

Oksana O. Karpenko¹, Kseniia V. Iashyna²

FORMATION OF KNOWLEDGE TRANSFER SYSTEM IN UKRAINIAN HIGHER EDUCATION INSTITUTIONS

The paper offers the definitions of "knowledge transfer", "technology transfer" and "innovation transfer" and identifies the interrelation between them. The main problems of knowledge transfer are defined, the establishment of knowledge transfer units in higher education institutions for innovative infrastructure development in Ukraine are proposed.

Keywords: knowledge economy; knowledge transfer; technology transfer; higher education institution.

Оксана О. Карпенко, Ксенія В. Яшина

ФОРМУВАННЯ СИСТЕМИ ТРАНСФЕРУ ЗНАТЬ У ВИЩИХ НАВЧАЛЬНИХ ЗАКЛАДАХ УКРАЇНИ

У статті досліджено поняття «трансфер знань», «трансфер технологій» і «трансфер інновацій» та встановлено взаємозв'язок між ними. Визначено основні проблеми трансферу знань, запропоновано створення центрів передачі знань у вищих навчальних закладах для розвитку інноваційної інфраструктури України.

Ключові слова: економіка знань; трансфер знань; трансфер технологій; вищий навчальний заклад.

Рис. 3. Табл. 1. Літ. 19.

Оксана А. Карпенко, Ксения В. Яшина

ФОРМИРОВАНИЕ СИСТЕМЫ ТРАНСФЕРА ЗНАНИЙ В ВЫСШИХ УЧЕБНЫХ ЗАВЕДЕНИЯХ УКРАИНЫ

В статье исследованы понятия «трансфер знаний», «трансфер технологий» и «трансфер инноваций» и установлена взаимосвязь между ними, определены основные проблемы трансфера знаний, предложено создание центров передачи знаний в высших учебных заведениях для развития инновационной инфраструктуры Украины.

Ключевые слова: экономика знаний; трансфер знаний; трансфер технологий; высшее учебное заведение.

Introduction. The main global trend in contemporary society building is global scientific and technological transformations. They determine the transition from primary industrial economy to postindustrial knowledge-based economy. The determinants of such economy's production are intellectual capital and information technologies, conditioned by international knowledge transfer as an objective result of technological globalization. Under current conditions the economic system is able to provide competitiveness in the context of global challenges increase only through determination and implementation of international knowledge transfer providing transformations for the country to reach the needed level of living standards for its population (Medvedkin, 2013).

The necessity of formation and development of knowledge-based economy is admitted by many countries of the world. The European commission has developed the strategy "Europe 2020. A strategy for smart, sustainable and inclusive growth" (ec.europa.eu), in which economic development based on knowledge and innovations is defined as the key priority.

¹ Kyiv State Maritime Academy named after hetman Petro Konashevich-Sahaydachniy, Ukraine.

² Dniprodzerzhinsk State Technical University, Ukraine.

At the current stage of human development the phenomenon of knowledge-based economy is getting global. Countries open their borders to provide the free flow of goods, services, labour force, capital and knowledge. Today innovations and knowledge penetrate all the spheres of national economies and cross state borders (Katsura and Lymar, 2010).

Research and publications analysis. A considerable contribution to studies on knowledge-based economy has been made by the following scientists: M.V. Chentsova (2008), T.S. Medvedkin (2005) and others. It's necessary to also mention the research by A.S. Bura et al. (2012), Iu.A. Dulepyn and N.V. Kazakova (2010), S.M. Katsura and V.V. Lumar (2010), V.V. Lymar (2013), T.S. Medvedkin (2013) on international knowledge transfer. The problems of knowledge transfer regulation in Ukrainian economy are investigated in the works of O.V. Kamianska (2008), O.M. Liashenko (2013), H.V. Shemaieva (2012), A.I. Zemliankin and I.I. Lyakh (2010) and other domestic scientists. In spite of considerable interest to this issue, there are still some aspects requiring a more detailed investigation.

Unresolved issues. The world experience proves the necessity of transition to knowledge-based economy and stimulating knowledge transfer within Ukrainian economy, but there is a number of obstacles that prevent their implementation.

The aim of research is to explore the peculiarities of knowledge-based economy, to define the obstacles of knowledge transfer within the Ukrainian economy, to develop the methods of successful knowledge transfer realization by creating and developing knowledge transfer units in domestic higher educational institutions.

Key research findings. From the end of the 1990s the term "knowledge-based economy" became widely spread in Western and domestic science. This new type of economy differs significantly from agrarian and industrial types of economy. Natural and material resources continue to be the basis for producing economic goods, but the growth and development of the whole economic system are provided now by the internal non-material factors rather than by the exterior ones. The most important of these factors are knowledge and human capital (Chentsova, 2008).

The key features of knowledge-based economy are: domination of high-tech branches and intellectual services in gross domestic product structure; formation of the major part of national income due to innovative or technological rent; high level of companies capitalization. The main value of companies is formed by non-material assets, in other words, by the intellectual component. The knowledge-based economy is the basis and the key component of "innovative economy". Its fundamental basis is productive knowledge and high-quality substantial education, which determine the ability to embody humanitarian and intellectual capital into productive activity. The main difference between knowledge economy and market economy lies in constant technological renovation of production and in self-reconstruction of its "knowledge" factors, their non-expropriation in the economic exchange process, quick restoration and relative availability for use (Heiets and Semynozhenko, www.semynozhenko.net).

The key provisions of knowledge economy are: transformation of knowledge into the main production factor; generation, distribution and application of knowledge in all the spheres of economy; human capital and intellectual labour role increase; dominance of non-manufacturing services over manufacturing; increase in

the number of scientists as the main knowledge generators; directing investments to knowledge-based spheres; transformation of knowledge into the main factor of competitiveness for enterprises, regions and even countries at world markets.

In the XXIth century about 20% of productive population is expected to be engaged in some sort of research work. The processes of intellectualization of production and labour will intensify; the effectiveness of resources use will increase (Medvedkin, 2005).

Implementation of innovations depends on the systematic transmission of knowledge, skills, technologies, methods, samples and production objects from one party to another to ensure the accessibility of scientific and engineering developments to wide circle of users, able to develop and use the technology in new products, processes, forms, materials and services, in other words, in their transfer. Transfer creates certain links between knowledge origination and its use in the process of innovations' production (Shemaieva, 2012).

At the same time, it should be noted that contemporary researchers propose to distinguish the notions "knowledge transfer", "technology transfer" and "innovation transfer" (Table 1).

The analysis of the notions given in Table 1 allowed us determine their interrelation (Figure 1).

So, the broadest notion is "knowledge transfer", the narrowest one is "innovation transfer", and the notion "technology transfer" occupies the middle position.

As of today, Ukraine hasn't managed to take an appropriate place in the processes of national and international knowledge transfer. Little success in knowledge transfer projects realization in Ukraine is conditioned by the following factors:

- insufficient development of innovative processes, which hampers the country's participation in international exchange of technologies;
- inconsistency in implementation and low efficiency of state scientific, technological and innovative policies;
- underdeveloped domestic legislation concerning the determination and protection of intellectual property rights of innovative process participants (Bura et al., 2012).

The key problems of knowledge transfer are:

- low level of R&D activities financing;
- inefficient use of funds on innovations;
- absence of public and private demand for scientific and engineering developments;
- low share of foreign investors in the funding of technological innovations;
- reducing number of innovatively active enterprises.

To revive the technology transfer for the purpose of Ukraine's competitiveness increase under the conditions of global challenges, it's necessary to implement reforms in the corresponding directions:

- to provide support and protection for national producers by promoting export of domestic innovative products;
- to provide financial assistance while patenting the industrial property objects abroad;

Table 1. Distinguishing the notions "knowledge transfer", "technology transfer" and "innovation transfer"

Notion	Definition	Source
Knowledge transfer	space-time transfer of technologies, high-tech goods, services; migration of scientists and experts, as a result of which countries – recipients of knowledge get benefits in order to build such a world economic order that will provide optimal growth of the world economy and equalize disproportions on the innovative landscape at the mega- and metalevels	<i>T.S. Medvedkin (2013)</i>
Knowledge transfer in industry	a stage of innovative process that consists in a transition between different organizational structures and technological processes of knowledge which is not only initial data, but also a final result of innovative process, where external knowledge is combined with internal one, accumulated in the course of previous innovative processes, including technologies, experience and skills, and transferred from one party to another, resulting in innovations in economy and social sphere	<i>A.I. Zemliankin and I.I. Lyah (2010)</i>
Knowledge transfer	organizational systems and processes with the help of which knowledge, including technologies, experience and skills, is transferred from one party to another, resulting in innovations in economy and social sphere	<i>Strategy (www.umr.ru)</i>
Knowledge transfer	a multidimensional and multibranch process of transmission of different forms and kinds of knowledge	<i>H.V. Shemaieva (2012)</i>
Technology transfer	a component of the knowledge transfer process that provides transmission of new technologies from creators to users	<i>Strategy (www.umr.ru)</i>
Technology transfer	rather broad spectrum of both interstate and domestic economic market relations	<i>V.P. Solovjev (2006)</i>
Technology transfer	transmission of technology validated by a contract between several legal or natural persons	<i>O.M. Lashenko (2013)</i>
Technology transfer	a component of knowledge transfer providing transmission of new technologies from their creators to society. The process of transmission and sale for the purpose of organizing competitive goods production. This process may have different forms: it may contain a licensed agreement, a foundation of a joint venture or a partnership with joint risks and rewards	<i>H.V. Shemaieva (2012)</i>
Technology transfer	transition of technologies in the direction of knowledge application	<i>Iu.A. Dulepyn and N.V. Kazakova (2010)</i>
Innovation transfer	transfer of a technology ready for use or of a product created on its basis	<i>Iu.A. Dulepyn and N.V. Kazakova (2010)</i>

- to organize exhibitions dedicated to scientific, technical and innovative activity, to support exhibition activity of domestic producers of high-tech products;
- to encourage establishing the branches of Ukrainian scientific and technological institutions, innovative enterprises and structures abroad (Kamianska, 2008).

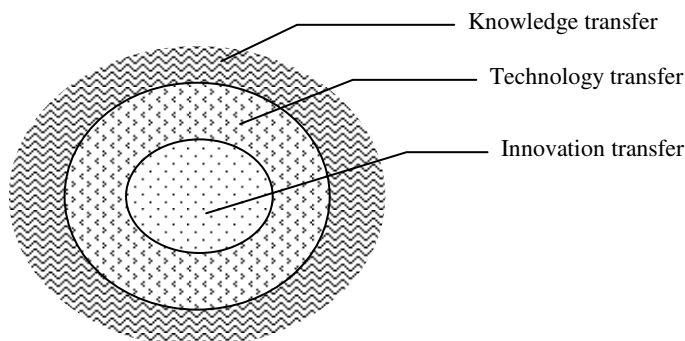


Figure 1. Interrelation of the notions "knowledge transfer", "technology transfer" and "innovation transfer", created by the authors

Thus, at the current stage of the world economy development it's predominantly the country's technological level, the scope of R&D activities, the availability of highly qualified labour force that determine its welfare and prospects of development and give significant advantages in international trade, particularly, in the international exchange of technologies.

Ukraine must create infrastructure for technology transfer including technology transfer units and continue establishing technology transfer units at the national and regional levels. To form demand for high technologies it's necessary to develop the national industry of venture capital in the country, to provide legal control over venture production, to stimulate the search for foreign venture funds in order to produce final products using the already developed technologies. The implementation of all the abovementioned suggestions will allow Ukraine get a proper place in exports and imports of international technologies.

The status of "contemporary university" determines these days a new function of a university, which is the role of knowledge integrator. University becomes a leading participant and an organizational intermediary for educational and scientific structures, from one side, and business, cultural institutions and public structures, from the other. The aim of this integration is solving interdisciplinary problems in education and science, as well as carrying out innovative activities (Kalinovskaya et al., www.rae.ru).

Postindustrial knowledge-based economy gives universities a triunique task involving experts, performing research activities, commercializing R&D results (Fedorov, 2007).

Building advanced competitive economy in Ukraine on the grounds of innovative activity is possible only under the condition of functioning full-fledged infrastructure including universities, technological and scientific parks, innovative centres, business-incubators, investment funds etc. Such structures have proved to be most effective in providing cooperation of education, science and business, and

assisting in quick going through the innovative cycle: new idea – prototype – patenting – launching the production. The experience of developed countries indicates that the dominating role in this process belongs to leading universities of the research type, in which, along with highly qualified personnel training, research activities are conducted and innovative developments are introduced. The analysis of innovative structures existing now in Ukraine indicates the low-to-nonexistent level of knowledge and technology commercialization section. This determines the necessity of forming a corresponding section of innovative infrastructure inside higher educational institutions (Sovershenna, ena.lp.edu.ua).

The task of knowledge transfer unit of a higher educational institution is to promote the project growth from an idea to a successful business. Every university is interested in getting maximum surplus as a result of its technologies commercialization. The higher is the level of development of the product, the more expensive it is to sell it. According to the principle of venture investment, in case of a success the value of initial shares can increase by dozens of times.

Knowledge transfer will allow higher educational institutions act as equitable participants of investment and innovative processes. That's why functioning of a contemporary higher educational institution is impossible without creating a corresponding knowledge transfer structure.

The project of the TEMPUS program (the program logo is given in Figure 2) "Knowledge Transfer Unit – From Applied Research and Technology-Entrepreneurial Know-How Exchange to Development of Interdisciplinary Curricula Modules" (the project logo is given in Figure 3) is implemented in the institutions of higher education of Ukraine for the purpose of creating modern knowledge transfer centers³.



Figure 2. TEMPUS program logo



Figure 3. The project logo

The grant holder of the project is the Joanneum University of Applied Sciences (Graz, Austria). There are 18 partners in the project, among them the representatives of the European Union: the World University Service – Austrian Committee (Austria), Budapest University of Technology and Economics (Hungary); Universitat de Girona, (Spain), the Royal Institute of Technology (Sweden); higher education institutions of Ukraine: Academician Yuriy Bugay International Scientific and Technical University (Kyiv), National Aerospace University "Kharkiv Aviation

³ Registration number of the project: 544031-TEMPUS-1-2013-1-AT-TEMPUS-JPHES. Number of the Grant Agreement: 2013–5054/001-001. Duration of the project: 36 months, 12/2013–11/2016.

Institute", the University of Banking of the National Bank of Ukraine (Kyiv), Khmelnytskyi National University, Kyiv State Maritime Academy named after hetman Petro Konashevich-Sahaydachniy, Dniprodzerzhynsk State Technical University; as well as the Ukrainian Student Union, the LLC "Centre of Innovative Machine Building Technology", the Association of Small Enterprises of Ukraine, Transcarpathian Chamber of Commerce and Industry, Ukrainian Institute for Scientific, Technical and Economic Information, Dnepropetrovsk Aggregate Plant, the Ministry of Education and Science of Ukraine.

The project execution involves 8 operational packs within the framework of which it's necessary to do the following (Tempus project, 2013):

1. Develop strategies for 6 Knowledge Transfer Units (hereinafter referred to as KTU) in 6 Ukrainian higher education institutions. These 6 KTUs will be equipped with the rapid prototyping technology (RPT) and get support and consulting from the EU partners.

2. Establish possibilities and confirm the knowledge transfer in these 6 KTUs.

3. Implement pilot projects in every KTU, develop corresponding instruments and services.

4. Develop/modernize and implement interdisciplinary curricula modules in the fields of engineering, technical sciences and business administration.

5. Perform quality control and monitoring of the project.

6. Provide consistency of the project results.

7. Share the project results with all interested parties.

8. Perform project management.

The basic activities of every KTU are the following:

- communications: KTU is a contact point for companies/external partners having priority in knowledge transfer to a wider circle (professional development, trainings and seminars);

- supporting and developing research activities: writing grant applications, project management;

- internal consulting, providing assistance to KTU staff in market presentation of innovative decisions (commercialization), internal evaluation (intellectual property management, marketing research activities) etc.

The main requirement of the project is effective, viable and influential operation of Knowledge Transfer Units in all partner domestic higher education institutions during and after the project realization. KTUs operation will have positive effects on both educational and scientific activities of the specified higher educational institutions.

Conclusions of the research and prospects for further investigations. Transition of developed countries to the new type of economy, knowledge-based one, has determined the necessity of forming effective mechanisms of knowledge production and commercialization on the basis of state, corporate and academic interests' coordination. This in turn determined progressive changes in public innovative policies of all developed countries, which started to show up through the expansion of universities' and business' powers in the innovative field and formation of a fundamentally new model of innovative system.

A contemporary higher education institution has to perform educational, scientific and innovative activities by creating a KTU for the purpose of knowledge trans-

fer effectiveness increase, thus contributing to social and economic development of regions and Ukraine in general. The main expected results from KTUs operation, created on the basis of higher education institutions, are the following:

- strengthening the positions of higher education institutions in global scientific and technical cooperation;
- creating the basis for integrated development of science and higher education, optimized by the directions of activities and the location;
- organizing cooperation of higher education institutions, research institutions, enterprises and other organizations, public authorities for the innovative development of productive industries;
- growth in the number of documented results of intellectual labour;
- implementation of innovative technologies at enterprises and organizations.

Thus, the knowledge transfer units, created on the basis of higher educational institutions, represent an integral part of the innovative model of economic development at different regional levels and Ukraine as a whole. Their significance consists in creating favorable economic and social conditions for the evolution of R&D and innovative business.

References:

- Бура А.С., Гуменик Б.О., Танаїєнко Н.П.* Проблеми міжнародного трансферу технологій в Україні // Вісник Хмельницького національного університету.— 2012.— №2, Т. 1. — С. 184–187.
- Гесць В.М., Семиноженко В.П.* Доктрина економіки знань: проект // www.semynozhenko.net.
- Дулєпин Ю.А., Казакова Н.В.* Стратегії трансфера інновацій в інноваційних системах, 2010 // www.v-itc.ru.
- Землякін А.І., Лях І.І.* Узагальнення підходів щодо трансферу знань як елемента інноваційного процесу // Вісник економічної науки України.— 2010.— №2. — С. 43–46.
- Калиновская Т.Г., Косолапова С.А., Прошкин А.В.* Треугольник знаний как фактор инновационного развития // www.gae.ru.
- Кам'янська О.В.* Управління трансфером технологій на машинобудівних підприємствах: Дис... канд. екон. наук: 08.00.04 / Національний технічний університет України «Київський політехнічний інститут». — К., 2008. — 281 с.
- Кацура С.М., Лимар В.В.* Принципи державного регулювання міжнародного трансферу знань // Економічний вісник Донбасу.— 2010.— №1. — С. 43–46.
- Лимар В.В.* Державне регулювання міжнародного трансферу знань в економіці України : Автореф. дис... канд. екон. наук: 08.00.03 / Інститут економіки промисловості НАН України. — Донецьк, 2013. — 24 с.
- Ляшенко О.М.* Комерціалізація та трансфер технологій: категорії та методи інноваційної діяльності, 2013 // masters.donntu.org.
- Медведкін Т.С.* Імперативи міжнародного трансферу знань в системі глобальних науково-технологічних трансформацій: Автореф. дис... докт. екон. наук: 08.00.02 / Інститут економіки промисловості НАН України. — Донецьк, 2013. — 40 с.
- Медведкін Т.С.* Інноваційний розвиток економіки України в контексті глобалізації світового ринку технологій: Автореф. дис... канд. екон. наук: 08.05.01 / Донецький національний університет. — Донецьк, 2005. — 20 с.
- Совершенна І.О.* Університетські центри трансферу технологій — важлива ланка інноваційної інфраструктури // ena.lp.edu.ua.
- Соловьев В.П.* Инновационная деятельность как системный процесс в конкурентной экономике (Синергетические эффекты инноваций): Монография. — К.: Феникс, 2006. — 560 с.
- Стратегія трансфера знань Нижегородского государственного университета им. Н.И. Лобачевского // www.unn.ru.
- Федоров М.П.* Роль университетов в инновационной экономике // Инновации.— 2007.— №2. — С. 71–75.

Ченцова М.В. Особенности формирования экономики знаний в современных условиях: Дис... канд. экон. наук: 08.00.01 / ФГОУ ВПО «Финансовая академия при Правительстве Российской Федерации». – М., 2008. – 24 с.

Шемасва Г.В. Організація трансферу інновацій бібліотеками України // Вісник Харківської державної академії культури, – 2012. – Вип. 37. – С. 78–85.

Europe 2020. A strategy for smart, sustainable and inclusive growth // ec.europa.eu.

Tempus project: knowledge transfer unit – from applied research and technology-entrepreneurial know-how exchange to development of interdisciplinary curricula modules // my-ktu.eu.

Стаття надійшла до редакції 18.03.2015.