В тоже время в химическом производстве региона ориентация на улучшение экологических показателей проявляется в незначительной мере. Химическая промышленность должна учесть положительный опыт проведения и финансирования экологической политики в металлургии [3].

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MODEL OF FORMATION OF KEY PERFORMANCE INDICATORS FOR PRICING PROCESS IN TOURISM

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Keywords: price, pricing process, mathematical model, key performance indicators, tourism enterprise, tourism product.

Abstract: the economic-mathematical model of the choice of key performance indicators of pricing process of a tourism product is offered. The model is the representative of a class of models of multicriteria Boolean optimization.

Pricing in management of activity of the tourism enterprise, undoubtedly, plays one of key roles [1]. Establishment of a certain level of prices for a tourism product directly influences results of activity of the tourism enterprise, achievement of the set strategic objectives by him. Modern conditions of managing demand from the tourism enterprises of use of flexible system of pricing for a tourism product, which would be capable to react to changes of the numerous factors influencing pricing process adequately.

The problem of formalization of pricing process of tourism product is very important for effective management of the tourist enterprise.

However, specifics of non-productive processes often bring to inadequate models of activity of the organization. One of the main problems of processes of the tourist enterprise is absence standard (target, optimum, nominal) values for key indicators of the majority of processes.

Another serious problem is the problem of quantitative estimation of indicators of processes of activity of the enterprises of the tourism sphere. For example, for the tourism enterprise indicators of process of formation of a tourist product except numerical characteristics (the number of tourists, the number of days of rest) have a significant amount of essential qualitative characteristics (relevance of the tourist direction, level of satisfaction of clients, level of service with the tourist agent).

The following problem connected with uncertainty of indicators of non-productive processes [2]. The tourism enterprises function in actual practice uncertainty of external environment.

At last, we identify one more problem, which essentially distinguishes the non-productive sphere from production branch and consists in unpredictable currents and value judgment of results of non-productive processes. Most often, such problem is called influence of a human factor. The human factor along with uncertainty of indicators is an integral part of all social and economic processes.

Modern approach to formation of system of key indicators is based on methods of mathematical modeling. For creation of such system, it is offered to use mathematical model of multicriteria Boolean optimization in a look [3]:

$$F^l\left(x_1, x_2, ..., x_n\right) \to extr\,, l = 1,\, 2,\, ...,\, p\,, \tag{1}$$

$$\varphi^i\left(x_1, x_2, ..., x_n\right) \le b_i\,,\ i = 1,\, 2,\, ...,\, m\,, \tag{2}$$

$$k_{low} \le \sum_{j=1}^{n} x_j \le k_{high} \tag{3}$$

$$x_j \in \{0,1\}\,, \quad j = 1,\, 2,\, ...,\, n\,, \tag{4}$$

where x_j – the indicator of inclusion of an indicator with number j in system of indicators of process (if $x_j = 1$, then the indicator joins in system, if $x_j = 0$, then do not); $F^l\left(x_1, x_2, ..., x_n\right)$ – linear or nonlinear criterion functions, each of which expresses criterion of optimization of a certain characteristic of system of indicators; p – number of criteria of optimization; $\varphi^i\left(x_1, x_2, ..., x_n\right)$ – linear or nonlinear criterion functions which set restrictions when forming system of indicators; m – number of such restrictions; b_i – real numbers; k_{low}, k_{high} – the minimum and maximum quantity of indicators in system which is capable to estimate effectively results of monitoring of process on these indicators; n – quantity of indicators in an initial set which of set the effective system of indicators is defined.

The set $\{y_1, y_2, ..., y_t\}$, which contains t of key indicators of efficiency of process where $k_{low} \le k \le k_{high}$ is result of modeling. Vector representation of result is explained by the fact that it is necessary to estimate efficiency of process in a complex on all key performance indicators. Therefore it is necessary to define not single indicators, but their system (vector). If it is heavy to define characteristics of indicators quantitatively and unambiguously, then the task (1) – (4) can be put in the conditions of indistinct uncertainty.

We will review an example of formation of model of a look (1) – (4) for process of pricing at the tourist enterprise. We will enter the following designations into an additive to designations from model (1) – (4):

$G\left(x_i\right)$ – value of usefulness function of an indicator i for pricing process monitoring;

a_i – cost of obtaining values an indicator *i*;

α_i – probability (risk) of obtaining false value at an assessment of process of pricing on an indicator i;

e_i – the number of experts in the field of pricing, values, necessary for an assessment, an indicator *i*;

q_r – qualification the expert *r* (quantity of indicators which monitoring the expert at the same time can carry out);

Q_t – the number of experts who have qualification not below, than t;

S – the volume of the budget of the tourist enterprise on carrying out monitoring of process of pricing;

d_i – the volume of the material and information resources necessary for an assessment of process of pricing for a tourist product on indicator *i*;

D – total amount of material and information resources of department of the financial and economic analysis and planning of the tourist enterprise.

The model has an appearance:

$$F^1 = \sum_{i=1}^{n} G\left(x_i\right) \cdot x_i \to \max\,, \tag{5}$$

$$F^2 = \sum_{i=1}^{n} a_i \cdot x_i \to \min\,, \tag{6}$$

$$F^3 = \sum_{i=1}^{n} \alpha_i \cdot x_i \to \min, \tag{7}$$

$$\sum_{i=1}^{n} \frac{e_i \cdot x_i}{q_r} \le Q_{q_r}, \qquad q_r = 1,..., \max_{i=1,...,n} \{e_i\}, \tag{8}$$

$$\sum_{i=1}^{n} a_i \cdot x_i \le S, \tag{9}$$

$$\sum_{i=1}^{n} d_i \cdot x_i \le D, \tag{10}$$

$$k_{low} \le \sum_{i=1}^{n} x_i \le k_{high}, \tag{11}$$

$$x_j \in \{0,1\}. \tag{12}$$

The task (5) – (12) belongs to the class of problems of linear multicriteria optimization [4]. The criterion (5) expresses maximizing usefulness of the choice of system of indicators of the pricing process; criterion (6) – minimization of the expenses connected with introduction of system of indicators in monitoring of the pricing process; criterion (7) – minimization of the risk connected with possible errors in measurement of indicators of the pricing process at the tourism enterprise. To the solution of a task (5) – (12) can be applied a method of weight coefficients, a method of priorities and other methods of vector programming.

After the system of key indicators of the pricing process is created, it is necessary to provide to each element of this system value of weight coefficient. Ranging of indicators on their influence on process is a necessary condition of obtaining values of target indicators in system of monitoring of activity processes of the tourist enterprise.

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MODELING OF UNIT "FINANCE" IN FINANCIAL-INDUSTRIAL GROUP

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Keywords: Finance, financial-industrial group, solvency, stability, business activity.

Abstract: when evaluating the performance and ranking of financial-industrial groups great importance is attached to the block "Finance". The simulation of this block is required in connection with the use in practice of a large number of financial indicators, wide range of their variation, and using fairly complex mathematical methods described in the economic literature.