

Yankovskaya V.V.

THE MODEL OF THE ASSESSMENT OF THE LEVEL OF TRAINING OF APPLICANTS FOR STUDYING IN A HIGHER EDUCATION INSTITUTION

Yankovskaya V.V., PhD, Assistant Professor of the Theory of Management and Business Technologies, Plekhanov Russian University of Economics, Russian Federation, Moscow

Abstract

The article considers the dependence of the level of quality of training of a graduate with a bachelor's degree on the level of training of an applicant, the role of professional competences of the Federal State Educational Standard (FSES), as well as possible competitive advantages of higher education institutions (HEIs). An attempt to simulate the process of teaching of a bachelor in HEIs, which is an attribute of a systematic approach to the management of the quality of this process in its analysis and synthesis, has been made.

Keywords: Modeling, Maxwell's law, professional competences, FSES.

Introduction

Within a market economy Russian HEIs have become full-fledged market participants and therefore they are forced to actively compete for consumer demand. The market of educational services applies increasingly stringent requirements to HEIs. Accordingly, achieving a leading position is possible through giving a product (a service) quality characteristics, which are important to consumers of educational services rendered by a HEI, as well as through the results of the educational process provided by this HEI. Based on a new type of economic relations, the philosophy of HEIs is consistently changing. The needs of bachelors' training stipulate new qualitative characteristics associated with competences of Federal State Educational Standards (FSES). The qualitative improvement of the bachelor's level of training is still an important issue. In current conditions this problem is getting more acute. There are many definitions that characterize both specialists and

bachelors in terms of their level of training, the content of knowledge, functions performed. Today, many companies offer such forms of work organization, which would enable employees to constantly improve their knowledge and skills to solve specific problems. In this case, the organization appeals more often to the concept of "competence", since a term "qualification" is getting too narrow.

Thus, ensuring the conformance of the qualifications of an employee to the requirements of a developing organization suggests a kind of a business process consisting of the following stages:

- the study and development of the necessary competences for this type of a working position;
- the assessment of the required competences in an employee;
- the identification of missing competencies;
- the development of training, retraining and advanced personnel training programs;
- the training process;
- the final evaluation of compliance of the qualification of an employee with new requirements.

In order to define a term "competence for a particular working position", it is necessary to define a concept of "competence".

A competence means the willingness and ability of an employee to regularly demonstrate a specific component of the production behavior expected by the company. There are certain expectations towards each employee of the company: the content of his/her work, the intensity of work, the fastness of provision of results, the quality of his/her interaction with colleagues, the level of qualification, etc. This is called the production behavior. Competences mean the ability to demonstrate separate components of the expected behavior.

All of the above leads to the permanent improvement of educational services rendered and the level of competitiveness of HEIs. Professional competences must comply with the main objective – to train a bachelor of an appropriate specialization, who can use the acquired knowledge and skills in the sphere of activity, which was studied in the learning process in the HEI. A bachelor should be prepared for professional growth, be professionally and socially mobile.

HEIs maintain a competitive edge quite often through unique specialized curricula, the financial, information and human resource capacity of the teaching staff.

Methods and materials

Theoretical-empirical, economic and specific scientific methods have been applied. The presented results were obtained during the studies conducted by the author in the Russian University of Economics in the period of 2013-2017.

Results and discussion

Nowadays the market dictates the dynamic development of a company, equipment and technologies in the modern production sphere. Requirements to the quality of bachelor's professional skills and abilities are constantly increasing. The essence and content of the continuous professional education system in modern conditions should be forward-looking and continuous. Pressing problems of the personality and society as a whole are the benchmark of the modern educational system. The essence of advance is to prepare bachelors in HEIs, who are fully prepared to address urgent problems and forecast, foresee future problems. Certainly, HEIs shall ensure the implementation of the continuous vocational education principle, the transition of a self-developing person from one professional status to another, which allows preserving basic personal qualities. This is the reason why it is necessary to pay attention to the quality of the admission procedure in HEIs. Moreover, the quality of products of a HEI (a graduate with the bachelor's degree) essentially depends on the quality of the admission procedure. This provision should be taken into account when modeling the process of the bachelors' training in HEIs, which is an attribute of a systematic approach to the management of the quality of this process in its analysis and synthesis. A group of students trained in a certain specialization, which is interpreted by the complex systems theory as a means of operation of the system of training in this specialization in a HEI, enters this system. They possess some quality characteristics, which are converted by this system into knowledge and skills characterizing a HEI graduate as a bachelor.

The level of pre-university training assessed through entrance examinations is an indicator of the quality of each student admitted to the HEI to study at a certain faculty. To assess the level of this indicator we shall introduce the following value:

$$f_i = \frac{R_i}{R_{max}} \cdot \eta_c; \quad i=1 \dots L_c \quad (1)$$

where R_i —the sum of scores for all competitive disciplines received by i -th applicant admitted to the HEI for a certain training program; R_{max} —a maximum possible score of an applicant when entering the HEI; L_c —a number of applicants admitted to the HEI for a certain training program upon results of entrance examinations; η_c — a coefficient considering the complexity of competitive tasks at entrance examinations for a certain training program, $0 < \eta_c \leq 1$.

The value η_c should be determined by the ratio of the enrollment competition (the number of applicants for one place) for the observed training program to the maximum competition for all profiles of one training program. The dispersion of f_i values for their

complete set L_c is subject to a certain law $\phi(h)$, a number of characteristics of which can be easily determined upon results of the admission to the training program:

- a theoretically maximum value $h_{max}=1$ for an applicant entering the HEI to study a certain training program is determined by equation (1) when $R_i = R_{max} = u \cdot p_c$ (u – the maximum number of scores on a competitive discipline; p_c – the number of competitive disciplines of the admission to a certain training program) and $\eta_c=1$;
- a minimum value h_{min} determined by equation (1) when $R_i = R_{min}$ – a pass rate – with an account of the value η_c of the selected training program;
- a mean value (expectation h_i) –

$$m(h) = \frac{1}{\sum_{i=1}^n f_i} \quad (2)$$

The one-parameter dispersion along the Maxwell (Rayleigh) dispersion curve will be taken as the law $\phi(h)$ of the dispersion of h_i values. This is justified by the following circumstances:

- this law is used to describe the distribution of significantly positive values, which is typical of h_i values;
- it has a negative asymmetry typical of actual cases of dispersion of h_i values;
- it limits the distribution on the left, allowing the variation $h_{min} \leq h_i < \infty$.

Using the expression for the replaced Maxwell's law, the following equation will be used for the description of the dispersion of values $h_i = h$:

$$\varphi(h) = \frac{1}{\sigma_0^2} (h - h_{min}) \exp \left\{ -\frac{h - h_{min}}{\sigma_0^2} \right\} \quad (3)$$

where σ_0 – a parameter of law estimated as follows:

$$\sigma_0 = \left(\frac{m}{2} \right)^{0.5} |m(h) - h_{min}| \quad (4)$$

where the values $m(h)$ and h_{min} are defined.

The Maxwell's law of the dispersion of h_i values for a particular training program is a complex characteristic of the quality of the admission to a certain training program. It helps to quantify not only the average level of pre-university training of the applicants admitted to a certain training program (it is determined by the value $m(h)$) compared to the perfect level of training ($h = 1$), but also the proportion δ_0 of admitted students, who have perfect pre-university training.

$$\delta_c = \int_1^c \varphi(x) dx = \exp \left[-\frac{(c - h_{\min})^2}{2\sigma_c^2} \right]; \quad (5)$$

The proportion δ_c of the admitted students, who perfectly prepared for the study of their chosen specialization, -

$$\delta_c = \int_1^c \varphi(x) dx = \exp \left[-\frac{(c - h_{\min})^2}{2\sigma_c^2} \right]; \quad (6)$$

and other characteristics that can be individual assessments of the quality of the group of students admitted to a certain training program.

When building a model (3) upon results of the admission to each particular training program in HEIs the following should be taken into account:

- in case of the out-of-competition enrollment of an applicant upon interview results the value of his/her $h_i = h_{\min}$, if his/her social benefits are determined by the success he/she achieved in pre-university training (an honor student, a winner of academic contests, etc.);

- if when $c < 1$ upon admission results $h_i = c$ for all applicants $i = 1 \dots L_c$, a model of the quality of such group of students enrolled is built upon the Maxwell's Law, where $h_{\min} = c$, $m(h) = 1$ and the value $\sigma = 0$ calculated by equation (4);

- in case of the enrollment to the up-market faculties ($c = 1$) there can be a case when $h_i = 1$ for all applicants $i = 1 \dots L_c$. In such limiting case h_i is not a random value characterized by $h_{\min} = m(h) = h(\max) = 1$, $\sigma = 0$. It is described by the Dirac function, or δ -function, which is a limiting case of the Maxwell's law when $\sigma \rightarrow 0$.

Conclusions

HEIs shall ensure the implementation of the principle of the continuous vocational education, the transition of a self-developing person from one professional status to another, allowing him/her to preserve basic personal qualities. This is the reason why we should pay attention to the quality of the admission procedure in HEIs. Moreover, the quality of the HEI's product (a graduate with a bachelor's degree) essentially depends on the quality of the admission procedure. This provision should be taken into account when modeling the process of the bachelors' training in HEIs, which is an attribute of a systematic approach to the management of the quality of this process in its analysis and synthesis.

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