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INTERNATIONAL EXPERIENCE OF ESTABLISHING TECHNOLOGY TRANSFER CENTERS AT THE UNIVERSITIES



The experience of creation and operation of technology transfer centers based on US universities has been analyzed in order to adopt the best practice for the creation of such centers in Ukraine.

Keywords: technology transfer center, technology transfer, innovation, commercialization, and R&D results.

INTRODUCTION. BACKGROUND OF THE PROBLEM

Today, ensuring the economic recovery at the national level is a major challenge [1]. Our time dictates to underlay a fundamental restructuring of the economy towards the innovative development, which is impossible unless the innovation processes have gone deep into all areas of public life. Economic and political security of each country depends on the competitiveness of its economy in the global market. Most corporations have almost exhausted their reserves for escalating outputs. At the same time, the experience of leading enterprises in various sectors has showed that increase in output depends on the timely conversion to the manufacture of innovative products. Nowadays, there is no need to spend some complex research to see that among the factors ensuring the competitive advantage, the innovative leadership based on the R&D commercialization assumes a crucial importance. For these reasons, the technology transfer is of particular relevance for the domestic enterprises. This transfer of innovative technologies will accelerate technological development of enterprises and restore their

capacity, which, in its turn, will raise the competitiveness of domestic products and reduce their prices. The implementation and commercialization of competitive advanced technologies and the effective technological exchange will enhance the capacity of high-tech exports and imports, as well as will facilitate technical and economic cooperation between Ukraine and foreign countries. The successful integration of Ukraine into the world economic community is impossible unless the government and the business sector consolidate and coordinate their efforts to produce high-quality and safe products. The success of foreign countries necessitates the study of foreign experience, including that in the field of creation of technology transfer centers.

THE PROBLEM STATEMENT AND SOLUTIONS

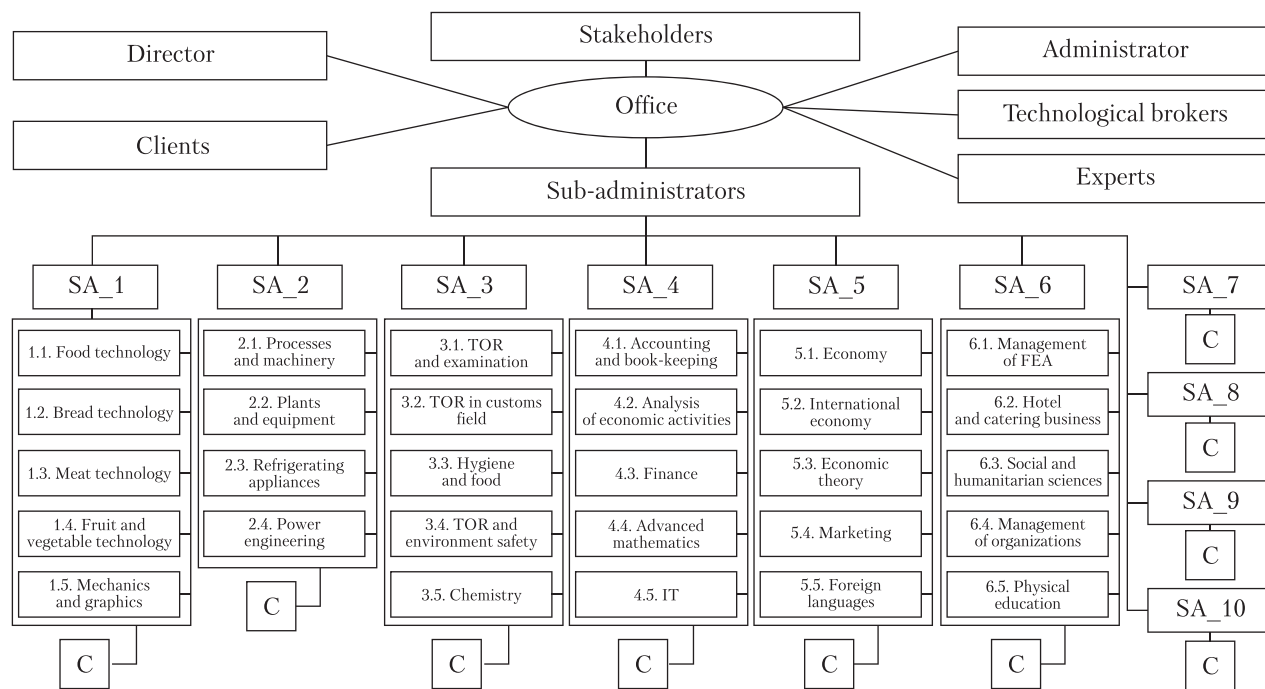
Today, in Ukraine, the intellectuals and businessmen are studying and analyzing the procedures for the establishment of technology transfer centers based on international experience in order to adopt the best practice thereof.

Recently, in the United States, there have been discussions on how to convert inventions to money. Today, American universities are economic en-

gines doing researches that result in creating new industries, boosting economic growth, and ensuring the national competitive in the global market. How has the US succeeded so impressively? The answer is simple: the country has created research centers based on higher education institutions and provided them with a comprehensive support at the government level. The main goal of such entities is to build a «bridge» between the university research and the industry [2].

One of the most successful attempts to build a transfer «bridge» between the universities and the business was the Patent and Trademark Law Amendments Act adopted in 1980 and known as the Bayh-Dole Act (BDA-1980). The Bayh-Dole Act transferred the federal patent and invention rights to the universities and granted them an au-

thority to decide on their own whether to assign those rights exclusively to the university as a whole, or to transfer them to the researchers or to share in any proportion between the researchers and the university center. In addition to the Bayh-Dole Act, the National Cooperative Research Act (NCRA-1984) was passed in 1984. This led to the formation of, at least, several hundred joint consortia (including those with universities involved) engaged in R&D works. Subsequently, the Act has been improved and transformed into the National Cooperative Research and Production Act (NCRPA-1993) that clarifies the application of the rule of reasonable approach to antitrust analysis of joint ventures [3, 4]. The reasonable approach rule assumes that the antitrust law should apply only to those firms and agreements that



SA_<1...10> – Sub-administrators of grid segments (at the faculty level)

<1.1...10> – Offices (technological managers)

C – Clients

The NTTN University Office structure

excessively restrict the trade, with the firm size and degree of monopoly being unlimited. The next important stage of the technology transfer development was the Federal Technology Transfer Act (FTTA) adopted in 1986 [5], which dealt mainly with national laboratories (NL). This document opens the way for joint («cooperative») R&D works between NL, on the one hand, and private firms, universities, and non-profit organizations, on the other hand. According to this law, the universities are entitled to retain the title to inventions resulting from the research based on the «cooperative» agreements with federal laboratories. However, it is just the Bayh-Dole Act that establishes all the opportunities and advantages for the universities. When the Act was adopted, about 70% of university research was funded by the government. The funding of science and research was believed to be a waste of money. Therefore, it was not surprising that under conditions of a poorly operating technology transfer, the funds spent on science were considered irreparable (though inevitable) loss. The Act allowed the universities to implement their own transfer programs: each university could formulate them in accordance with their interests, capabilities, and unique circumstances [6].

In summary, it should be noted that the universities developed their individual rules regulating the transfer of scientific knowledge and technologies, which were widely diversified in many ways, in terms of the resources allocated to the

needs of transfer activity, the percentage of income for members of the faculty staff involved in R&D and in patent registration, the rules for incorporation of latest startup companies, as well as in terms of the objectives and «operation mode» of technology transfer offices [7, 8, 9, 10]. Statistical data have showed dramatic changes in research universities. One can see this by the dynamics of patenting, by growing licensing income and number of publications of university patents in research articles. The process speeded up after 1984 [11], as a result of which, the share of university patents in the total US patents increased from less than 1%, in 1975, to 2.5%, in 1990 [3]. In 1998, the universities received 2900 patents; in 2003, they got 3629 ones [4, 5]. Finally, in 2010, the total number of registered university (college included) patents grew up to 4500 [5]. In other words, the number of patents increased by 1700% or 18 times as compared with the time before the adoption of the Bayh-Dole Act [5]. In general, one can see that the total number of patents obtained by American universities has been growing almost through the whole thirty-year period since the adoption of the Bayh-Dole Act. It is quite difficult to compare the data on revenues from the commercialization of university patents because of differences in methodologies used for various projects. However, in 2003, the universities were reported to receive more than USD 1 billion licensing income [4], and in 2009, (according to the National Science Foundation) they gained USD 1.5 billion. In the last 8–9 years, the growth of university revenues has slowed, perhaps, as a result of adverse financial conditions in the technology transfer market [6].

Let us consider one of the positive examples, the Center for Commercialization at the University of Washington (UW). This is a research university funded from the federal budget. The University has been developing innovations in various fields, including biofuel alternatives, effective treatment of Alzheimer’s disease and brain cancer, and drinking water treatment in developing countries. In 2005, for the commercialization of

Table 1. C4C Commercialization Results in 2012

Licenses	51
Software lease agreements	143
Other	6
Total	200

Table 2. UW Revenues in 2012

Washington Research Center	31 816 603
UW Center for Commercialization	8 923 511
Other revenues	254 719
Total	40 994 833

R&D activities a C4C technology commercialization center was established at UW. Starting with 2005, the C4C has commercialized over 100 projects and allocated about USD 6.5 million as grants to inventors. The C4C commercialization results for 2012 are showed in Table 1. The UW revenues for 2012 are given in Table 2.

Thus, the C4C share in the total UW income is almost 22%. This result is very impressive, because only 200 R&D works commercialized by C4C yield a profit of about USD 9 million [12].

CONCLUSIONS

The experience of technology transfer centers in the United States and analysis of the results of their work have demonstrated their effectiveness and the prospects for their existence in the future. The stated experience should be definitely used in Ukraine with the peculiarities of the existing legal framework taken into consideration.

It should be noted that, as of today, Ukraine has a legislative framework for the establishment and operation of technology transfer centers. In particular, the Law of Ukraine on the State Regulation of Technology Transfer [13] states that the title to technology developed at the expense of the budget funds should belong to higher education institutions involved in its development. The Law of Ukraine on Higher Education regulates the economic activities of educational, scientific, and research institutions, science parks and their consortia [14]. In addition, there is the term «*research university*». The objective of such legal entities is to convert the R&D results to the innovative product and to commercialize the latter.

In Ukraine, among examples of successful implementation of technology transfer centers, there are university offices of the National Technology Transfer Network (NTTN). The NTTN was established by the Ministry of Education and Science of Ukraine on the basis of European principles and standards. At the end of 2014, the NTTN had about 60 members, most of them were state-owned universities. The experience of certification of NTTN certification has showed that the

universities are well-motivated to the creation of technology transfer offices.

Let us consider how the NTTN university office operates at the Kharkiv State University of Food Technology and Trade. The purpose of the office is to create a domestic segment of the International Information and Communication System for Technology Transfer, to get from the NTTN tools in order to promote the commercialization of R&D outcomes in the domestic market and to enhance the export potential of Ukraine. The University expects to expand relations (including international) and to facilitate the search for potential partners to transfer the R&D results to domestic and foreign enterprises, and to establish new business contacts with other institutions of higher education in Ukraine and worldwide [15]. The university office is headed by the Vice Principal for Science and Research Activities. The office staff consists of 57 technical managers responsible for preparing the technical proposals, 33 technical auditors responsible for auditing and reviewing the technical offers, 34 experts responsible for making expert opinions on the proposed technical offers, and 3 technology brokers. The office operation is organized by an administrator whose responsibilities include the coordination of sub-administrators holding their personal accounts in the system. The office structure is showed in Chart below.

The NTTN university offices have been established also at the O. Honchar Dnipropetrovsk National University, the Odessa National Academy of Food Technologies, the Chernihiv State Technological University, and at the Kharkiv State Academy of Physical Culture.

Summarizing the above, it is necessary to establish technology transfer centers at the universities of Ukraine for the effective management of both existing and future R&D results, their successful commercialization, and for the creation of fundamentally new patterns of interaction between the academic science and the industry with the market rules and the needs of the economy as a whole taken into account.

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МІЖНАРОДНИЙ ДОСВІД СТВОРЕННЯ
ЦЕНТРІВ ТРАНСФЕРУ ТЕХНОЛОГІЙ У ВИЩИХ
НАВЧАЛЬНИХ ЗАКЛАДАХ

Проведено аналіз досвіду створення та функціонування центрів трансферу технологій на базі університетів США з метою застосування позитивних методів при створенні подібних центрів в Україні.

Ключові слова: центр трансферу технологій, трансфер технологій, інновації, комерціалізація, результат науково-технічної діяльності.

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МЕЖДУНАРОДНЫЙ ОПЫТ СОЗДАНИЯ
ЦЕНТРОВ ТРАНСФЕРА ТЕХНОЛОГИЙ
В ВЫСШИХ УЧЕБНЫХ ЗАВЕДЕНИЯХ

Проведен анализ опыта создания и функционирования центров трансфера технологий на базе университетов США с целью применения положительных методов при создании подобных центров в Украине.

Ключевые слова: центр трансфера технологий, трансфер технологий, инновации, коммерциализация, результат научно-технической деятельности.

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