Peculiarities of expert estimation. Comparison methods

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Abstract

This paper is devoted to integrated assessment of the alternative courses of action (objects) in the decision-making process. Expert investigation is frequently used method of comparison practical activities aspects. In some cases this method is only possible, as awareness about object behaviour can be obtained only from hands-on experience. Although attempts to create an automated system for obtaining expert evaluations to exclude the human factor are proceeding. In the paper comparison method used in getting criteria weights are described.

Keywords: comparison method, the decision-making process, expertise, criteria.

1 Introduction

Expertise is the basis of credibility of a person who is perceived to be knowledgeable in an area or topic due to study, training, or experience in the subject matter. The difficulty of getting evidential expert estimation is that there is difference in experts opinion, while as estimation based on only one expert opinion can be one-side. Therefore it is necessary to choose an exact mathematic method allowed to get formalized expert opinion [1].

To allow comparison of several objects, each of which is characterized by a set of different criteria, there is a need for to form a single integrated assessment, which will be subsequently used to compare and select one or more objects of the set in question, and their priority in terms of predetermined goals. Each valued object or effect is specific, and therefore, their evaluation requires the development of specific criteria.

Nowadays expert estimation is frequently used as this is the only way to assay actions (objects) and to make forecasting. At the same time scientists are looking for ways to create automated expert system, allowing to minimize involvement of a person in evaluation process or eliminate it completely. Expert estimation often considered as functional aspects of thinking, which can be

described at a computational level and reproduced as function of the automated system [2]. But it is necessary to analyze peculiarities of the evaluation process more detailed.

2 Main peculiarities of the evaluation process

To make decisions about some action (objects) is necessary to get a correct integral evaluation. Integral evaluation verity is based on several steps [3]:

1. Criterion selection - a quality criterion must be chosen to compare the objects.
2. Comparison method – method of comparing action (objects) must be chosen.
3. Estimations collection - the expert estimations of the objects must be collected.
4. Definition of criteria weights – criteria must be compared against each other.
5. Analysis of expert evaluations
    The primary focus of this paper is on comparison methods.

2.1. Criterion selection

The choice of criteria depends on the goal of investigation. It may be due to standards or legal documents, the specificity of line of investigation, the process organization etc. [4].

2.2. Comparison method

The method of simple ranging

The method of simple ranging is based on expert's arranging objects as personal preference. 1 sets to the most important object. 2 – the following object and so on. Results of ranging can be tabulated.

	1	2	3	…	i	…	m
x_1	a_{11}	a_{12}	a_{13}	…	a_{1i}	…	a_m
…	…	…	…	…	…	…	
x_j	a_{j1}	a_{j2}	a_{j3}	…	a_{ji}	…	a_{jm}
x_n	a_{n1}	a_{n2}	a_{n3}	…	a_{ni}	…	a_{nm}

Table 1: Expert estimates

a_{ij} – an order of preference of one object above the other;
x_j – comparison objects, j from 1 to n;
m_{kj} – number of the experts;
Integrated expert opinion is calculated on the basis of table (1).

$$S_j = \frac{\sum_{i=1}^{m} a_{ij}}{m_{kj}} \tag{1}$$

The received values are characterized the importance of compared objects. To exclude possibility of casual distribution of ranks and to define degree of coherence of experts estimation can be calculated the coefficient of a konkordation. The first step is to get the average rank of the compared objects (2):