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IMPROVING STAFF STIMULATION SYSTEMS: CAUSAL-CONSEQUENCE APPROACH

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ABSTRACT

"Motivation" and "stimulation" are two close concepts, however, if the concept "stimulus" is used mainly to denote material or moral encouragement, then the "motive" is used more broadly and covers all aspects of employee behavior. In the activities of an enterprise, stimulation plays a huge role, since it is aimed at motivating an employee to effective and high-quality work, which not only covers the employer's costs for organizing the production process, wages, but also allows for a certain profit. The article describes two aspects of staff incentives: staff training, in particular, the effectiveness of investment in staff training; and the second aspect – mathematical models of work processes, in particular, a measure of human resource assessment.

Key words: staff, stimulation, motivation, staff training, human resource assessment, causal-consequence approach.

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1. INTRODUCTION

The main condition for effective enterprise management is the use of available resources to achieve optimal results. Today, the staff of the enterprise is considered as one of the most important resources, therefore the process of formation of an effective system of use of production personnel deserves special attention. One of the main directions in ensuring the activation of this process is to improve the current system of motivation. Since there is a direct relationship between the efficiency of staff and its motivation, management of this dependence is of strategic importance to the enterprise. In the general sense, the motive acts as a driving force, an incentive to action. As a management tool, motivation is a process of encouraging employees to carry out effective activities for the realization of tasks and achievement of the goal of the enterprise. There are many systems of personnel motivation, but only specific elements of these systems that require improvement are used by enterprises. Also, labor motivation should be considered as a set of external and external driving forces, which motivate employees to act, set the boundaries and forms of their activities, give this activity orientation to achieve the goals and stimulate it [1-3].

It is known that the most dynamic element of the system of motivation is the material motivation. Taking into account the great influence of this element of motivation on the productivity of the personnel of the personnel, the greatest attention is given to its improvement in this article.

In the previous works of the authors [4], much attention was paid to staff stimulation, however, not all aspects of this process were covered in full.

The results of the analysis of scientific research of domestic and foreign scientists [5-10] correspond to the solution of theoretical and applied aspects of the problems of personnel motivation. The scientific and practical results of writing this article together solve an important scientific and practical task - improving the system of personnel motivation.
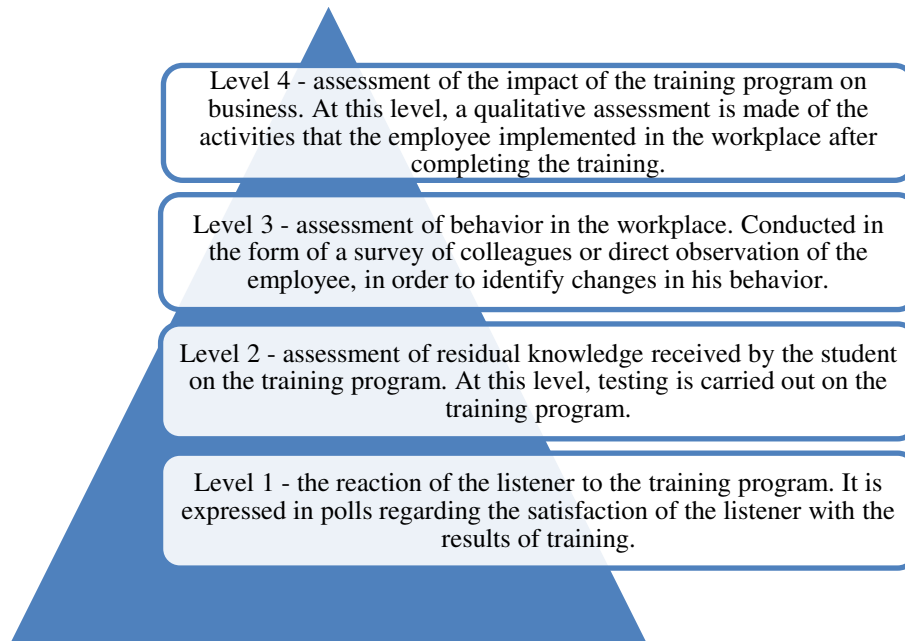
2. MATHEMATICAL MODEL OF ESTIMATION OF THE EFFICIENCY OF INVESTMENTS IN STAFF TRAINING

Enterprise personnel can be classified according to various features. To form an effective system of personnel management, it is classified according to the participation of employees in the main activities of the enterprise. On this basis, the staff is divided into:

- Production personnel are employees engaged directly in the production process and servicing them (including in research departments and laboratories, in warehouses, in security, in the management of the enterprise);

- Non-productive personnel are employees of the non-productive sphere, whose objects are kept on the balance sheet of the enterprise, but are not related to its main activities (housing and communal services, children's and sanatorium organizations that belong to this enterprise).

To effectively use the potential of the company's personnel as one of the priority tasks of management, today there is the development of an effective system of motivation, which increases labor potential, and as a result of its growth, productivity increases, product quality and competitiveness of the enterprise as a whole. But one should not forget that motivation must be personalized. What can inspire one worker to work with greater productivity, in another can cause the opposite effect and lead to a decrease in creative potential.

An integral part of the learning process is the evaluation of the effect of learning. Most companies use the model proposed in 1959 by Donald Kirkpatrick [5]. The Kirkpatrick model includes four levels of assessment of learning outcomes (Fig. 1).

Level 4 - assessment of the impact of the training program on business. At this level, a qualitative assessment is made of the activities that the employee implemented in the workplace after completing the training.

Level 3 - assessment of behavior in the workplace. Conducted in the form of a survey of colleagues or direct observation of the employee, in order to identify changes in his behavior.

Level 2 - assessment of residual knowledge received by the student on the training program. At this level, testing is carried out on the training program.

Level 1 - the reaction of the listener to the training program. It is expressed in polls regarding the satisfaction of the listener with the results of training.

Figure 1 Model estimates of the effect of training by Donald Kirkpatrick

Using the Kirkpatrick model to assess the effectiveness of learning, of course, helps to identify a positive learning outcome, but at the same time forms a stereotype of thinking associated with the perception of learning as a costly budget item.

There is still no unified theory of evaluating the effectiveness of investment in personnel.

There is such a model of the process of personnel training in the framework of exactly this (functional) approach, that is, a function has been obtained that describes the response of the modeled object (personnel) to an external (training) effect [6; 7]:

$$b(t) = b_{max} - (b_{max} - b_{min}) * e^{-r*t}$$

where   t – training time;

b(t) – current labor productivity of the group of personnel;

b_{max} – maximum value of labor productivity of the group of personnel;

b_{min} – minimum value of labor productivity of the group of personnel;

r – "speed" of training of the group of personnel ("indicator of training").

Such a model is quite general, since it makes it possible to build a model for evaluating the effectiveness of investment in staff training, without being interested in the structure of the learning process, which obviously depends on the type of training program and other non-economic characteristics. To build this model, it is sufficient to determine the growth function of the investment in staff training (C_L) depending on the time of such training and the cost reduction function ($C\omega$) depending on the reduction in the group of personnel's work time ω.

Suppose that the cost of implementing some training program grows linearly with respect to the time of its operation TL, then

$$C_L = k_1 * T_L + C$$

where k_1 – is the growth rate of costs with increasing learning time TL;

C – the cost of organizing the learning process, not dependent on TL.

The labor productivity of the personnel group working on the fulfillment of the scope of work ω, provided that the fulfillment of this volume is carried out periodically, and not once, can be defined as

$$b = \frac{\omega}{T_\omega}$$

where ω – the volume of work performed,

C – execution time amount of work ω

Then, taking into account the considered equation of the personnel training process model, the training time TL required to achieve a given level of labor productivity by a group of personnel is

$$T_L = -\frac{1}{r} * ln\frac{b_{max} - b(t)}{b_{max} - b_{min}} = -\frac{1}{r} * ln\frac{\frac{1}{T_{min}} - \frac{1}{T_\omega}}{\frac{1}{T_{min}} - \frac{1}{T_{max}}} = -\frac{1}{r} * ln\frac{1 - \frac{T_{min}}{T_\omega}}{1 - \frac{T_{min}}{T_{max}}}$$

where T_{min} – the minimum execution time of the work ω (corresponds to the maximum level of labor productivity b_{max});

T_{max} – the maximum execution time of the work ω (corresponds to the minimum level of labor productivity b_{min});

To assess the effectiveness of the training process should be approached from the standpoint of financial management and quantify the results of such investments. The solution to this problem was proposed in 1997 by Jack Phillips [8], who suggested adding four levels of the Kirkpatrick model with another level, namely, to use the well-known financial indicator, the return on invested capital (ROI), to assess the personnel training process:

$$ROI = \frac{Financial\ result\ from\ training}{Training\ costs}$$

With the outward simplicity of the formula, its calculation is hampered by the need to take into account all the costs of training, as well as to clearly separate the effect from training, from effects that could arise as a result of the influence of other factors. In 2003, Jeff Moonen proposed simplified methods for calculating the return on investment SROI (Simplified Return-on-Investment) [9]. In particular, the calculation using non-financial indicators, the calculation of SROI on qualitative data and other methods.

3. CAUSAL-CONSEQUENCE RELATIONS IN THE PROMOTION OF LABOR IN TERMS OF "NET PROFIT GROWTH"

In the literature [10], the idea is repeatedly emphasized that the need to stimulate (that is, to take into account the amount of labor and its remuneration) arises only in connection with the alienation of people from the goals and results of the assigned work, i.e. when the work is done by "outsiders". Stimulation is an additional payment of society (and enterprises) for the opportunity to achieve the goals of one group of people at the expense of the labor of another group of people (through the exploitation of labor). In the modern world, public opinion, the

mentality of people, trade unions – everything is aimed at low labor standards and high pay. The interests of employers are opposite.

The measure of a human resource (HR) is advisable to call the employee's labor potential and define it for a particular profession as its ability to perform a certain amount of work per working day. The unit of workload is proposed to adopt the standard labor hour (SLH) – the amount of work that an employee with normal intensity, who has an average market qualification of this professional group, will perform per hour of labor.

This definition allows us to obtain a formula for calculating the labor potential of an employee:

$$HR = k_q * k_i \bullet (Ts + Tad),$$

where T_s – the standard duration of a working day (T_s = 8 hours);

T_{ad} – additional working hours;

k_i – the coefficient of labor intensity (k_i = 1 standard intensity);

k_q – the coefficient of qualification.

We give a conditional example. Suppose, in addition to 8 hours, the employee works 5 hours; the intensity factor of his labor is 1.5 (k_i = 1.5); the coefficient of qualification is 0.5 (k_q = 0.5). Then this employee has a HR equal 9.75 SLH.

It should be borne in mind that the level of the human resource of a given employee determines only his ability to work. The actual amount of work done may be differ significantly from the limit and depends on the level of its payment, which is strictly determined with the actual amount of work performed. The price of a human resource is equal to the market value of the SLH when performing work with a normal labor intensity.

Consider the dependence of the volume of sales of labor by the employee on its price. The employer negotiates with the employee about the amount of human resource purchased and its price with contractual terms. In practice, labor is allocated in the form of a salary for a part of a human resource. Award for the performance of work – above the duties on the salary. It should be borne in mind that staff at different prices can "sell" working time for the basic salary and working time for working for a bonus.

Therefore, it is necessary to quantify the sales of a human resource from its price, provided that the "field of activity" is unlimited. An example of the dependence studied is shown in Figure 2. To build a graph in practice, you can set its characteristic points s_{min} – the minimum hourly rate that begins to interest the worker.
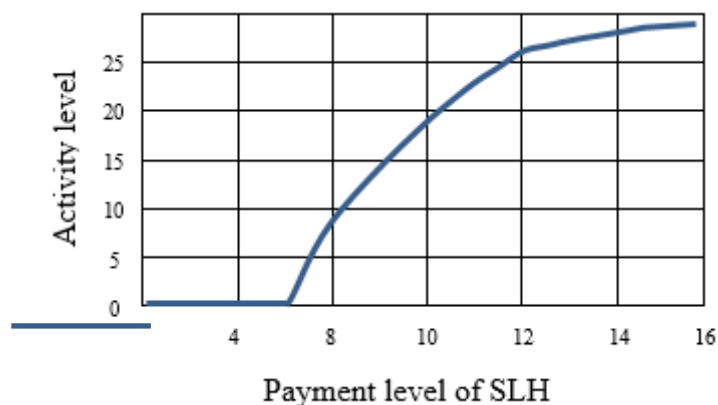

Figure 2 The dependence of the activity of the staff of the wage

We consider the integral indicator of net profit (NP) to be the main indicator of the activity of the company's executive directorate, which is calculated through a set of indicators (profit growth during the period of the premium system, expansion of market share, development of new products, etc.). In developing specific provisions for stimulating managers, these indicators need to be further specified.

Denote the NP_{base} – the level of net profit of the enterprise in the base period. Then, in the period for which the level of additional remuneration is determined, its non-zero value will be obtained only if the condition of profit growth is higher than the standard level, i.e. $NP \geq NP_{base}$.

The magnitude of the increase in net profit (NPI), from which the remuneration is calculated, is defined as the difference $NIP = NP - NP_{base}$.

It should be noted that in practice, often the level of the NPI is taken to be zero, and then the calculated rate of profit growth is equal to the amount of profit received in the stimulation period under consideration, i.e. equal to the magnitude of the NP. The starting position for the search for the desired dependencies is the hypothesis that the level of net profit depends on the additional working hours of managers and (or) their high intensity of labor. As was shown above, this labor intensity depends on the level of expected remuneration, which is taken as part of the NPI. There is a chain of causal relationships, which has the form shown in Figure 3.
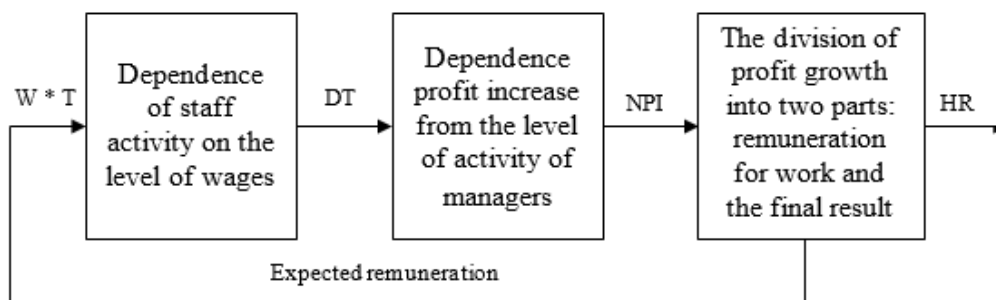
Figure 3 The scheme of causal-consequence relations in the promotion of labor in terms of "net profit growth"

The scheme in Figure 3 shows that for a quantitative description of the incentive process, it is necessary to determine the following relationships:

1. The dependence of the intensity of labor d on the level of hourly reward W, the expected group of managers. The mathematical expression of this dependence is as follows: $d = f(W)$ (1)

2. The dependence of the estimated profit growth from the intensity of labor managers. Mathematically, this dependence will be written as:

3. $NPI = \varphi (d, T, FCP)$ (2)

where FCP is the factors and conditions of production, i.e. prices, conditions of product sales, availability of raw materials and supplies, equipment condition, etc.;

T – the duration of the period of stimulation.

It should be noted that this dependence in the quantitative description of the incentive process occurs in two forms:

– in the form of the calculated dependence used by the board of directors when organizing the labor incentive system;

– in the form of evaluating the dependence of the performers – a group of managers that is stimulated. This second form of dependence will be called the dependence of the expected increase in profits.

1. The amount of remuneration allocated for the remuneration of employees as part of the estimated net profit

$W * T = Pr * NPI$ (3)

where Pr – profit share allocated to reward management employees according to contractual terms.

Then the value of the final result of the enterprise has the following expression: $FR = (1 - Pr) * NPI$ (4)

It should be mentioned that when calculating the expected remuneration, managers estimate not only the value of the estimated net profit, but also the degree of stability of the standard Pr, which in some cases can be adjusted by the board of directors or the meeting of shareholders in the event of urgent expenses.

The application of the described approach to modeling work processes for a given dependence (1) and linear dependence of profit growth on the level of activity of managers for a particular production system gives the results given in the Table 1.

Table 1 Calculation of the stimulation system parameters (T = 500 hours)

Parameter	Values of remuneration shares Pr					
	0.0	0.05	0.10	0.15	0.20	0.25
Amount of remuneration	0.0	10.0	20.0	30.0	40.0	50.0
Estimated Executive Award	0	0	12.0	26.0	36.0	48.0
Total Award	0	0	5.0	13.0	18.0	24.0
Number of additional working hours	0	0	6.0	9.0	9.2	9.2
Additional Profit	0	0	120.0	180.0	184.0	184.0
Final result	0	0	114.0	153.0	147.2	138.0

Thus, the approach proposed to the calculation of incentive systems allows the selection of the optimal system parameters in the case when the functions "labor intensity – remuneration level" and the dependence of the company's profit on the intensity of labor of managers are set.

4. CONCLUSION

The problems of motivation of employees of enterprises remain at present very relevant, as the results of the activities of enterprises depend on properly developed systems of motivation, especially when introducing innovative technologies and scientific and technical progress into production.

The development and practical application of new motivation systems directly in organizations (enterprises) make it possible to attract more highly qualified specialists who are able to manage both small and large teams, focusing mainly on individual motivation in accordance with the quantity and quality of labor.

The proposed optimization mathematical model allows not only to maximize the income from investments in staff training, but also to evaluate their effectiveness. Also, the mathematical model of the incentive system allows you to select the optimal system parameters, if the dependence of the enterprise's profit on the intensity of the managers' work is set and the function "labor intensity – remuneration level" is set. Considered two aspects of

staff incentives: staff training, in particular, performance assessment in investing in staff training and mathematical models of work processes, in particular a measure of human resource assessment, can significantly improve the motivation of employees in the enterprise.

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