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The Research on the Impact Factors of the Comprehensive Evaluation of Communication Unit Camps Based on Analytic Hierarchy Process

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Abstract

Currently, the comprehensive assessment of the communication troops' camp planning project is primarily qualitative, with limited quantitative evaluation. Drawing upon the relevant spirit of some documents and leveraging the author's own work experience, this article thoroughly explores the factors influencing the comprehensive assessment of the project and proposes quantitative representation methods for these factors. Utilizing the Analytic Hierarchy Process (AHP), a hierarchical structure model and judgment matrix for the evaluation factors of the communication troops' camp construction planning project are constructed, enabling the determination of the weightage of each factor. This provides a certain level of support and reference for the project approval and management by branch offices, while also offering valuable insights for the approval and management of camp planning and construction projects in other types of troops and battlefield projects.

Keywords

Communication Corps, Camp Infrastructure Planning Endeavor, Determinative Elements, Assessment, Analytic Hierarchy Process (AHP)

1. Introduction

For a long time, comprehensive evaluations of large and medium-sized military engineering projects have mainly relied on expert review meetings, expert ratings, or the subjective comparisons of personnel in charge combining various document regulations, norms, and standards. Factors influencing project approval were scattered among various document regulations, instructions from senior leaders at all levels, and the minds of project managers. The proportion of subjective factors is significant, and there is a lack of quantitative research on comparative evaluations among multiple projects.

At the current stage, China is still in a critical period of development and construction, with the center of national development focused on economic construction. In the short term, it is not possible to significantly increase military expenditure. Given the limited funds available for military construction and the underdeveloped national economy, it has become an urgent and practical issue for the competent authorities at all levels of military construction to scientifically and reasonably select and determine the construction projects and the sequence of project organization implementation, correctly identify the direction of investment, maximize the effectiveness of limited military expenditure, and make the most of the resources.

Based on an analysis of existing evaluation problems in military engineering projects, this paper explores the comprehensive efficiency factors affecting the communication unit's camp planning and construction. To provide a reference for subsequent project evaluations, an evaluation index system is established using the Analytic Hierarchy Process (AHP). Expert judgment matrices were constructed to calculate and determine the weights of the indices. The research on the impact factors of the comprehensive evaluation of communication unit camps is based on AHP [1] [2].

2. Literature Review

Regarding the research on military engineering projects, scholars such as Zhou Yufeng [3] and Wen Haiyang [4] have examined the issues of cost control throughout the entire project construction process and proposed measures to address them. Bai Xiao *et al.* [5] and Ma Li [6] have qualitatively analyzed the tendentious problems in investment decision-making for military engineering construction projects and offered principles for resolving these issues. Wang Xiugang, Hu Decheng, and Bai Hongchuan [7], from the perspective of financial management in military engineering, have advocated for the establishment of a military engineering investment review center based on the practices of the National Ministry of Finance's investment review center, highlighting the necessity and principles that should be adhered to in military engineering investment management. Long Xinhua [8] has analyzed the current status and existing drawbacks in investment management, organizational implementation, and project operation mechanisms of our military's engineering construction before its adjustment and reform. In response, he has proposed a new military engineering construction management model that emphasizes the principles of investment allocation. In 2003, Weng Dongfeng [9] introduced the concept of efficiency guarantee for military engineering facilities systems and proposed an evaluation method. However, the quantitative representation of the efficiency guarantee, influencing factors, and evaluation indicators were not addressed. In 2015, Meng Binbin [10], from the perspective of defense economics, pointed out the problem of the "unclear planning role of demand-driven budgeting system" that our military has implemented for a long time. In 2016, Zhou Dongsheng [11] analyzed the problems existing in the current management of military engineering construction and emphasized the importance of introducing performance evaluation. He constructed a fuzzy comprehensive evaluation method and system for post-project evaluation performance in military engineering projects. In 2018, Tang Min [12], based on the perspective of project group management, conducted research on the application of roadmaps in military construction planning. He macroscopically studied the evaluation method for prioritizing project group resource guarantees and verified the reliability of the method using equipment construction as an example.

The above-mentioned studies can be mainly classified into two categories: one is conducted by personnel engaged in specific engineering project management at the frontline of troops. Their research and discussions are based on the aspects of project implementation, progress management, cost management, and post-project evaluation. In terms of investment decision-making, most of these studies only suggest improving the scientific nature of decision-making qualitatively. The recommendations and measures proposed are predominantly qualitative. The other category includes research that qualitatively describes problems related to defense budget allocation and project decision-making from the perspective of the national strategic level, with most cases cited focusing on equipment development projects.

Considering the needs of project approval work at the strategic and campaign level, and based on the planning project library and construction funding framework specified parent unit, there has been limited exploration and research on how to scientifically evaluate the efficiency guarantee of engineering construction projects, select and determine annual construction projects, and formulate annual construction plans to ensure the maximum effectiveness of investment projects.

3. The Structure of the Paper

Chapter 1 expounds upon the contemporary state and modalities of evaluating military engineering construction projects; Chapter 2 provides a comprehensive synthesis of the research status and extant issues surrounding the holistic assessment of military engineering projects. Chapter 3 proceeds to proffer an introduction to the fundamental framework of this manuscript. Chapter 4 elucidates the commonly employed methodologies for comprehensive project evaluations. In Chapter 5, an investigation is conducted to establish a comprehensive evaluation indicator system for the planning of communication battalion camp construction projects, along with the quantification methods for each individual indicator. Chapter 6 delves into the standardization techniques for indicator data, focusing on the quantitative representation approach formulated in the preceding section. Chapter 7 acquaints us with the fundamental principles of the Analytic Hierarchy Process (AHP) methodology. Building upon the previously established indicator system, Chapter 7 constructs a hierarchical structure for the indicators, establishes judgment matrices, calculates the weights for each indicator, and subsequently carries out sorting and analysis of said indicators. Finally, Chapter 8 concludes the entirety of the discourse, expounding upon the significance of the scholarly inquiry undertaken.

4. Methods for Comprehensive Project Evaluation

Comprehensive project evaluation involves a comprehensive assessment of the evaluated object based on pre-determined evaluation criteria, integrating various factors, and providing a comprehensive evaluation of things or phenomena influenced by multiple factors. It aims to select appropriate evaluation methods to assess the overall priority of the evaluated objects based on given conditions. This provides a theoretical basis for project management decisions [13].

Any project description consists of qualitative and quantitative descriptions. Therefore, comprehensive evaluation requires the combination of qualitative and quantitative indicators, resulting in qualitative methods and quantitative methods [14].

4.1. Qualitative Methods

There are many qualitative methods available, including expert judgment, expert rating, expert table, prioritization sequencing, etc. [14].

4.2. Quantitative Methods

All the indicators involved in quantitative evaluation methods can be quantified and require mathematical calculations. Optimization theory is the most commonly used method, including single-objective decision-making and multi-objective decision-making [14].

4.3. Combined Qualitative and Quantitative Methods

Comprehensive project evaluation often requires the integration or synthesis of qualitative and quantitative indicators to obtain a comprehensive result. This necessitates the use of combined qualitative and quantitative methods. Common methods include a comprehensive scoring method, analytic hierarchy process, TOPSIS method, grey relational analysis [15], neural networks [16], data envelopment analysis [17], and their integrated application.

5. Establishment of a Comprehensive Evaluation Index System for Communication Unit Camp Planning and Construction Projects

The evaluation index system needs to be established based on the analysis of influencing factors, according to the hierarchical structure of evaluation objectives, criteria, and indicators. There are three main sources and bases for establishing the index system: Firstly, policy or planning indicators explicitly determined by the government or competent authorities, which need to be obtained from departments responsible for relevant management tasks. Secondly, the financial and qualitative indicators are established based on the goals and demands of the project's relevant stakeholders. These indicators are determined and established by the departments concerned according to the principles of mutual benefit, fairness, and reasonableness. The relevant data and information can be obtained from social project management organizations or service agencies [18].

Considering the uniqueness of the military camp facilities and the limited availability of publicly accessible research materials, we make full use of the advantages of positions and resources in engineering construction planning to adopt primarily the first approach and appropriately consider the second approach. We analyze the influencing factors and determine the evaluation indicators.

Based on the guiding ideology and construction principles stated in the aforementioned documents, combined with the characteristics and existing situation of the communication troop's camp facilities guarantee, there are issues with the current allocation of project funds. Drawing on the author's work experience, we fully utilize the working platform and resource advantages to research the factors influencing the guarantee of communication troop's camp facilities. We extract and determine several indicators from five aspects: functional tasks, strategic direction, urgency, unit level, and support personnel. This helps in constructing a comprehensive evaluation indicator system for the communication troop's camp construction planning project, providing a scientific and objective basis and reference for project prioritization.

5.1. Factors Related to Functional Tasks

In this study, we select the most critical tasks, which are the maintenance of optical cable routes and the operation and maintenance of backbone transmission stations, as quantitative indicators.

1) Route Maintenance Task

According to the relevant provision, backbone optical cable routes are classified into four levels: Level 1, Level 2, Level 3, and Level 4, based on their importance. The longer the length and higher the level of the maintained optical cable route, the more important the task. The route maintenance task quantity, R_g, is defined as the sum of the lengths of the maintained optical cable routes multiplied by the importance weight coefficients of each level. The calculation formula is shown as Equation (1).

$$R_g = \sum_{i=1}^{n} L_i \cdot x_i \quad n = 4 \tag{1}$$

In the formula: L_i represents the length of the i-th level maintained optical cable; X_i represents the importance weight coefficient of the i-th level optical cable.

To ensure a scientifically based quantification of indicators, we select the criteria for the transmission system and optical cable availability rate specified by some relevant provisions as a basis for calculating the relative importance of each level of optical cable. Compared with a reference model that has a 2500 km digital link length and 32 sets of optoelectronic equipment, the average "availability rate" indicator for level 1 backbone transmission systems is 99.5%, and for level 2 backbone transmission systems is 99%. The annual allowable outage time for level 3 and 4 C-level optical cable routes should not exceed 0.052 hours/kilometer. The outage time indicator is distributed according to 25% for equipment inside the station and 75% for communication lines. The "availability rate" of the transmission system refers to the ratio of the total normal operation time of the transmission system within a certain inspection period to that inspection period. It can be represented by the equation:

$$K_{xt} = \frac{KT - ZT}{KT} \times 100\% \tag{2}$$

Formula: K_{xt} represents the availability rate of the transmission system; KT represents the inspection period; ZT represents the system outage time.

Based on this, the calculation formula for the allowable outage time per kilometer of the route, ZT_l, is as follows:

$$ZT_l = \frac{(1-K_{xt}) \times KT}{2500} = \frac{(1-K_{xt}) \times 24 \times 365}{2500} \times 75\% \tag{3}$$

The optical cable availability rate is K_g.

$$K_g = 1 - (1 - K_{xt1}) \times 75\%; \tag{4}$$

$$K_g = \left(1 - \frac{ZT_l \times 2500}{24 \times 365}\right) \times 100\% \tag{5}$$

By substituting the above data into the formula, the calculated availability rate indicators for levels 1, 2, 3, and 4 of the optical cable respectively are as follows.

$$K_{g1} = 1 - (1 - K_{xt1}) \times 75\% = 1 - (1 - 99.5\%) \times 75\% = 99.625\%; \tag{6}$$

$$K_{g2} = 1 - (1 - K_{xt2}) \times 75\% = 1 - (1 - 99.0\%) \times 75\% = 99.250\%; \tag{7}$$

$$K_{g3} = K_{g4} = \left(1 - \frac{0.052 \times 2500}{24 \times 365}\right) \times 100\% = 98.516\% \tag{8}$$

Based on the above data, the availability indicators of the third and fourth-level optical cables are the same. Therefore, in this document, we will merge the third and fourth-level optical cables and refer to them as third-level cables. We will convert the availability into weighting coefficients for importance using the formula shown in Equation (9).

$$x_i = \frac{K_{gi}}{\sum_{i=1}^{4} K_{gi}} \times 100\% \tag{9}$$

In the formula: KTL_i represents the availability indicator of the ith-level optical cable (Table 1).

2) Station Maintenance Tasks

Table 1. Correspondence between availability and weighting coefficients of different level cables.

Optical cable level	Level 2	Level 1	Level 3 (including Level 4)
General rate requirements	99.625%	99.250%	98.516%
The important degree weight coefficient	33.500%	33.374%	33.127%

In a feasibility report, transmission stations are classified into five categories from 1 to 5 based on the importance of user support, with several subcategories within each main category. If a station supports multiple users, its level is determined based on the importance of each user. The more levels a station corresponds to, the more users it supports, indicating heavier tasks. The higher the level and the more levels of backbone transmission stations involved in maintenance, the more important and heavy the maintenance tasks. The calculation formula for the maintenance workload of backbone transmission stations (R_t) is the number of stations corresponding to their levels multiplied by the weighting coefficient of each corresponding level. For a camp with multiple stations, this calculation should be performed for each station separately and then summed up.

After consulting relevant experts, the classification of backbone transmission stations is considered a preliminary effort. There is no existing quantitative method available for reference. The difference in importance between different subcategories within the same main category is minimal. To simplify the calculation, this document will no longer consider the difference in importance between different subcategories of stations, and the differentiation of subcategories will only be used to distinguish the number of station levels. The calculation formula is shown in Equation (10).

$$R_t = \sum_{i=1}^{m} T_i \cdot w_i \quad m = 5 \tag{10}$$

In the formula: T_i represents the number of stations corresponding to each level; w_i represents the weighting coefficient of the ith main category station.

To scientifically quantify the relative importance between stations, based on consultations with the responsible person for the feasibility report of this battlefield construction project and the staff members of the branch offices, the weighting coefficients for the importance between stations can be considered as follows: 1st main category—0.35, 2nd main category—0.25, 3rd main category—0.2, 4th main category—0.15, 5th main category—0.05 (**Table 2**).

5.2. Strategic Direction Factors

Communication units deploy their forces close to the front lines and users, with thousands of camps deployed throughout the country. During a certain period, the importance of support in different strategic directions is not the same. The more important the strategic direction in which the project is located, the more

Table 2. Correspondence between station levels and weighting coefficients for importance.

Station category	The first category	The second category	The third category	The fourth category	The fifth category
Importance coefficient	0.35	0.25	0.2	0.15	0.05

important the project itself. Let Z represent the importance of the strategic direction. A larger Z value indicates a more important strategic direction and a more significant project. Based on the direction of the project within each theater, it is divided into 5 levels, and different weighting coefficients are assigned according to the importance of support in five different theater directions in this fiscal year. Due to security reasons, this document assumes the following relative weighting coefficients for the importance of different theater directions (Table 3).

5.3. Construction Urgency Factors

1) Overall Support Satisfaction

The primary concern for camp housing support is to ensure that officers and soldiers have a place to live. Therefore, the first consideration should be whether there is sufficient housing. Let ZL represent the overall dissatisfaction rate. A higher dissatisfaction rate indicates a more severe shortage of housing, indicating a greater urgency for construction. ZL = 1 − (current available camp building area/theoretical demand building area) × 100%. The calculation formula is shown in Equation (11).

$$ZL = 1 - \frac{KM}{XM} \times 100\% \tag{11}$$

In the formula: KM represents the current available camp building area; XM represents the theoretical demand building area.

2) Communication Equipment Room Support

The functional tasks of communication units in maintaining communication stations determine the battlefield readiness of the camps. The support of communication equipment rooms (specialized facilities) is a core task of camp housing support, and the quality of support directly affects the combat effectiveness of the troops. Considering that the proportion of equipment room area to the total camp building area is relatively low in some camps, to prevent the situation of equipment room shortages from being overshadowed by the overall support situation, let QFL represent the equipment room deficiency rate. A lower deficiency rate indicates better support, while a higher deficiency rate indicates poorer support and greater urgency for the project. QFL = 1 − (current available communication equipment room area/theoretical demand area of communication equipment rooms) × 100%. The calculation formula is shown in Equation (12).

Table 3. Weighting coefficients for theater direction importance.

Theater direction	Theater direction 1	Theater direction 2	Theater direction 3	Theater direction 4	Theater direction 5
Weight coefficient	0.25	0.2	0.3	0.15	0.1

$$QFL = 1 - \frac{XM}{LM} \times 100\% \tag{12}$$

In the formula: XM represents the current available communication equipment room area; LM represents the theoretical demand area of communication equipment rooms.

3) Camp Location Indicators

Considering the different harsh conditions in different geographic regions, the degree of remoteness and hardship of the camps' locations is used as a measure. The more challenging the location, the higher the priority of the project. Let Q represent the degree of remoteness and hardship. A larger Q value implies a more challenging location, indicating a stronger sense of urgency for the project. According to the standards specified in the "Notice on Issuing the Implementation Plan for Improving the System of Hardship and Remote Areas" issued by the Ministry of Personnel and the Ministry of Finance in 2006, this text classifies the national hardship and remote areas into six categories in ascending order: Category One, Category Two, Category Three, Category Four, Category Five, and Category Six [2]. For calculation and comparison, areas outside these six categories are defined as Category Seven. The differences between the categories are measured by the average subsidy standards of current personnel in each category [3], as follows: Category One—210 yuan, Category Two—350 yuan, Category Three—580 yuan, Category Four—1050 yuan, Category Five—1950 yuan, and Category Six—3200 yuan. To facilitate comparison and calculation, the average subsidy for Category Seven is considered as 0 yuan. These amounts are then converted into relative weightings for hardship and remote areas, as shown in formula (13).

$$Q = \frac{q_i}{\sum_{i=1}^{7} q_i} \times 100\% \tag{13}$$

where q represents the subsidy amount for the relevant hardship and remote area project (**Table 4**).

4) Indicator of Quarters' Quality

The military forces were originally under different headquarters, services, and theaters of operation, with significant differences in the ages of quarters' constructions. Therefore, the ranking of projects should fully consider the quality of quarters. LJ is defined as the obsolescence level of quarters, and a higher value of LJ indicates older and more urgent quarters; LJ = (the construction area of each type of quarter × the construction age of that type of quarter) ÷ (the total construction area of the camp's quarters × the design service life of the quarters).

Table 4. Correspondence between Categories of Hardship and Remote Areas and Hardship and Remote Degree.

District category	Category 1	Category 2	Category 3	Category 4	Category 5	Category 6	Category 7
Allowance	210	350	580	1050	1950	3200	0
Hard and remote	0.0286	0.0477	0.0790	0.1431	0.2657	0.4360	0.0000

When calculating the construction area of each type of quarter and the total construction area of the quarters, it does not include quarters that have reached the design service life or quarters that, although not reaching the design service life, have been identified by professional institutions as needing to be demolished. The calculation formula is shown in formula (14).

$$LJ = \frac{\sum_{i=1}^{n} M_i \cdot N_i}{M \times N} \quad i = 1,2,3,4 \tag{14}$$

where i represents the category number of quarters, namely, specialized premises (communication rooms), office command premises, service support premises, and apartment housing; M_i is the construction area of the i-th type of quarters; N_i is the years since the construction of the i-th type of quarters; M represents the total construction area of the camp's quarters; N represents the design service life of the quarters, and based on the current national building design standards and the actual situation of the military camp's support, N is taken as 50 years.

5.4. Factors of Camp's Residential Level

In the project application at different levels such as brigade headquarters, battalion, company, platoon, and squad, the power of discourse is different, and the higher-level unit has the right or opportunity to decide the retention or exclusion of projects for the next-level unit. To ensure fairness, the indicator of the residential unit's level is introduced. Based on the residential level of all projects in the planned project library, it is divided into six levels: brigade, regiment, battalion, company, platoon, and squad. JB is defined as the unit-level degree, and the larger the JB value, the greater the weight, indicating a stronger urgency for project construction. The degree levels in this text are measured based on the corresponding level officer's subsidy standard, specifically: brigade level—1000, regiment level—1000, battalion level—600, company level—800, platoon level—400, squad level (watch post)—280. Considering that all units under the jurisdiction of the regiment are brigades, and the number of companies directly under the regiment is greater than the number of companies directly under the brigade, the regiment level is revised to 650 based on the deputy-level standard of the brigade. The calculation formula is shown in formula (15).

$$JB = \frac{jb_i}{\sum_{i=1}^{6} jb_i} \times 100\% \tag{15}$$

where jb_i represents the corresponding officer's subsidy for the unit's residential level (**Table 5**).

5.5. F actors of the Camp's Support Force

According to the current standards for camp's support and construction, the number of personnel assigned to the camp (*i.e.*, the number of support forces) is one of the most important bases for organizational construction and should also be an important factor in evaluating the comprehensive support efficiency of the project. In this text, BL is defined as the support force, and its importance is calculated based on the number of personnel assigned to the camp. The calculation does not distinguish between officers, soldiers, civilian personnel, and employees.

$$BL = bl \tag{16}$$

where bl represents the number of assigned personnel in the camp where the project is located.

6. Standardization of Comprehensive Evaluation Indexes for Projects

After obtaining data for each index, a comprehensive evaluation of camp planning projects can be conducted. However, due to the different magnitudes and dimensions of each index, as well as the divergent purposes and evaluation criteria of decision-makers, it is not possible to directly integrate and evaluate the various indexes together. A certain method is needed to eliminate the differences in magnitudes and dimensions of each index, allowing the values of the evaluation indexes to be compared on the same scale.

Based on the assessment of the practical situation of the communication unit's camp construction planning project and the expectations of the branch offices, this article establishes a comprehensive evaluation index system consisting of five indicators, all of which are performance indicators. The higher the value of the indicator, the better the efficiency, and the higher the priority of the project's overall evaluation. However, the physical dimensions and magnitudes of the five primary indicators are not completely the same. To eliminate the aforementioned influences, a normalization process is now applied to the five indicators, using the following formula:

$$x_{ij} = \frac{x'_{ij} - \min x'_{ij}}{\max x'_{ij} - \min x'_{ij}} \tag{17}$$

In the formula: $\min x'_{ij}$ represents the lower limit of the indicator; $\max x'_{ij}$ represents the upper limit of the indicator.

7. Analytic Hierarchy Process (AHP)

The Analytic Hierarchy Process is a practical multi-criteria decision-making method that combines qualitative and quantitative aspects. It can be used to

Table 5. Correspondence between Camp's Residential Unit Level and Unit-Level Degree.

Camp residential level	Brigade level	League level	Camp Level	Camp Level	Platoon level	Class
Number of chief official post allowance	1000	650	600	800	400	280
Level degree	0.2681	0.1743	0.1609	0.2145	0.1072	0.0751

determine the importance ranking of the influencing factors in the comprehensive evaluation of the communication unit's camp construction planning project obtained in this article. Based on the influencing factors listed in Section 1, the AHP method is used in this paper to obtain the weights of each factor, clarify the factors that should be given priority attention in the overall evaluation of the project, and enhance the scientific nature of project approval by the branch offices.

7.1. Hierarchical Structure

Taking the comprehensive guarantee efficiency of the project as the goal level and the factors and indicators analyzed in the first section as the criteria level and sub-criteria level, the hierarchical structure established is shown in **Figure 1**.

7.2. Establish Judgment Matrices, Compute Weights

Firstly, based on the current situation of the comprehensive evaluation of the communication unit's camp construction planning project, the assistant to the officer responsible is invited to conduct pairwise comparisons and assign values to each element of the layers in **Figure 1**, according to the 1 - 9 scale method (Sinuanystern & Amitai, 1994). Then, using the eigenvector method, the relative weights of each element in the layers are calculated, and a consistency check is performed. The results of the weight calculation for each criterion element are shown in **Tables 6-8**.

The results show that at the criterion level, among the factors that affect the overall guarantee efficiency of the project, both functional tasks and strategic direction factors are ranked first with a weight of 0.3283. In the sub-criterion level, concerning the criterion "functional tasks," the impact of line maintenance tasks is greater than that of station maintenance tasks, with a weight of 0.75. Concerning the criterion "urgency," the most significant impact is from the overall non-compliance rate, with a weight of 0.5060, followed by the shortfall rate of equipment rooms, with a weight of 0.2530.

7.3. Weight Ranking and Analysis

Based on the weight results of the criterion level to the goal level and the sub-criterion level to the criterion level, the composite weights of each element in the sub-criterion level to the goal level are calculated, and a hierarchical ranking is conducted. The results are shown in **Table 9**. According to the ranking results, the top three factors influencing the comprehensive guarantee

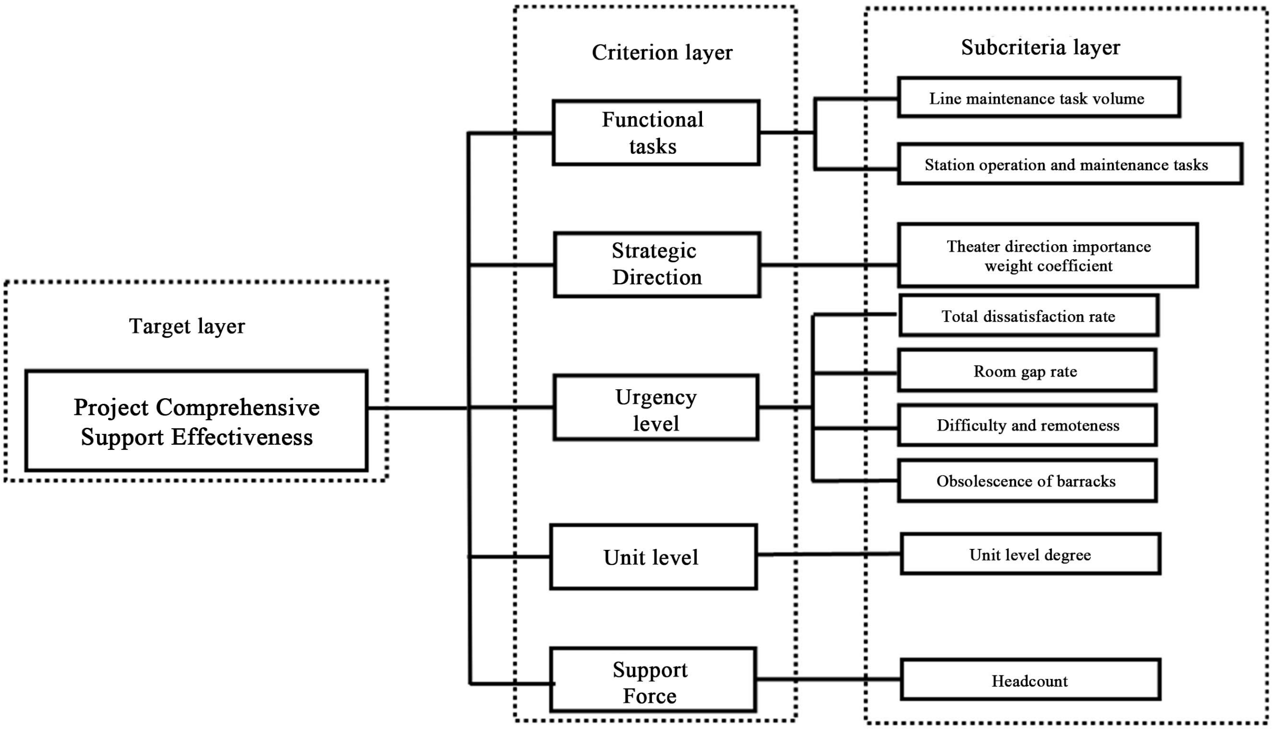

Figure 1. Hierarchical structure diagram.

Table 6. Judgment matrix and weight for criterion level to goal level.

Project comprehensive guarantee efficiency evaluation	Functional tasks	Strategic direction	Urgent degree	Unit Level	Security forces	Consistency scale	Weight	Weight ranking
Functional tasks	1	1	5	3	2		0.3283	1
Strategic direction	1	1	5	3	2		0.3283	1
Urgent degree	1/5	1/5	1	3/5	2/5	0.0089	0.0657	5
Unit Level	1/3	1/3	1 2/3	1	4/5		0.1137	4
Security forces	1/2	1/2	2 1/2	1 1/2	1		0.1641	3

Table 7. Judgment Matrix and Weight for Sub-criterion Level to Criterion Level "Functional Tasks".

Project comprehensive guarantee efficiency evaluation	Line maintenance task	Station maintenance tasks	Consistency ratio	Weight
Line maintenance task	1	3	0.0000	0.7500
Station maintenance tasks	1/3	1		0.2500

efficiency of the communication unit's camp construction planning project are strategic direction, line maintenance tasks, and troop support. These rankings align with the practical project approval, indicating the effectiveness of this method in quantitatively evaluating the comprehensive guarantee efficiency of the communication unit's camp construction planning project.

Table 8. Judgment Matrix and Weight for Sub-criterion Level to Criterion Level "Urgency".

Project comprehensive protection, barrier efficiency assessment	Total non-satisfacti on rate	Machine room gap rate	Hard and remote	The barracks are old	Consistency ratio	Weight
Total non-satisfaction rate	1	2	3	7	0.0000	0.5060
Machine room gap rate	1/2	1	1 1/2	3 1/2		0.2530
Hard and remote	1/3	2/3	1	2 1/3		0.1687
The barracks are old	1/7	2/7	3/7	1		0.0723

Table 9. Total Weight and Ranking of Elements in the Sub-criterion Level.

Target layer	The standard layer	Criterion layer element weight	Sub-criterion layer	Subcriterion layer, and the element weight	Total weight of the influencing factors	Total weight ranking
Comprehensive project protection effectiveness assessment	Functional tasks	0.3283	Line maintenance task	0.7500	0.2462	2
			Station maintenance tasks	0.2500	0.0821	5
	Strategic direction	0.3283			0.3283	1
	Urgent degree	0.0657	Total non-satisfaction rate	0.5060	0.0332	6
Comprehensive project protection effectiveness assessment	Urgent degree	0.0657	Machine room gap rate	0.2530	0.0166	7
			Hard and remote	0.1687	0.0111	8
			The barracks are old	0.0723	0.0047	9
	Unit Level	0.1137			0.1137	4
	Security forces	0.1641			0.1641	3

8. Conclusions

This article combines the practical management of the approval process for the communication unit's camp construction planning project with relevant documents and work experience. It examines and quantifies the factors influencing the comprehensive guarantee efficiency of the project using the Analytic Hierarchy Process, obtaining the weights of each factor. The following conclusions are drawn:

1) Regarding the comprehensive guarantee efficiency of the project, both the strategic direction and the functional tasks undertaken by the camp during the project are equally important, with weights of 0.3283. The number of personnel in the deploying unit in the camp, which represents troop support, is of secondary importance, with a weight of 0.1641.

2) Within the functional tasks, line maintenance tasks have the greatest impact, with a weight of 0.7500. Concerning urgency, the overall non-compliance rate has the most significant impact, with a weight of 0.5060. This article utilizes the Analytic Hierarchy Process to determine the factors and weights that influence the comprehensive guarantee efficiency of the communication unit's camp construction planning project, providing support and reference for project management and approval by the branch offices. It also has some instructive significance for the planning, construction, and approval of camp projects and battlefield projects in other military units.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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