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Equipment Support Quality Management Effectiveness Evaluation based on FCE Method

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Abstract

For multi-criteria and multi-factors evaluating, the paper put forward a new fuzzy comprehensive evaluation model about equipment support quality management effectiveness evaluation (ESQMEE). An index system is presented. AHP method is applied to ascertain the index weight. At the end of the paper, a real example is given. The results of the example evaluation indicated the model is feasible and effective. It can give a support to improve the complex equipment management effectiveness.

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Keyword: quality management; effectiveness evaluation; AHP; fuzzy comprehensive evaluation

1 Introduction

Management effectiveness is the effect and benefit result of the running mechanism. The mechanism often expresses its effect as one or several forms, otherwise economic benefit. The equipment support quality management effectiveness evaluation (ESQMEE) system evaluating the quality management effectiveness of the whole equipment support process. It is a multi-criteria and multi-factors complicated evaluation. It's hardly to build a uniform and examinable criterion. The FCE method suits with the ESQMEE. In order to satisfy the equipment support quality management multi-dimension and multi-view request, a hierarchical index system is built. The AHP method is applied to calculate the index weight. ESQMEE system is established by the qualitative analysis and the quantitative computing.

2 Establishment of ESQMEE index system

According to the ISO9001 standard procedure model and after analyzing the characters in the operation process of the equipment supply support, we can assess the ESQMEE from four aspects which include daily management, resources management, implemental management and quality check management. The paper established the index system according to the reasonable and scientific

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principles. It is shown in Fig. 1. Based on the AHP thought, the evaluation index system is divided into three levels. They are the target level, the sub-target level and the index level. The target level factor set is $U=\{u_1,u_2,u_3,u_4\}$. The sub-target level has four factor sets, including daily management $u_1=\{u_{11},u_{12},u_{13},u_{14},u_{15}\}$, resources management $u_2=\{u_{21},u_{22},u_{23}\}$, implemental management $u_3=\{u_{31},u_{32},u_{33},u_{34}\}$, and quality check management $u_4=\{u_{41},u_{42},u_{43},u_{44}\}$.These factor sets reflect the factors' influence on the ESQMEE.

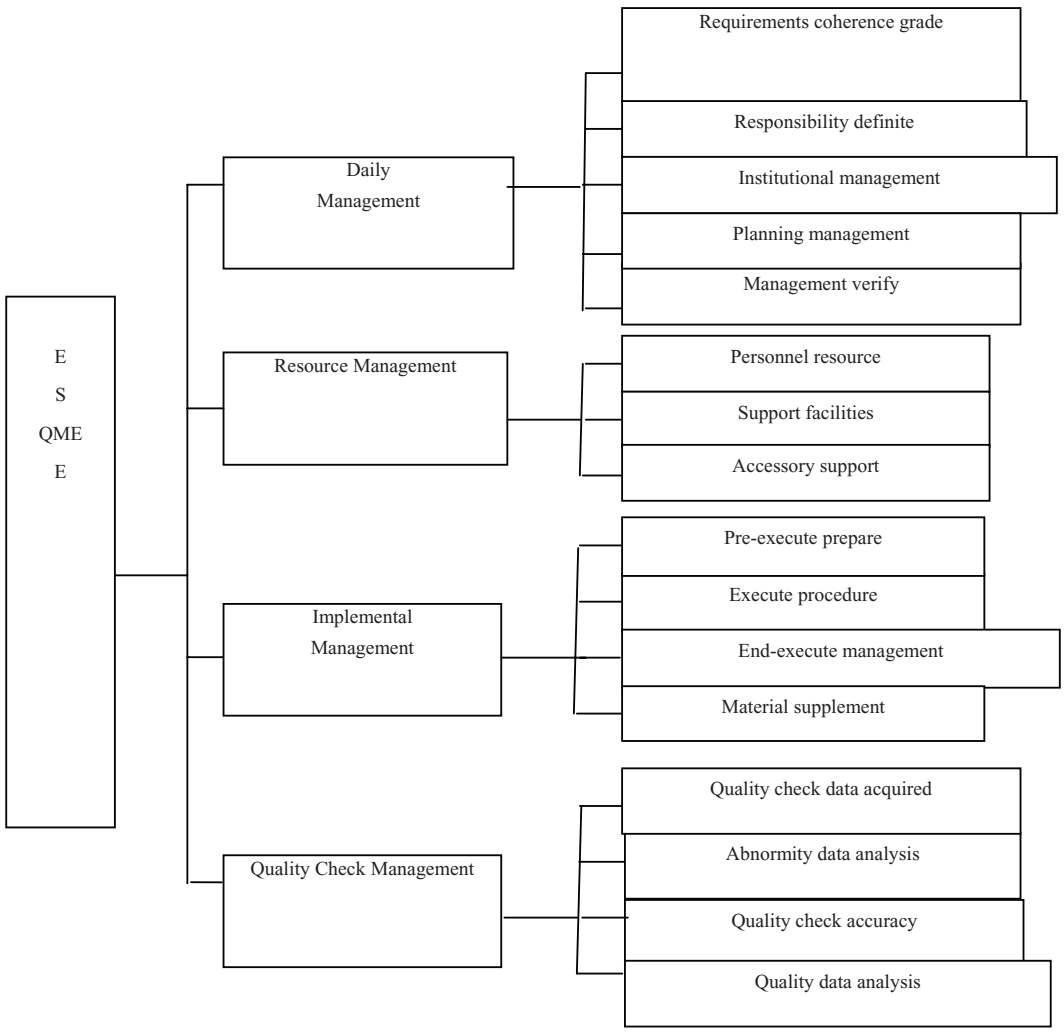

Fig. 1. The index system of the ESQMEE

3 The ESQMEE procedure based the FCE method

FCE is one of the application methods of fuzzy mathematics. Currently it has been applied in many fields. The main idea of the FCE method is: firstly, define a group of remarks (remark grade set), such as excellent, good, middle and bad. Secondly, obtain the index's evaluation results from the evaluation scores given by the experts. The results are translated to the dependent degree with the help of dependent function. Finally, we can get the final evaluation result by the fuzzy transform computing. That is making the fuzzy calculation about the index weight matrix and factor fuzzy evaluation matrix. The advantage of this method is that it can obtain the evaluation result by analyzing and computing the dependent degree and the index weight of the multi-factors which are difficult to quantify. The steps of establishing the model by applying FCE method are given as follows.

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