

*Section: Modern mathematical methods, models and information technologies
in the economy*

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EVALUATION OF CAPITALIZATION OF HUMAN CAPACITY WHICH WAS FORMED AS A RESULT OF TRAINING

The modern economy is the knowledge-based economy. This is the economy in the development of which knowledge and innovation play the dominant role. In such conditions, the efficiency of business organizations depends not so much on financial capital as on intellectual one. One of the three components of intellectual capital is an organization's human capital. That's why the basis for the successful development of modern high-tech production is the continuous improvement of professional knowledge and skills of staff, employee development and training. And according to the knowledge management model the main tasks of the HR manager are to organize not only staff training, but also the assessment of the quality of this training [1]. The knowledge and skills gained as a result of the training increase the human potential of the staff. However, this is not enough. It is necessary that this knowledge be fully used in practical activities. It is necessary that human potential be capitalized, so that human potential is transformed into human capital.

The aim of this paper is to analyze the methodology for assessing the quality of training from the point of view of using the acquired knowledge in subsequent labor activity, namely estimating the production function for acquired human potential. To do this, we considered metrics that should be used to assess the quality of training for line managers and middle-level managers.

Many practical and theoretical researches are aimed at developing approaches to measuring the knowledge, skills, abilities and other characteristics of employees. Various organizations have proposed and used a large number of metrics to evaluate employee quality. The company considers personnel as a human resource in which it is necessary to invest. Therefore, the company wants to evaluate the consequences of training in monetary terms. And, accordingly, it wants to improve precisely those knowledge and skills that are necessary for the development of this business organization. Along with this attempts are being made to regularize and standardize these metrics. An example of such generalization of basic research in this area is the report by Loughborough University in partnership with University of Leeds [3].

The simplest and clearest approach to assessing results of a worker's training, i.e. training of direct performers. All formulas used in this case are based on the calculation of the return on investment (ROI) of the employer's human capital. For example, if the employee's labor productivity before training (P_b), the employee's labor productivity after training (P_a) and the unit cost of production (C) are known, then for personnel training costs (S), the effectiveness of investment in human capital (ROI) is calculated by the formula:

$$ROI = \frac{(P_a - P_b) \cdot C}{S}.$$

This assessment can be called 'hard'. But such a method is correct only for employees who are directly involved in the production or delivery of products, goods and/or services. When training managers, it is necessary to take into account their knowledge and skills in organizing production. This assessment may be called 'soft' since it is not so easy to justify economically. It should be noted that the use of a hard estimate in this case is also correct. A line (or direct) manager is responsible for managing employees and resources to achieve specific functional or organizational goals. He is responsible for

ensuring the effectiveness of employees, which is a prerequisite for the effectiveness of the organization as a whole. That's why evaluation of the effectiveness of training linear managers can be carried out indirectly through a change in the productivity of the unit which this manager is leading by. As a criterion we can also use the ROI. A middle-level manager, in turn, is directly responsible for the work of line managers and, through them, for the junior staff performance and productivity of line units. The results of training middle-level managers can ultimately be evaluated by the financial results of the organization.

However, it is advisable to use such hard estimates for a period that is significantly distant from the time of the training. Only then we can expect a significant economic effect for the organization as a whole. It should be emphasized, that for the middle-level managers this period is longer than for the line managers. In order to adjust the training itself and post training support program, we must be able to evaluate them in real time. For this purpose, we to carry out a soft assessment immediately after the end of the training and in the process of implementing the post-training support program [4]. We made soft evaluation of the change in the human potential as a result of the training, and the level of its capitalization using the integral quality indicator. The construction of this indicator is carried out according to the following algorithm.

The preliminary stage provides for such steps. Firstly, before starting the training, it is necessary to determine the tasks that must be solved and to form key performance indicators (KPI), which are particular indicators F_i ($i = \overline{1, n}$) (quantitative or qualitative) of the effectiveness of their achievement. Secondly, using the method of analysis of hierarchies, these particular indicators are ranked and weight w_i ($i = \overline{1, n}$) is assigned to each of them in accordance with its significance. We get the integral indicator:

$$I = \sum_{i=1}^n w_i \cdot F_i, \quad \text{wherein} \quad \sum_{i=1}^n w_i = 1, \quad w_i > 0.$$

Evaluation itself also involves several steps. All KPIs measured before and after the training are assigned the values in the ‘very weakly-weakly-medium-very-very very strong’ scale. The values of each of these qualitative variables are associated with a quantitative indicator that varies within [0; 1] and characterizes the degree of achievement of the goal. In accordance with the accepted criteria, the results of the training are evaluated and a vector of empirical indicators is formed: $Y = \{y_1, y_2, y_3, \dots, y_n\}$.

The next step is the normalization of these indicators, taking into account the basic values of the indicators (before the training) and the values of the KPI that must be achieved as a result of the training (model values). If, as a result of the training, this particular indicator should reach the greatest possible value, then this formula was used to normalize:

$$F_i = \frac{y_i^{\max} - y_i}{y_i^{\max} - y_i^{\min}}, \quad i = \overline{1, n},$$

where y_i^{\max} and y_i^{\min} are the maximum and minimum values of this particular indicator. And if this specific indicator should be as small as possible, then this formula was used to normalize it:

$$F_i = \frac{y_i - y_i^{\min}}{y_i^{\max} - y_i^{\min}}, \quad i = \overline{1, n}.$$

In this case, it is advisable to consider three scenarios: optimistic, pessimistic and the most likely (realistic). And choose the model values y_i^{\max} and y_i^{\min} of indicators in accordance with these scenarios.

The next step after normalizing particular performance indicators is their convolution and the construction of an integral indicator. The empirical value of the integral indicator is compared with its reference value, which allows us to assess the degree of achievement of the learning goal in real time.

To implement this assessment methodology, a special software product was developed. The initial data used for the work of this program are KPIs, the model values of which are formed before the training, the values of these indicators, measured before the training, and the values that were achieved as a result of the training. The program is available for customization. It allows you to change the scale that is used to assess the degree of capitalization of human potential, in accordance with the selected scenario.

It should be noted that this methodology does not evaluate human capital itself, but only its increment as a result of training. Since we consider the difference between the key performance indicators ‘after’ and ‘before’ the training, the systematic error does not affect the result. The proposed method for estimating the efficiency of human potential capitalization is characterized by the fact that two systems of key performance indicators are used in the formation of an integral indicator. One of them combines the quantitative indicators of the work of the unit, which is led by the manager, and the second of them combines the qualitative indicators of the personal contribution of the manager to the work of the unit.

Literature:

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