

Integration Processes in the Chain: Science, Higher Vocational Education and Production, as a Factor in Increasing the Competitiveness of the Educational Institution

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Abstract: The article deals with current issues related to the formation of an effective mechanism for preparing a competitive specialist. The author focuses on the integration of higher education with production and science, defines the concept of integration, considering the positive aspects of the occurring integration processes that serve to extend the opportunities for training of competitive specialists and to increase the competitiveness of the educational organization. High school absorbs not only a certain state of science and industry, but also their relationship to society. Development of an effective mechanism improving the university competitiveness goes through several stages. In the first phase university is primarily considered as an educational institution, where the focus is shifted to teaching. In the second phase, the university is beginning to act as a teaching and research institution. In the third stage there are processes of integration of higher education (its educational and scientific activities) with the institutions of science and various industrial enterprises. The fourth stage complies with the topmost step of the integration process - the formation of inter-university training, research and production centers, which are characterized by organically integrated educational, research and production system.

Key words: Integration • Training gear • Competitive specialist • Higher vocational education • The competitiveness of an educational organization

INTRODUCTION

Development of an effective mechanism improving the university competitiveness requires qualitatively new forms of cooperation between higher education and the professional organization that is a consumer of the services of the education system. This is explained not only by significant financial cost needed for modernization of the learning process, but also the fact that in recent years the dynamics of demand for various professionals has evolved. In this regard, there is a need in developing a flexible adaptive communication between universities and organizations which are customers of professionals. To solve this problem, a clear interaction between the university and organizations is required. In this case, there will be a mutual benefit. Organizations and enterprises will receive highly skilled specialties of a

certain range, in turn, universities will have resources that will enable you to adapt the learning process to the needs of production.

In the case of building an effective mechanism of interaction between "customer" and "executor", which are, respectively, organizations and institutions of higher education, in this mechanism the recommendations on the types and scope of training for the required specialties and qualifications are formed for specialized training and research center.

While creating a mechanism for the specialist training we are interested in the system of relations, i.e. those integrating processes that take place within the mechanism, allowing to keep it in the appropriate state, generating with new properties. This kind of communication leads to increased competitiveness of educational organizations.

In the scientific literature the integration is the process of combining of some elements into a whole, which results in new properties. However, most researchers have focused on strengthening the links between the elements that lead to such a quantum leap, because the formation of an important aspect of the mechanism is not simply a definition of its elements, but their relationship and new properties that can occur with the combination [1].

The concept of "system" and "integration" has its own specifics. Thus, the concept of "system" to a larger extent fixes an objective form of a whole and the concept of "integration" emphasizes the process and mechanism of combining parts and acquiring an integrated set of qualities, etc. by a whole or a complex. However, integration can be considered as a general option of objective reality [5. P. 23].

On the other hand, consider the integral effect, which implies the harmonization of relations between the comprehensively developing elements. Internal connections that have been rigid unambiguously become flexible, comprehensive, resulting in weakening of the factors of central control and increasing of self-control factors. More optimal redistribution of various forms of links between control and self-control leads to replenishment of the system opportunities for receiving new effects. Thus, if the process of universalization is a quantitative increase in the diversity of properties, then the process of harmonization has a qualitative nature.

In this connection, it is necessary to find out the relation between "harmony", "comprehensiveness" and "integrity". It is of interest in terms of understanding of a harmony as "a certain unity of the parties and the stages of development of the system, achieved through additional functional agreement and by solving non-antagonistic contradictions" [1. P. 32].

Thus, the essence of integration appears as a dual process of universalization of elements and the harmonization of relations between them. In the approach to integration it is necessary to shift the focus on the properties of the elements themselves, which contain a potential of general integral properties, manifested in the formation of the new system [10].

The integration of a phenomenon is a process of development to a consistent state, which is characterized not only by a greater degree of interconnectedness of all elements, but above all, the change in the properties of the elements themselves. Development of the system is due to the universalization of the elements' properties and

harmonization of their relations with each other, resulting in a higher level of system integrity and the new integrated results.

In preparation of a competitive specialist we can not forget about the scientific component of the process. Universalization of scientific research as a means of improving the level of competitive specialists training appears to enhance their interdisciplinary nature in terms of fundamentalization of special scientific research and in the applied general theoretical studies. As a result, each research topic assumes the character of a complex multi-study. The most important condition for the integration of the scientific work is, on the one hand, the strengthening of inter-university co-operation and on the other hand, the increasing links with industry and science.

It is important to note that higher education absorbs not only a certain state of science and industry, but also their relationship to society. Sociology of science says that the interaction of scientific and production activity in the society has a concrete historical character. There was a time when science was behind the production. Classical engineering education with its focus primarily on the needs and requirements of material production reflects this relationship between theory and practice. STD changes this ratio. The progress of science begins to precede the progress of the productive forces of society. Science, realizing its true creative purpose is first groundbreaking techniques and then the technology and economy.

At this time, the preferred orientation of higher education on the production becomes clearly one-sided. Of course, even under STD education should work for production. But if the link from science to production begins to prevail over the counter ones, then high school, standing in the way, is to realize this new interaction between science and industry in the content and organization of work. Interaction between the university and the production also increases, but this increase is within another larger process - the scientific revolutionization of production. The deeper the relationship between production and science is, the more education has to be guided by the laws of its development.

The qualitative feature of interrelation between education and reproduction of the labor force is that education, like science, is converted into a direct productive force of society. First, the role of skilled labor force, which function is performed by education, increases. Second, education has a growing influence on

the formation and development of STP. Along these two lines the process of transforming education in the direct force of society is progressing. High School has a great scientific potential, but it is used by no means in full. Most schools even with a technical profile do not have modern industrial and experimental facilities and if they have, it is mostly just for training, rather than for scientific purposes. So, when they themselves start the practical development and pilot testing of the research results and engineering developments, it appears to be beyond their power and implementation is significantly delayed. Moreover, when the universities have direct contact with the production, it does not always lead to the desired results, since usually research output of university scientists does not have the form ready for use in practice. Therefore, the following conclusion arises; (and it has already been confirmed by the quantitative correlation and regression analysis) that we need a more flexible transition from high school developments to mass production in industrial applications. One of the specific ways to improve the R&D (including economic) is the consistent integration of scientific research. The task of universities is not to get involved in small, random subjects.

The science to a large extent predetermines the efficiency of the economy and its regions, particularly in R&D - as the initial link of the cycle "science - production - consumption." Practical use of the achievements of scientific and technical progress provides a significant portion of the increase of national wealth. In the HTP is a significant increase in the processes of integration of science and industry, due to the conversion of the latter into the technological implementation of research findings. Science, in this case, acts as a member of material production [9]. At the same time, increase of its influence on other areas of human activity, the special nature of the work in the science behind the emergence of a new independent sector of the economy - the scientific production that is one of the most important ways to improve the social division of labor. Let us explain the nature of the interaction of science, university and industry, for this we define these concepts.

Science is the effects and implementation of the intellectual potential of society, released recently, all the more so in a particular branch of industry, characterized by significant and very dynamic behavior.

High school is the structure created by society for the two global objectives:

- EP - the educational process necessary for regeneration and improvement of the intellectual potential of society;
- R&D - research and development work carried out in the framework of solving the problems of science, teaching and production.
- Production - the structure of wealth creation that specifically addresses the needs of society.

These units are in close contact with each other through the information field.

The field of information - a set of changes that occur outside of the elements of the considered system associated with the course of development of scientific and technological revolution and the social and political life.

Through the information field the production again and again, each time on a new basis, sets the objectives for the universities, namely to study the latest production equipment, process technology, division of labor, the principles of organization and management. Thus, the relationship of education and science should be the basis for a strategy and its connection with the production - the basis for policy making.

Do not forget that the impact of science on the economic and social sphere of the regions is usually ambiguous and difficult to determine. The most clearly it is manifested in the functioning of higher education. Effective training of highly qualified personnel in universities suggests their close relationship with scientific research [8]. With the development of science the number of places for the application of skilled labor increases and a need for training of specialists with higher education arises. A high level of scientific activity in the region contributes in locating of science-intensive industries in their territories, which, in turn, determines the need for additional specialists. The specificity of education has implications for planning practice, which is reflected in the following aspects:

- In the ratio of the elements of planning and spontaneity in the field of education. On the one hand, this area is the most controlled sector of the economy, as financed from central sources, on the other hand, the role of subjective factor is very important, because subject and object are the people;
- Plans for the development of education should be ahead of time plans for the development of other sectors;

- Planning of education requires a slightly different approach, taking into account the major trends and perspectives of science and production and use of special planning methods in comparison with the production industries;
- The complexity of educational planning is related to the difficulty of predicting the socio-economic impact of growth or change of the structure of population education;
- The planning of education must take into account intra-branch (between forms of training and education), cross-industry (production professionals and the need for them), the national economic (between the child population and the capacity of educational institutions) relations [4].

The characteristic of the university science is to combine basic research, applied research and experimental development in one institution. However, R&D performed in universities is insufficient. The economic effect of the introduction of the direct developments of academic science is just a small part of the overall effect of practical application of the results obtained in this sector. Thus, the achievement of economic benefit in academic science acts as a secondary task in relation to the creation of new scientific knowledge, which is characterized as a scientific effect [12].

Better integration of university research and production is possible in two ways. First, the high school science and its achievements can be used as a tool for the implementation of production tasks established on the basis of inputs and their needs. Second, science is a tool to establish production goals and provide the ways and means of achieving them [3]. Higher education consists of two interrelated components, such as research and development activities and the educational process. In building an effective mechanism for training competitive specialists, obtain the following correlation of integrating processes. The research activities of the university, integrating with the company, allows: for high school - to realize the real course and diploma projects, apply the scientific recommendations of teachers and students, that is, to use the potential of university research; and for the enterprise – to provide material and technical base, as well as the possibility of experimental verification of the results of research [7]. The integration of the educational process and the enterprise allows the company: for high school - reducing the period of adaptation of young professionals, including students in productive activities, for the company - providing material

and technical base, involving production specialists in the learning process.

Despite some constraints of higher education cooperation with industry, the inclusion of universities in research is of great significance for the development of science in general, as basic research, defining scientific and technical progress is held in high schools. Such cooperation contributes to the scientific and technical training of students and increase of the university competitiveness in the education market:

- Encourages schools to review training programs and materials to meet the changing demands of the economy and also enables involvement of professionals from enterprises to delivering the special courses;
- Students from the first years are attracted in the research and included in the production process well before the end of high school;
- In addition to general education aspects the scientific and research activities in science parks and other organizations funded by the state, is important and purely practical for teachers and students who receive significant financial reward;
- The ability to use the latest expensive equipment.

On the other hand, the industrial enterprises benefit from collaboration with universities:

- Companies can use consultations and attract highly qualified university staff to research works;
- Cooperation with universities allows improving qualifications of the company employees;
- Joint work enriches the practice through participation in various joint symposia;
- It is possible to produce high-tech products;
- Enterprises obtain highly qualified specialists according to their profile.

Domestic and international experience shows that the scientific potential of higher education in its efficient use is a powerful accelerator of social development and economic transformation. Scientific complex of high school is a generator of new scientific and technical solutions, the latest models of incubators and technology. About 40% of science topics developed in high school ends up with new scientific ideas, performing a "breakthrough" in various areas of knowledge, opening the prospect of development for new types of scientific and technical products.

Many graduates in the production process insufficiently use university knowledge and skills, since the tasks they solve in high school are too private, requiring only knowledge and application of the laws of the learned science. Modern production usually poses such tasks for the specialists which require knowledge of the various fields of science, including those that may have not been studied. In this connection it is necessary to pay attention to the alignment of interdisciplinary connections that would help, on the one hand, the systematic repetition of the main points of the studied material, would form the foundation for the study and absorb new knowledge, which would facilitate a more effective training of specialist and already at the university allow forming the components of future specialist competitiveness.

As applied to the system of education, its formation as a system of successive continuing education is acute [12]; it should unite the secondary, general and special, higher and different types of additional post-graduate education. Moreover, it is a single complex, in which the operation of individual elements would be subject to the common goals and objectives. This should be a single system, not just a set of educational institutions, whose activity has little to do with each other. This is the education system that ensures flexible and efficient management of the process of training and professional development and timely response to the changing needs of society.

Therefore, in the system of education and training, the formation of creative personality traits should be strengthened through learning knowledge, skills and experience of solving the creative problems in all areas of their elected practical activities [6].

In general terms, these changes can include:

- Increased synthesis of disciplines and optimization of the well-established knowledge and recent developments;
- Introduction of problem teaching methods and training and research works into the educational process, enhancement of learning focus of students' research;
- Conducting comprehensive training sessions such as business games, lectures in the form of round-table discussions with several experts;
- Reading the special courses and organization of practical knowledge on the theory and practice of creativity, rationalization and invention based on the display of new technology solutions in the

professional field and disclosure of social, economic, psychological, physiological, etc. incentives and mechanisms to achieve new results.

The introduction of creative learning can take place in several ways:

- Strengthening the creativity of teaching all disciplines, covering any and all pupils and students;
- Developing a special system of additional creative training based on the principles of performance-oriented management for a group of students who display brilliant creative abilities;
- Creation of special courses, faculties, etc. for training and re-training of students and professionals to solve the most complex tasks of scientific and practical problems.

Development of an effective mechanism to improve the university competitiveness goes through several stages [2]. In the first phase, university is primarily considered as an educational institution, where the focus is shifted to teaching. In the second phase, the university is beginning to act as a teaching and research institution, with widely developed research, amplified with a training function and some novel forms of production, for example, pilot production. Integration of science and educational work occur in the higher professional education, thus giving impetus to the development of the following processes associated with more effective training of specialists. In the third stage there are processes of integration of higher education (its educational and scientific activities) with the institutions of science and industrial enterprises. Thus, creating conditions for the merger of the educational process with research, application of scientific achievements in production, as well as the relationship between science, educational process and production significantly increases. The fourth stage corresponds to the topmost phase of the integration process - the formation of inter-university training, research and production centers, which are characterized by organically integrated educational, research and production system, where, the learning process, research and experiments, respectively, are carried out.

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