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## FORMATION OF INDICATORS SET THAT CHARACTERIZE THE LEVEL OF STAFF MOTIVATION

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## ФОРМУВАННЯ МНОЖИНИ ПОКАЗНИКІВ, ЩО ХАРАКТЕРИЗУЮТЬ РІВЕНЬ МОТИВАЦІЇ ПЕРСОНАЛУ

**Summary.** The article proves the need to develop mathematical models for managing the process of motivation in domestic enterprises using modern mathematical devices and appropriate software tools for their computer implementation. A single approach will provide comprehensive accurate and dynamic management of the motivation process, a clear understanding of its main elements and assessment of the employees motivational sphere in order to identify opportunities to influence it. The choice and substantiation of the main quantitative and qualitative indicators that determine the motivation level of the enterprise employees on the completeness, effectiveness and minimality criteria.

The dynamics of transient external and internal environments is taken into account. A set of evaluation parameters that characterize the staff motivation level allows increasing the accuracy of the assessment for businesses in different sectors of the economy. It is proved that the use of modern decision-making systems is a prerequisite for the effective operation of a modern enterprise.

**Анотація.** У статті доведено необхідність розроблення математичних моделей управління процесом мотивації на вітчизняних підприємствах з використанням сучасних математичних апаратів та відповідних програмних засобів їх комп'ютерної реалізації. Єдиний підхід дозволить забезпечити комплексне точне та динамічне управління процесом мотивації, однозначне розуміння основних його елементів та оцінювання мотиваційної сфери працівників із метою виявлення можливостей впливу на неї. Здійснено вибір та обґрунтування основних кількісних та якісних показників, що визначають рівень мотивації працівників підприємства за критеріями повноти, дієвості та мінімальності. Враховано динаміку швидкоплинного зовнішнього та внутрішнього середовищ. Складена множина оцінювальних параметрів, що характеризує рівень мотивації персоналу, дозволяє підвищити точність оцінки для суб'єктів господарювання різних галузей економіки. Доведено, що використання сучасних систем прийняття рішень є обов'язковою умовою ефективної діяльності сучасного підприємства.

**Key words:** *staff motivation, quantitative indicators, qualitative indicators, motivational process, staff incentives, completeness criterion, efficiency criterion, minimum criterion.*

**Ключові слова:** *мотивація персоналу, кількісні показники, якісні показники, мотиваційний процес, стимулювання персонал, критерій повноти, критерій дієвості, критерій мінімальності.*

**Topicality.** The problem of work motivation has always been considered as one of the basic components of the personnel management system. At this stage of market economy development, it is especially important because the global and domestic economic crises have affected not only the conditions of employment, but also affected their basic needs and motivation to work, caused serious changes in the labor market, which require turn, changes in the system of managing employee motivation.

Numerous studies conducted to motivate work have significantly developed its theory and practice, but the specifics of this problem in the current environment requires a revision of approaches to motivational process management, stimulating employees methods, researching their needs and motives that change over

time under the influence of many external and internal factors. This makes it expedient to use mathematical models and methods to solve the above problem, which allow to take into account the rapid economic and social processes, to form a reasonable and productive series of measures that increase the efficiency of the motivational mechanism in domestic enterprises.

Among the main disadvantages of existing approaches to motivation management in the enterprise are the following: the lack of clearly formalized methods for assessing the staff motivation level, allowing accurately and with minimal cost to identify the initial solution, taking into account many quantitative and qualitative parameters; limited approaches to the study of the structure of the employees motivational sphere, which is explained by

the insufficient development of a mechanism for identifying the most important dissatisfied motives.

The practical application of existing mathematical models in domestic enterprises is significantly complicated by the lack of a single approach that would provide comprehensive accurate and dynamic management of the motivation process, unambiguous understanding of its basic elements and would assess the employees motivational sphere to identify opportunities to influence it.

Given the complexity of the motivational process, the influence of subjective factors on its implementation and management in the enterprise, dependence on the external crisis environment, the need to take into account a large parameters number of different nature, limited financial resources for its implementation, necessary and relevant development of mathematical models of motivation process management at domestic enterprises with the use of modern mathematical devices and appropriate software tools for their computer implementation.

To understand the management principles of the motivational process in the enterprise, it is necessary to clarify its essence and main stages, which is impossible without defining the concept of motivation.

The essence of motivation must be considered through the main categories that determine the causes of human actions, determine and activate its activities: needs, motives and incentives.

As an independent scientific problem, the concept of needs became especially relevant in the first half of the twentieth century. What most authors have in common is the definition of the characteristic function of motivating a person to activity. And that is why the study of the motivation problem should begin with the consideration of this category.

From a psychological point of view, the need of the individual is the awareness of the absence of certain factors that motivate a person to action. As for labor activity, the need is a state of man that serves as a source of his active activity and is created by the lack of objects necessary for its existence [1].

Need is a feeling of physiological, social or psychological discomfort due to the lack of a certain object, it is the need for what is needed to create and maintain normal living conditions and human functioning. Needing can be interpreted as a state of imbalance, deficit, to eliminate which are aimed at human actions [2].

Some authors [4] do not agree with the definition of need as a deficit, a shortage, explaining that the need may arise due to psychological stimuli that arise spontaneously, without a prior feeling of deficiency, due to the attractiveness of a particular object. That is, it is not just the lack of a certain object, but the desire to have an attractive, necessary, necessary to achieve the goal or to eliminate unpleasant or intensify pleasant feelings.

The most common view is that the need is not the lack of a certain good, but its reflection in the human mind. That is, it is a mental phenomenon of reflecting

the objective need for anything for the body (biological needs) and the individual (social and spiritual needs).

Needs express certain benefits necessary to support the life and development of the human body, social group, society [4]. The missing good is often called the object of need.

Certain values of life are also considered as needs: the goals of human activity, the principles of life or the most important qualities necessary to achieve life goals. However, it should be noted that the location of these values in order of importance does not mean that they are ranked according to need. For example, a person can put earnings in one of the first places, but do not attach importance to the lack of money at some point, because he does not feel the need for them.

Needs express certain benefits necessary to support the life and development of the human body, social group, society [4]. The missing good is often called the object of need.

In the psychological and economic literature there are the following definitions of need [2, 5]:

- focus on certain actions to support life;
- deep unconscious attitudes of man to self-preservation and ensuring their own biological and social integrity;
- the main decisive forces of individual activity in interaction with the outside world;
- the internal program of the individual life, which reflects, on the one hand, the dependence on the conditions of existence, and on the other - the need to implement this program in order to exist.

Thus, it will be rational to interpret the need as a psycho physiological state of man, which is formed due to the influence of external and internal environments and acquires for it (due to necessity, attractiveness) personal significance. The emergence of a need is a mechanism that causes a person to be active in finding and achieving a goal that can meet this need.

People tend to repeat the behavior that they associate with the satisfaction of the need, and avoid that which is associated with insufficient satisfaction. This fact is called the law of result.

Because needs make people want to meet them, managers must create situations that allow employees to feel that they can meet their needs through a certain type of behavior that leads to the goals of the organization.

Needs are manifested in the motives that motivate a person to activity and become a form of their manifestation. Motive - a conscious inner motivation of a person to a certain behavior, activity, which is aimed at meeting its needs.

The motive is also defined as:

- a set of external and internal conditions that cause human activity and determine its direction;
- conscious reasons for choosing the actions and deeds of the person;
- the motivating causes of human behavior and actions that arise under the influence of its needs, is an image of the desired good, which satisfies the needs, provided that certain actions are performed.

Motives arise, develop and are formed on the needs basis, but they are relatively independent, because needs do not accurately determine the set of motives, their strength and stability.

With the same need, different people may have different motives. If needs constitute the essence, the mechanism of all types of human activity, then motives are concrete manifestations of this essence.

The need becomes a motive after the embodiment in a particular subject that can satisfy it.

Although the motive expresses a willingness to act, encourages it, it may not grow into action. It is possible to increase the intensity of certain motives in human activity due to external stimuli - stimuli.

Incentives are goods (objects, values, opportunities, etc.) that can meet a person's needs when performing certain actions. A good becomes a stimulus to labor if it forms the motive of labor, which in turn is the desire to obtain it.

An incentive should be understood as external motivations that have a targeted focus. Motive is also an incentive to act, but it can be based on both incentives (reward, promotion, etc.) and personal reasons (sense of duty, responsibility, fear, etc.).

It should be emphasized that only a conscious, perceived stimulus becomes a motive. A. Kolot explains it this way: "for example, for a bonus (incentive) to become a motive for the behavior and activities of a particular employee, it is necessary for him to be aware of it as a fair reward for work. Then the effort to earn the award will increase efficiency. However, for some employees who do not hope to receive the award (low professional training, indiscipline, etc.), this possible reward is not transformed into a motive, remaining at the level of potential incentive "[6].

The incentive encourages the employee to a certain style and nature of work behavior. Strong incentives, as a rule, contribute to the formation of a stable motivation for conscious initiative, creative activity. Weak stimuli, on the other hand, can weaken internal motives.

Motive is a finally formed type of decisions, the final product of motivation, obtained on the basis of certain information about needs, incentives, their compliance with each other, which determine the purposeful nature of action.

Hence, motivation can be defined as a dynamic process of motive formation. However, motivation is also seen as a means or mechanism of realization of already existing motives. Thus, neither in understanding the essence of motivation, its role in the regulation of behavior, nor in understanding the relationship between motivation and motive, there is no unity of views.

One of the options for organizing the staff work, which contributes to their motivation, is to provide a flexible work schedule. Numerical studies and observations show that with sufficient skills and meaningful work, self-regulation of working time increases productivity. At the same time, the problems

of not going to work due to illness, family or other unforeseen circumstances become secondary.

Psychological methods include the formation of a favorable psychological climate in the team, communication between employees of different departments of the enterprise, mutual trust between employees and management, creating favorable conditions for recreation and health of employees.

One of the psychological methods of motivation is staff evaluation.

Personnel evaluation is a process of determining the employees effectiveness in the process of achieving the organization goals, which allows you to obtain information for management decisions.

The model of personnel evaluation is based on the principle of combining external and internal factors influencing employee motivation and enterprise activity.

According to the sustainability of the impact, there are incentives for long-term impact, which are a priority for several years, and short-term impact, which operate for a certain period (up to one year) until the existing need is met.

According to the method of influencing employees, incentives are divided into positive ones, which encourage a person to act, and negative or coercive ones: remarks, reprimands, deprivation of bonuses, etc.

Under the condition of stimulation, there are general and targeted incentives.

General applies to all employees, for example, it may be rewards in connection with the anniversaries of employees, public holidays.

At the target form of stimulation development of special provisions is necessary. It is necessary to clearly record the results of employees specific activities, the achievement of which is a condition of incentives.

At the time of the stimulation is direct, current and promising.

Direct is most effective due to the small time interval between performance and reward. Current incentives are applied based on the results of a certain period (quarter, year). They give the employee confidence in receiving a reward for the results of this period, so at the end of the period a person will work most effectively to achieve results.

Long-term incentives focus on long-term motivation of employees and contribute to the growth of their activity, but a significant gap in time between performance and reward is a disadvantage of this form of incentive.

The formation of a system of staff incentives should be based on the following principles:

1. Availability. Each incentive must be accessible to all employees, and the conditions of incentives must be clear and democratic.

2. Complexity. A combination of tangible and intangible, positive and negative, general and targeted, individual and collective incentives depending on the structure of the motivational sphere of employees, the system of approaches to personnel management, experience and traditions of the enterprise.

3. Differentiation, which means an individual approach to different categories and groups of workers.

4. Graduality. It should be borne in mind that material incentives are subject to constant adjustment in the direction of increase, and too much promised remuneration has a negative impact on staff motivation, as it forms, respectively, high expectations of employees.

5. Minimize the time interval between the result of work and remuneration and establish a clear link between them, ie preference should be given to a direct form of incentive.

6. Flexibility. The incentive system needs constant review depending on changes in society and the team. There is a need for flexible adaptation of this system to the preferences of employees and to the changing needs and capabilities of the enterprise.

If we trace the development of attitudes towards staff in the organization, then first it was considered as a consumable, then - as a resource, investment, and today - as a driving force, the potential of the organization. In the process of developing the idea of a person in the organization, the tools of action have changed, but information about the potential of employees is still limited to information about the accounting staff, average age and professional level. Of course, the experience of managers and constant contact with staff gives more information about employee motivation, but not always objective. Motivation and its level remain the intuitive knowledge of managers. Thus, the problem of assessing motivational processes is extremely relevant and requires detailed study.

To solve the problem of assessing the level of staff motivation, it is necessary to determine the optimal set of quantitative and qualitative assessment parameters that will meet the conditions of completeness, effectiveness and minimality [3].

According to the criterion of completeness, it is necessary to form a number of parameters that would fully characterize the level of motivation of staff in the enterprise, i.e. cover the three main components of motivation: the desire to be an employee of the organization, perform their work and try to do it as well [7].

In particular, the first component, according to the author, is manifested in the indicators that characterize the stability, stability of personnel in the enterprise: staff turnover, variability of the workforce, staff sustainability, and job turnover.

Staff turnover is characterized by a staff turnover ratio, which is defined as the ratio of the number of employees fired at will and for violations of labor discipline and the average number of employees.

$$R_{st} = \frac{N_l}{N},$$

where  $R_{st}$  - is the staff turnover ratio;  $N_l$  - the number of employees fired voluntarily and for violation of labor;  $N$  - the average number of employees.

The coefficient of variability (replacement) of labor is defined as the ratio of the retired persons

number, instead of which new employees should be hired, and the average number of staff:

$$C_v = \frac{N_r}{N},$$

where  $C_v$  - is the coefficient of labor variability;  $N_r$  - the number of retirees, instead of which new employees should be hired.

The staff sustainability ratio is calculated as the ratio of the employees number who worked the entire period (year) and the average number of staff.

$$R_{ss} = \frac{N_w}{N},$$

where  $R_{ss}$  - is the frame rate;  $N_w$  - the number of employees who worked the entire period (year).

The number of employees who worked throughout the period is determined as follows:

$$N_w = N_b - N_d + N'_d$$

where  $N_b$  - the number of employees at the beginning of the period;  $N_d$  - dismissed number;  $N'_d$  - released in the reporting year from among those accepted in the same period.

Job turnover ratio is the ratio of all retired employees number and the jobs number where employees were replaced.

The second component of motivation is manifested in such indicators as the coefficient of efficient use of working time, the coefficient of loss of working time and the coefficient of labor discipline.

The utilization rate of working time characterizes the utilization level of the maximum possible working time and is defined as the ratio of effective, actually worked time by one employee or group of employees for a given period of time (taking into account full working conditions) and the maximum possible working time.

$$C_e = \frac{T_a}{F_{max}}$$

де  $C_e$  - coefficient of efficient working time using;  $T_a$  - the actual time worked by one employee or group of employees for a given period of time (taking into account the full provision of working conditions);  $F_{max}$  - the maximum possible working time fund.

The coefficient of loss of working time is determined as follows [1]:

$$T_{tot} = \frac{T_1 + T_2 + T_3}{N}$$

де  $T_{tot}$  - total loss of working time per employee during the reporting period;  $T_1$  - loss of working time caused by employees diseases, man-days;  $T_2$  - loss of working time due to all-day downtime, man-days;  $T_3$  - loss of working time due to administrative leave and absenteeism, man-days.

The effectiveness of the system of employees motivation at the enterprise affects the level of their labor discipline, which is determined by the relationship of mutual responsibility of employees based on conscious and voluntary compliance with current laws and regulations on labor rules of conduct, in accordance with their job functions and responsibilities [2].

The coefficient of labor discipline is an important indicator that characterizes the ratio of the number of violation cases of labor discipline and the average number of employees.

$$C_{LD} = \frac{V_{LD}}{N}$$

where  $C_{LD}$  – coefficient of labor discipline;  $V_{LD}$  – the number of violation labor discipline cases.

The main violations of labor discipline include: lateness; absenteeism (all-day or intra-shift); appearance at work intoxicated; untimely or incomplete performance of their duties.

The third component can be found in such indicators as labor productivity, work quality, loyalty and labor activity.

Labor productivity is a generalized indicator of labor efficiency, which characterizes the ratio of labor results and labor costs.

Thus, labor productivity is an indicator of its efficiency, which is characterized by the ratio of the products, works or services volume, on the one hand, and the amount of labor spent on the production of this volume, on the other hand.

$$P = \frac{Q}{N}$$

where  $P$  – productivity;  $Q$  – volume of production (works, services).

The quality of work can be determined by the ratio of the proportion of marriage and complaints and the average number of staff [1].

$$L_q = \frac{M}{N}$$

where  $L_q$  – labor quality ratio;  $M$  – the proportion of marriage and complaints.

Qualitative indicators for assessing the level of motivation are loyalty and work activity.

There are no uniform and formalized approaches to assessing staff loyalty. According to the author, the degree of staff loyalty can be accessed on the basis of the following indicators: compliance with norms, rules, traditions of the organization; trust, respect for leadership; no information leakage; participation in the social life of the organization.

The level of labor activity is characterized by the following indicators:

- 1) initiative - the ability to put forward new ideas, proposals, the ability to start a business;
- 2) self-sacrifice - the maximum return of efforts, knowledge, abilities;
- 3) honesty - performance of work diligently and conscientiously;

4) enthusiasm - enthusiasm for work, strong passion and elation.

At the second stage of formation of a indicators set for an estimation of motivation of the personnel at the enterprise we will limit the number of parameters formed on criterion of completeness with use of their efficiency criterion.

Therefore, indicators of economic performance, such as productivity and quality of work, should be excluded, because, in addition to staff motivation, they take into account other factors.

By improving the system of staff motivation it is possible to increase the level of labor productivity, however, according to the author, with the help of labor productivity it is impossible to assess the current level of staff motivation in the enterprise, because productivity is influenced by the level of equipment and technology. It is determined by the degree of mechanization and automation of production processes, the use of advanced technologies, new types of raw materials; the presence of a market segment that allows the company to sell products, change its range and volume; organization of enterprise management, its organizational structure, production management system, management technologies, the degree of automation of the management system, a clear definition of the tasks of units, etc.

Regarding the quality of work, the number of defective products or complaints does not always depend on the employee and his level of motivation, but can be caused by other factors: poor quality raw materials, faulty equipment, insufficient skills, working conditions and complexity, etc.

According to the criterion of minimality, it is necessary to exclude the use of correlated, polymeric indicators. For example, the stability, personnel stability in the enterprise can be characterized by the coefficients of staff turnover, variability (replacement) of labor, sustainability of workers, job turnover. To assess the level of staff motivation, the author proposes to use the indicator of staff turnover, as it characterizes the movement of personnel in the enterprise, due to employee dissatisfaction with certain circumstances or dissatisfaction of the owner (administration) with the employee's production behavior. High staff turnover indicates a low level of staff motivation. The management of this process, first of all, is to minimize the discrepancy between the needs and interests of employees and the specific opportunities to meet them. Analysis of staff turnover is necessary to decide on the development and optimization of staff motivation system [4].

Indicators of efficient use of working time and loss of working time are also correlated. According to the author, it is necessary to exclude the latter, as it also characterizes the loss of working time for reasons beyond the control of employees.

Therefore, the author proposes to use the following indicators to determine the level of staff motivation:

- 1) staff turnover rate;
- 2) the coefficient of efficient use of working time;



- 3) the coefficient of labor discipline;
- 4) staff loyalty;
- 5) labor activity.

**CONCLUSIONS.** For increasing the efficiency of decision-making to determine the level of motivation of staff, it is proposed to make an appropriate multi-layered decision-making system. This will solve many problems of economic and technical nature, among which the main is the need for a complete and accurate description of the business model, identification of many potential decisions, making accurate decisions about the motivational level in real time, the need to process powerful arrays of input information, the need to take into account the quantitative and qualitative assessment parameters of the entity at the same time. The choice and substantiation of the main quantitative and qualitative indicators that determine the level of employees' motivation of the enterprise on the criteria of completeness, effectiveness and minimality was carried out. The proposed indicators allow taking into account the dynamics of transient external and internal environments. A set of evaluation parameters that characterize the level of staff motivation allows increasing the accuracy of the assessment for businesses in different sectors of the economy.

Thus, modeling the process of management motivation of managerial work makes it possible not only to quantify its level, but to form relevant measures that increase its effectiveness.

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