

TECHNOLOGY TRANSFER BETWEEN ACADEMIA AND BUSINESS AS A DRIVER IN IMPLEMENTATION OF INNOVATION IN THE COMPANIES

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Abstract

This paper aims to examine technology transfer as a driving force in innovation implementation in the companies. In today's highly competitive business environment, it is necessary to continuously innovate and measure the innovation performance in the companies. Innovations such as new ideas, development of new products and services, and commercialization of universities' research and development results are a source of competitive advantage. The reason for cooperation between universities and companies is use of technology transfer for implementation of the new solutions from academia into business practice.

Key words: commercialization, cooperation, innovation, innovation performance, technology transfer.

Introduction

Technology is widely accepted as essential for improving the economy of a nation. There is an increasing appreciation that in the long term the ability to master technology and to manage and generate technological change is decisive in determining a country's international competitiveness and capacity to grow. Firms are increasingly seeking global R&D partnerships and science and technology cooperation as a way to build their capacity, strengthen their core competencies and expand into technology fields that are considered critical for maintaining and developing market shares.

Technology transfer (TT) is a key contributor to innovation performance, competitiveness and economic development of a country. However it is a high-risk process since there is no guarantee that a technology development project would result in successful product innovation or the investment would generate sufficient return (Guan et al. 2006). Technological competence is represented by technological resources, skill and experience which give firms their distinctive competitive advantage (Prahalad, Hamel 1990). Such competence can be built up internally, through research and development (R&D) and through various organizational learning processes which enhance and maintain the knowledge base, but it can be also built externally. The process through which technology moves from outside sources to the organization is TT (Bessant, Rush 1995). TT suggests the movement of technology from one place to another, for example, from one organization to another, from a university to an organization, or from one country to another (Solo, Rogers 1972). It can be a lengthy, complex and dynamic process and its success is influenced by various factors originating from many different sources. TT needs to be perceived in terms of achieving three core objectives (Hoffman, Girvan 1990): the introduction of new techniques by means of investment of new plants; the improvement of existing techniques and the generation of new knowledge.

Methodology used in creation of this paper was mainly investigation of current state of relevant domestic and foreign literature - analyzing, summarizing and evaluating the connections between topics of technology transfer and innovation. By defining conclusions from the literature study authors used general methods of induction and deduction, qualitative method, and modeling method within illustrating relations between researched topics.

1. Innovation and innovation management

Innovation is becoming a major source of economic development and wealth of several countries. The concept of innovation was introduced by economist Joseph A. Schumpeter, who defines innovation as an enforcement of a new combination of production factors, while innovation is presented as a new combination. According to this hypothesis innovation is the use of existing processes, technologies and factor in new, till now unused way. Schumpeter classified 5 changes, which are reflecting the development (Schumpeter 2011):

- implementation of new products, respectively original products with new characteristics,

- the usage of new production techniques, production processes and new way of ensuring of the production,
- opening up new markets,
- use of new raw materials,
- changes in the organization of production and its security.

Innovation in the company are largely based on the developments in production and the market. Innovation leads to the enlarging of the production process. The term innovation can be presented as the implementation of “something new” in current activities in the company, for example a new knowledge, technology products, but also the various improvements.

Another theoretical perspective defines innovation as a specific tool by which are changes used as an opportunity to differentiate own business or service from the competitors (Drucker 2012).

Scientific literature offers a wide spectrum of views focusing on the definition of innovation (Table 1).

Table 1. Definitions of innovation

Author(s)	Definition
Wright 2010	Innovation is the successful exploitation of new ideas to increase customer value and creation wealth for society.
Kotler 2007	Innovation is defined as an idea, service, product or technology, developed and offered to customers who see it as a new or unique.
Košturiak 2012	Innovation is managed process of generating, transfer and implementation of ideas into the practical application, that invokes qualitative change and the customer appreciates it as a new added value, for which it is willing to pay.
Srpová et al. 2010	Innovation is a practical transfer of ideas into new products (goods and services), processes, systems, and social relations.
Hvizdová 2012	Innovation is a major change in the economy that is tied to the implementation of knowledge, which causes increasing the value in the whole company. Result of innovation is positive change which leads to efficient use of resources. Innovation capacity of companies is the basis of wealth creation and depends on the formation of their knowledge strategy.

The purpose of innovation is to transform the outputs of innovation activities to commercially successful products. Innovation will be realized only there, where the outputs of innovation activities will have a positive impact on increasing the effectiveness and efficiency of business processes and will bring to customers the required value of future benefits.

In the current turbulent environment, companies are forced to consider the various factors that affect their development and progress. The most important factor which affects the success of the company is innovation and innovation potential of each company. The correct implementation of innovation allows to increase its competitiveness,

enlarge the flexibility of responding to constantly changing customer requirements and strengthen its market position. Innovation represented a tool by which it is possible to deal with ever more demanding customer needs, increasing competitive pressure, rapid technological development and the globalization of business.

Successful companies are those companies that are able to carry out their activities in a different way, in the comparison with competitors. Successful companies are characterized by applying new ideas, knowledge, practices and creative thinking into everyday working life. Innovation and innovative strategy are included in the corporate vision, mission and objectives.

In the condition of Slovak companies it is necessary to apply new ideas, knowledge and processes into their work activities and thereby bring innovations to market. Innovation is now an essential tool for increasing the competitiveness of companies.

The concept of innovation management describes the decisions, activities and processes that lead from the new ideas to its realization in order to create business value. Innovation management is controlling and implementing the processes, activities and policies which lead to creating new value for customers and the company creatively, by the changing of one or more dimensions in the trading system (Xu 2007).

Innovation management is a comprehensive system of knowledge that makes it possible to effectively manage innovation activities of company. Through innovation it is possible to practically transfer people's thoughts and ideas to new products (goods and services), processes, systems, organizational and managerial structures, also into operating procedures, social relations and so on. Innovation management is, on the one hand focused on delivering of innovative improvements into business processes and systems, by which can be flexibly meet increasing customer requirements, on the other hand it is possible to manage all mentioned processes by the innovation management.

Innovation activities and innovation management largely contributes to increasing the competitiveness of company and realization of their products on the market. Innovation management helps companies to find up the opportunity and use it to create and introduce new ideas, processes or products.

The development of innovation management is largely influenced by the science and research, which is a key element of the knowledge economy in terms of competitiveness of the company. Challenges of the new, "science - driven" economy can be divided into the following groups:

- new market characteristics,
- new types of innovation,
- new needs of stakeholders,
- a new approach to innovation management,
- need of new methods of innovation management.

Innovation Management is also closely related to the theory and practice of general management, marketing, logistics, production, financial management and so on. The role of innovation management is to effectively manage the innovation process, which cannot be predicted and the need the specific and modern management instruments.

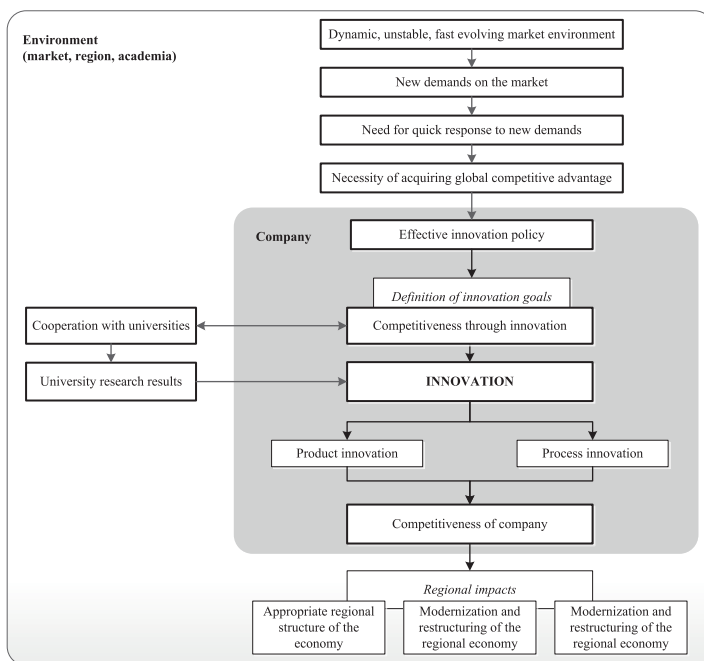
The consequence of a fast-paced market environment are quickly changing market demands. Companies have to be able to react on customers' changing requirements in a

short time to be successful, and at the same time the global market environment requires disposing of a global competitive advantage.

Innovation are considered as the main driver of economic and social development. Innovation processes lead to positive qualitative changes in society. These changes are realized usually in the public sector. The focus of these activities should be small and medium companies. The reason is that implemented innovation processes lead to higher competitiveness of enterprises, in consequence, it is possible to gain new markets, increasing employment and prosperity of the company, resulting in an increase in regional and national economic development and prosperity. Effective innovation policy determines the definition of innovation goals. It means that innovation policy specifies how the innovation goals will be achieved.

As it was already mentioned, it is possible to enhance the company's competitiveness through innovation. The innovation can be realized as a product innovation or process innovation. Product innovation is: the development of new products, some of the characteristics of product are changed, new products are released on the market, changes in design of established products, use of new materials or components in the manufacture of established products. Process innovation is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and software. For example. The relations are clearly illustrated in the figure 1.

Figure 1. Innovation policy



Source: based on www.edotacie.sk.

Addressing corporate interests to universities by the reason of their research results with commercial potential forms basis of cooperation between industry and academia.

Universities are generating knowledge that is now an essential source of competitive advantage for businesses, as well as the fact that the companies share a common interest, which is to apply the knowledge in practice.

Acquisition of innovations from universities offers companies many advantages. Main advantages embodies in expert assistance with implementation of modern technologies to processes of companies to increase productivity and efficiency, solving problems that companies cannot solve on their own and need assistance from experts with years of experience, or in providing technical expertise, which is done quickly and relatively cheaply (compared to expert services provided by specialized businesses).

2. Process of TT and its role in implementing innovations in the companies

The technology transfer process is the “process of conducting basic research that is developed into commercializing new technologies” (Hofer 2007). It consists of numerous complex activities whereby multiple factors influence university performance during the transfer. Process of TT itself can be divided into two main phases:

1. *protection of intellectual property* - in this phase the research takes place and is generated the actual subject of intellectual property,
2. *commercialization* – includes especially the choice of a particular method of commercialization and finding partners for its implementation.

Commercialization represents “financial evaluation of intellectual property of the institution” (NPTT 2015). Depending on how is the intellectual property commercialized, the process of TT can be implemented in several ways, which include following (CVTI 2012):

- *Joint research*. Realizing research through cooperation means two or multilateral cooperation, where each of the partners brings a deposit (research potential, capital, feasibility of producing outputs, connection to practice, etc.). It usually focuses on larger and more difficult projects, which often involve a share of basic research, therefore are expected results are specified rather general.
- *Realizing research on order*. Research is realizing following a contract, where the sponsor (company) determines the research task (or outcome), which a scientific research institution (university) realizes. Result is generation of a subject of intellectual property, which takes the sponsor and to which the law is carried out depending on the form of the signed contract.
- *Transfer of intellectual property rights (or sale)*. The best strategy in case that the holder of intellectual property rights (especially industrial rights) wants to avoid the risk of obsolescence of the intellectual property (because its further use would be ineffective and would cease to be profitable), is the transfer of property rights to the intellectual property. Payoff for the transfer of rights is usually a one-time and with immediate maturity.
- *Licensing*. If the holder of the rights to the subject of intellectual property is not able to place it on the market or ensure its commercial success in the required range by himself, the good strategy is to license. The holder of rights grants permission to another

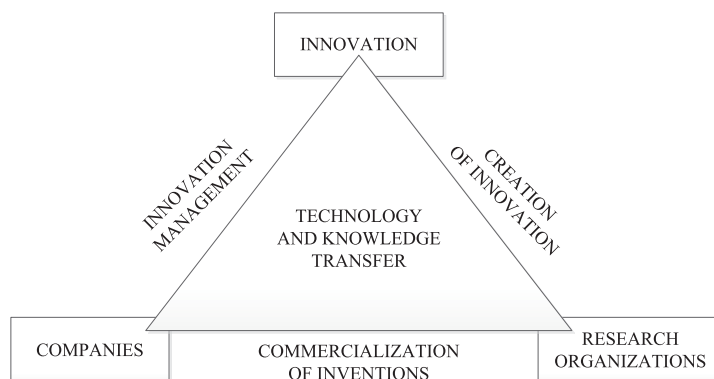
person to use the intellectual property following the mutually agreed terms. The specific conditions and financial reward are defined in a closed licensing agreement.

- *Establishing spin-off companies.* This form of TT is chosen in order to independently use and develop intellectual property of academic or research institutions and to create a product or service exercisable on market. In the activities of a spin-off company are usually concerned also authors of the intellectual property. Intellectual property is provided to spin-off company through a license agreement or transfer of rights. The institution may obtain shares in the spin-off company.

Technology and knowledge transfer play essential role in implementation of innovation into practice as is shown in figure 2. Innovations are created in various research organizations within academic R&D. When an invention is discovered, its commercial potential has to be considered first. After passing this assessment, research organizations provide patent protection for the invention. Once the organization has the intellectual property rights secured, the disclosure of the invention can be done and the seeking for business partners can begin. This is the part, when companies can acquire necessary innovations, if they make with research organizations terms acceptable for both sides. Commercialization of invention takes place and company manages the implementation of innovation in accordance with its innovation policy.

Companies interested in supporting the development of cooperation with universities should use cooperation management. Cooperation management is “effective and efficient management of relationships in a cooperation between separate and relatively independent organizations or individuals, with the goal of improving their competitiveness” (Soviar et al. 2013). Creating cooperative interconnections allows spreading of innovative activities and helps increasing the global competitiveness of the participating organizations, because globalization means that internal efficiency isn’t enough to achieve international competitiveness (Solvell et al. 2003).

Figure 2. Implementation of innovation into practice



Cooperation management offers effective management of cooperative processes between organizations. Its aim is to continuously improve inter-organizational activities and provide flexibility to companies facing challenges of today, so that opportunities for cooperative development don’t remain unused (Davis 1999). One of the most serious

problems prohibiting cooperation activities to be successful in deregulated markets, is the inability of organizations to identify and develop cooperation management. Cooperative values and intentions determined by the organization serve to correctly define management roles within the cooperation. Modern cooperative initiatives need management committed to fulfillment of the cooperation objectives, led by the cooperation values and responsible to concerned and informed members of the partnership.

Conclusions

Transfer of knowledge from science and research is realized through the innovation system, which predetermines the way of creation, implementation and monitoring of innovation. Innovation and technology transfer as a main drivers of today's economic growth should be strengthened throughout the country and the flow of information and technology between stakeholders (innovators, companies, state and financial institutions) should be easier.

Innovation is playing an increasingly important role in developing and enhancing the competitiveness of countries. The innovation is linked to the growth of prosperity and with the creation of new professions. Innovation is a source of growth of the company performance, prosperity and also the source of increasing added economic value. In general, research results demonstrate that the combination of technological and non-technological innovation is positively reflected on the labor productivity of company. Those companies that combine product innovation with process innovation, while using organizational change, are in advantage in comparison with companies that are concentrated on just one of these type of activities. The importance of individual innovative measures (such as the implementation of a new product, a new process, and so on) is widely accepted and in practice increasingly used.

Innovation and economic policy are aimed to stimulating innovation activities that are part of the functioning of modern market economies. The European Union, but also the entire global economy is currently in a state of very slow growth. Stagnation of the economy can be solve by investing in to innovation. The aim is to expand the boundaries of science, enhance the competitiveness of companies, regions and help to solve problems of the whole society and economy.

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