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technology for reliable assessment of the strategic potential of IBS, developing in the direction of a fixed target state [1–3].

Literature review. Literary sources and publications that are used in this article allow us to describe in detail the mathematical apparatus of solving a problem, assessing the strategic potential of an intelligent business system. This is the use of the hierarchy analysis method, strategic management techniques and others.

Formulation of the problem. In process management, an intelligent business system is understood as a set of intelligent business processes (IBP) (main, providing, as well as IBP management, development), which form a certain structure designed to actively achieve a fixed global goal with maximum efficiency [4]. IBS has the resources (human, material, intellectual) that determine its material and intellectual potentials. IBS, as a rule, is based on knowledge, contains a complex of software linguistic and logical-mathematical knowledge management tools for intelligent business processes, activities, information and knowledge search in an interactive solution in a natural language [3–5]. The IBS structure is dynamic. It develops and changes under the influence of the features of the implemented IBS strategy, its internal complexity and changes in the external environment. It is assumed that IBS has a matrix structure in which the members of the project team are subordinate not only to the project manager, but also to the heads of those structural divisions in which they constantly work. IBS intellectual products are software for the automation of management accounting in trade, catering, and small and medium-sized businesses. The design and development of software is based on its life cycle model, which contains the following steps: analysis; design; development; testing; implementation; escort. It is generally accepted that its resources determine the potential of any enterprise. The strategic potential of IBS is understood as the totality of available resources (human, material, intellectual) that can be put into action, mobilized to achieve the global goal of IBS, determined by its mission. Typically, strategic potential is defined by a multitude of quantitative indicators. Taking into account the features of the IBS subject area, such as the quality and efficiency of decision making; unclear goals; the number of agents involved; chaos, fluctuations and quantization of the behavior of the internal and external environment; the multiplicity of mutually influencing factors; weakness structurefull, uniqueness, non-stereotyped situation, etc. It is difficult to indicate the degree of attainability of the target state based on all indicators [4, 6].

In this regard, an urgent task arises of assessing the strategic potential of the IBS with one quantitative indicator characterizing the degree of its achievement of the global goal.

Subject technology for assessing strategic potential. The levels and mutual influence of its material and intellectual potentials determine the strategic potential of IBS. Each of these potentials depends on the intensity of the influence of the strengths and weaknesses of the resources of the IBS functional zones (marketing; production; research work (innovation); personnel; finance; management; external economic activity; other functional areas) on the degree to which the IBS target state is achieved. The intensity of the influence of the strong, weak sides of each functional area is determined by its significance and forecast probability and its manifestation on the time interval [0; T] with duration T. It is assumed that \( U \leq U \leq \bar{U} \), where \( U \) is the bottom limit, \( \bar{U} \) is the top limit of the probability of a side appearing during the movement of the IBS to the target position. The importance of strengths and weaknesses is determined by its contribution to assessing the level of IBS potential. In the following, the material potential of IBS is understood as the totality of the available material and human resources of the IBS functional zones that can be activated, mobilized to achieve the global goal of IBS. Similarly, the intellectual potential of IBS is understood as the totality of the intellectual and human resources of the IBS functional areas that can be activated, mobilized to achieve the global goal of IBS. The level of Strategic Potential (SP) IBS is determined by dependence

\[
SP = \varphi(MP, IP),
\]

where \( MP \) is the level of material potential of IBS, \( IP \) is the level of intellectual potential of IBS. It is assumed that

\[
MP_p \leq MP \leq MP_o, \quad IP_p \leq IP \leq IP_o
\]

where \( MP_o, IP_o \) is an optimistic assessment of the material and intellectual potentials of IBS and \( MP_p, IP_p \) is a pessimistic assessment of the material and intellectual potentials of IBS.

An optimistic assessment is manifested under the condition that the weaknesses of the resources of the functional zones are manifested with a probability equal to \( U = \bar{U} \). A pessimistic assessment is manifested under the condition that the strengths of the resources of the functional zones are manifested with a probability equal to \( U = U \). In an optimistic assessment, strengths are manifested with probability equal to \( U \in [U, \bar{U}] \). In the case of a pessimistic assessment of potentials, weaknesses appear with the probability equal to \( U \in [U, \bar{U}] \). In reality, strengths and weaknesses are manifested with probability equal to \( U \in [U, \bar{U}] \). In this case, the material potential is determined by the formula

\[
MP = \varphi_1(MP_o, MP_p),
\]

and intellectual potential is determined by dependence

\[
IP = \varphi_2(IP_o, IP_p),
\]

In addition to \( U \), the second factor affecting the IBS potential level is the significance of the \( i \) strengths and weaknesses of the resources of the IBS functional zones:

- \( \alpha_i \) is significance of the \( i \)-th strength of the material and human resources of the functional zones of IBS, \( i = \overline{1, n_1} \), \( n_1 \) is the number of strengths;
- \( \beta_i \) is significance of the \( i \)-th weaknesses of the material and human resources of the functional zones of IBS, \( i = \overline{1, n_2} \), \( n_2 \) is the number of weaknesses;
Taking into account the introduced designations, complex estimates are found:

- optimistic assessment of material potential $MP_o$ is found [7, 8],
- pessimistic assessment of material potential $MP_p$ [7] is

$$MP_p = 1 - \sum_{i=1}^{n_2} \beta_i \left( U_i - U_i^o \right) / \left( U_i - U_i^o \right),$$

- optimistic intellectual potential $IP_o$ [7] is

$$IP_o = \sum_{i=1}^{m_1} \gamma_i \left( U_i - U_i^o \right) / \left( U_i - U_i^o \right),$$

- pessimistic intellectual potential $IP_p$ [7] is

$$IP_p = \sum_{i=1}^{m_2} \theta_i \left( U_i - U_i^o \right) / \left( U_i - U_i^o \right).$$

Considering the additive nature of dependences (5–8), in determining $PM$ and $IP$ according to (3, 4), the geometric mean value $MP_o$ and $MP_p$, $IP_o$ and $IP_p$ is used.

$$MP = (MP_o \cdot MP_p)^{1/2}, IP = (IP_o \cdot IP_p)^{1/2}$$

Assessment of strategic potential is defined as the geometric mean value of $PM$ and $IP$.

$$SP = (MP \cdot IP)^{1/2}$$

When defining values $\alpha_i, i = 1, n_1, \beta_i, i = 1, n_2, \gamma_i, i = 1, m_1, \theta_i, i = 1, m_2$, it should be mind that the functioning of IBS in the process of moving to the target state is determined by the multidimensional nature of business processes, their interconnection, dynamics, the multiplicity of participating agents, randomness, poor structure, etc. This leads to the emergence of new discrete structures with a new quality and influence on the process of achieving a global goal. It is advisable to use the method of analysis of hierarchies for study the influence of strengths and weaknesses on the achievement of the target state [9]. The basis of AHP is a hierarchy, which is a system of levels, each of which consists of elements and factors. The task in the language of hierarchy is to determine the intensity of the influence of lower-level elements on the focus of the problem. In an optimistic assessment of potentials, the focus of the problem is to increase the degree of achievement of the global goal. In a pessimistic assessment of potentials, the focus of the problem is to reduce the degree of achievement of the global goal. Fig. 1 shows the hierarchy for determining significance of $\alpha_i, i = 1, n_1$ and $\gamma_i, i = 1, m_1$.

To implement the procedure for determining $\alpha_i, \beta_i, \gamma_i, \theta_i$ a group of experts is created from numbers experienced IBS specialists who fill out questionnaires for the corresponding elements of the hierarchy (fig. 1, fig. 2). On the grounds of the completed questionnaires, a generalized matrix of pairwise comparisons is formed. Based on this matrix, local and global priorities of the elements of the lower and middle levels of hierarchies are determined. The global priorities of the elements of the lower level of hierarchies (fig. 1, fig. 2) determine their significance. The expert method determines the predicted values of $U, U_i, U_j$ for each strong and weak side [8, 10].

The results obtained make it possible to determine $MP_o, MP_p, IP_o, IP_p$, using dependences (5–8), then using dependence (9) to determine $MP$ and $IP$. Based on dependences (10), the strategic potential of IBS is estimated.

As a result of the described technology, the value $SP$ of the strategic potential of an intelligent business system is received. Fig. 3 shows the geometric interpretation of the $SP$, as the length of the side of the squares, with the area $M = MP \cdot IP$ [11, 12].

The use of an expert procedure using the technology of the hierarchy analysis method to evaluate the significance of the strengths and weaknesses of the material, human, and intellectual resources of the functional areas of the business system is supposed to be operated by the expert with qualitative concepts (more, much more, etc.) [12, 13].
At the same time, the real reasoning of experts based on natural language cannot be described within the framework of traditional mathematical formalisms. Therefore, when assessing the degree of achievement of the target state by an enterprise, it is advisable to use fuzzy sets. The membership function $\mu(M)$ of the "masses" in the set $H_o$, providing the necessary degree $h_o$ of achievement by the enterprise of the goal, is trapezoidal (fig. 4), where $[AC]$ is the core of $\mu(M)$. $M_o = \{M : h_o \leq \mu(M) \leq U\}$.

The formula for $\mu(M)$ has the form

$$
\mu(M) = \begin{cases} 
0, & M < A, \\
SP - A & B - A, \\
h, & A \leq M \leq B, \\
h_o, & B \leq M \leq C.
\end{cases}
$$

In the case under consideration, $A = 0.49, C = 1$. Value $B = 0.7$, the value of $U$ is chosen equal to 0.9, $h_o \leq h \leq U$.

The described sequence of actions defines the subject technology for assessing the strategic potential of IBS, which contains the following steps:

- Collection of qualitative and quantitative information about the internal environment of IBS, the material and intellectual resources of its functional zones;
- Identification of the strengths and weaknesses of the material resources of the IBS functional zones;
- Identification of strengths and weaknesses of the intellectual resources of the IBS functional zones;
- Determination of forecast probabilities of manifestation of $U, \overline{U}, \overline{\overline{U}}$ of all IBS strengths and weaknesses;
- Expert procedure for the formation of matrices of pairwise comparisons;
- Determination of the significance $\alpha_i, i = 1, \pi_1$, $\beta_i, i = 1, \pi_2$, $\gamma_i, i = 1, \pi_3$, $\theta_i, i = 1, \pi_4$ of the strengths and weaknesses of IBS;
- Assessment of the material potential of IBS;
- Assessment of the intellectual potential of IBS;
- Assessing the Strategic Potential of IBS.

As a result of the implementation of the developed subject technology, the SP value is obtained. Let the threshold $h$ is specified that defines the minimum acceptable degree of achieving a global goal. If $SP \leq h$, then it is logical to expect that the target IBS state will not be achieved [14].

Conclusions. The proposed subject technology allows us to determine a comprehensive assessment of the strategic potential of IBS, striving to achieve a given target state, to assess the ability to achieve IBS. The proposed subject technology can serve as the basis for creating information technology for assessing the strategic potential of IBS.

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