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ABOUT SYSTEM CRITERIA DEVELOPMENT AND COEFFICIENTS CALCULATION FOR AN ESTIMATION OF AGRARIAN-EDUCATIONAL LECTURERS YEARLY PERFORMANCE

Dmytro Melnichuk*, Volodymyr Bulgakov**, Anatoliy Shostak***

*The National Academy of Science in Ukraine

**The Ukrainian Academy of Agrarian Sciences

***National Agrarian University of Ukraine, Kyiv

Summary. The problem of the estimation of activity of scientific and pedagogical staff is constantly under control of authorities of the National Agricultural University. The main difficulty in the solution of this problem was the search of a simple and accessible technique that would allow to find a formalistic approach to the humanitarian nature of scientific and pedagogical activity. A method of assessment of the scientific and pedagogical staff, worked out on a new basis, was developed and introduced in NAUU. The article covers other aspects of quality management education.

Key words: rating, estimation of activity, scientific and pedagogical activity

INTRODUCTION

Assessment of research and educational workers, structural divisions and an institution of higher education as a whole is a complicated and very important problem. The National Agrarian University for example is the IV accreditation level institution of higher education, it contains the following 8 educational and research institutes (ERI):

- natural and humanitarian;
- plant growing, soil science and ecology;
- animal breeding and water biological resources;
- veterinary medicine, quality and safety of products manufactured in agrarian-industrial complex;
- business;
- technical
- forestry and landscape-gardening;
- land resources, science of law and pedagogy.

There are also the institute of postgraduate education and the military faculty.

There are 123 sub-faculties in the above-mentioned ERIs, they are united into 30 educational and research centers (ERC) in accordance with their profiles. Task-level and research laboratories, earlier dispersed, have been united into 7 research institutes (RI)

being parts of ERIs. 18 faculties are parts of the NAUU's ERIs, where the training in 15 specialties and 40 specializations is carried out. Regional Berezhansk and Nizhyn Agricultural Engineering Institutes (III accreditation level) as well as Irpin, Zalischiky, Nemishaievo Agrarian Colleges and Boyarka Agricultural Secondary School are structural divisions of the NAUU. The training is executed according to the following educational and skill levels: bachelor, specialist and master. The training's forms are: internal training, instruction by correspondence, education with examinations without attending lectures and distance studies.

The method of the acting subjects' assessment developed in the NAUU permits to estimate the quality of teaching-educational process with the help of quantitative indexes (criteria). *It permits not only to estimate, but to optimize the process organization, improve the management and labor motivation, determine the place of a given educational institute among institutes of the same profile in any field of education. This is the main aim of the developed method.*

Unfortunately, the work quality of structural divisions as well as single workers cannot always be formalized. As for the teaching staff, the estimation criteria for their work results are based on the provision „On planning and consideration of load grant for research and educational workers of the NAUU"

At the same time the main drawback of all known methods is the fact that aspiring to the objectivity and maximum consideration of various factors, the developers create excessively cumbersome and inconvenient methods overburdened by a large quantity of questionnaires, forms, rating-lists, formulas and other accompanying documentation. This always arouses an inner protest and aversion from the direction of direct performers: *to estimate any work according to such criteria is more difficult than to perform the work itself. Such methods already do not service any basic activity for its optimizing but themselves are a separate kind of activity*. But the following question arises: Who needs it and why?

The method developed and realized in the NAUU has passed valid and precise expertise, and has solid normative and lawful foundations. We have deviated from the system based on a count of scores, which is the base of almost all the existing methods.

Our method is unique in Ukraine today and permits to formalize the teaching-scientific-educational process in an institute of higher education to the maximum, and at the same time it is sufficiently *objective, easy to use and its results are unambiguous*.

PROBLEM DEFINITION

The tasks facing higher agrarian educational institutes under the present-day tight economical and socio-political conditions require not only structural and management changes, but an improvement of the quality of educational process so that to overcome the ingrained stereotypes and introduce recommendation of agrarian-pedagogical science into the teaching activity. What is the heart of the problem?

Firstly, accepting and mastering new pedagogical ideas and educational technologies of their application by the teaching staff as well as generalizing huge existing experience (both native and foreign) of introducing agrarian-pedagogical science into practice.

Secondly, passing from the spontaneous and *weakly controlled* application of major achievements in agrarian-pedagogical science by the teaching staff to an introduction of

its recommendations as a *controlled process.* The rating is the serious instrument of this process.

The stated problem has taken on special urgency in connection with entering the National Agrarian University into the Global Consortium of Institutions of Higher Agrarian Education and Researches in Rural Economy. The Rector of the National Agrarian University of Ukraine, Scholar of the National Academy of Sciences of Ukraine D.O. Melnichuk was elected as President of the Consortium (in September, 2003, the Research-Practical Conference of the Consortium has taken place on the basis of the NAUU, in which representatives of more than 100 leading universities and scientific establishments from 56 countries have participated).

KINDS OF ACTIVITY AND EFFECTIVENESS CRITERIA FOR TEACHING WORK

As it was mentioned above, the humanitarian nature of teaching-educational and scientific activity undergoes formalization with great difficulty. The developed method allows to represent quality criteria of such activity by means of quantitative indexes (coefficients). It is known that recently the method of educational process estimation has been reduced to the level of qualitative criteria research. The research of quantitative estimation criteria for different aspects of scientific-teaching-educational process, which gives objective information on advantages and disadvantages of educational institute's activity, is the necessity prerequisite for improving its work. Therefore we will attempt to see and derive some quantitative indexes (criteria) through the prism of qualitative indexes. In other words, we will attempt to formalize the humanitarian activity with the purpose to estimate objectively the work efficiency of the institute of higher education, its divisions and individual instructors.

In accordance with the provision „On planning and consideration of load grant for research and educational workers of the NAUU" approved by the rector, the budget share of salary consists of remuneration for 5 kinds of works, namely: educational, research, introduction, methodological as well as cultural and educational. The same concerns also the individual plan of an instructor, for whose fulfillment he or she shall give a report at the end of the year. The annual time budget of a research and educational worker (REW) is equal to 1.548 hours (258 6-hour working days).

As it is known, all things shall be considered in the comparison: the ratio of quality, which we have, to the quality, which we would like to have (normative). The numerical determinant of this ratio is *a coefficient.* And so *the essence of the method is reduced to determining coefficients, which describe the teaching-scientific-educational process and its subjects.* With this purpose the following quantitative indexes or basic criteria for the scientific-teaching-educational process are proposed:

Coefficient of teaching work fulfillment

$$K_{tch} = \frac{\sum_{i=1}^{n} t_s}{T_{tch}}, \tag{1}$$

where:

i – the kind of fulfilled teaching work;

n – the number of teaching work kinds (can be changed every year);

Σ – the sum of all kinds of fulfilled teaching work;
t_s – the standard time necessary to fulfill the separate teaching work, hours;
T_{tch} – the planned (budget) share of the teaching work, which shall be fulfilled by an instructor during the *academic* year, hours (at the present time it is equal to 900 hours, 58% of 1548 hours).

Coefficient of scientific work fulfillment

$$K_{sci} = \frac{\sum_{i=1}^{n} t_s}{T_{sci}}, \tag{2}$$

where:
i – the kind (name) of fulfilled scientific work;
n – the number of scientific work kinds (can be changed periodically);
Σ – the sum of all kinds of fulfilled scientific work;
t_s – the standard time necessary to fulfill the separate scientific work, hours;
T_{sci} – the planned (budget) share of the scientific work, which shall be fulfilled by the instructor during the *calendar* year, hours (at the present time it is equal to 200 hours, 13% of 1548 hours).

Coefficient of introduction of the achievements of scientific and technological progress to production

$$K_{int\,r} = \frac{\sum_{i=1}^{n} t_s}{T_{int\,ri}}, \tag{3}$$

where:
i – the kind (name) of fulfilled introduction work;
n – the number of introduction work kinds, work concerning introduction of state budget and contract scientific developments to production (can be changed every year);
Σ – the sum of all kinds of fulfilled introduction work;
t_s – the standard time necessary to fulfill the separate introduction work, hours;
T_{intr} – the planned (budget) share of the application work, which shall be fulfilled by the instructor during the *calendar* year, hours (at the present time it is equal to 140 hours, 9% of 1548 hours).

Coefficient of scientific-methodological work fulfillment

$$K_{sm} = \frac{\sum_{i=1}^{n} t_s}{T_{sm}}, \tag{4}$$

where:
i – the kind (name) of the fulfilled scientific-methodological work;
n – the number of fulfilled scientific-methodological work kinds (depending on needs the problem can be changed every year);

Σ – the sum of all kinds of fulfilled scientific-methodical work;
t_s – the standard time necessary to fulfill the separate scientific-methodological work, hours;
T_{sm} – the planned (budget) share of the scientific-methodological work, which shall be fulfilled by the instructor during the *academic* year, hours (at the present time it is equal to 170 hours, 11% of 1548 hours).

Coefficient of cultural and educational work fulfillment

$$K_{ce} = \frac{\sum_{i=1}^{n} t_s}{T_{ce}}, \tag{5}$$

where:
i – the kind (name) of the fulfilled cultural and educational work;
n – the number of the fulfilled cultural and educational work kinds (depending on present-day requirement can be changed every year);
Σ – the sum of all kinds of the fulfilled cultural and educational work;
t_s – the standard time necessary to fulfill the separate cultural and educational work, hours;
T_{ce} – the planned (budget) share of the scientific-methodical work, which shall be fulfilled by the instructor during the *academic* year, hours (at the present time it is equal to 138 hours, 9% of 1548 hours).

The increase or decrease of the weight of every of 5 load kinds is provided for by the „On planning and consideration of load grant for research and educational workers of the NAUU", but the total load summed up through all kinds of activity shall be no less than 1548 hours, i.e. shall be equal to the annual time budget. For example an instructor successfully fulfills scientific work, introduces its results and reports soundly assuming on 700 hours instead of 200 and 140 hours, respectively. In that case the sub-faculty shall decrease his or her load by corresponding quantity of hours of other activity kinds. As the general estimation criterion for an instructor's activity during a year *the general coefficient* (K_{gen}), which is the ratio of the sum of all kinds of the fulfilled work (hours) to the standard (planned) one:

$$K_{gen} = \frac{T_{tch} + T_{sci} + T_{intr} + T_{sm} + T_{ce} + T_{oth}}{T_s} \geq 1 \leq 2 \tag{6}$$

This coefficient corresponds exactly to the degree of fulfillment and over-fulfillment of the planned load by a research and educational worker, it falls in the range from 80% (K_{gen} = 1.00, i.e. total annual load *is equal to* 1548 hours) to 100% (K_{gen} = 2.00, i.e. total annual load *is equal to* 3096 hours) of higher salary of such post. When K_{gen}<1 (i.e. less than 1548 hours is fulfilled) the well-reasoned explanation shall be submitted into the office of the head of studies of the institute.

Fig. 1 shows the geometrical interpretation of set forth method. Of course, the shown *limits and volume* of the activity kinds have enough relative, reference character. In essence, they are norms. In reality the weight of each activity kinds can change, what is reflected in individual plans of instructors.

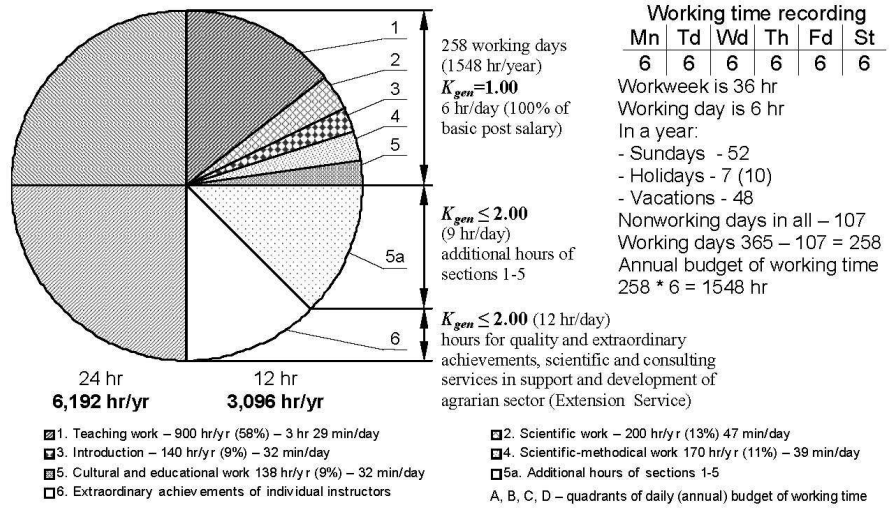

Fig. 1. Standard time calculation according to work kinds for REWs of the NAUU.

The list of main activity kinds of research and educational workers of the NAUU together with the components of their salary is shown in Fig. 2 (see also quadrant A in Fig. 1, when K_{gen} is 1.00).

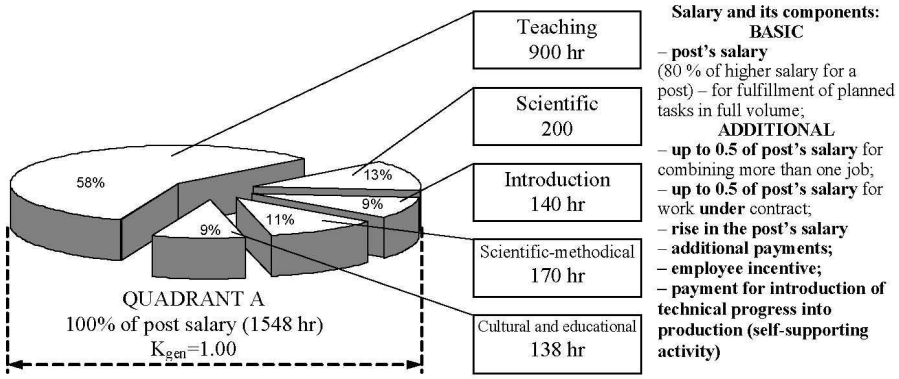

Fig. 2. List of basic activity kinds and components of salary of REWs of the NAUU.

Generalization of results

Annual estimation of results of teaching staff's and structural divisions' activity has been conducted in the NAUU from 1997. From 2001 the diversified remuneration of labor are paid within the limits of 20% of higher salary in accordance with individual coefficients. It shall be noted that only 11.6% REWs of the NAUU have K_{gen} = 1.75–2.00.

And only 5% of members of the staff have the maximum value, K_{gen} = 2.00 (see Fig. 3). It is not the result of strict demands but the result of objective approach to estimating the teaching labor. Considering the fact, a specially created committee has to work thoroughly with original (primary) materials incoming from sub-faculty, since a temptation can arise to submit overstated and not confirmed by documents data.

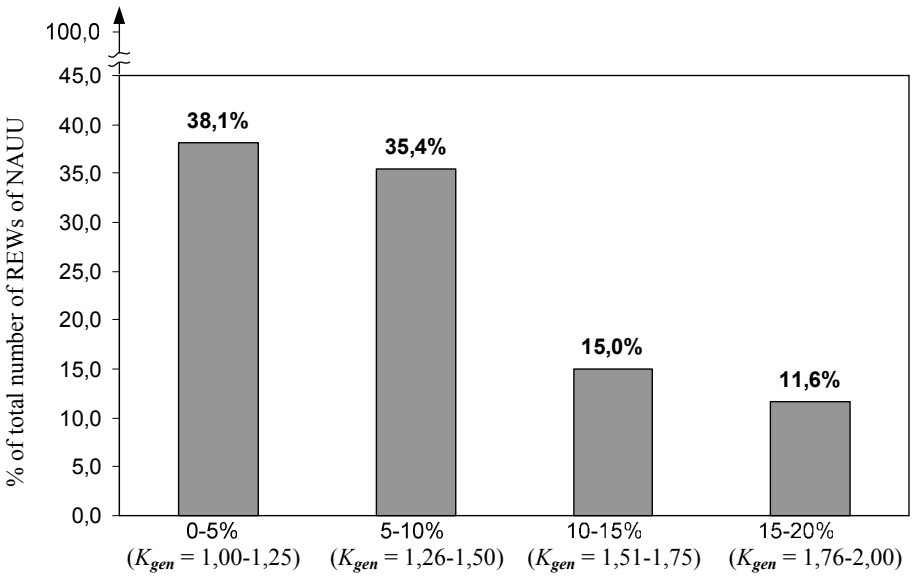

Fig 3. Distribution histogram for increase of post salaries of research and educational workers of NAUU according to rating results for the year of 2002

The system stimulates such activity kinds, which overstep the limits of direct functional duties listed in job descriptions.

Every year, estimation of results of all activity kinds is carried out before December 25.

The activity of sub-faculties having $K_{gen} < 1.00$ is subjected to comprehensive analysis. Causes are determined, necessary methodological and material aid is granted, weaknesses are pointed out, organizational decisions are reached as well as other measurements concerning reinforcement and stabilization of their work are taken. Similar approach is used as for the teaching staff.

The ratings of ERI' of the NAUU obtained according to general coefficient K_{gen} for the year 2002 are shown in Fig. 4. To analyze the situation, similar histograms were drafted for each kind of activity with taking into account all coefficients: K_{tch}, K_{sc}, K_{intr}, K_{sm}, K_{ce} and K_{oth}.

In case the rating committee detects any false additions, a respective instructor (sub-faculty) shall be displaced from the rating process, i.e. he or she will have K_{gen} = 1.00.

The questions of activity estimation and stimulation have been solved not only for member of the staff, but for persons, who hold more than one office. It concerns all such persons, both those whose main office is in the NAUU, and those who are workers of other establishments, institution, companies and so on, including the foreign ones. The maintenance staff of the sub-faculties also was not forgotten (laboratory managers,

teaching masters, methodologists and others): additional salary payments to them were made in accordance with the rating of respective sub-faculty.

The *separate* method was developed for activity estimation and rating determination of members of staffs of research institutes; there are 7 such institutes in the NAUU. But this is not the subject of this paper.

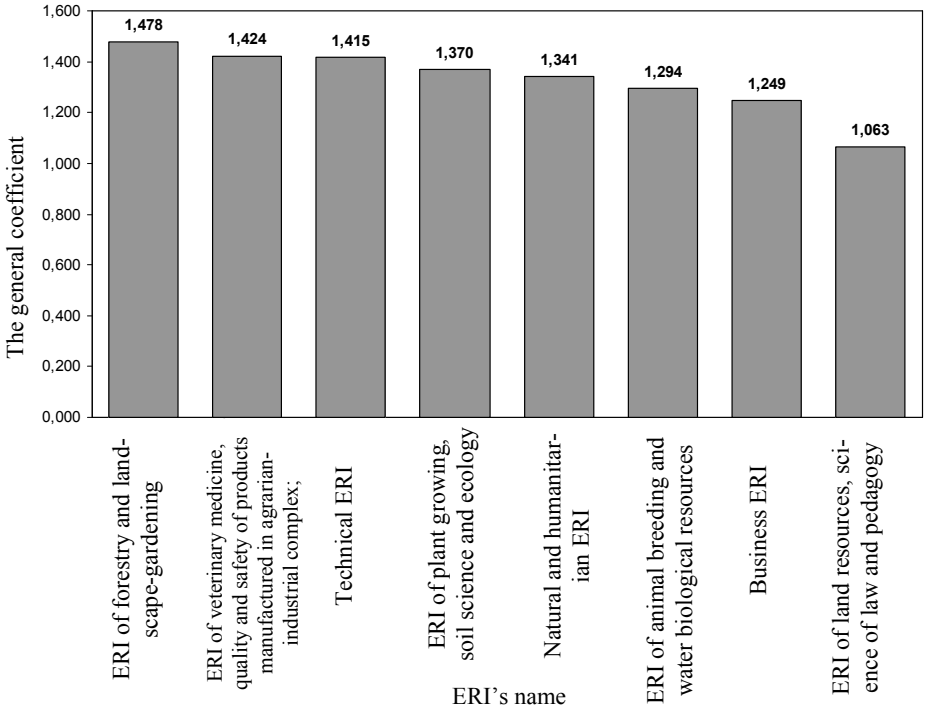

Fig. 4. General ratings of ERIs of the NAUU for the year of 2002 (according to the generalized coefficient)

When the method of activity estimation for instructors and structural divisions was created, the question of *its adaptation to the specific* several sub-faculties was solved. The activity of colleagues connected with taking out patents and inventor's certificates for example are typical only for sub-faculties of technical profile. And inclusion of similar index in evaluation method for humanitarian profile sub-faculties such as sub-faculties of Ukrainian, German and French languages, philosophy, culture science and other seems dubious. The necessity to *formalize* the evaluation methods is one more aspect of its adaptation. With that purpose the software support for the above-mentioned method was developed, which permits to realize the assessment calculation scheme in the form suitable for data processing by an application program and storage in a database. The editing program of assessment calculation schemes permits to „assemble" or modify it by the direct-manipulation method: to move the work index into the integral index and move integral indexes into indexes corresponding to activity kinds.

A number of technical problems were detected, which were connected with the necessity to create comfortable environment for a user, and which shall be solved in the course of *preparation to the system to replication of code.* In order that the program can work, *Windows 95/98/2000/* and professional version of *Microsoft Office* containing *Access 97/2000* shall be installed on the computer.

AN OUTLOOK OF THE SYSTEM'S IMPLEMENTATION

In accordance with Article 58 of Law of Ukraine „On education" and Provision „On measures of winners' incentive", the rating estimation of activity of the NAUU' staff permits to apply various forms of incentives to such REWs and managers of divisions, who will occupy higher rating places: to be recommended for awards of the President of Ukraine – orders or decorations, to receive honorary titles; to be granted scientific ranks, promotion, awarding prizes, additions to salary, to be awarded by diplomas, prolonging the contract for the next period and other kinds of material and moral incitements.

It is an effective instrument for the manager, who has *direct feedback* with every subject of the university's activity. The developed system can be wholy adapted to an estimation of activities of other universities in other fields.

CONCLUSIONS

So, which criterion shall the set forth method satisfy?

Criterion. 1. Simplicity of setting forth. The method is understandable, many times approved, accepted by performers, executed at a high enough level, has references and is based on the experience of predecessors and colleagues. There are "through" recommendations and the limits of its application are marked from the problem's definition to its solution.

Criterion. 2. Novelty of method. In this case the „novelty" of method is understood both as the non-evidence of its recommendation to a specialist and as the complexity of solved problems. The novelty at emotional level „shakes" and shows new points of view on the known events. The presence of the novelty at methodical level is evident, it enables to foresee the estimated phenomena.

Criterion. 3. Instrumentality of methods. The method is not reduced to emotional appeals and non-constructive criticism of analogues. A number of real-world problems have already been solved in the NAUU. It would be difficult to solve them without this method. This is a very important fact that the method can work not only in „author's performance". It is more effective than other known methods and contains warnings about typical errors of a user, who works with it. The method permits to set problems and obtain one or several interconnected solutions, which are not obvious for a user without the method's help, i.e. the method is practically feasible.

Criterion. 4. Expenses of users connected with the method. To use the method efficiently, it is necessary to spend some additional time and means, the author's consultations are necessary too. After the actual explanation, all the instructors have mastered the method minimally.

Criterion. 5. Aims of authors (auxiliary criterion). The authors were not impelled by the wish to satisfy their vanity or receive money. The stimulus consisted in the wish and

ability to hand over the development to colleagues at a worthy scientific level with the purpose to continue investigations and solutions of new problems as well as to use the method as an instrument to create a new generation method of reaching an independent creative level.

MOREOVER

The method assists the idea to conduct sufficient decentralization, i.e. to devolve separate operating levers of money flow and main kinds of activity to lower management levels, which provide decision making, and more professional execution of some decisions.

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