Evaluation of Security Management Ability of PAP Based on "Eight Norms"

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Abstract: Aiming at the factors affecting the equipment security management of PAP, the "Eight Norms" of the PAP security work were introduced into equipment security management ability evaluation by using fuzzy analytic hierarchy process (FAHP), and the weapon equipment security managementability evaluation system was constructed. The evaluation index weights were determined by the analytic hierarchy process (AHP), and the evaluation index expert score was conducted by applying the group decision theory. Finally, the evaluation score of equipment security management ability was obtained by using MATLAB, and the system construction was analyzed by taking a grass-roots mobile brigade of PAP as an example. The results show that this method can scientifically and effectively evaluate the equipment security management capability of troops.

1. Preface

Equipment security management referred to a series of management activities that prevent or deal with accidents and cases during storage, transportation, usage, maintenance, and retirement, scrap, etc. As an important measure to consolidate the combat power and ensure security and stability, equipment security management was an objective reflection of the organic unity of troops and equipment. It was an important guarantee for improving the quality and effective playing potential of troops [1, 2]. In recent years, in order to meet the requirements of the new era mission, the number of types of equipment were equipped to PAP. Because of the huge quantity, high-tech content, and frequent use, the pressure of equipment security management for the grassroots troops had increased significantly. With the promulgation of PAP security work of "Eight Norms", it had been got a result in the security management. This leads to the lack of scientific and reasonable evaluation methods, resulting in unscientific and imperfect evaluationfor equipment security management, and it severely restricts the capabilities improvement of PAP. Therefore, the grassroots level urgently needs to establish a set of guidance methods and evaluation systems based on "Eight Norms".

Fuzzy hierarchical evaluation method was a new evaluation method combining analytic hierarchy process and fuzzy comprehensive evaluation method, which can effectively solve the problem of combining quantitative and qualitative analysis. With good reliability, it had wide application in military fields for efficiency, capacity assessment, etc. [3]. By constructing the equipment security management evaluation model based on security work "Eight Norms", paper applied fuzzy comprehensive evaluation method to equipment security management evaluation system, helping the grassroots troops to find their own lack of management, aiming to improve equipment security management scientific level and ability.

2. Basic situation of "Eight Norms"

2.1. Source of "Eight Norms"

"Eight Norms" was the abbreviation of "Eight basic norms for security work in the eight aspects", which was the summary of the practice of PAP security work. It was a method to solve the problem that the overall planning of PAP security work was not in place and the security construction was not comprehensive, and it was a method to grasp the security construction systematically.

"Eight Norms" cover all aspects of PAP security work. The basic contents were in-depth security education, in-place security training, sound security organization, implementation of security system, good security environment, complete security facilities and regular security activities, clear responsibility for security. "Eight Norms" was a systematic norm for PAP to grasp the basic contents, standard requirements and methods of security construction under the new situation, it was the basic basis and important compliance that guides the armed forces to organize security construction and carry out daily security work. The implementation of the "Eight Norms" was a major decision-making and deployment made by the Party Committee of PAP. It was the most basic and effective fundamental policy for the security work. It was also an effective and important measure that had been tested by practice in recent years.

2.2. "Eight Norms" Guidance and Adaptability to Equipment Security Management

"Eight Norms" had strong guiding and adaptation equipment security management for PAP. Specifically, Equipment security management education was the basic means of universal security knowledge and the main way to enhance security awareness [4]. Equipment security management training was fundamentally improving the ability and quality of officers and men to prevent accidents, and striving for the basic ways of troops. Equipment security management organization play a leadership and guarantee role in the planning design, coordination and implementation of the troop equipment security management, and the inspection and supervision work. Equipment security management system was the fundamental follows of the equipment security management work, which was the basic basis for organizing equipment security management. Equipment security management facility was an important condition for specification operations, promoting love-fitting cultures, and building security barriers. Equipment security Management Activity provide a substance guarantee for persistent guarantees and stable support for equipment security development. Equipment security activity was an important carrier that promotes equipment security. Equipment management security responsibility refers to the responsibility of the responsibility and problems in the security work, and was the key to promoting equipment security management.

3. Equipment security management evaluation with fuzzy level method

With the military system adjustment, the motor brigade was equipped with the basic combat unit of PAP, equipped with equipment with military, vehicles, and anti-chemical, and had significant representation in equipment security management.

3.1. System construction

A motorized brigade was located in a hard side area, and the equipment of training on duty was often used frequently. In the past three years, although the unit guarantees the security without accidents in the premise of successful completion of the tasks, there was also the lack of equipment professionals, the information capacity was not met, and some people do not pay attention. According to the foregoing analysis, this paper introduces "Eight Norms" as the first-class indicator of the equipment safety management evaluation system of a mobile brigade. In addition, through consultation, consulting equipment related field experts, combined with the evaluation index, the main factors of evaluation index, identified 32 secondary evaluation indicators [5-7], and construct the equipment security management evaluation system as shown in Figure 1.



Figure1 Equipment Security Management Ability Evaluation System

3.2. Evaluation process

3.2.1. Construction Judgment Matrix

The influence degree of each index in the equipment security management evaluation index system on the evaluation of equipment safety management capability was different. Therefore, we used the analytic hierarchy process to compare the fuzzy factors and establish the judgment matrices.

$$D_{U} = \begin{bmatrix} 1 & 1/3 & 2 & 1/2 & 2 & 1/3 & 1/3 & 4 \\ 2 & 1 & 5 & 4 & 4 & 3 & 1 & 7 \\ 1/2 & 1/5 & 1 & 1 & 1/2 & 1/5 & 1/7 & 4 \\ 2 & 1/4 & 1 & 1 & 1/2 & 1/3 & 1/5 & 2 \\ 1/2 & 1/4 & 2 & 2 & 1 & 1/2 & 1/3 & 3 \\ 3 & 1/3 & 5 & 3 & 2 & 1 & 1 & 6 \\ 3 & 1 & 7 & 5 & 3 & 1 & 1 & 5 \\ 1/4 & 1/7 & 1/4 & 1/2 & 1/3 & 1/6 & 1/5 & 1 \end{bmatrix}$$

$$D_{UI} = \begin{bmatrix} 1 & 2 & 3 & 2 \\ 1/2 & 1 & 3 & 1/2 \\ 1/3 & 1/3 & 1 & 1/4 \\ 1/2 & 2 & 4 & 1 \end{bmatrix} \quad D_{U2} = \begin{bmatrix} 1 & 3 & 2 & 1/3 \\ 1/3 & 1 & 1/2 & 1/5 \\ 1/2 & 2 & 1 & 1/4 \\ 3 & 5 & 4 & 1 \end{bmatrix} \quad D_{U3} = \begin{bmatrix} 1 & 1/3 & 1/2 & 1/2 \\ 3 & 1 & 2 & 2 \\ 2 & 1/2 & 1 & 1/3 \\ 2 & 2 & 3 & 1 \end{bmatrix}$$

$$D_{U4} = \begin{bmatrix} 1 & 2 & 4 & 3 \\ 1/2 & 1 & 3 & 2 \\ 1/4 & 1/3 & 1 & 1 \\ 1/3 & 1/2 & 1 & 1 \end{bmatrix} \qquad D_{U5} = \begin{bmatrix} 1 & 3 & 2 & 2 \\ 1/3 & 1 & 1/2 & 1 \\ 1/2 & 2 & 1 & 2 \\ 1/2 & 1 & 1/2 & 1 \end{bmatrix} \qquad D_{U6} = \begin{bmatrix} 1 & 2 & 3 & 2 \\ 1/2 & 1 & 2 & 1/2 \\ 1/3 & 1/2 & 1 & 1/4 \\ 1/2 & 2 & 4 & 1 \end{bmatrix}$$
$$D_{U7} = \begin{bmatrix} 1 & 2 & 1/2 & 1/3 \\ 1/2 & 1 & 1/4 & 1/2 \\ 2 & 4 & 1 & 2 \\ 3 & 2 & 1/2 & 1 \end{bmatrix} \qquad D_{U8} = \begin{bmatrix} 1 & 1/2 & 1/3 & 1/5 \\ 2 & 1 & 1/2 & 1/2 \\ 3 & 2 & 1 & 1/2 \\ 5 & 2 & 1/2 & 1 \end{bmatrix}$$

3.2.2. Conformity for consistency and determine the evaluation index weight

Through the consistency test, the results meet the requirements. Then characteristic value was calculated and normalized by the matrix algorithm, and the value of the weight value was obtained[8].

$A_U = [0.0846]$	0.2746	0.0511	0.0655	0.0794	0.1810	0.2359	0.0279]
$A_{U1} = [0.4070$	0.1988	0.0888	0.3054],	$A_{U2} = [($).2323	0.0838	0.1377	0.5462]
$A_{U3} = [0.1228]$	0.3458	0.1733	0.3581],	A U4=[().4699	0.2801	0.1144	0.1356]
$A_{U5} = [0.4249]$	0.1438	0.2701	0.1613],	A _{U6} =[(0.4117	0.1801	0.0984	0.3098]
$A_{U7} = [0.1674]$	0.1074	0.4297	0.2955],	$A_{U8} = [($).0922	0.1757	0.4077	0.3244]

3.2.3. Establish an evaluation object factor set U and judges V

According to Figure 1, the factor of the evaluation target can be obtained:

$$U = \{U_1, U_2, U_3, U_4, U_5, U_6, U_7, U_8\}$$
$$U_1 = \{U_{11}, U_{12}, U_{13}, U_{14}\}, U_2 = \{U_{21}, U_{22}, U_{23}, U_{24}\}, U_3 = \{U_{31}, U_{32}, U_{33}, U_{34}\}$$
$$U_4 = \{U_{41}, U_{42}, U_{43}, U_{44}\}, U_5 = \{U_{51}, U_{52}, U_{53}, U_{54}\}, U_6 = \{U_{61}, U_{62}, U_{63}, U_{64}\}$$

 $U_7 = \{U_{71}, U_{72}, U_{73}, U_{74}\}, U_8 = \{U_{81}, U_{82}, U_{83}, U_{84}\}$

The evaluation results use a 5-level division method, which is "Very Satisfied, Satisfied, Moderate, Dissatisfied, very dissatisfactory" 5 evaluation levels to evaluate each indicator. In order to quantify comparison between individual indicators, Assign each index value.

So we obtained the judge matrix: $V = [90\ 80\ 70\ 60\ 50]^{T}$.

3.2.4. Establish a single factor evaluation matrix

The previous equipment safety management evaluation at the grass-roots level was generally based on the subjective evaluation of leaders, which was not objectively, truly and comprehensively reflect the current situation of equipment safety management at the grass-roots level. This paper was directed to this status quo, by selecting a questionnaire survey by selecting the expertise of different levels of equipment security management, achieving a comprehensive and balanced effect. Equipment Security Management Evaluation Expert Select Composition can be seen in Table 1.

Rank	l	Number	
1	De	1	
2	Minister of	1	
3	Equipmen	1	
4	Grass-roots	Chief of Brigade	1

Table 1 Equipment Security Management Evaluation Expert

5	representatives of	Staff Officer of Brigade	1
6	the army	Chief of the support unit	1
7		Squadron leader	1
8		non-commissioned officer	1
9		Squadron Ordnance Staff	1
10	Re	1	

According to the results of the questionnaire, we use the method of fuzzy statistics to construct the judgment matrix and obtain the fuzzy membership matrices:

$R_{U1}=$	^{0.3}	0.2	0.3	0.2	ر0	D	۲ ^{0.4}	0.4	0.2	0.2	ر0		^{0.6}	0.3	0.1	0	ر0
	0.4	0.3	0.2	0.1	0		0.5	0.3	0.2	0	0	р _	0.4	0.5	0.1	0	0
	0.4	0.2	0.3	0.1	0	K U2=	0.4	0.4	0.1	0.1	0	K U3=	0.3	0.5	0.1	0.1	0
	$L_{0.5}$	0.2	0.3	0	l_0		$L_{0.3}$	0.5	0.2	0	0		$L_{0.4}$	0.3	0.2	0.1	0
$R_{U4}=$	^{0.6}	0.1	0.2	0.1	⁰]		^{0.3}	0.4	0.2	0.1	ر0		۲ ^{0.4}	0.3	0.2	0.1	0
	0.3	0.5	0.2	0	0	D	0.2	0.3	0.4	0.1	0	D	0.4	0.2	0.3	0.1	0
	0.4	0.3	0.2	0.1	0	N U5-	0.4	0.3	0.3	0	0	N U6-	0.3	0.5	0.2	0	0
	$L_{0.5}$	0.4	0.1	0	l_0		$L_{0.3}$	0.3	0.3	0.1	0		$L_{0.5}$	0.2	0.2	0.1	$\lfloor 0 \rfloor$
<i>RU</i> 7=	^{0.4}	0.4	0.1	0.1	⁰]		^{0.7}	0.2	0.1	0	ر0						
	0.5	0.4	0.1	0	0	D _	0.5	0.3	0.1	0.1	0						
	0.4	0.3	0.2	0.1	0	N U8-	0.5	0.2	0.2	0.1	0						
	$L_{0.6}$	0.2	0.1	0.1	l_0		$l_{0.6}$	0.3	0.1	0	0						

3.3. Evaluation results

According to the formula

$$\mathbf{B} = \mathbf{a} * \mathbf{r} \tag{1}$$

$$p = b * v = a * r * v \tag{2}$$

We can get the following results:

$$P_{U1}=78.8940, P_{U2}=84.1875, P_{U3}=81.6514, P_{U4}=81.7623$$

 $P_{U5}=78.7995, P_{U6}=80.2881, P_{U7}=81.4835, P_{U8}=82.9343$

According to the results of primary fuzzy comprehensive evaluation, we use the weight of primary index to calculate the evaluation value of equipment safety management [9].

$$P_U = 82.1279$$

In summary, the assessment value of the equipment security management of PAP was 82.1279. From the final result of the evaluation, the equipment safety management evaluation value of PAP mobile brigade based on the "Eight Norms" of safety work was between Very Satisfied and Satisfied. From all level indicators, Equipment Security Management, Equipment Security Management Organizational, Equipment Security Management Activities, Equipment Security Management Responsibilities had higher evaluation value, all over 80 points, were in a satisfied level, but were all at low levels of satisfaction. Equipment Security Management Education, Equipment Security Management Education, Equipment Security Management Education, security Management Security Management Education, Equipment Security Management Education value was less than 80 points, and was at a moderate level. The results of the evaluation were consistent with the actual situation, and the next step was needed to improve the level of equipment security management, especially targeted, strengthen the education of equipment safety management and the construction level of equipment safety management environment.

4.Conclusions

How to make the complicated equipment security management evaluation comprehensive and objective was a difficult problem. In this paper, we take the "Eight Norms" as the first-class indicators to construct PAP equipment security management evaluation system. Then, we conduct instance verification as an example with a PAP motor brigade. the final results were basically consistent with the reality, which proves that the method can effectively reflect the equipment security management level of PAP. At the same time, this method was also conducive to find the weak links in equipment security management, and provides a scientific and effective reference for the evaluation of equipment security management at the grass-roots level of PAP in the future.

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