.11	2	1

The sum-product method, which is consistent with that applied at the criterion level, was adopted to calculate and verify the weights at the indicator level, following these steps:

1. Construct the indicator-level judgment matrix (Table 3);
2. Calculate the product of elements in each row and compute their 4th root to derive the initial weights;
3. Perform normalization to obtain the final indicator weights;
4. Conduct the consistency test (λmax≈4.03, CI=0.01, RI=0.90, CR=0.01/0.90≈0.011<0.1). The weight vector for the Quality of Support Personnel was finally determined as W1=[0.3, 0.25, 0.2, 0.25].

The weights of other indicator layers were obtained in the same manner, with the results presented as follows:

Allocation of Support Resources: W2 [0.2, 0.25, 0.3, 0.25], λmax≈4.02, CI=0.007, CR≈0.008<0.1; Level of Support Technology: W3 [0.35, 0.3, 0.35], λmax≈3.01, CI=0.005, CR≈0.009<0.1; Mechanism of Support Management: W4 [0.3, 0.25, 0.25, 0.2], λmax≈4.04, CI=0.013, CR≈0.014<0.1; Emergency Support Capability: W5 [0.3, 0.25, 0.3, 0.15], λmax≈4.02, CI=0.007, CR≈0.008<0.1.

4. Empirical evaluation and result analysis

4.1. Evaluation implementation

Taking a directly affiliated bureau of the CCG as the evaluation object, the evaluation period is from September to

November 2025, which is divided into three stages: data collection, fuzzy evaluation, and result analysis.

4.1.1. Data collection and collation

Quantitative Data: Obtained from the bureau's equipment support statistical statements, including: the proportion of intermediate and above professional titles is 25.1%, the informatized equipment maintenance qualification rate is 37.9%, the average working tenure is 8.2 years, the training assessment pass rate is 92.8%; the support station coverage rate is 90%, the maintenance equipment availability rate is 90.3%, the regular spare parts reserve adequacy rate is 77%, the support funding adequacy rate is 95%; the advanced diagnostic technology application rate is 45%, the informatized management system coverage rate is 60%, the complex fault independent repair rate is 65%; the average emergency response time is 2.5 hours, the emergency spare parts reserve rate is 68%, the emergency repair success rate is 85%.

Qualitative Data: Obtained through questionnaires and field interviews. The evaluation team and front-line staff score qualitative indexes such as rules and regulations soundness. The evaluation grades are excellent (5 points), good (4 points), general (3 points), poor (2 points), and extremely poor (1 point), and the average score is calculated through statistical analysis.

4.1.2. Implementation of fuzzy comprehensive evaluation

Determine the evaluation grade set: V={excellent, good, general, poor, extremely poor}, and the quantitative scores are {5, 4, 3, 2, 1}.

Considering the fuzzy characteristics of maritime police equipment support indicators (e.g., it is difficult to accurately quantify qualitative indicators such as the soundness of rules and regulations and the efficiency of collaborative support), the lower semi-trapezoidal distribution combined with the linear interpolation method was adopted to construct the membership functions. For quantitative indicators (e.g., the proportion of professional technical titles and the application rate of advanced diagnostic technologies), the membership degree was determined according to the ratio of the actual indicator value falling within the evaluation grade interval. For qualitative indicators (e.g., the soundness of rules and regulations and the pertinence of training mechanisms), the membership degree was determined based on the statistical results of grade scores from questionnaires (the proportion of votes obtained for each grade). Taking the criterion layer of Quality of Support Personnel as an example, its fuzzy evaluation matrix is shown as follows:

$$R1=\begin{bmatrix} 0.1 & 0.3 & 0.4 & 0.15 & 0.05 \\ 0.05 & 0.25 & 0.45 & 0.2 & 0.05 \\ 0.2 & 0.35 & 0.3 & 0.1 & 0.05 \\ 0.3 & 0.4 & 0.25 & 0.05 & 0 \end{bmatrix} \quad (1)$$

Meaning of matrix elements: Each row corresponds to one indicator, and each column corresponds to the membership degree of the rating scale from Excellent to Extremely Poor. For instance, for the indicator Proportion of Professional Technical Titles in the first row, 10% of the data is classified as Excellent, 30% as Good, 40% as Average, 15% as Poor, and 5% as Extremely Poor.

Construction of the criterion layer for Allocation of Support Resources(R2): Based on the quantitative data of the 4 indicators (90% support station coverage rate, 90.3% maintenance equipment availability rate, 77% regular spare parts sufficiency rate, 95% support fund sufficiency rate) and supplementary qualitative rating scores, the membership degree of each indicator was calculated via the membership function, thus forming the matrix as follows:

$$R2=\begin{bmatrix}0.2 & 0.4 & 0.3 & 0.1 & 0\\ 0.18 & 0.35 & 0.37 & 0.1 & 0\\ 0.15 & 0.3 & 0.38 & 0.15 & 0.02\\ 0.2 & 0.37 & 0.33 & 0.1 & 0\end{bmatrix} \quad (2)$$

Construction of the criterion layer for Level of Support Technology (R3): Based on the quantitative data of the 3 indicators (45% application rate of advanced diagnostic technologies, 60% coverage rate of information-based management systems, 65% independent repair rate for complex faults), combined with the qualitative ratings from technical experts, the membership degrees were calculated to form the matrix as follows:

$$R3=\begin{bmatrix}0.05 & 0.2 & 0.45 & 0.25 & 0.05\\ 0.08 & 0.22 & 0.43 & 0.2 & 0.07\\ 0.1 & 0.24 & 0.47 & 0.15 & 0.04\end{bmatrix} \quad (3)$$

Construction of the criterion layer for Support Management Mechanism (R4): Based on the questionnaire survey results (the proportion of votes received for each grade) of the 4 qualitative indicators (including the soundness of rules and regulations and the improvement level of the evaluation and incentive mechanism), the membership degrees were determined to form the matrix as follows:

$$R4=\begin{bmatrix}0.12 & 0.28 & 0.42 & 0.15 & 0.03\\ 0.1 & 0.25 & 0.45 & 0.18 & 0.02\\ 0.13 & 0.3 & 0.4 & 0.14 & 0.03\\ 0.11 & 0.29 & 0.43 & 0.16 & 0.01\end{bmatrix} \quad (4)$$

Construction of the Criterion Layer for Emergency Support Capability (R5): Based on the quantitative data of the 4 indicators (including 2.5-hour emergency response time, 68% emergency spare parts reserve rate, etc.) and the qualitative ratings of collaborative support efficiency, the membership degrees were calculated to form the matrix:

$$R5=\begin{bmatrix}0.15 & 0.3 & 0.38 & 0.14 & 0.03\\ 0.12 & 0.28 & 0.4 & 0.17 & 0.03\\ 0.18 & 0.32 & 0.36 & 0.13 & 0.01\\ 0.1 & 0.25 & 0.42 & 0.18 & 0.05\end{bmatrix} \quad (5)$$

Fuzzy synthesis operation: The weighted average method is used to calculate the comprehensive evaluation vectors of the criterion layer and target layer. The comprehensive evaluation vectors of the criterion layer are:

B1=W1×R1=[0.1625, 0.325, 0.35, 0.1375, 0.025]

B2=W2×R2=[0.18, 0.33, 0.34, 0.12, 0.03]

B3=W3×R3=[0.08, 0.22, 0.45, 0.2, 0.05]

B4=W4×R4=[0.12, 0.28, 0.42, 0.15, 0.03]

B5=W5×R5=[0.15, 0.3, 0.38, 0.14, 0.03]

The comprehensive evaluation vector of the target layer is:

B=[0.25, 0.25, 0.15, 0.15, 0.2]×[B1,B2,B3,B4,B5]^T=[0.143, 0.293, 0.369, 0.146, 0.039] (6)

4.1.3. Quantification of evaluation results

Comprehensive evaluation score = 0.143×5+0.293×4+0.369×3+0.146×2+0.039×1=3.32 points. According to the evaluation grade standards (4.5–5 points for excellent, 3.5–4.4 points for good, 2.5–3.4 points for general, 1.5–2.4 points for poor, 1–1.4 points for extremely poor), the comprehensive evaluation grade of the bureau's equipment support capability is "general."

4.2. Analysis of evaluation results

4.2.1. Analysis of the criterion layer

Support Personnel Quality (3.46 points): Overall at a "slightly above general" level (**Figure 1**). The high training assessment pass rate (92.8%) lays a foundation for personnel quality, but the low proportion of intermediate and above professional titles (25.1%) and informatized equipment maintenance qualifications (37.9%) restricts the improvement of comprehensive capabilities.

Support Resource Allocation (3.51 points): Rated as "good." The sufficient support funding (95%) provides a strong guarantee, but the aging maintenance equipment and insufficient spare parts reserve at reef stations need to be optimized.

Support Technology Level (3.08 points): At a "general" level. The application rate of advanced diagnostic technology, the coverage rate of informatized management systems, and the independent repair rate of complex faults are all low, and the technical empowerment effect is not obvious.

Support Management Mechanism (3.31 points): The rules and regulations are basically sound, but the evaluation and incentive mechanism lacks scientificity, and the training content is not targeted enough, which affects the release of support efficiency.

Emergency Support Capability (3.40 points): The emergency response time and repair success rate basically meet the requirements, but the low emergency spare parts reserve rate (68%) and weak cross-regional collaborative support capability need to be strengthened.

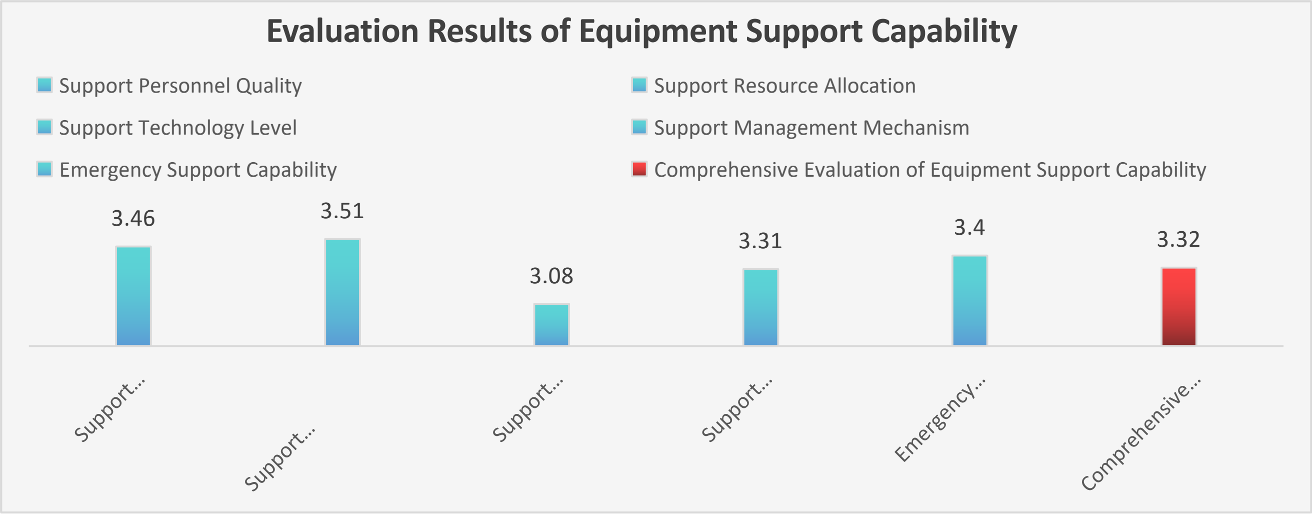

Figure 1. Evaluation results

4.2.2. Test of evaluation results

Expert evaluation method and test-retest reliability method are used to test the evaluation results. Five external experts unanimously believe that the evaluation index system is scientific and reasonable, and the evaluation results are in line with the actual situation of the bureau; the test-retest reliability analysis shows that the correlation coefficient between the two evaluation results after an interval of 1 month is 0.87, indicating that the evaluation results have good stability and reliability.

5. Countermeasures and suggestions for improving the equipment support capability of CCG

5.1. Improve the professional quality of support personnel

Formulate a special talent introduction plan, focusing on recruiting professionals in informatized equipment maintenance and ship power system repair. Cooperate with universities and scientific research institutes to establish talent training bases, and select 30–50 support personnel for practical training every year. Establish a talent echelon management mechanism, give play to the role of technical leaders in mentoring, and strive to increase the proportion of intermediate and above professional titles to more than 35% and the informatized equipment maintenance qualification rate to more than 50% within 3 years.

5.2. Optimize the allocation and management of support resources

Increase investment in reef support stations, update aging maintenance equipment, supplement spare parts reserves, and strive to increase the good rate of maintenance equipment at reef stations to more than 90%; establish a shared management mechanism for support resources to realize resource complementarity between coastal and reef stations; establish a dynamic reserve mechanism for spare parts, and adjust the reserve types and quantities according to the failure rate and task requirements.

5.3. Improve the level of support technology

Introduce advanced technical equipment, such as ship equipment condition monitoring systems and fault diagnosis expert systems, and increase the application rate of advanced diagnostic technology to more than 60%. Accelerate the construction of an informatized management system for equipment support, realize full-process information management of support business, and break information barriers. Strengthen technical cooperation with scientific research institutes, jointly tackle key technical problems such as complex fault repair, and increase the independent repair rate of complex faults to more than 80%.

5.4. Improve the support management mechanism

Revise and improve the equipment support rules and regulations, clarify the work standards and responsibility division of each link, and establish a normalized supervision and inspection mechanism. Build a scientific evaluation and incentive mechanism, directly linking evaluation results with performance appraisal, promotion, rewards, and punishments to mobilize staff enthusiasm. Optimize the training mechanism, carry out demand-oriented training, increase the proportion of practical courses, and organize more than 4 post-training activities every year.

5.5. Strengthen emergency support capability

Revise and improve the emergency support plan, and organize 2–3 emergency drills every year to enhance the response capacity. Establish a special reserve warehouse for emergency spare parts, and increase the reserve rate to more than 85% in accordance with the principle of "sufficient reserve and rapid allocation." Establish a collaborative support mechanism with surrounding CCG bureaus and local maintenance enterprises to improve the integration efficiency of emergency resources.

6. Conclusion

Combined with the characteristics of the Coast Guard's equipment support, this paper constructs an equipment support capability evaluation system including 5 criterion layers and 19 index layers, uses the AHP method to determine the index weights, combines the fuzzy comprehensive evaluation method to establish an evaluation model, and conducts empirical research with a certain bureau of the CCG as the object. The evaluation results show that the system can scientifically and objectively reflect the level of the Coast Guard's equipment support management capability and accurately identify the weak links in management. The research results fill the gap in the scientific management evaluation of the Coast Guard's equipment support capability, provide an effective tool for the Coast Guard's equipment support management decision-making and capability improvement, and have strong popularization and application value.

Disclosure statement

The authors declare no conflict of interest.

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