

# On the distribution of the incentive fund at the university

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*The article highlights two approaches to solving the problem of the distribution of the incentive fund, one of which is based on the calculation of the cost of one point; the second one is based on elementary incentive payment in the system with weight indices. The latter approach makes it possible to single out a small number of clusters of successful personalities. Comparison of the considered approaches at the stage of their implementation allows us to draw the conclusion about the different aspirations of teachers in the performance assessment systems. A mathematical solution is proposed for the distribution of the incentive fund in the framework of the second approach. The proposed method allows dividing fund resources in an extremely short period of time.*

**Keywords:** TASK OF THE DISTRIBUTION, INCENTIVE FUND, ACTIVITY, PERSONALITY, TEACHERS, CLUSTERS, METHOD OF CALCULATION, POINTS, WEIGHT.

## 1. Introduction

Many higher education institutions develop strategic plans for their development. Obviously, the solution to this problem can only be complex. At the same time, one of the directions in the field of solutions is the determination of key indicators of teaching activities that affect the development of the university, and the further development of the corresponding incentive system [1].

At present, the question of improving the incentive system for university teachers remains relevant [2]. When developing any incentive system, researchers solve the problems of a quantitative method for evaluating activities and the distribution of the incentive fund between teachers.

We can find two approaches to the quantitative assessment of the activities of teachers. One approach uses rating points, the second – weights. There are different methodological grounds for the second approach (weight approach). However, often they lead to complicated decisions. It is relevant to search for such a solution to the problem of distribution of the incentive fund, which would be simple and create the conditions for the best teaching aspirations.

The article proposes a method for distributing an incentive fund among clusters of teachers. The method can be applied if the assessment system uses weighting factors and is based on the hierarchy method. In addition, the features of the point and weight approaches are discussed.

## 2. Preconditions and meals for resolving the problem

There are three main problems for incentive system developers:

1. What specific types of performance indicators need to be evaluated (taken into account) [3]?
2. How to get a quantitative equivalent of success (effectiveness) of the teacher [4]?
3. How to distribute the incentive fund for teachers?

The solution to the first and second problems is often executed jointly. Most of researchers use a point approach when the selected performance indicators of a teacher are characterized by rating points [5].

However, the point approach can operate with two types of rating [6]:

- a rating built with the use of a relative assessment of the performance of each teacher according to the natural indicators given in the various meters;
- a rating, built with the use of a single conditional-natural meter of the scope of works performed.

In the second case, the focus is on operating with coefficients when using a single meter of the scope of work performed. It can be attributed to the "weight approach" if "weighting factors" and the hierarchy method are used in its methodology.

That is, we will consider that the "weight approach" is a way of assigning quantitative estimates to the elements of the teacher's activities, which uses weight coefficients and is based on the hierarchy method. There are various methodologies based on different foundations in determining the hierarchical set of indicators in the performance evaluation system.

The weight approach seems to us more justified for solving the problem of incentives, because the researchers found the demotivating nature of the point-rating system for assessing the activities (the first type of rating). Teachers aim to achieve a formal goal – getting points [7].

So, in the weight approach, the hierarchical system of indicators for assessing the effectiveness of university employees (types, elements of activity) is associated with weight coefficients [2]. To determine the values of weights, a comparative analysis can be used [8]. Weight coefficients can be part of a more complex system, such as a hierarchical system of criteria to measure and evaluate the effectiveness of quality assurance [9].

We can notice that the weight approach uses more flexible techniques to create a system for evaluating the performance of teachers.

Existing weight approaches differ methodologically; they can choose a different basis for establishing a hierarchy of performance indicators. More effective can be considered those that take into account the goals of the university and the personal orientation of the teacher. Less effective are those that set weights for previously financially stimulated privileges or positions.

In the approach with a rating of points after receiving a quantitative individual result for all teachers, the total of all points is calculated and, based on the size (amount) of the incentive fund, "the cost of one point" is calculated. Further, this should be multiplied by the individual points of the teacher.

In the weight approach, the same method of allocation of the incentive fund can be implemented, the difference can be manifested in the fact that weights can already be taken into account in calculations. Also, the weighted approach allows the use of other methods of distributing the incentive fund.

We propose a method of distributing the incentive fund, which is based on the distribution of personal results at several levels in the system of assessing the activities of the teachers.

It assigns incentive payments according to the level at which the teacher will be. This makes it possible on the one hand to lead teachers away from the pursuit of points, on the other hand to consider teachers at the same level as a community with equal opportunities in implementing educational or scientific projects. That is, the method allows you to distinguish clusters of teachers to solve different problems at the university.

The distribution of the incentive (premium) fund taking into account the selected levels can be realized by adjusting the methodology proposed by us earlier [10].

### 3. Results

A feature of the proposed method is associated with a mathematical solution to the problem of the distribution of the stimulating fund. The method takes into account:

- amount of money (size of the incentive fund);
- the distribution of the results of assessing the activities of teachers by levels (cluster distribution of teachers);
- coefficients that allow you to clarify the difference in payment between different levels of results (between different clusters).

The method of distribution of the incentive fund is implemented in five stages:

1. Initially, it is necessary to determine how many levels will be selected. There can be any number of levels. The choice of the number of levels can be done once - at the time the method is implemented. If necessary, you can return to the selection.

2. After forming an array of individual results of teachers' activities, it is advisable to normalize all results by the maximum value. This is necessary to avoid specific values, as they will be different in different systems. The result of this procedure should be a matrix with a list of teachers and their individual standardized results.

3. Next, it is necessary to calculate the "Width" of the range ( $D$ ) taking into account the selected number of levels  $m$ , and, if necessary, the minimum (limiting) value of the individual normalized result ( $R_{min}$ ) can also be taken into account:

$$D = \frac{1,00 - R_{min}}{m}$$

$m$  is the number of levels.

4. Teachers are distributed by levels depending on the individual standardized result of the activities. The result of the procedure should be the number of teachers  $N_1, N_2, \dots, N_m$ , the results of which fell into the corresponding ranges. Table 1 shows an example of the distribution of teachers by level at  $R_{min}=0$ ;  $m$  is 4;  $D=0,25$ .

**Table 1:** The distribution of teachers by level.

Level	Ranges	Number of teachers	Amount of one incentive payment
4	0,76-1,00	$N_4$	$k^3 \cdot S_e$
3	0,51-0,75	$N_3$	$k^2 \cdot S_e$
2	0,26-0,50	$N_2$	$k^1 \cdot S_e$
1	До 0,25	$N_1$	$k^0 \cdot S_e$

5. Finally, teachers are assigned payments from the incentive fund (see the last column of Table 1).

Let us explain the content of the last column of Table 1.

If  $SF$  is the amount of distributed incentive (premium) fund, it can be represented as the sum of the following type:

$$SF = N_1 \cdot S_e + N_2 \cdot k \cdot S_e + N_3 \cdot k^2 \cdot S_e + \dots + N_m \cdot k^{m-1} \cdot S_e.$$

$S_e$  is the elementary incentive payment, that is, the "elementary" part of the incentive payment that is taken as invariant;

$N_1$  is the number of teachers, whose results fell within the range of No. 1;

$N_2$  is the number of teachers, whose results fell within the range of No. 2, etc.

Separately, we will discuss the  $k$  coefficient. This is a coefficient that shows how many times the amount of incentive payment for teachers whose results hit different levels should differ. Its value and mathematical expression for it can be chosen by the developers of the incentive system themselves. We chose the power law for  $k$ , which reflects the difference in pay between teachers at different levels: at each next level the payment is  $k$  times more than at the previous level. Obviously, the coefficient  $k$  must be greater than one. It can be chosen the same, but it may be different for different levels or you can choose a different law for it.

The previous equation can be rewritten as:

$$SF = \sum_i^m (N_i \cdot k^{i-1} \cdot S_e).$$

The elementary incentive payment is:

$$S_e = \frac{SF}{\sum_i^m (N_i \cdot k^{i-1})}$$

And the amount of the incentive part of the payment ( $S_i$ ) for one teacher at different levels is:

$$S_i = k^{i-1} \cdot S_e$$

Table 1 shows its mathematical expression for four levels, taking into account that  $i = 1, 2, 3, 4$ .

### 4. Discussion

Comparison of the considered approaches at the stage of their implementation allows us to draw the conclusion about the different aspirations of teachers in the performance assessment systems. Table 2 shows the comparative characteristics of the point and weight rating approaches and their differences.

**Table 2:** Comparison of the point rating and weight approaches.

Specifications	Point approach	Weight approach
Significator	rating points	weight coefficients
The way of distributing the incentive fund	one, there is no choice of the way	the possibility to choose the way
Single financial indicator	point cost	elementary incentive payment *
Possibility of automation	yes	yes
Personal orientations of the teacher	«pursuit of points»	seeking to get into another cluster *

\* when using the proposed method of distribution of the incentive fund.

The proposed method of distribution of the stimulating fund can be applied both when considering general individual performance results, and when considering results for individual types of teacher activity (scientific, educational, etc.).

Calculations are easily automated in this method. After the number of teachers at different levels is determined, automation allows you to distribute the fund in a very short period of time.

## 5. Conclusions

The weight approach to the formation of the teacher performance assessment system is more flexible, it is able to reflect the significance of certain types and elements of activity, and therefore it is more promising from the point of view of managing teachers to achieve the goals of the University.

We can assume that the "weight approach" is a way of assigning quantitative assessments to the elements of the teacher's activity, which uses weighting factors and is based on the hierarchy method.

When implementing the weight approach, there is an opportunity to use the proposed method of distribution of the incentive fund. This method takes into account the size (amount) of the incentive fund, the number of teachers whose results have fallen at different levels, and the rule for determining the coefficient reflecting the difference in the incentive part of payment.

The method allows to change the attitude of teachers to the results of performance assessments and to form a desire to be in another cluster, but don't chase points.

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