

# PRACE NAUKOWE

Uniwersytetu Ekonomicznego we Wrocławiu

# RESEARCH PAPERS

of Wrocław University of Economics

Nr 394

## Local and Regional Economy in Theory and Practice

edited by  
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Publishing House of Wrocław University of Economics  
Wrocław 2015

Copy-editing: Marcin Orszulak  
Layout: Barbara Łopusiewicz  
Proof-reading: Magdalena Kot  
Typesetting: Agata Wiszniowska  
Cover design: Beata Dębska

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Wrocław 2015

**ISSN 1899-3192**  
**e-ISSN 2392-0041**

**ISBN 978-83-7695-512-4**

The original version: printed

Publication may be ordered in Publishing House  
tel./fax 71 36-80-602; e-mail: [econbook@ue.wroc.pl](mailto:econbook@ue.wroc.pl)  
[www.ksiegarnia.ue.wroc.pl](http://www.ksiegarnia.ue.wroc.pl)

Printing: TOTEM

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## DETERMINANTS OF KNOWLEDGE TRANSFER PROCESSES IN A REGION

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## DETERMINANTY PROCESÓW TRANSFERU WIEDZY W REGIONIE

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DOI: 10.15611/pn.2015.394.18

**Summary:** The paper presents determinants of the regional system of knowledge transfer. Knowledge transfer is an important element of the regional innovation system, affecting its efficiency and ability to meet demands of the modern knowledge-based economy, aimed at improving innovativeness and competitiveness of the local economy and its individual participants. It is important to match institutional arrangements and practices related to knowledge transfer to the local economic and institutional specifics, diverse innovation needs of local businesses and the R&D sphere, as well as business environment institutions. The first part is devoted to the discussion of factors and determinants of knowledge transfer processes. The second part of the paper presents determinants in the regional knowledge transfer system. The third section describes the driving forces and barriers in the knowledge transfer system in the region of Łódź.

**Keywords:** innovation, the regional knowledge transfer system, the institutional sphere of the knowledge transfer system.

**Streszczenie:** W artykule zaprezentowano uwarunkowania w regionalnym systemie transferu wiedzy. Transfer wiedzy jest istotnym elementem regionalnego systemu innowacji, wpływa bowiem na jego sprawność i zdolność do sprostania wymaganiom współczesnej gospodarki opartej na wiedzy, zorientowanej na poprawę innowacyjności i konkurencyjności lokalnej gospodarki, i jej poszczególnych uczestników. Ważne jest dopasowanie rozwiązań instytucjonalnych i praktyk w zakresie transferu technologii do lokalnej specyfiki gospodarczej i instytucjonalnej, do zróżnicowanych potrzeb innowacyjnych lokalnych przedsiębiorstw i sfery B+R czy instytucji otoczenia innowacyjnego biznesu. W części pierwszej artykułu omówiono czynniki i determinanty procesów transferu wiedzy. W części drugiej artykułu przedstawiono uwarunkowania w systemie transferu wiedzy w regionie. W trzeciej części opisano siły motoryczne i bariery w systemie transferu wiedzy w regionie łódzkim.

**Słowa kluczowe:** innowacje, system transferu wiedzy w regionie, sfera instytucjonalna systemu transferu wiedzy.

## 1. Introduction

Undertaking effective innovative activities by enterprises requires, among others, access to external sources of usable knowledge. This is important especially for smaller operators due to their limited human, technical and financial resources. The regional sphere of research and science, including higher education institutions, can play a useful role in this regard as one of external sources of knowledge. Transfer of knowledge between the two spheres, as well as determinants of the effective and efficient transfer process, are now the subject of lively interest on the part of science, politics and practice of innovation management [Jasiński 2006]. This includes such areas of research as academic entrepreneurship, regional innovation systems and open innovation models [Fagerberg, Fosaas, Sapprasert 2012; Leydesdorff, Meyer 2003; Nowakowska 2011].

Knowledge transfer and commercialization are an important element of the regional innovation system, affecting its efficiency and ability to meet demands of the modern knowledge-based economy, aimed at improving innovativeness and competitiveness of the local economy and its individual participants [Shane 2005; Gwarda-Gruszczyńska 2013; Matusiak 2010]. It is important to match institutional arrangements and practices related to knowledge transfer to the local economic and institutional specifics, diverse innovation needs of local businesses and the R&D sphere as well as business environment institutions. Thus, the experience and potential of regional technology transfer centers, their profile and network of contacts affect their quality and suitability for the regional innovation system [Jewtuchowicz 2005; Bąkowski, Marzewska (eds.) 2012].

The aim of this paper is to present determinants of regional systems of knowledge transfer. The first part is devoted to the discussion of factors and determinants of knowledge transfer processes. The second part of the paper presents determinants in the regional knowledge transfer system. The third part describes the driving forces and barriers in the knowledge transfer system in the region of Łódź.

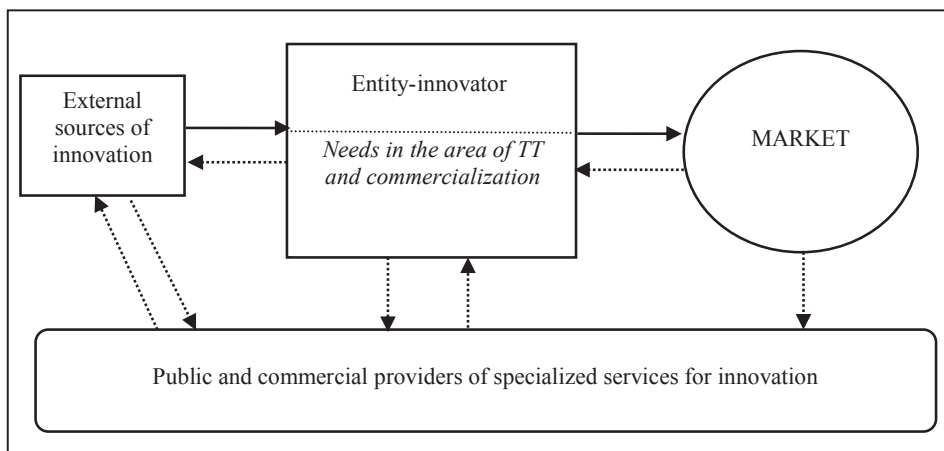
## 2. Knowledge transfer processes in a region

Contemporary understanding of innovation as an integrated networking process is the starting point for a systemic approach to certain issues, creating new technical and organizational solutions, their transfer as well as application in business practice. This occurs within a particular set of relationships that make up an innovation system, which can be considered from the perspective of the level of the whole economy as well as the regional or local level [Edquist 2005].

Innovative systems considered from the regional perspective are a specific forum for cooperation of different types of organizations and institutions operating in a region, whose main objective (or one of the objectives) is the development of innovative entrepreneurship in a region [Conway, Steward 2009]. These units include: regional

authorities (at the voivodeship (region), powiat (county) and commune (municipal level), regional development agencies, universities, R&D institutes, innovation centers, financial institutions, consulting firms, manufacturing and service companies, etc. A specific functional network linking all the actors in the field of innovation and knowledge transfer is formed within this structure. They are characterized by orientation towards the demand aspect of innovation which requires interactions between enterprises and the sphere of research, science and technology. This is due to the proximity and greater confidence in the partners coming from the same area, professing the same values, determined by the same cultural factors [McDermott 2013].

A system of knowledge transfer (KTS) has evolved within the framework of regional innovation systems. It includes activities leading to the transfer and transformation of knowledge into new products, services, technologies, organizational and marketing solutions as well as instruments to support the commercialization phase of an innovative idea [Matusiak, Guliński (eds.) 2010]. The main objective of the knowledge transfer system is, therefore, the activity aimed at meeting innovative needs of businesses. The main functions of the KTS encompass (see Figure 1): (i) providing new solutions (technologies, ideas), useful for the existing or planned innovative activities of innovative enterprises, (ii) providing services related to new solutions for innovative enterprises, (iii) providing services for innovative enterprises related to commercialization of knowledge and (iv) providing services for sources of innovation useful for innovative enterprises.



**Figure 1.** The knowledge transfer system from the functional perspective

Source: own elaboration.

The main actor of this system is an innovative entrepreneur (innovator) pursuing innovative ideas in the existing business or a company created for this purpose. The gap between innovative capacity and company's intentions is considered to be an important



reason for this enterprise to make use of pro-innovation services offered by innovative business environment institutions, as well as commercial providers [Santarek et al. 2008; Stawasz, Głodek 2012]. The needs of businesses in this respect may arise in different phases of the innovation process, i.e. at the stage of creating an idea, its evaluation and commercialization and in connection with various issues associated with the implementation of the innovation itself [Pullen et al. 2012; Bogdanienko 2004].

Functional tasks and processes within the regional KTS include creating an effective platform for cooperation of entities generating demand for and supply of knowledge and new business ideas. At the same time, seeking ways to meet the needs of companies in terms of new solutions (technologies, ideas) useful for the current and intended innovative business activities, as well as the support for the commercialization process, requires specific pro-innovation services [Bąkowski, Marzewska (eds.) 2012; Kaźmierski 2012; Bell 2005].

### 3. Driving forces and barriers in a regional system of knowledge transfer

The development of a regional system of knowledge transfer is influenced by two categories of features characterized by a different direction of impact, defined below as [Matusiak, Guliński (eds.) 2010]:

1. *Driving forces* – the features positively influencing transfer and commercialization processes. They can be seen as opportunities and new possibilities creating the foundations for the knowledge-based economy.

2. *Barriers* – all the restrictions and features that hinder the efficient functioning of the transfer and commercialization system, consequently blocking the cooperation of scientific institutions and enterprises in the framework of innovative entrepreneurship.

Both of these categories of features can be classified according to the following four areas: (i) *structural* – objective changes in the environment, new structures and institutions forming the basis of the knowledge-based economy, (ii) *systemic* – features resulting from the laws and regulations in force in a given country, as well as policies implemented to promote innovation and entrepreneurship, (iii) *awareness and culture-related* – dissemination of knowledge about the processes, their understanding and acceptance, (iv) *competence-related* – describing the skills and effectiveness of system participants in terms of the implementation and management of innovative processes.

In the knowledge transfer system in Poland, the barriers are characterized by greater gravity than the driving forces that develop the system (see Table 1). The barriers reached the mean value of 3.64 points and the driving forces the mean value of 3.19 points, i.e. almost 0.5 percentage point more on the scale of 1–5 points (the measurement was obtained using the arithmetic average of all the factors).<sup>1</sup>

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<sup>1</sup> In the opinion of the BIOS program experts [Matusiak, Guliński (eds.) 2010],

The presented results show that there are significant difficulties in the functioning and development of the knowledge transfer system in Poland. The driving forces are still too weak to provide a significant impetus to the development of the system.

**Table 1.** Comparison of driving forces and barriers in the KTS (barriers and driving forces assessed by the arithmetic mean of the experts' opinions)

DRIVING FORCES (assessment 3.18 pts).			
Structural	Systemic	Awareness and culture-related	Competence-related
3.22	3.18	3.06	3.26
BARRIERS (assessment 3.64 pts).			
Structural	Systemic	Awareness and culture-related	Competence-related
3.76	3.55	3.56	3.57

Source: the author's compilation based on Matusiak, Guliński (eds.) [2010].

#### 4. The driving forces and barriers in the Łódź system of knowledge transfer

The key issue in building an efficient system for the transfer of knowledge in the region of Łódź is the removal of the currently existing barriers that hinder its fully effective operation and development [Badanie potencjałów... 2013; Stawasz, Głodek 2012; Rogut, Piasecki 2011]:

1. *Structural barriers* – result mainly from the specificities of the sectors of the economy, science, R&D and support in the Łódź region. They are also a result of the absence of developed strategies and implemented policies, resulting in, for example, inadequate allocation of EU funds, a low level of competence of public administration and the weak development of regional growth poles. The most important identified structural barriers in the regional system of knowledge transfer are: excessive bureaucratization and formalization of the support mechanisms associated with the EU funds, the emphasis on the technical infrastructure at the expense of services supporting entrepreneurship and knowledge transfer, the low level of consolidation of the knowledge transfer system, the immature market of new business concepts, the lack of local market demand for innovative products, the focus of universities on the development of impractical educational services [Stawasz, Głodek 2012; Rogut, Piasecki 2011].

2. *Awareness and culture-related barriers* – concern the features related to the lack of trust or use of stereotypes. They result from the lack of awareness, low social acceptance for innovative attitudes and low confidence. This group includes barriers such as a low level of contacts and cooperation between the business community and research units (often an informal contact occurs), the passivity of scientific institutions

in developing an offer of innovative solutions, no initiatives for commercialization of knowledge on the part of research institutions.

3. *Systemic barriers* – relate to the problem of over-regulation, excessive number of legal acts and the volatility of the law. They include such barriers as the lack of a coherent vision of how a regional innovation policy can translate into the socio-economic development, regulations relating to the protection of intellectual property rights hindering the generation of benefits from future commercialization.

4. *Competence-related barriers* – include the sphere of public administration, government authorities, higher education institutions, entrepreneurs, personnel and managers of support institutions. They encompass barriers related to state aid, various intellectual property issues, available pro-innovation services and the development of the financial market supporting the development of innovation. These barriers often go beyond the competences of people involved in this rather broad field.

With respect to the *driving forces* of the KTS in the Łódź region, it seems that they play at most a moderate role in stimulating the development of this system. The comparatively best situation is encountered in the area of competence-related factors but these factors play only a slightly visible role in the development of the regional system of knowledge transfer. Structural and systemic factors are also relatively favorably assessed. Awareness and culture-related factors had the least positive assessment. In the case of these factors, it is clear that there are serious shortcomings in terms of the development of social awareness, politics and the economy and its impact on the knowledge transfer system in the region.

Among *structural factors*, the most important are the EU funds, creating new possibilities for financing projects aimed at different forms of economic development, including the development of entrepreneurship, innovation, knowledge transfer, the development of centers of innovation, the creation of pro-innovation services, education, trainings, etc. Systemic changes, the development of entrepreneurship, FDI and the Polish accession to the EU have led to increased competitive pressures in the economy of the region, significantly altering the conditions of operations for local business and mounting the pressure on the need for innovative behaviour, reorienting local businesses towards new growth factors based on the latest technological innovations, increased spending on know-how and the development of human resources, resulting from the depletion of extensive growth opportunities.

Among *systemic factors*, the development of the *venture capital* market institutions is of some importance, particularly in terms of its weakest link, i.e. investments in innovative companies at the early stage of development (*seed and start-up*).

Among *awareness and culture-related factors*, a relative significance is ascribed to support for academic entrepreneurship, providing an opportunity to overcome the general thinking pattern that commercial trials are contrary to the principles of scientific work and research, and thus inappropriate for representatives of the scientific community. Universities, through their employees, are quite willing to participate in the implementation of various support programs, including their management. People

managing innovation centers are often former or current employees of academic institutions.

Among *competence-related factors*, quite important is the internationalization of activities conducted by innovation centers and the participation in international projects, which increases knowledge of models, processes and strategies related to the transfer of know-how and technology, builds skills to move on international markets, as well as increases the experience and competence of managers and owners of Polish enterprises in the area of new product development policy, marketing, financial management and knowledge management.

The general assessment of the driving forces and barriers in the functioning of the KTS in the Łódź region indicates that the barriers in the operations of the system are characterized by greater gravity than the strength of the driving forces that develop the system. This indicates that there are significant difficulties in the functioning and development of the knowledge transfer system in the region. The driving forces are still too weak to provide a significant impetus to the development of the system.

The prevalence of the barriers over the driving forces can be seen in all the selected areas of the system. This means that there are difficulties with providing development impulses in all the areas. The relatively greatest difficulties occur in the case of structural as well as awareness and culture-related factors. The comparatively slightest difficulties can be observed in the case of competence-related and systemic factors.

## 5. Summary and conclusions

The barriers are characterized by greater gravity in the functioning of the KTS in the Łódź region than the driving forces that develop the system.

The weakness of the regional infrastructure of innovative business environment institutions lies in their high concentration in the Łódź agglomeration, as well as excessive individualism and competition existing between these institutions. The small scale of operations, along with the weak financial and organizational base of institutions, their lack of experience in the transfer of knowledge, poor contacts with the academic and business communities, as well as weak international contacts also have their negative impact. Especially in the case of university centers for technology transfer, it can be said that their experience, profile and number of employees do not correspond with the potential of universities that they work for. The activities of the regional sphere of centers for innovation and entrepreneurship are poorly coordinated, there is particularly a lack of coordination between the activities related to knowledge transfer and entrepreneurship, as well as the support for innovative projects. Actions taken in the field of innovation are insufficiently supported by the regional innovation and entrepreneurship policy, which in turn provides insufficient support for knowledge transfer mechanisms.

The presented analysis of determinants associated with the observed driving forces and barriers in the knowledge transfer system in the Łódź region indicates

a significantly higher assessment of the importance of the barriers compared to the impact of the factors identified as the driving forces. The overall prevalence of the barriers over the driving forces occurs in all the areas of the system. This highlights the occurrence of significant difficulties in the functioning and development of the system of knowledge transfer in the region. The driving forces are still too weak to provide a significant impetus to the development of the system. The comparatively greatest difficulties occur in the area of structural as well as awareness and culture-related areas. The slightest difficulties are encountered in the area of competence-related and systemic factors.

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