

# DIFFUSION OF INNOVATION AS A CONSEQUENCE OF UTILIZATION OF EU FUNDS BY COMPANIES

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ABSTRACT

The article points to diffusion of innovation as a consequence of popularization and dissemination of the results of projects implemented with the help of the Structural Funds. Attention has been paid to the progressive nature of the diffusion process. It is a kind of transformation that contributes to accelerated changes in structure and function within the business ecosystem, as a result of the adoption or rejection of a given innovation. The diffusion process involves not only the spread, but also popularization of innovation. The innovations resulting from the involvement of public funds, which impose additional restrictions on undertakings promoting the solutions developed in the regional and national system, play an important role in this process.

## Introduction

In order to increase the level of innovation in the economy, it is essential that new solutions developed and used by business entities, scientific units and other business environment institutions are disseminated and made available to the public, and used as widely as possible to improve the competitiveness of the economy. With the widespread access to innovation, it is also possible to create new solutions based on it, to develop new applications,

and for the innovator, to profit from its use. Diffusion of innovation in the economy enables intensive, ongoing cooperation between authors and beneficiaries of innovative solutions. As illustrated by the example of economically developed countries (Brodzicki, Dzierżanowski, Erlandsson, Szultka, 2004), co-operation contributes to achieving results that are often inaccessible to individual entities.

The aim of the study is to identify tools for the diffusion of innovations used by entrepreneurs – beneficiaries of public support offered under Measure 5.2 of the Operational Program Innovative Economy 2007–2013. The paper was financed from the funds allocated to the Faculty of Management at the Cracow University of Economics, as part of a grant to support research capacity.

## Literature review

In today's economy, the flow of different resources between organizations is a common phenomenon. Described by the term diffusion, it is applied in the social sciences, including management sciences. In organization management, diffusion refers to knowledge and information, innovation and the concept of management (Banaś, 2013, pp. 9–10). Diffusion means not only the transfer of knowledge and practical experience between organizations, but the transfer based on conversion, i.e. transformation and adaptation of certain solutions.

Among the benefits of diffusion are: the opportunity to share knowledge about proven technical and organizational solutions, and assistance in obtaining information. The protection of intellectual property (Lachiewicz, Matejun, 2012, p. 118) is a barrier to the diffusion of modern solutions, especially technical and technological in nature.

Today, diffusion is used in innovation management. Diffusion of innovation is a process of rational transfer of proven methods and results of innovative processes from one organization to another, and their dissemination (Lachiewicz, Zakrzewska-Bielawska, 2016, pp. 146–147).

Diffusion of innovation may consist of spreading a new, previously unknown technology, product, or management method within a group of potential users (Jagodziński Ostrowski, 2013, p. 110). It is characterized by spontaneity, i.e. when an invention arrives on the market, it is adapted by users over time. The problem of spontaneity as an immanent feature of diffusion is the study object of various authors in the management sciences. Dobija points out that the original understanding of the laws of thermodynamics, indicating the inevitability of spontaneous energy dissipation, expresses the correctness of all sciences, including economics (Dobija, 2007, p. 184).

Literature sources name many models of diffusion of innovation (Jagodziński, Ostrowski, 2013). Among the most often analyzed is the model proposed by Bass and Rogers. The Bass diffusion model describes the process of innovation users' increment and assumes that the entire market will adopt the innovation. This process is influenced by the innovation factor, which reflects the importance of marketing activities and the imitation factor, taking into account the impact of user observation and duplication of innovation.

On the other hand, the Rogers model describes the diffusion of innovation by dividing innovation users into separate groups (Jagodziński, Ostrowski, 2013, pp. 113–114). The first group is the innovators, i.e. first users of innovations; they are interested in novelties, but are bored quickly. The second group are early adopters who take the risk of introducing the innovation and expect benefits. The third group is the early majority who expect proven innovation, and the fourth is the so-called late majority, who adopt the innovation over time. The last group of imitators is laggards, who are reluctant to innovate (Rogers, Singhal, Quinlann, 2009).

In theoretical sources, the diffusion of innovation is viewed as a welcome complement to innovation, as the efficiency of the implementation of the new solution increases with the number of imitators who introduce the

innovation (Jasiński, 2006, p. 10). The sources of innovation can thus be sought in the transfer of technology and research (Stawasz, 1999, pp. 37–41).

The diffusion of innovation begins when the imitators begin to use a given technology or to manufacture a given product (Janasz, 2004, p. 62). Diffusion may relate to the company itself – it is then referred to as internal diffusion – or and the environment; in the latter case we are dealing with external diffusion. As a result of long-term practice, experience, own rationalization ideas and improvements, employees gain unique knowledge. Internal diffusion should make this knowledge more available to other employees. Internal diffusion can also take place on the basis of own research conducted by an organization (Buszko, 2013, p. 29).

It should be noted that diffusion is a time-consuming, long-lasting process, especially in the case of radical and international innovations (Brzeziński, 2001, p. 105). However, taking into account the time dimension, diffusion of innovation, allows to skip the time needed to obtain R&D innovation and related costs that the company would not be able to afford.

## Method

In the period of 2013–2016, our own research was carried out, aimed at acquiring source information on diffusion of innovations used by 68 entrepreneurs – beneficiaries of the Polish Agency for Enterprise Development (PARP) system project “KSI KSU Advisory for Innovative” within Measure 5.2 “Supporting business environment institutions providing pro-innovative services and their networks of supra-regional importance “of the Operational Program Innovative Economy. Two study periods have been identified in the study structure, covering the years 2013–2014 and 2015–2016, respectively. Owners/managers were asked to identify tools of innovation diffusion used by the company and their suitability for enhancing the organization's competitiveness. In the process of selecting a research sample, a targeted selection was carried out from among the beneficiary companies of the pro-innovative services from the Małopolskie Voivodship. This study was conducted using the following research methods and techniques: CAPI and IDI.

Based on the section of the Polish Classification of Activities (PKD 2007), the selection of the sample varied in terms of sections: C, F, G, J, M, P, Q (Table 1).

**Table 1.** Companies surveyed according to the sections of PKD 2007

Section	PKD No.	Participation in the studied structure (%)
C – Industrial processing	32.12.Z Manufacture of jewellery and related articles	2.94
F – Construction	43.12.Z Preparation of the construction site	14.71
G – Wholesale and retail trade; repair of motor vehicles, including motorcycles	45.32.Z Retail sale of parts and accessories for motor vehicles, except motorcycles	7.35
J – Information and communication	62.01.Z Computer software programming services	17.65
M – Professional, scientific and technical activities	71.12.Z Engineering activities and related technical consultancy	19.12
P – Education	85.59.A Teaching foreign languages	10.28
Q – Health care and medical assistance	86.22.Z Specialist medical practice	13.24
	86.90.E – Other health care activities, not elsewhere classified,	14.71

Source: own study based on own analysis.

Of all the surveyed companies, 57% were based in a municipality (43% in Krakow, 6% in Tarnów, 9% in Nowy Sącz). The remaining 43% were entrepreneurs operating in the districts: Krakowski (15%), Nowosądecki (12%), Bocheński (4%), Wadowicki (3%), Brzeski (3%), Limanowski (6%).

Entrepreneurs targeted in Action 5.2 received support for a relatively short period of time, and in many cases benefited from a one-off service, typically consulting or training (entrepreneurs reported a specific problem they wanted to solve to the institution, and after receiving support did not continue the cooperation). In deciding to use the services of the Business Environment Institute (Gródek-Szostak, Kajrunajtys, Chęcińska-Zaucha, 2016), they were guided by the broadly understood need for company development, including the area of innovation.

### Support under the 5th priority axis Diffusion of innovation PO-IG 20107–2013

Support under the 5th Priority Axis was intended for the development of trans-regional cooperation links, including joint ventures of advisory and investment nature in particular, which contribute to the ease of transfer and diffusion of knowledge and innovation between cooperating entities. The main addressee of the support provided, contributing to the increase of cooperation between entrepreneurs (Figure 1) and between entrepreneurs and research centers were micro-, small and medium-sized enterprises (SMEs).

Sub-measure 5.1	Sub-measure 5.2	Sub-measure 5.3	Sub-measure 5.4.1	Sub-measure 5.4.2
<ul style="list-style-type: none"> <li>Investments and consultancy and training related to the development of cooperative relations of supra-regional importance, including clusters</li> </ul>	<ul style="list-style-type: none"> <li>Comprehensive support for innovation centers, among others science and technology parks, technology incubators, technology transfer centers, located in areas with the greatest development potential</li> </ul>	<ul style="list-style-type: none"> <li>Support for the construction and development of business environment networks of supra-regional importance and business-related institutions operating nationwide, providing services in the field of innovative activity of entrepreneurs</li> </ul>	<ul style="list-style-type: none"> <li>Support for the use of industrial property rights and copyright and related rights by entrepreneurs</li> </ul>	<ul style="list-style-type: none"> <li>Promotion and information in the field of industrial property and industrial design</li> </ul>

**Figure 1.** Support structure for diffusion of innovation in the 5th axis of the Priority Operational Program Innovative Economy 2007–2013

Source: own study based on Operational Program Innovative Economy 2007–2013.

The main objective of Measure 5.2 was to facilitate access of entrepreneurs across the country to complex, high-quality business services that are essential for innovation.

According to the standard, the pro-innovation consulting service (Gródek-Szostak, 2016; Jaki, Gródek-Szostak, 2017) covered two stages of support – Table 2.

**Table 2.** Support structure under Measure 5.2 “Support for business environment institutions providing pro-innovative services and their networks of supra-regional importance

Stage I	Stage II
Consulting in the area of innovation implementation in order to develop an enterprise by improving existing or implementing a new product (product or service), process, marketing methodology or organization methodology in terms of operating principles, organization of the workplace or environmental relations, which is providing the information and procedures necessary for one entity to duplicate the work of another, or to use solutions owned by another entity, or to apply new solutions designed for their needs by another entity	<p>Dedicated entrepreneur support.</p> <p>The scope of Stage II included 15 elements:</p> <p>D1: Analysis of alternative development paths;</p> <p>D2: Specification of the chosen development path;</p> <p>D3: Developing a detailed financial model with a scenario analysis and qualitative factors for the financial model;</p> <p>D4: Identification of possible technology implementations;</p> <p>D5: Seeking and establishing contact with the technology provider;</p> <p>D6: Support in the development of functional documentation;</p> <p>D7: Preparation of negotiations with the technology supplier and supporting the negotiation process with the technology provider;</p> <p>D8: Support in preparation of the contract and a final verification of its wording;</p> <p>D9: Developing a detailed implementation plan with a risk analysis;</p> <p>D10: Support in pilot implementation of the solution;</p> <p>D11: Support in implementing the complete solution;</p> <p>D12: Analysis of the impact of implementation on the environment;</p> <p>D13: Support in the human resources development project and the creation of an incentive system;</p> <p>D14: Support for the management of intellectual property;</p> <p>D15: Preparation of intellectual property management strategies</p>

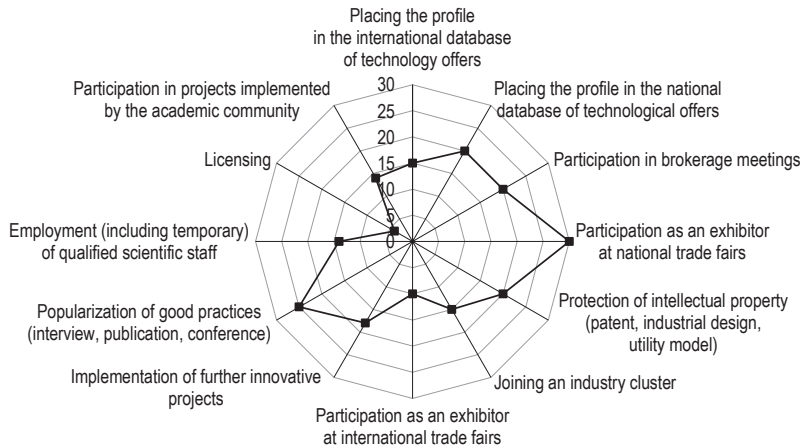
Source: own study.

The result of Stage II was undertaking cooperation with another entity (confirmed by the parties by signing a relevant agreement), in particular a research unit (as understood by the regulations on financing science), aiming at developing an innovative solution (including modernization or significant improvement of the solution already owned by the entrepreneur) for the sole needs of that entrepreneur, or the entrepreneur's acquisition of an innovative solution or the right to use it in a business activity (in particular machinery or equipment) from another entity, in particular a scientific unit (confirmed with a contract).

## Results

Using highly specialized pro-innovation services was the basis for the diffusion of innovations introduced into a company's business practices. The catalog of forms of innovation dissemination (diffusion) identified by the respondents in their enterprises is presented in Figure 2.

The flow of silent knowledge (sharing knowledge and experience, especially in the area of technology, collaborative learning) and the demonstration effect (watching other companies' actions and mutual motivation) both have a great impact on the development of innovation in the supported cooperative relationships.



**Figure 2.** Forms of innovation dissemination in the study group

Source: own study.

Almost half of the surveyed companies (48%) noted a positive impact of the support received under Measure 5.2 on the development of innovation. According to the respondents, the service that was most influenced by the development of innovations in companies was a technological audit (Gródek-Szostak, Kajrunajtys, 2010) combined with specialized consulting services.

## Conclusions

The diffusion of innovation in the analyzed companies varied in form. The least of them (less than 5%) indicated licensing as the chosen and realized form; 20% of the respondents patented their products, though most of them haven't planned it due to procedural barriers, which were ultimately overcome by their involvement in advisory services. Approximately 30% of respondents indicated that they participated in national trade fairs as exhibitors as a result of consulting services. It required planning the form of presenting their own innovative solutions, producing information materials and the exhibition booth itself. For many business entities, especially small ones, this was a venture they would not undertake without the support of an external, directing action. Approximately 25% of the indications pointed to the engagement in the popularization of best practices (interview, publication, conference), which required not only the preparation of information materials but above all, overcoming resistance to such activity and the proper planning of time. This is particularly valuable for small businesses as such engagement interferes with their basic operational activities. As a result of project participation, approx. 14% of the respondents decided to establish and launch cooperation with the academic community in their projects.

The collected conclusions described above, together with the extensive material collected during the follow-up interview provide a noticeable added value to the ongoing debate on the various aspects of innovation and management.

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