

# Issues of increasing budget funds efficiency for training in the context of the integrated framework

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**Abstract**— The article highlights the main process that is a part of the top-level business processes in higher education - the educational process itself. The analysis of impact of each process on the efficiency of the final result, which considers graduated personnel for various sectors of the economics, including the sphere of higher education as well, has been carried out. At present, the actual employment figures in accordance with the specialty (direction of training) indicated in the diplomas reflect low government cost-effectiveness in this sector. This problem requires a systematic approach with an initial qualitative analysis of the causes of the situation. Every educational process at university requires new approaches to improve the quality of education. For this purpose, it needs the efforts of all stakeholders: representatives of the professional community, employers, and the state. It is necessary to revise approaches to candidates selection at universities, including the requirements for the lowest exam points and the goal-setting of future graduates, starting from the moment of choosing the direction of study and ending with receiving university degree by students in the first level of higher education.

**Keywords**— Higher education, Educational (training) process, Quality.

## I. INTRODUCTION

Recent changes in the higher education system, modern requirements due to Bologna agreement, have led to the situation when paradigm which has existed for a long time, concern higher education organizations as non-commercial organizations have changed. The state budget expenditures for education, from the economic point of view, is an investment, and therefore, it demands an evaluation of its efficiency, that can be determined by efficiency above all the main business processes. At the same time, the quality of all the processes in an educational institution affects their efficiency performance: main process, additional, auxiliary, development and management.

The main business processes of the upper level in the triple and quadruple helix can be identified as an educational process (the educational service providing) and research activities.

The level of the institution is determined by the quality, and, in turn, it is largely determined by the quality of the supporting processes.

At present there are three categories of universities.

The first category is the top 20 universities, which are required to be into international rankings, which predetermines the implementation of high indexes of research activities commercialization. These educational institutions receive 25 % of the total targeted budget funding for academic activities [1]. The second level of universities is the so-called top 100 – the total amount of its funding is  $\frac{3}{4}$  of subsidies for education [1]. Other universities share  $\frac{1}{4}$  of funding, in other words, some of them do not get any funding [1]. It is worth noting that some of the "non-top" universities contribute the maintaining and "strengthening" the position of outsiders because of weak management culture, and lack of understanding of modern trends and strategic thinking. In such kind of universities, the vast majority of scientific and pedagogical staff retains a conservative perception of educational organization and considers it a non-profit institution "not a business".

As a result of reforms, which related to the Bologna process accession in our country, the research activities have become a part of the main processes at universities.

The object of research in this work is the educational process in higher educational institutions.

The subject of research is the main, auxiliary and supporting processes, as well as management processes, the complex of which presents the educational process as a whole.

The objects of observation are two Universities of Novosibirsk city: FSBO HE "Novosibirsk State Technical University" and FSBO HE "Novosibirsk State University of Architecture and Civil Engineering".

Relevance and scientific value. The principle of higher education funding by the state according to the normative-per capita principle [3], that is, concern to the number of contingents and according to the basic standard of minimum costs, which is determined by the state, to graduate a specialist of a particular profile, transforms these costs into investment ones. The same circumstance in conjunction with the number of students under an educational services contract, that is, on a commercial basis, predetermine the change of the paradigm of higher education as a non-commercial process into the sphere with all commerce features.

Commercialization of educational services of higher education, which started in the 90s of the last century, has dynamically shown steady growth during three decades. According to the quality monitoring of the universities enrollment during the past eight years by the National Research University "Higher School of Economics" [4] in 2011, the commercial enrollment was 25.7% out of a total number of students, while in 2018 this figure was already 39%.

A final product that is "launched" on the market by the industry is a graduate with a well-defined set of competencies. In a case with the graduates under a commercial basis, they are free to determine the need for their professional activity in accordance with the direction of training, but in the case of budgetary basis graduates, the funds invested by the state can be recognized as effective investments only in the way of receiving a benefit from a graduate student appropriate the education they have received.

Currently, the topic of quality of educational services in the context of the concept of the triple and quadruple helix in education is becoming increasingly acute and is being discussed in academic society and professional communities, including HR-managers and owners and top managers of enterprises. The issue is scientifically and practically motivated, as while studying and processing the employment indicators its databases, it is possible to identify certain market trends to predict target enrollment figures for particular training directions, and formalize the requirements for applicants due to reducing the budget loss for education.

As mentioned above, employment indicators of higher and secondary vocational schools graduates are the targets of the State Program "Education Development". This approach is objective in terms of the role of the state as an investor for education.

HR-managers who are responsible for recruitment in the companies tend to point out the shortcomings of graduate applicants while studying their CVs and interviewing [5], the heads of organizations - potential employers point out that graduates skills level is insufficient for solving real problems [5], students also express concern at their employment and look for the reasons for the interest loss for the sphere of working activity, which they get knowledge at [6]. Representatives of universities academic staff are concerned at the searching for criteria for assessing the quality of education as there are still no such formalized criteria, which may predetermine the students' employment [7-12].

This study was conducted with regard to the process approach towards one of the main activities of higher educational institutions. The implementation of a process approach in higher education is also actively discussed among researchers and academic staff [13 - 17].

Task setting. The main aim of the study is to identify factors that contribute and impede the evaluation of the efficiency of the educational process in regional universities.

The "effective process" in this study intended to be the management of educational activities of the university, whereby enrollment control figures are initially performed, and the established state program of Russian Federation "Education Development" (approved by the Government,

October 12th, 2017 No. 1242) employment indicators are implemented at the end of the process: "the proportion of graduates who were employed during the calendar year after their graduation, out of total number of graduates of educational organizations who were trained the basic educational programs of higher education: 68 percent are in 2019; 69 percent are in 2020 [2]". In addition, the students' willingness to continue their education in graduate and postgraduate programs is adopted by authors as a parameter of high quality of education.

In accordance with the aim of studying, the following tasks were identified:

- 1) determination of the motivation of students of secondary educational institutions (schools, lyceums, gymnasiums) when choosing a higher educational institution and future job-related plans;
- 2) identification of the dependence of the results of the unified state examination of the applicants and the academic performance during the studying at the university;
- 3) studying the plans and motivation factors of undergraduate students concern their intention to continue the education for master degree and further postgraduate program;
- 4) determination of conditions and students satisfaction concerns the quality of teaching in terms of the formation of competencies for successful employment and interest for a future profession.

## II. MATERIALS AND METHODS

The methods used for this researching work are the method of econometric analysis of database indicators concern students - objects of observation; statistical data analysis method; questioning, the method of generalization, parentheses, following the example. Some components, such as multi-levelled equations, graphics, and tables are not prescribed, although the various table text styles are provided. The former will need to create these components, incorporating the applicable criteria that follow.

Providing educational services, from the point of view of the process approach, is a top-level business process which includes the following main processes:

- career guidance work with the secondary school's graduates;
- implementation of the enrollment company starting from its preparation, announcement until the final student's enrollment;
- educational process per se;
- final examination;
- employment of graduates and/or their admission to the next level of education.

As the initial stage of these processes can consider the work aiming at university image forming on the educational services market, its ratings, and also the requirements for applicants based on these two components.

### III. RESULTS AND DISCUSSION

#### A. The study of the motivation of graduates of secondary schools in choosing the direction of study in high school

During the career guidance activities among students of the tenth and eleventh grades of secondary schools of Novosibirsk city held in October-November 2018, a sociological survey was carried out due to identify their motivation when choosing subjects for the unified state exam and, consequently, the direction of training for university admission.

170 students from five schools were interviewed, 53 (31.1%) of them are the tenth-grade student's rest of them are the eleventh-grade students. Secondary educational institutions which were selected for the survey are not elite so it allows getting an average sample.

According to the survey, almost 100% of the respondents - 167 people intend to continue their education at a higher educational institution and work subsequently in accordance with the direction of training at the university.

Figure 1 presents the preferences of the respondents due to future sphere activities graph. Do not add any kind of pagination anywhere in the paper. Do not number text heads-the template will do that for you.

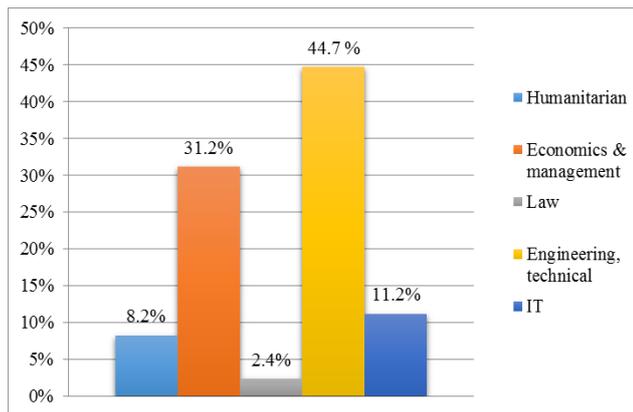


Fig. 1. Distribution of preferences of secondary schools graduates due to the sphere of future profession.

Despite the dynamic development of IT technologies sphere, the popularity of this sphere is replaced by engineering and economics among surveyed graduates.

The high popularity of engineering among future applicants attracts the attention, which ranks the top position among (44.7% of respondents). It can be noted that the state policy aimed to make engineering education popular has brought positive results during the last few years.

During developing and conducting the survey, the authors hypothesized that the major part of school seniors choose a profession based on the following factors (in descending importance): 1) budget based education, 2) under parents influence, 3) a random factor and "for the ride". The conscious choice of future profession was assumed to be the last rating position.

However, the results of the survey partially confirmed this hypothesis, which is shown in Figure 2. The possibility of a budget based education substantiates the future

profession choice among 43% of respondents. Personal interest for the profession took the second rating position, and if it viewed in conjunction with a projection of further profession attractiveness, the conscious choice of the profession concerning the professional sphere is a crucial factor for more than 52% of future applicants. This circumstance, in the authors' opinion, allows hoping for increasing of graduates' employment rate according to their specialty next five years.

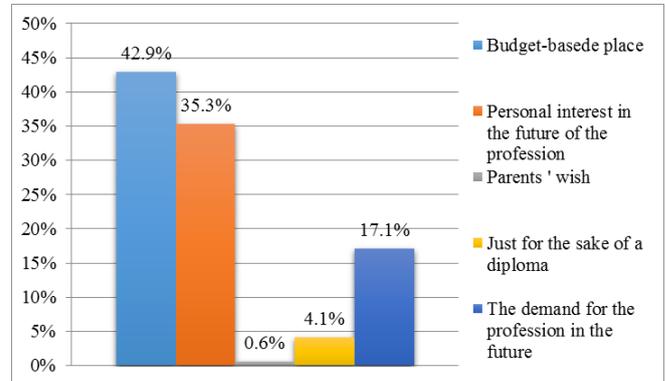


Fig. 2. The motivation of school graduates when choosing a university for getting an education.

The choice of future study direction is determined with the chosen subjects for final unified state exams: the results presented in Figure 3 fully correlate with the previous question. Popular subjects for exams include disciplines which are necessary for engineering and economic specialties admission: mathematics, physics, and social studies.

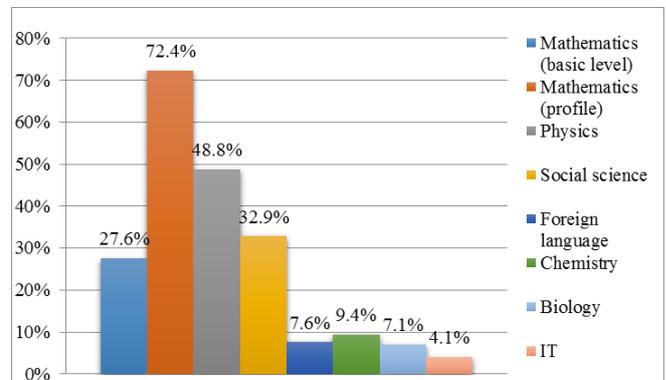


Fig. 3. Subjects selection for the Unified State Exam.

Thus, the first process - the school students' carrier guidance and their enrollment in a particular direction of the study indicate quite achievable numbers of employment indicators in accordance with the education provided by the development program, but this stage determines up to 50% loss of investment in higher education. This negative trend is intensifying during university studies.

#### B. The impact of the final exam results on the level of academic performance at the university

The second process - the admission campaign, apart from the cultural direction of training and leaders among universities, is based on the results of unified state exams. The authors hypothesized that in spite of disputes about the feasibility of unified state exams, the correctness of their

results as a criteria of learning ability of future applicants in academic environment, the unified state exam results can be a criteria of academic performance of the applicants and can be an indicator of their ability to successfully graduation from university on time. In other words, high results of final exams increase the probability of successful completion of training and correlate with indicators of the quality of learning.

Conducting of the study was based on formal criteria: the results of the unified state exam and the results of the university exam (an average indicator of academic performance). The actual data of the unified state exam results and the results of university exams (identified by surname) of students from two Novosibirsk universities were taken as an empirical base. 400 people were analyzed (100 people from each grade starting from the first to the fourth year) in each university.

SAUCE is a construction university, one of the eight universities in Russia, which managed to maintain autonomy and avoid merging with a larger university.

NSTU - Technical University, the only university in the city with the basic profile status among the TOP-100, which is a "talent factory" for industrial enterprises of different directions and different levels.

Data of 4 profiles of the construction direction (08.03.01) was analyzed in NSUACE.

Data of Management direction students (03.03.02) was to be an analyzing base in NSTU.

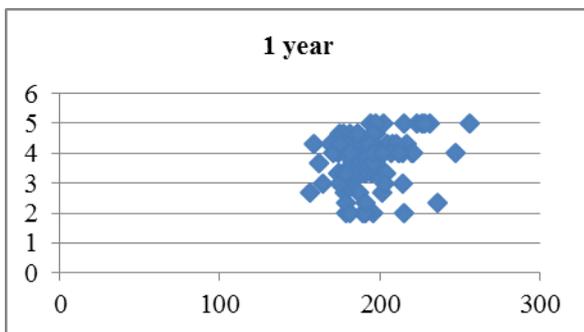


Fig. 4. Scatter plot of correlation of exam results the current academic performance of SAUCE students

A direct correlation between the results of the unified state exam and current academic performance was detected in each analyzed university. The example of a scatter plot of correlation for NSUCE is shown in Figure 4. The correlation indicators: 1 year -0.01; 2 year - 0.36; 3 year - 0.43; 4 year - 0.52.

TABLE I. DYNAMIC INDICATORS OF THE STUDENT'S NUMBER OF CONSTRUCTION DIRECTION OF 2014 AND 2015 ADMISSION IN NSUACE

Year of admission	Number of students			
	1 year	2 year	3 year	4 year
2014	659	531	452	405
2015	658	569	488	472

The reduction of students' number of admission period because of academic failure is taken into account.

The results can be interpreted as follows: the first university year is essentially an adaptation period for students when they have to adapt to a different approach of the educational process, which is marked by an understanding of the subject and a high level of self-discipline, so freshmen have a lower correlation indicator.

After the students' adaptation to a different learning system, the habit of a responsible approach to the results of the study, and their own future prevails, and the correlation indicator increases.

The analysis results at NSTU have also shown a direct correlation between the results of the USE and academic performance at the university. The reason for academic failure in the third year requires additional research. Perhaps this the period is the beginning of students' employment, which leads to declining attendance and, as a consequence, exam results.

The incentive for greater academic effectiveness of the 4th year students is a need for writing and defense of the final qualifying work at the final year of study.

However, the data in Table 1 shows how much budget fund has lost for education concerns the only direction at one university. If the average tuition fees are 100 thousand rubles per a student, the loss in 2014 admission is about 50 million rubles, if not more than 50% of graduates employed according to their specialty profile (the actual percentage was 47% of graduates in 2017, there is no data for 2018) we can add almost 81 million rubles to 50 million rubles. That is, the loss for education under one direction of the study of one regional (not the largest) university during one year is about 130 million rubles according to the most modest estimates.

Based on analysis data results, the following conclusions can be drawn:

1. The level of motivation for studying among budget based students is higher. This conclusion is paradoxical: commercial based education should stimulate to maximize the effect of receiving the service. It can be assumed that the situation with such a lower learning indicator among commercial based students is determined by the following indicators:

- not the students but their parents pay for education, that is, the fact of payment loses its value for the students;
- if the students pay for their education, it means that they have to work, which distracts from their studies and, as a result, leads to low current academic performance;
- on the commercial based education implies a lower USE results compared to budgetary based education, which causes both a lower correlation indicator and lower academic performance at the end of the university exams, although it should be noted that the studying of construction is quite complicated;
- budget based students strive to keep their budgetary form; in addition, there is a small financial motivation - a scholarship for good academic performance.

2. Despite the justified criticism of the USE, its results indicate a willingness to learn at the university among future students. In addition, the essential fact is that such an examination system significantly reduces the subjectivity and corruption component in the competition for budget-based education.

Thus, in order to increase future profession prestige to a greater level, it needs a redistribution of target admission levels for the most popular specialties in the market. The applicants do not think about a profession they choose in pursuit of a budget based form of education, which is the main motivational factor more than 40% when choosing an educational institution and profile, and, as a result, they look for a job that is not related to the direction of study after graduation.

*C. The academic staff of universities as a motivation factor for the choice of profession*

A survey of 276 students, 72% of whom are budgetary based students and the rest of them are commercial based students, was held in NSTU and SAUCE in January - March 2019. The survey involved second and fourth-year students.

The survey results showed that 68.8% of respondents intend to work in accordance with the training direction, 26.4% are adamantly opposed to change their profile of activity, the rest 0.8% have not decided yet.

According to the data of monitoring Center of Economics and Continuing Education IPEI RANEPa, 48% of graduates of engineering direction, 10% of construction profile, and 6% of IT specialists would like to change their profession [17]. Thus, the state suffers significant losses by financing the education of those who do not plan to work with their received profile.

The official results of monitoring of graduates employment which universities refer are overstated, they usually declare 80% or more of employment. Thus, SAUCE declares 80 to 91 percent depending on the direction. The real percentage of employment in positions related to the direction of training for 2017 was 47%. This indicator describes the percentage of budget based students. Similar data can be found in scientific works related to this issue from both professional HR specialists and science representatives involved in research on this issue. In term of efficiency of budget funding, these data begs the question: what is the reason for the loss of interest in the profession among the applicants?

It can be assumed that the reason for that is associated with the third process - learning. Only 40% of the respondents think the knowledge they receive at the university is sufficient to get a job and perform a professional activity, 46.8% of them strongly disagree and consider the level of knowledge insufficient, and 13.2% see a need of additional training. The quality of the educational process is largely dependent on the quality of the academic staff, the formation of which is influenced by the following factors:

- federal state educational standards personnel requirements,
- competencies requirements for the graduates at the side of employers,

- dynamics and trends of socio-economic development of the industry.

One of the tools for providing to perform the graduate's competencies requirements demanded by the modern business is the compulsory requirement of federal educational standards for the academic setting which must be taught by lectures - employees of the organizations represented the training profile.

It should be noted that the transition to new federal standards declines the percentage of academic setting carried out by real business representatives.

This trend contradicts the demand for business representatives among the students: 46.7% of the students out of 276 respondents noted a need to increase the number of lectures given by employees of industrial organizations.

Respondents were asked to rate on a five points scale the quality of the teaching staff involved with companies according to a number of criteria and provide: half of the respondents give the average score for each of the criteria, as shown in Table 2.

TABLE II. ASSESSMENT SCALE OF TEACHING QUALITY AMONG LECTURES – PRACTICAL WORKERS

Evaluation criterion	The score, % of respondents				
	1	2	3	4	5
Interesting presentation of lecture material	2.5	8.3	35.1	39.1	14.9
Conducting practical classes encouraging interest to the subject	3.6	13.1	36.0	30.2	17.1
Transfer of experience through real-life examples	7.3	9.2	28.6	35.9	19.0
The usefulness of the material	3.6	8.0	29.5	38.5	20.4
Material memorability	6.2	12.0	37.5	32.4	12.0

As can be seen from the results, the rates vary from 3 to 4 points. However, to the question “What percentage of disciplines out of total number should be taught by lectures practical-workers?” almost 50% of respondents think that 80% of disciplines should be taught by practical-workers. Thus, the value of practical-workers decreases due to the quality of teaching, the reason of which is a lack of experience and teaching skills.

According to the survey the attractiveness of lecturers practical-workers, the results can be presented as 88% of students consider to learn the professional competencies which are necessary for job in receiving specialty profile, 55.8% review the possibility to do their best get a job at a lecturer’s company, 33.3% find it interesting to get actual knowledge about the position and prospects of the development in their professional sphere, and 26.1% hope to replicate the experience of professionals during their practical training. The questionnaire had a multiplied choice answers to the question “Why is it attractive for students to involve lecturers practical-workers in education?”

There are some factors which impede the effective use of this form of improving the professional competencies of students and their readiness for real activity:

1) the local model of academic set formation based on the division into groups, and compulsory attendance of classes for successful exam passing, in contrast to the Western modular system and “credits”, implying an individual approach to the curriculum of each student;

2) lack of interest from the side of employers, as it requires the diversion of the core staff for mentoring, review of the amount of work, time and labor costs.

Thus, a system approach to the formation of academic staff is still most optimal. There is an idea to bring the traditions of scientific schools establishing. Such work should be started in the first undergraduate year: senior university staff (heads of graduating departments, deans of faculties, etc.) should work with applicants and their parents, explaining the opportunities and aims of all three levels of education during the admission work. From the first days of study at the undergraduate program, talented students should be involved in the research work and motivated to continue their studies in the master's program, and further in graduate school. This aspect is a crucial factor in socially educational work, which is a supporting process in education.

Next step is supervising of talented students, motivating them to continue their education and involving them into the research work during all the years of study.

Implementation of the modular system in the magistracy enables undergraduates to combine the educational process and profile job, for example, a part-time job, which allows consolidate theoretical knowledge and learn in through the doing. It requires state support in case of supporting employers who provide part-time jobs for young professionals. Currently, there is a problem of employment of graduate students, despite their academic load allows combining study and job using the individual schedule and part-time job. Employers are not satisfied with the fact that students will have to be distracted by studies, although such an approach would allow forming high-quality personnel reserve of the enterprise for less payment.

It is worth pointing out that employers complain about the quality of universities training.

And there is another study of the authors: the loss of working time for full-time employees of the enterprises and organizations is from 10 to 50 percent. That is, the motivation for refusing students at part-time jobs, to be supposed it as inefficient work is just stereotypical thinking.

Postgraduate school students should perform pedagogical work in part-time-equivalent positions and improve their teaching skills with the special courses in the frame of the postgraduate program in order to complete the personnel reserve for the educational industry. After postgraduate school, the compulsory requirement for employment into the universities staff should be 3-5 years experience in accordance with the profile of the activity.

The level salary, academic staff requirements, bureaucracy, and other factors have a negative influence in the educational sphere. One of the drawbacks of the proposed training model for the industry is the length of its implementation processes.

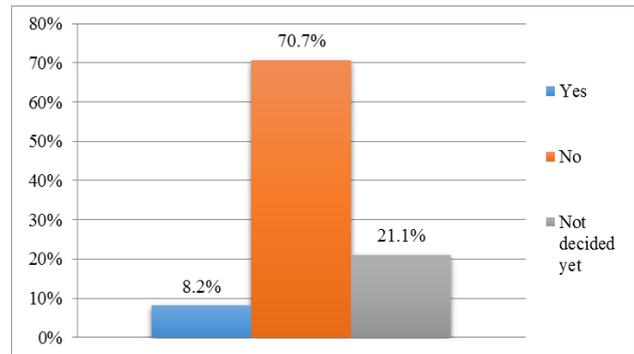


Fig. 5. Structure of answers to the question about the desire to continue education in postgraduate school.

As can be seen from data in Figure 5 only 8.2 % respondents are ready to enter the postgraduate school but 21.1 % them consider joining the postgraduate program which is quite optimistic.

The reasons for the low demand for postgraduate school among potential graduate students are a topic for another study. There was an attempt to identify possible motives for interest for potential graduate students during the survey, the results of which are presented in Figure 6. The survey respondents were asked to choose several answers.

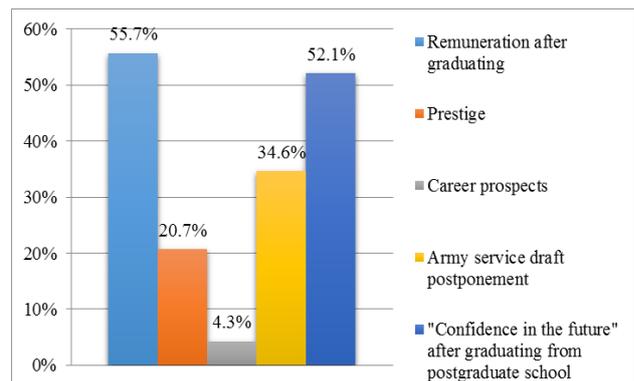


Fig. 6. Motivation to continue learning in postgraduate school.

Survey data allows concluding that there are motivational factors to continue education in postgraduate school. Here we can see the wider promotion of this direction among professionals through the cooperation agreements between universities and enterprises in order to provide practical students' work and commercial contracts.

A systematic approach of personnel formation in higher education institutions can be one of the tools for solving the issue of investment efficiency.

The formation of budget-based places requires the formal way of calculation of target admission levels for all direction based on the factors: projected industry requirement for personnel by the graduation (the number of retired people; the number of people who changed their sphere of activity under various circumstances; working capacity and innovative potential of the industry etc.); the number of graduates with qualification certifications, etc.

To improve the efficiency of educational invested funds the state should return to the condition under which graduates have to work a certain number of years in the

obtained profession in case of budget-based studying, including successful research work in postgraduate school.

At present, new legislation “About Scientific, Scientific and Technical and Innovative Activities in the Russian Federation” is being discussed, which consider compulsory defending a thesis as a result of postgraduate training. Such an approach should have a positive impact to promote a labor potential in the sphere, but it requires additional tools for its implementation (review of current policies of dissertation councils, remuneration of postgraduate students in implementation of their basic labor in higher education, academic staff remuneration, and evaluation of innovative teaching methods to review the staff requirements for the industry, etc.).

#### IV. CONCLUSION

From the consideration of the topic of all processes in educational activity as a top-level business process, the following conclusions were drawn:

1) 53% of students of secondary educational institutions make a deliberate choice of a profession which is based on personal qualities and preferences, or prospected expectations, during the vocational guidance activity. 43% of respondents are motivated by the budget - based study. Such results allow concluding the prediction about the high rate of future work not in accordance with the chosen specialty profile;

2) in accordance with an econometric analysis of a sample of students based on the results of the unified state exam and the university exams results, a correlation between the USE results and academic performance during the study was revealed, and the budget-based students have higher rates. On the one hand, this data can act as criteria for predicting the quality of student learning despite the ambivalent towards the results of the unified state exam academic environment representatives. On the other hand, there is a paradoxical situation that budget-based students take a more responsible attitude towards education. Thus, raising the minimum entrance-exam scores can increase the likelihood of completing the budget – based studies by reducing the percentage of flunking out. The savings obtained by reducing the admission target figures will increase the budget for material and technical equipment and other important items of educational expenditure;

3) the staff of the educational sphere needs to be updated to take into account the latest requirements: the compulsory gained pedagogical experience of academic staff in accordance with the disciplines must be implemented through various regulatory standards, including requirements for work experience in accordance with the education and taught disciplines. This approach needs comprehensive state support, including both economic (remuneration in an educational sphere is not significantly lower than that of high-level specialists in relevant spheres) and regulatory to increase the employer's interest to employ young graduate students for a part-time job, and reviving the mentoring institution;

4) a high number of people who have of higher education among the population of the country, which is typical for Russia even though the level of employed people in accordance with received profession is below than 50%

indicates an inefficient use of budget funds invested in such a strategically important industry for the development of the country as education.

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