Construction of Performance Evaluation Index System of Practical Training Based on SPSS

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Abstract. The construction of performance evaluation index system of actual combat training is the key link of performance evaluation of actual combat training. This paper determines the initial indicators through field research and literature review; designes questionnaires corresponding to the initial indicators, collects questionnaire data, and uses SPSS software to perform reliability analysis, validity analysis and factor analysis on the questionnaire data. Based on the analysis results, the irrationality is excluded. Indicators, establish a performance evaluation index system for actual combat training.

Questionnaire

Through the field research and review of the literature, 19 initial indicators were determined (because military secrets were involved, so the specific content was not listed, replaced by the labels D1~D19), and 19 indicators were compiled into questionnaires, each of which corresponds to a specific indicator. The respondents scored the indicators according to the importance of each indicator, and the scores were 1-5. The greater the score, the higher the importance. The forms of questionnaires were divided into online distribution and on-site distribution. 100 questionnaires were distributed and 96 were recovered. The recovery rate was 96%, which met the requirements.

Questionnaire Data Analysis

Reliability Analysis

The purpose of reliability analysis is to analyze whether the questionnaire survey results have sufficient reliability[1].The rules for the coefficient method determination are as follows:

Coefficient <0.7, unreliable;0.7 < coefficient < 0.8, more reliable;0.8 < coefficient < 0.9, very reliable.

The coefficient is calculated as shown in equation (1).

$$r_a = \frac{k}{k-1}\left(1-\frac{\sum s_i^2}{s^2}\right) \quad (1)$$

Where k is the number of indicators, si is the standard deviation of each indicator, and s is the total standard deviation.

Based on the α coefficient method, the results of the questionnaire survey on the performance evaluation index system of actual combat training were analyzed. It was found that the α coefficient was 0.881. It can be seen that the α coefficient is within the range of (0.8, 0.9). Therefore, the questionnaire survey results are very reliable. The results of SPSS analysis are shown in Table 1.

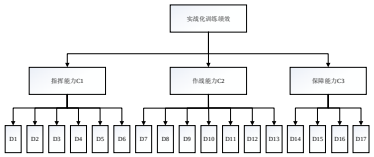
Table 1. Reliability analysis results

α coefficient	Number of items
0.881	19

Validity Analysis

The purpose of validity analysis is to test the closeness between the information reflected in the data of the questionnaire and the real situation of the problem [2].There are many methods for validity analysis, usually using the KMO test and the Bartlett sphericity test.

The calculation of the KMO test is as shown in equation (2).



(2)

Where rij is a simple correlation coefficient between variables, and pij is a partial correlation coefficient between variables.

The rules for its determination are as follows:

The closer the KMO value is to 1, the stronger the correlation between the indicators is, indicating that the closer the information reflected by the data in the questionnaire is to the real situation of the problem [3]. It is generally considered that when KMO>0.7, the correlation between the indicators is strong.

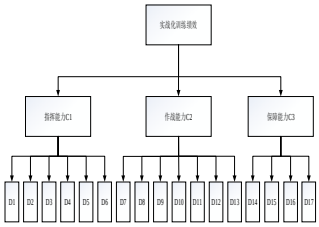
After analysis, the KMO is 0.873>0.7, so the correlation between the indicators is considered strong; and the sig. is 0.00<0.01, so the questionnaire data is considered to be significantly correlated. The results of SPSS analysis are shown in Table 2.

Table 2. KMO and Bartlett test results

KMO sampling adequacy test		0.873
Bartlett spherical test	Approximate chi square	1194.182
	Degree of freedom	171
	Sig.	0.00

Factor Analysis

The purpose of factor analysis is to classify multiple variables according to their internal correlations [4]. The calculation process is as shown in equation (3).



(3)

The main steps are as follows:

1) By SPSS analysis, the gravel map is shown in Figure 1.

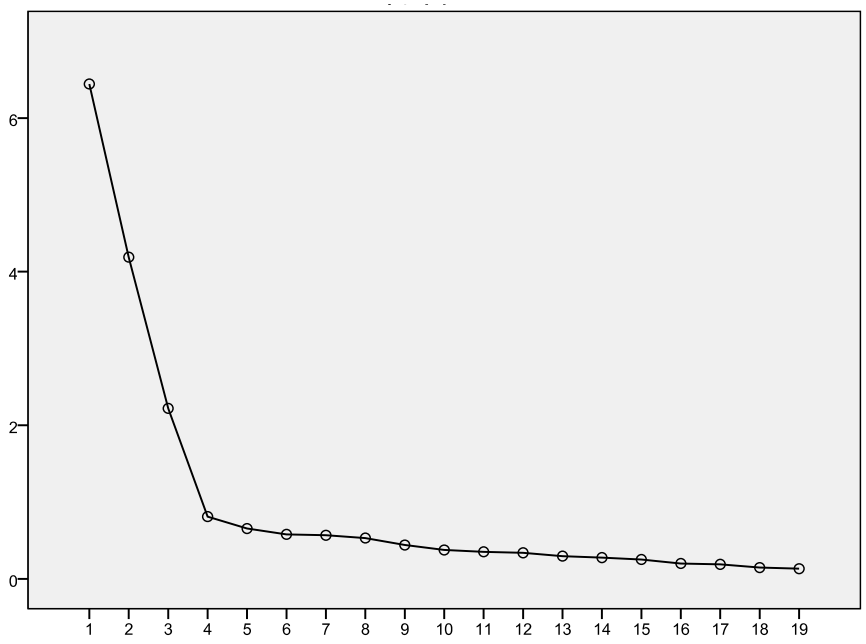


Figure 1. Gravel diagram

Analysis of this gravel soil shows that there are three points on the steep slope of the fold line, so the number of factors determining the questionnaire is 3.

2) The results of the total variance interpretation value are shown in Table 3.

Table 3. Total variance interpretation

ingredient	Initial eigenvalue			Total variance interpretation		
	total	% of variance	Cumulative %	total	% of variance	Cumulative %
1	6.444	33.914	33.914	6.361	33.477	33.477
2	4.189	22.047	55.961	4.228	22.255	55.731
3	2.220	11.683	67.644	2.263	11.913	67.644
4	0.811	4.267	71.911			
5	0.655	3.448	75.359			
6	0.579	3.049	78.408			
7	0.568	2.988	81.396			
8	0.531	2.797	84.192			
9	0.441	2.321	86.513			
10	0.376	1.979	88.492			
11	0.353	1.855	90.348			
12	0.339	1.786	92.133			
13	0.296	1.560	93.694			
14	0.277	1.457	95.151			
15	0.252	1.327	96.478			
16	0.200	1.055	97.533			
17	0.189	0.996	98.529			
18	0.147	0.775	99.304			
19	0.132	0.696	100.000			

The total variance interpretation value is 67.644%>50%, and the questionnaire data is considered to have a good explanatory ability for the actual situation.

3) The rotation component matrix is shown in Table 4.

Table 4. Rotation component matrix

index	ingredient		
	1	2	3
D1	0.813	0.176	-0.167
D2	0.222	0. 704	0.272
D3	0.054	0.016	0.738
D4	0.022	-0.058	0.711
D5	0.662	0.202	0.118
D6	0.807	0.187	-0.046
D7	0.825	0.199	-0.085
D8	0.516	-0.372	0.488
D9	0.813	0.191	-0.082
D10	0.555	0.678	-0.143
D11	0.732	-0.332	0.085
D12	0.312	0.744	-0.147
D13	0.262	0.812	0.129
D14	0.233	0.856	-0.029
D15	0.292	0.759	0.051
D16	0.826	0.181	-0.058
D17	-0.020	0.048	0.787
D18	0.061	0.049	0.785
D19	0.763	-0.408	0.235

It can be seen from Table 4 that the maximum factor load of the two indicators D8 and D10 is >0.5, and the cross load is >0.4, so D8 and D10 are eliminated. For the remaining indicators, the maximum factor load is >0.5, and the cross load is <0.4. Therefore, according to the dimension of the largest factor load, the indicators are classified into three categories. Named "C1", "C2" and "C3" respectively, and based on such classification, an indicator system is established.

Summary

Based on SPSS analysis questionnaire results, reliability analysis, validity analysis, factor analysis and other steps, this paper determines the actual training indicators, classifies the indicators, and finally constructs a practical training performance evaluation index system, which lays a foundation for the actual training performance evaluation.

Reference

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