їхнього переростання у небезпеку, адаптацію діяльності підприємства до умов середовища функціонування, корегування процесу управління діяльністю підприємства з метою досягнення стабільного рівня ЕБПП, не принесли бажаних результатів і промислове підприємство потрапило у кризову ситуацію, то єдиним способом її подолання буде використання методів антикризового управління.

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INFORMATION MODELING OF SECURITY INCREASE in EXPERT KNOWLEDGE ASSESSMENT

Recently, the importance of tasks has considerably increased, when it comes to making compromise solutions in the process of studying complex social objects. This is due to an increase in the dynamism of the environment and the development of science and technology, which led to the emergence of a large number of alternative choices. Under these conditions, expert procedures are used to make decisions more frequently. Expert methods are an effective tool for analyzing social objects, forecasts making, and for defining their quality and value. The use of expert methods is relevant for the assessment of many processes.

Thus, the urgent task of information modeling is to increase the safety of expert knowledge evaluation. The technology, on the basis of expert assessment of some indicators of the object under study, displays the aggregated assessment and its linguistic interpretation of the level of expert knowledge security for making further decisions.

Let us formulate the task of evaluating the object under study as follows [1]. Let there be a set of objects $X = \{X_1, X_2, ..., X_n\}$, that needs to be evaluated by many indicators (criteria) and ordered by a certain rule. For a specific application, a general set of criteria for expert evaluation needs to be grouped according to the criteria $G = \{G_1, G_2, ..., G_m\}$. Each group of criteria has a different number, which we will denote as follows: $K_i = \{K_{i1}, K_{i2}, ..., K_{in_i}\}$, $i = \overline{1, m}$. Each criterion is a question to answer on which one is to choose the answer variant Z_{ijk}, $i = \overline{1, m}$, $j = \overline{1, n_i}$, $k = \overline{1,4}$, which is the closest to the truth. For each criterion, an expert chooses one of the answer options to which the corresponding score b_{ijk} is assigned. Answers to the questions are presented in the form of a graduation scale. The given rating scale for answers to questions is heuristic and characterizes the level of the object being evaluated [2-3]. Let us determine the convolution of the estimates, for example, as the sum of the scores of the answers grading scale for the groups of criteria G_i, that we denote – $g_i, i = \overline{1, m}$.

Thus, we obtain a set of numerical variables $g = \{g_1, g_2, ..., g_m\}$ for the group of evaluation criteria, respectively, $G = \{G_1, G_2, ..., G_m\}$, which take values at a certain numerical interval.

Let us construct a structural scheme for improving the safety of expert knowledge assessment , Fig. 1.

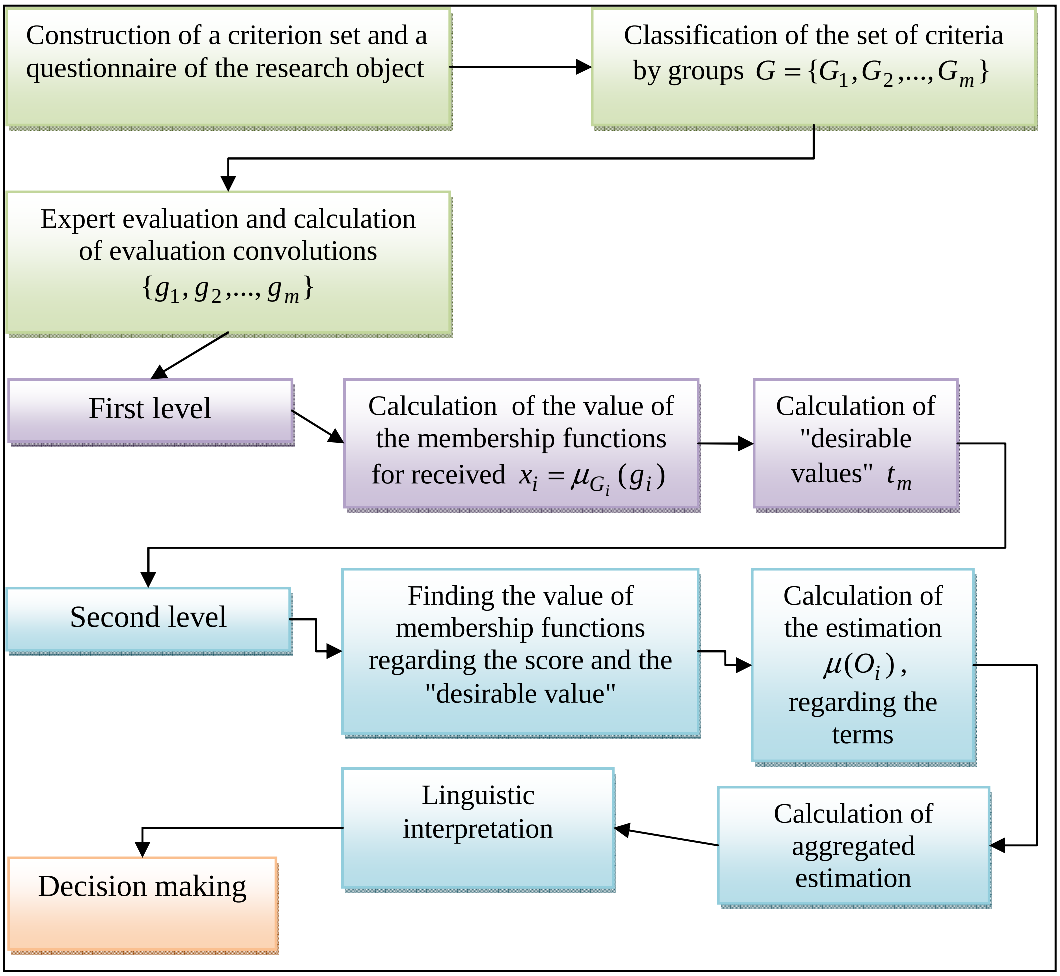

Fig. 1. The structural scheme for improving the safety of expert knowledge assessment

Let us cite a general algorithm for improving the safety of expert knowledge evaluation.

Step 1. For the applied task of expert evaluation under consideration, we are conducting an expert survey and calculate the convolution of the sum of points for the corresponding groups of criteria $\{G_1, G_2, ..., G_m\}$.

Step 2. For each group of criteria, the decision maker (DM) has its own reasoning, which should be the "desirable values", that is, the sum of the points for each group of criteria, respectively – $T = (t_1, t_2, ..., t_m)$.

Step 3. We calculate the values of membership functions for the obtained points of the object of research and "desirable values", respectively (1):

$$\mu_{G_i}(g_i, a, b) = \begin{cases} 0, & g_i \le a; \\ 2\left(\dfrac{g_i - a}{b - a}\right)^2, & a < g_i \le \dfrac{a+b}{2}; \\ 1 - 2\left(\dfrac{b - g_i}{b - a}\right)^2, & \dfrac{a+b}{2} < g_i < b; \\ 1, & g_i \ge b. \end{cases} \quad (1)$$

Where a – the convolution of the minimum points sum, b – the convolution of the maximum points sum of the grading assessment scale by criteria in the group G_i, g_i – – the convolution of the points sum according to the grading scale $(i = \overline{1, m})$.

Step 4. We find the value of membership functions μ_{Uij} regarding the score and "desirable value" according to [1].

Step 5. DM expresses his own thoughts on terms (desirable terms) in groups of criteria – U^*.

Step 6. We calculate scores $\mu(O_i)$, $(i = \overline{1, m})$ regarding the received and desired terms according to [1].

Step 7. DM sets weight coefficients for each group of criteria $\{p_1, p_2, \ldots, p_m\}$ and conducts their valuation $\{w_1, w_2, \ldots, w_m\}$.

Step 8. Using an average weighted convolution, we compute the aggregated evaluation and compare it with the term set to obtain a linguistic assessment for the investigated object of study:

$$m = \sum_{i=1}^{m} w_i \cdot \mu(O_i), i = \overline{1, m}. \quad (2)$$

Let us introduce the linguistic variable *M(m)* = «the safety of expert knowledge assessment». The universal set for the variable *M(m)* is the segment [0; 1], and the set of values of the variable *m* – is a term set $M = \{m_1, m_2, m_3, m_4, m_5\}$.

To establish a linguistic assessment of the object of study, the obtained value is compared to one of the term-sets: $m \in (0{,}67;\ 1]$ – $m_5 =$ «the safety of expert knowledge assessment is high»; $m \in (0{,}47;\ 0{,}67]$ – $m_4 =$ «the safety of expert knowledge assessment is above average»; $m \in (0{,}36;\ 0{,}47]$ – $m_3 =$ «the safety of expert knowledge assessment is average»; $m \in (0{,}21;\ 0{,}36]$ – $m_2 =$ «the safety of expert knowledge assessment is low»; $m \in [0;\ 0{,}21]$ – $m_1 =$ «the safety of expert knowledge assessment is very low».

Further, a following decision is taken regarding the object of the research on the basis of the safety of expert knowledge assessment.

Thus, the task of information modeling of improving the safety of expert knowledge assessment on the basis of a two-level mathematical model is developed. It can be used to obtain an aggregated assessment of the reliability of alternatives in various tasks with expert assessments, increasing their security of obtaining.

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