

# Methodological Approach to Improving the Efficiency of Mining Enterprises Personnel on the Basis of Quality Improving and Development of Labor Processes

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**Abstract**—Growing competition creates the need to improve the efficiency of mining personnel. The effective time of Russian workers is 3-5 times lower than at advanced foreign mining enterprises. One of the main reasons for the low labor efficiency of employees of Russian enterprises is the low level of organization and management of labor processes. In this regard, the question of improving the methodological tools for assessing and improving the quality of labor processes becomes urgent. To solve the problems of the study, the methods of system, structural and functional analysis, the process approach to the description of the labor process, the author's methodological approach to assessing the quality of the labor process, the methods of constructing a step-by-step algorithm from top to bottom were used. As a result, the author developed a methodological approach to assessing the quality of the labor process using the process approach model, proposed an algorithm to improve the efficiency of personnel based on a balanced improvement in the quality of the labor process. The results can be applied both at mining enterprises and at enterprises of other sectors of the national economy.

**Keywords**—efficiency of personnel work, quality of labor process; increase of labor efficiency; improvement of quality and development of labor process.

## I. INTRODUCTION

The purpose of the work is the development of methodological provisions to improve the efficiency of personnel of mining enterprises on the basis of improving the quality and development of labor processes.

The market economy creates tough conditions of competition for modern Russian enterprises. In these conditions, in order to ensure survival in the market, the owners and management of enterprises are forced to develop and implement development strategies, improve the efficiency of the units and the entire enterprise. One of the directions of this activity is to improve the efficiency of personnel. To improve the efficiency the personnel management of Russian mining enterprises develops advanced production technologies, buys new machinery, equipment, changes the management system and organization of production. However, the improvement of one or more elements of the production process does not lead to an increase in the efficiency of the enterprise as a whole. Despite the ongoing changes, the personnel performance level in the mining industry in Russia remains significantly lower than in economically developed countries. The effective working time of Russian miners is

200-300 hours per year, while at advanced foreign enterprises 1300-1500 hours. The level of wages per 1 ton of coal production in Russia is 5-10 dollars, in economically developed countries 2-4 dollars [1]. Such a significant lag in the efficiency of the personnel of Russian and foreign developed mining enterprises is explained by the lag in technique and technology on the one hand, as well as the insufficiently high level of management and organization of labor processes and personnel training.

As the experience of competitive mining enterprises shows, the main reserves for improving the efficiency of activities that the enterprise can use are in the production and labor processes [2-3].

The development of advanced technologies and the purchase of new expensive equipment without adequate provision of advanced planning, organization, stimulation, labor control, personnel training, preparation of the necessary material and technical resources do not allow to achieve the expected results of the efficiency of personnel and enterprise activities, reduce the efficiency of investments. It is necessary to comprehensively improve the company's activities and labor processes. In this regard, the question of improving the methodological tools for assessing and improving the quality of labor processes becomes urgent.

To date, in the scientific literature, scientists have interpreted the concept of "quality of the labor process" in different ways. Some scientists consider "the quality of the labor process as the level of correspondence between the costs of living and embodied labor in the production process, the optimality of its organization, the degree of complexity, the level of intensity and the economic significance of labor" [4].

Others consider the quality of the labor process as an element of the system of labor concepts - the quality of labor is characterized by complexity, intensity and productivity of labor [5-9].

In the work Kuletsky V.N. et al. "the concept of the labor process is considered as a set of its main elements: personnel, equipment, working processes and conditions of their implementation, as well as the quality of the labor process as the degree of compliance of the condition of its elements with the target parameters of safety and production efficiency" [10].

## II. METHODOLOGY

The study considers the structure and quality of the labor process in the theory of the process approach. The process approach is a theory of management, which is firmly established in management in the 70-90-s of the last century. According to this theory, all the functions that are performed in the company are represented as a system of interrelated processes. According to the theory of the process approach, for effective management of the company, it is necessary to manage the main and auxiliary processes that it must perform for successful functioning and development [11]. Consider the structure of the labor process from the point of view of the process approach (see Fig. 1).

The efficiency of labor ( $\Theta T$ ) in the performance of the labor process is determined by the useful effect of labor ( $\Pi \Theta T$ ) per unit of working time (PB):

$$\Theta T = \Pi \Theta T / PB = \text{Прод}T \cdot YK / PB \quad (1)$$

(Ч) (the value of the useful effect  $\Pi \Theta T$  per unit of working time PB - 1 hour) [12]

The efficiency of labor ( $\Theta T$ ) in the performance of the labor process is determined by the useful effect of labor ( $\Pi \Theta T$ ) per unit of working time (PB).

The product of labor (the amount of benefits)

$$\text{Прод}T = \Pi CT \times \text{Кол}T \quad [12] \quad (2)$$

where  $\Pi CT$  – the labor productive force;  $\text{Кол}T$  - the labor quantity.

$$\Theta T_{\text{норм.}} = \text{Прод}T_{\text{норм.}} \cdot YK_{\text{норм.}} / PB = \Pi T_{\text{норм.}} \cdot YK_{\text{норм.}} \quad [12] \quad (3)$$

where  $\text{Прод}T_{\text{норм.}} / PB = \Pi T_{\text{норм.}}$  - standard productivity of the worker defined by the used technology, equipment (machines, tool, information resources), management and organization of labor process, requirements to qualification of the worker;  $YK_{\text{норм.}}$  - regulatory requirements for the quality parameters of the results of the labor process. Determined by the technology used and the requirements for the quality of labor results.

In practical activity of the enterprise normative efficiency of labor of the employee  $\Theta T_{\text{норм.}}$  is recommended to define in the following sequence:

- Selection, regulation of the labor process technology.
- Determination of regulatory requirements for equipment (machines, tools, information resources, etc.) required for the implementation of the labor process for the selected technology.
- Definition of requirements to management and organization of labor process.
- Definition of requirements to qualification of workers.
- Definition of normative requirements to the level of quality of work results  $YK_{\text{норм.}}$ .
- Limitation of labor efficiency during performance of the labor process  $\Theta T_{\text{норм.}}$ .

The choice of a method of limitation of efficiency of labor process is defined by features of concrete labor process. As a rule, it is advisable to carry out limitation of labor productivity using the method of time-keeping observations.

Limitation of the quality level of labor results is determined by the choice of the most significant parameters in terms of the value of labor results for the enterprise.

To determine the reserves for improving labor efficiency with the existing equipment and technology, we propose to use the indicator of target labor efficiency  $\Theta T_{\text{цел.}}$ , which is calculated as the ratio of the actual labor efficiency  $\Theta T_{\text{факт.}}$  of the personnel to the normative labor efficiency  $\Theta T_{\text{норм.}}$ .

## III. RESULTS AND DISCUSSION

If the labor efficiency of personnel  $\Theta T$  is taken as an indicator of the productivity of the labor process, then the organization and management of the labor process, the used equipment, technology, resources, personnel with a certain motivation and qualification are quality parameters and factors of the labor process efficiency.

Obviously, the effectiveness of the labor process will be determined by the level of development of the elements of the quality of the labor process: the level of organization and management, technology, equipment used, provision of necessary resources, qualification and motivation of personnel engaged in the labor process.

It is logical to assume that to ensure the necessary efficiency of the labor process, the state of each of its elements must correspond to a certain level of development necessary and sufficient to ensure the necessary efficiency of labor. If the management of the enterprise decided to introduce a new highly productive equipment to improve the efficiency of the labor process, then to ensure its productive work, it is necessary to bring the other elements of the labor process into compliance with the new requirements: to organize labor process, to regulate technology of use of the new equipment, to provide temporarily process with necessary resources, to train and provide motivation of the personnel sufficient for implementation of labor process with new higher indicators of efficiency.

In the practical activities of many Russian enterprises, there are regular situations when management masters advanced production technologies, buys new equipment, changes the management system and organization of production to improve the efficiency of personnel. However, the improvement of one or more elements of the production process does not lead to an increase in the efficiency of the enterprise as a whole. To obtain a significant increase in labor efficiency, a balanced change in each element of the quality of the labor process is necessary: organization and management, equipment, technology, resources, personnel.

This task determines the need to develop a methodological approach to assessing the quality of the labor process, which managers and specialists of mining enterprises could use in their daily practical activities to assess and improve the quality of labor processes.

With the help of the process approach and identification of elements of the labor process, we have developed the author's methodological approach to assessing the quality of the labor process, which managers and specialists will be able to apply in their practical activities in a particular enterprise.

The methodological approach to the assessment of the quality of the labor process is developed based on the following provisions:

- Assessment of the quality of the labor process is carried out in two aspects: quality of the labor process regulation, quality of the labor process.
- Assessment of the quality of the labor process is carried out by the main elements of the labor process: regulation of labor process, organization and management of labor process, technology of labor process, means of production of labor process, provision of resources, personnel evaluation.
- As a criterion of difference of quality levels of labor process it is offered to use degree of influence of quality level of labor process on an indicator of efficiency of work of the personnel.
- Assessment of the quality and efficiency of labor in the implementation of the labor process should be carried out considering the views of managers and performers (participants) of the labor process.

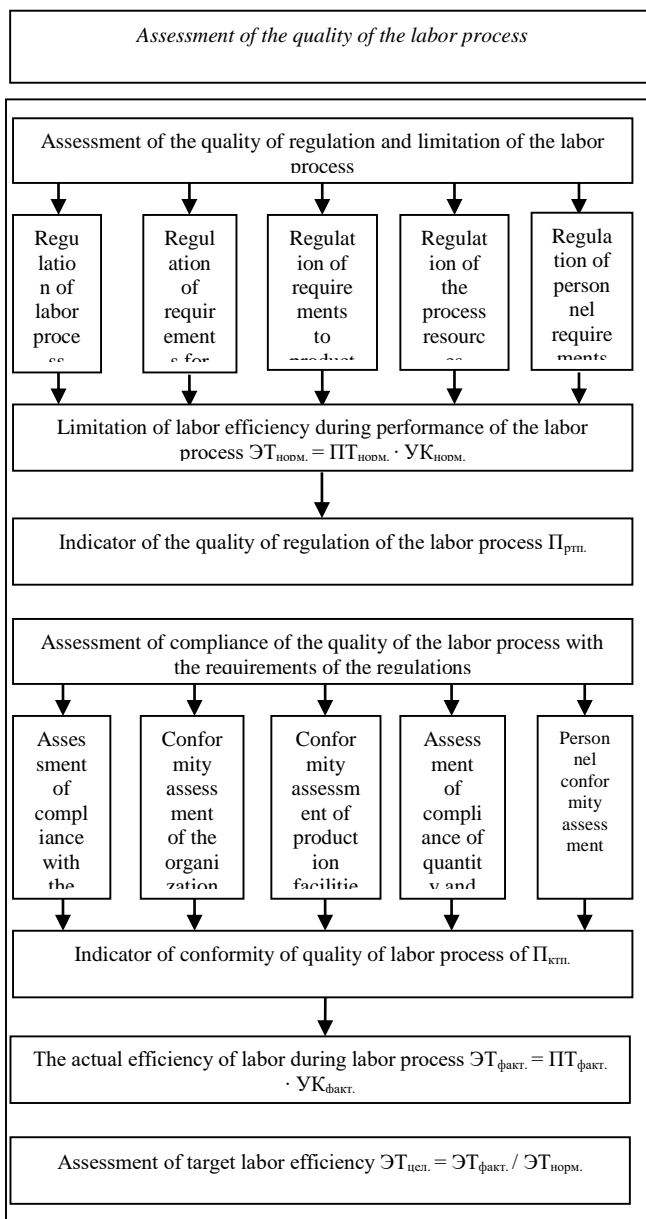


Fig. 1. Scheme of methodological approach to the assessment of the quality of labor process

The level of development of the labor process in terms of ensuring the necessary efficiency of labor is proposed to determine the following indicator:

$$\Pi_{\text{разв.тп.}} = \Theta T_{\text{факт.}} / \Theta T_{\text{треб.}} \quad (4)$$

where  $\Theta T_{\text{факт.}}$  - actual performance indicators of the employee in the performance of the labor process;  $\Theta T_{\text{треб.}}$  - required indicators of labor efficiency necessary to ensure the efficiency and competitiveness of the enterprise.

The required indicators of labor efficiency necessary to ensure efficiency and competitiveness are determined by methods of comparative analysis with similar indicators of advanced enterprises of the industry or by limitation of labor efficiency.

The balance of the development of labor process elements relative to the indicator of development is determined by the balance coefficient:

$$K_{\text{сб.}} = \Pi_{\text{разв.э}} / \Pi_{\text{разв.тп.}} \quad (5)$$

$\Pi_{\text{разв.э}}$  - indicator of the development of the element of the labor process (technologies, management and organization, machinery and equipment, personnel; resource support).

Let's illustrate calculation of indicators of development of labor process on an example.

The actual performance of the employee in the performance of the labor process amounted to 2% during the working day  $\Theta T_{\text{факт.}} = 2$  units/day.

The required indicators of labor efficiency necessary to ensure the efficiency and competitiveness of the enterprise are 4 units/day.

Consider the correspondence of the elements of the labor process to the required level of labor efficiency.

Indicator of technology development:

$$\Pi_{\text{разв.тех.}} = \Theta T_{\text{тех.факт.}} / \Theta T_{\text{треб.}} \quad (6)$$

$\Theta T_{\text{тех.факт.}}$  - labor efficiency, which is able to provide actually used technology;  $\Theta T_{\text{треб.}}$  - required indicators of labor efficiency necessary to ensure the efficiency and competitiveness of the enterprise.

Labor efficiency, which is able to provide actually used technology is 4 parts per day. The required labor efficiency is 4 parts per day.

$$\Pi_{\text{разв.тех.}} = 4/4 = 1 \text{ unit}$$

Thus, the technology used allows to achieve the required labor efficiency.

An indicator of management and organization development:

$$\Pi_{\text{упр. и орг.}} = \Theta T_{\text{упр. факт.}} / \Theta T_{\text{треб.}} \quad (7)$$

$\Theta T_{\text{упр. факт.}}$  - labor efficiency, which is able to provide the actual operating system of labor management;  $\Theta T_{\text{треб.}}$  - required indicators of labor efficiency necessary to ensure the efficiency and competitiveness of the enterprise.

$$\Pi_{\text{упр. и орг.}} = 4/4 = 1 \text{ unit}$$

Indicator of machinery and equipment development:

$$\Pi_{\text{техн.}} = 2/4 = 0,5 \text{ unit}$$

Personnel development indicator:

$$\Pi_{\text{непс.}} = 2/4 = 0,5 \text{ unit}$$

Thus, even though the technology adopted at the enterprise allows achieving the necessary indicators of labor efficiency, the level of management and organization, the willingness of personnel to work with the technology used, the development of machinery and equipment do not allow achieving the required indicators of labor efficiency.

To ensure a balanced development of labor processes of the enterprise, the author has developed a step-by-step algorithm for improving the efficiency of personnel based on improving the quality of labor processes, which can be used by managers and specialists in their practical activities to improve the efficiency of labor processes (see Fig. 2).

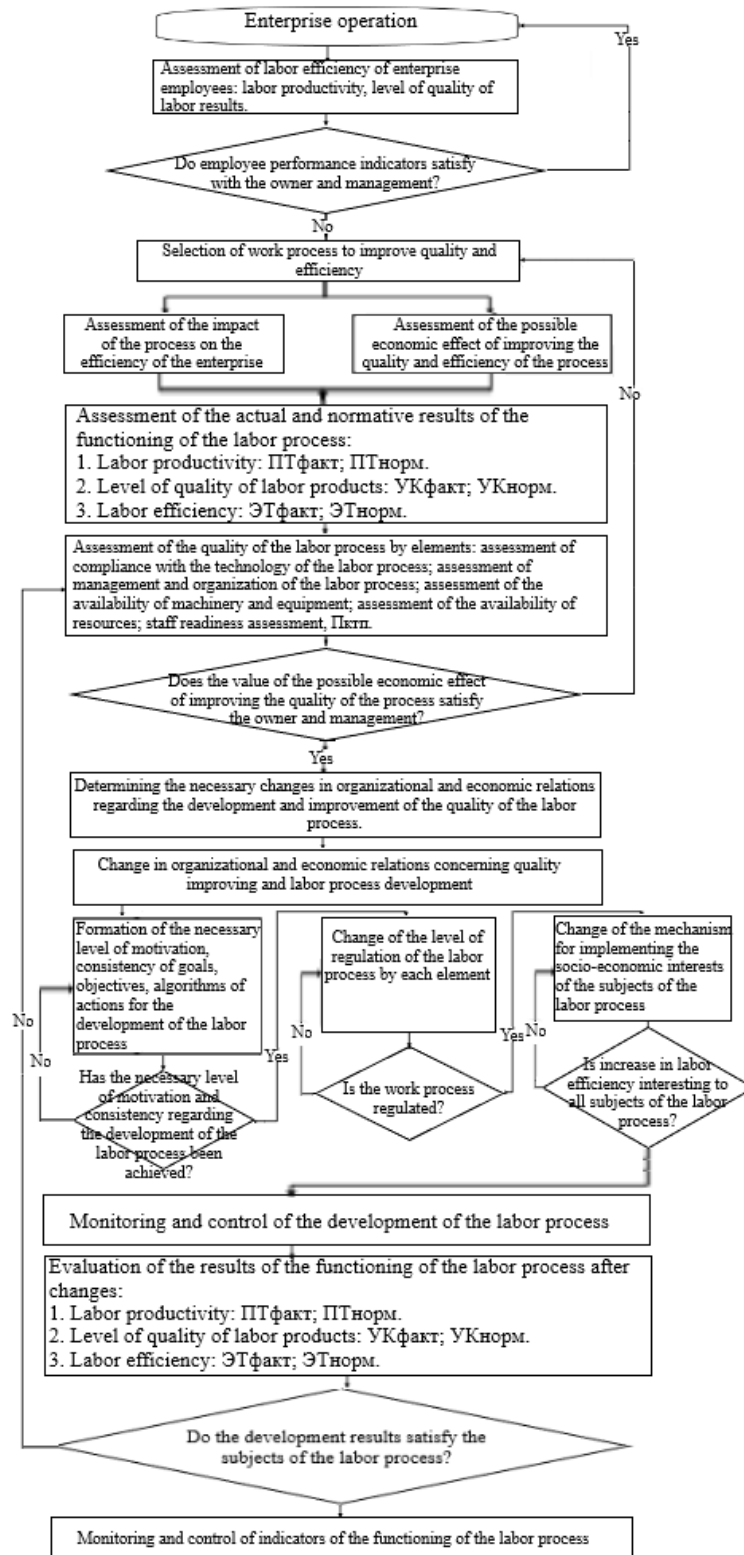


Fig. 2. Algorithm for improving labor efficiency based on improving the quality of labor processes

#### IV. CONCLUSION

To ensure effective interaction of the personnel of the enterprise in the process of increase of labor processes efficiency it is necessary for management to provide coordination of opinions, interests of employees on the main subjects:

- consistency of ideas about the goals of improving the quality of labor processes;
- consistency of interests, goals of employees, the level of motivation of management and staff to improve the efficiency of the labor process;
- consistency of opinions of the head and employees about the tasks, algorithms, necessary resources, deadlines.

The proposed methodological approach to the assessment and algorithm for improving the quality of labor processes can be used by managers and specialists of mining enterprises, as well as enterprises of other sectors of the economy to improve the efficiency of personnel.

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