

SECTION 2

ECONOMIC FACTORS FOR HIGHER EDUCATION DEVELOPMENT IN THE CONDITIONS OF SOCIETY INFORMATIZATION

2.1. Innovative development as the key factor to increase competitiveness of Ukrainian higher education institutions

One of the most important factors of providing competitiveness of Ukraine in the world economy, on the one hand, and to facilitate its transition to the principles of real innovation and investment modernization development, on the other hand, is an effective use of the potential of intellectual property in general and the faculty and staff of higher education institutions in particular¹⁴⁸.

The development innovative model suggests a systematic application of scientific achievements in the real sector of the economy, as well as the activation of innovation activity of organizations and business structures. The most important role in this process should play a scientific and innovative activity of university, which is the source of future-oriented and progressive development of innovations aimed at creating changes in the system of training and maintaining their positive result for the economy and society.

Under these conditions, an important priority of the state innovative policy of Ukraine should be the creation of a favorable innovative climate and providing various support to small innovative enterprises, technology parks and business incubators already existing and being created based on the state universities. It is of particular importance for technological universities, since in the real sector of economy of Ukraine, despite the huge resource potential of the state, it has been mostly exhausted the possibility of increasing production at the expense of extensive factors. Considering this, we can see the increasing importance of small innovative enterprises, technology parks and business incubators existing at universities. The solution to these and other questions in the context of improving the competitiveness of the university requires the restructuring of university activities, highlighting the innovative component as a priority.

To effective forms of cooperation of universities and businesses in the field of innovation, we should include the creation of appropriate infrastructure, adapted to promote and support applied research in science and technology in collaboration with

¹⁴⁸Старостіна А., Кравченко В. Інтелектуальна власність у вищій школі: передумови ефективного використання та ризику створення і комерціалізації // Львівській ЦНІІ (<http://cstei.lviv.ua/upload/pub/Innov>). – 2012. – 19.12. (Доступ 22.02.2013 р.).

outside researchers, institutions, government agencies and private companies. This has been called the technological park (technopark), whose main task is "...the implementation of investment and innovation projects, introduction of science-intensive developments, high technologies and manufacturing competitive product in world markets"¹⁴⁹.

Foreign experience shows that the creation of small innovative enterprises on the basis of higher education institutions gives the latest advantages, including¹⁵⁰: additional sources of funding and development of the university; realization of scientific innovative projects of the university; stimulation of scientific activities; providing students with practical knowledge; competitiveness of graduates in the labour market; improving the image of the university. In this kind of partnership the higher education institutions should act as a consultant and assistant, to contribute to the growth of innovative potential of enterprises and improving their activities. Besides, educational function of the university lies in the development and implementation of interactive educational products that promote an innovative approach in the activities and business structures and higher education institutions as factors in their competitiveness.

German universities create their own centers of support for small business: four largest German research organization – Max Planck Society, Fraunhofer Society, Leibniz Society and Helmholtz Society – have relevant units, whose function is to support scientists in the field of implementation of research results at universities and research institutes. Services provided by these units, include: advising, assistance in the creation of innovative enterprises, preparation of business plan, financing and commercialization of inventions. The principle of functioning of small innovative enterprises under universities in the USA is a triad: from basic knowledge through the national laboratory to technology commercialization. For example, in US universities there is the largest part of long-term innovative research.

Similar experience exists in the national universities. So, in Kharkiv National University named after V. N. Karazin there was opened Innovation Center, which was created for the effective commercialization of scientific, technical and technological developments¹⁵¹. The strategic objectives of the Innovation Center were identified the creation an environment at the university focused on the effective use of scientific, technical and technological potential of the university for the

¹⁴⁹Солдатова С. О необходимости и основных формах сотрудничества вузов и бизнес-структур в области инновационной деятельности // Наука та інновації. – 2011. – № 4. – С. 82–83.

¹⁵⁰Александрова С.Ю. Малые инновационные предприятия при высших учебных заведениях российской федерации: проблемы и перспективы развития: автореф. дис. канд. экон. наук.: 08.00.05 / ФГБОУ ВПО «Московский государственный технический университет имени Н.Э. Баумана». – М.: 2012.

¹⁵¹У Каразинському університеті відбулося відкриття Інноваційного центру // Український науковий клуб (http://nauka.in.ua/news/education/article_detail/8356). – 2012. – 20.11. (Доступ 22.02.2013 р.).

development, introduction and industrial mastering of new techniques, technologies and products of intellectual activity of scientific and pedagogical workers, students and postgraduate students; active involvement of scientific and pedagogical workers, post-graduates and students of the university in research activities in the field of high and innovative technologies; forming the base of innovative development of the university, national and international funds and financing programs of innovative projects, a variety of grants.

The main activities aimed at enhancing research and innovation activities of Ukrainian universities and at facilitating its implementation should include the following¹⁵²: the development of the state target scientific-technical and social program "Science in universities"; amendments to the Law of Ukraine "On public procurement"; the renewal of the agreement between Ukraine and the European community on scientific and technological cooperation, which provides financial support of higher education institutions research projects, scientific institutions through exemption from import duties and VAT at import scientific equipment components on coming to the territory of Ukraine; implementation of a comprehensive intercollegiate projects, which will allow to concentrate financial and human resources on priority directions of development of science and technology and to solve important scientific, economic and social problems, to avoid duplication of topics, to combine the efforts of several scientific schools in addressing pressing problems.

Taking into account the importance of the effective selection of research projects for the coming years with the aim of obtaining competitive scientific results, implementation of which will be able to influence effectively the development of innovation economy, Ministry of education of Ukraine annually conducts a competitive selection of research projects, basic research, applied research, scientific and technical (experimental) developments with the participation of universities and research institutions that belong to the sphere of management of the Ministry¹⁵³.

Do not stay aside of these processes the academic interests of the higher national institutions of Ukraine. Thus, the Resolution of the International Scientific-practical Forum "Science and business – the basis of development of economy", was defined by¹⁵³: a strategic priority for universities and research institutions of Ukraine, the commercialization of scientific research; formation of science parks, the feasibility of unification of scientific schools and the material-technical base of scientific research, given the demand of the real sector of the economy; the need to

¹⁵²Державна служба статистики України. Офіційний сайт [Електронний ресурс] / Режим доступу: <http://ukrstat.gov.ua/>

¹⁵³МОНмолодьспорт: Від наукового пошуку до трансферу інновацій // Урядовий портал (<http://www.kmu.gov.ua>) . – 2012. – 15.10.

accelerate the work of universities to join the Ukrainian-Russian inter-University network of technology transfer and its integration into the European network EEN.

An important indicator of the development of the education system and ensuring its competitiveness is the dynamics of the rate of investment in the education sphere, especially taking into account the fact that Ukraine has chosen the model of economic development based on knowledge. The table 2.1 shows dynamics of indicators of capital investment in education in absolute terms and their share in total investment volume and dynamics of capital investment in research and development. The analysis shows that in the analyzed period there was an annual decrease in the level of capital investment in education (except 2015) on the background of fluctuations in the overall volume of capital investments in all economic activities (indicator drop was observed in 2013 and 2014 compared with the previous year); the corresponding fluctuations are observed in terms of investment in research and development (decrease of the indicator occurred in 2012 and 2014 compared to the previous year).

Table 2.1

Dynamics of capital investments in education and science in Ukraine¹ (calculated by the authors according to¹⁵⁴)

Indicator	2010	2011	2012	2013	2014	2015
Overall capital investment	180575,5	241286,0	273256,0	249873,4	219419,9	273116,4
Growth coefficients (chain)	-	1,34	1,13	0,91	0,88	1,24
Capital investment in education, mln. UAH	1818,4	2090,7	1463,5	1030,5	820,9	1540,1
Growth coefficients (chain)	-	1,12	0,70	0,70	0,80	1,88
Investment share in education, % of the total investment	1,0111	0,87	0,54	0,4144	0,3758	0,5663
Capital investment in research and development, mln. UAH	549,7	717,9	548,8	599,2	375,4	518,2
Growth coefficients (chain)	-	1,31	0,761	1,091	0,63	1,38
Investment share in education, % of the total investment	0,30	0,30	0,20	0,24	0,17	0,19

¹ – excluding the temporarily occupied territory of the Autonomous Republic of the Crimea and Sevastopol city, for 2014-2015 as well without the part of the antiterrorist operation zone.

According to the data at the table 1 the capital investment share in education in the investigated period has a tendency to decrease from 1 % of their total volume in 2007 to 0.4% in 2014, which taking into account the general situation with education sphere in Ukraine cannot be considered to be positive. During the last five years, the growth in the volume of capital investment in education in absolute terms was observed only in 2011, after which the indicator value decreased compared to 2010, more than 2 times. Of course, this situation could not affect the capacity of national universities, including the scientific sphere.

To achieve the theoretical, methodological and technological breakthroughs in all fields of higher education institutions without which it is impossible to overcome the economic and technological crises, the formation of new vision and achievement the goals of high schools, requires the establishment and maintenance the universities innovative activity management as the basis for ensuring its competitiveness. The purpose of this paper is to determine the most effective forms of universities innovative activity in the context of ensuring its competitiveness.

The importance and priority of innovative development of the universities necessitates the development of methodological and methodical fundamentals of practical tools and regulatory support, the development of appropriate innovative task of higher education system strategic management. At the same time, we should take into account the issues facing universities at the stage of innovative transformations, among which urgent solutions are required by: the issue of scientists support with special rooms (science laboratories) and scientific equipment; the issue of staffing, due to the action of a number of factors, namely: insufficiency of personnel and its training, lack of the opportunities among young people for creativity in terms of the financial deficit, the reluctance of young people to connect their lives with science; improving the system of information support of small innovative enterprises at universities; the issue of financial support with the lack of real financial and credit mechanisms providing such support (it is necessary to involve intensively external financing of small innovative enterprises at universities, developing modifications to the schemes of venture capital financing of innovative projects, business network, encouraging small innovative enterprises at universities to participate in international projects). The solution to these and other challenges requires the formation of development strategy of the modern university, the definition of strategic vision at the beginning of a new stage in the development of the university. Thus, under the strategic vision in this context we understand "...clear, thoughtful direction, which allows to allocate resources optimally in time and create (select) a unique strategy as well as methods and models for its achievement"¹⁵⁴.

¹⁵⁴ Холод Б., Дашевська О. Сучасний інструментарій вибору операційних стратегій розвитку ВНЗ // Академічний огляд. – 2012. – № 1. – С. 9.

As the results of the taken research we define^{155,156}: the main factors of strategy formation of universities innovative development, which were systematized on the grounds of the existing problems, the peculiarities of formation of innovation development strategy and priority measures for its implementation. So, the main problems of higher education system development at the modern stage include: the necessity of renting premises and research equipment; building capacity; improvement of information support of scientific and innovation activities; the need to strengthen financial support and the formation of a real financial-credit mechanism for research and innovation activities of the universities; updating the material-technical base of scientific and tertiary education institutions; the formation of a network of scientific training centers and further centers for collective use of equipment.

The formation peculiarities of innovative development strategy of the universities should be: (1) the need to create and use a databank of social, economic and political indicators with the aim of forecasting trends in the development of the education sphere of the region, the country; (2) the results records of objective monitoring of the University performance in the preparation of the strategy and its implementation; (3) defining market niches of universities in educational and research sphere; (4) the focus on improving the efficiency of the organization of work of education institutions, including improving the effectiveness of scientific work of students, educational-methodical and scientific-research work of the teaching staff; attracting foreign investment in the development of research and innovative work, the material-technical base of the university.

The priority tasks in the implementation of the innovative development strategy of the university, include:

- the creation of examination centres of innovative projects on the basis of universities with the aim of assessing the relevance of the ideas and their potential implementation;

- creation of technology transfer centres, which will contribute to the establishment of contact with the enterprises-partners, personnel matters, the formation of the customer base at the initial stage of development of small innovative enterprises;

¹⁵⁵Володин Н.Н. Концепция инновационного развития университета / Официальный сайт российского национального исследовательского университета им. Н.И. Пирогова [Электронный ресурс] // Режим доступа :<http://www.rsmu.ru/3820.html>

¹⁵⁶Нефедова Т. М. Стратегічні пріоритети інноваційного розвитку ВНЗ у контексті забезпечення конкурентоспроможності // Освіта: соціальні аспекти в контексті економічного розвитку України: монографія / за заг. ред. професорів С. М. Лаптева, В. С. Сідака, М. П. Денисенка. – К., 2014. –С. 166 – 180.

- the establishment of holding companies under universities that will streamline and coordinate the work of small research units and innovative enterprises at universities;

- the creation of large research laboratories to implement the association "The university is a small innovative enterprise".

The implementation of the innovation strategy is impossible without the formation of relevant policies in the field of innovative and scientific activities. It has been determined that the innovation and research policy of the university should be formed based on the following main principles: integrity of scientific and educational processes and their focus on economic and social development of the society; the concentration of scientific and financial resources on the priority research areas, the full cycle of research and development, ending with the creation of the finished product; support of leading scientific schools and groups, individual scientists, able to provide a high level of scientific research and education; support of entrepreneurship in scientific-technical sphere; the integration of science and education in the international community.

Successful implementation of the innovation policy aimed at achieving competitive advantages requires the restructuring of the organizational structure of universities to transition to a new, innovative structure. The advantages, achieved by higher education institutions through the creation of innovative governance structures, include: the development of science and technology transfer; increase the level of university staff motivation; development of scientific schools and teams; enhance the competitiveness of graduates in the labour market; a more attractive educational offer.

The mentioned above information will promote a positive image of the innovation-oriented university. Thus, European universities are increasingly focusing on technology transfer, as it contributes not only additional income, but to create the image of the institution, graduates and scientists who not only have a high educational level, but are the creators and beneficiaries of economic success associated with the commercialization of technologies.

Innovative matrix management system of the university can be represented in multiple levels, the interaction of which should ensure the implementation of the innovation process at all stages. At the strategic level, there are the rectorate and academic council of the university, defining the strategy of innovative development, innovative policy, scientific and other spheres. At the functional level – functional units that provide the vital functions of the university in all spheres and the so-called "technostructure", which is a combination of innovative functional units and centres. The object of the restructuring should be all structural units of the university, but, above all, basic units of "operating level" – institutions, faculties, departments¹⁵⁸.

Another approach to ensuring innovative development of the university is the creation of a unit responsible for innovation. A striking example of this innovative structure is the structure of the department of innovation policy and innovation activities at Moscow state university named after M. Lomonosov, which acts as a center for innovative thinking of the university, allows to accumulate research experience and implement it into practical application through technology transfer, science parks and incubators¹⁵⁷. The selection of innovative structure of the university should be based on the number of areas such as training, breadth of scientific topics and sizes of the university.

The general model of organization of Ukrainian universities must be built taking into account the global trends, namely: continuous improvement of the quality of higher education, updating its content and forms of organization of educational process; optimization of the higher education system, its differentiation; integration, globalization of educational and research systems; cooperation of business, education and science; capitalization of educational services and scientific research; the multilateral system formation of investment providing university education; the development of public-private partnership in this sphere; development of small innovative enterprises in the structure of the university.

2.2. Components of intellectual capital in the economy of knowledge

Attention to the information and intellectual factors - both at the level of individual enterprises and at the level of the economy of the state as a whole - was particularly intensified at the stage of post-industrial society formation. Intellectual capital, along with other factors of production - physical, monetary, technical and financial, is now a vital resource of any company. This resource is characterized by three components - knowledge, information and creativity - which are often defined as "a public good" in the economic literature. In the modern economy, the activity, which is based on innovative knowledge, information and creativity, determines the development of the economic system and is the main force that affects the progress development. At the stage of the information economy formation, the economic and theoretical studies of knowledge, information, and creativity in the combination of these three categories are particularly relevant, since any economic system is a sphere of production and reproduction of information, and processes occurring in an economic system are based primarily on knowledge and the ability of individuals to create.

Today, knowledge becomes a source of high productivity, innovation and

¹⁵⁷Макаркин Н. П. Матричное управление в высшем учебном заведении / Н. П. Макаркин, О. Б. Томилини, И. М. Фадеева // Университетское управление: практика и анализ. – 2004. – № 1(30). – С. 43–47.