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Determinants of Knowledge Transfer in a Region

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Abstract

The main goal of the paper is to identify the determinants of knowledge transfer in a region on the basis of literature studies. The paper begins by discussion of the concept of knowledge transfer and its importance to regional development. Then it focuses on transfer of knowledge, with regard in particular to the triple-helix model. It also indicates the concept of success in the processes of knowledge transfer. A section of the paper contains a discussion of the determinants of transfer of knowledge in a region. The basis for recognition of the determinants in question were literature studies. On these grounds evidences were found to suggest that knowledge transfer in a region is determined by heterogeneous factors. The findings provide the basis for developing practical advice on effective knowledge transfer practices.

Keywords: knowledge transfer, region, innovation

Introduction

It is believed nowadays that knowledge is a key to economic development and competitiveness for a region. Knowledge absorption in a region involves not only firms, but also public and private research institutions. The principal issue here is the process of knowledge transfer in which success might influence development of a region. Hence, it seems important to identify the determinants which affect transfer of knowledge. Therefore, the main goal of the paper is to recognize the determinants of knowledge transfer in a region on the basis of literature review. The paper's structure consists of two sections. The first part includes discussion of the essence of knowledge and its transfer, while the second part focuses on identification of the determinants of knowledge transfer, on the basis of literature studies.

1 Knowledge and its transfer — primary issues

The development and competitiveness of a region is determined by various factors such as, inter alia, innovation, entrepreneurship, and regional policy, as well as fiscal and monetary policy, etc. (Klemens 2013, 153; Mach 2012, 111–112; Makieła 2013, 62; Zygmunt 2011, 62; Zygmunt and Szewczyk 2012, 65–66). It should be emphasized, however, that one of the fundamental factors regarded nowadays as an asset in regional development is knowledge. This statement is in accordance with the opinions of, inter alia, Todtling and Trippl (2005, 1203), Hülsbeck and Pickavé (2014, 123), Uotila, Melkas and Harmaakorpi (2005, 855). As Howells indicates: "knowledge and innovation matter when it comes to economic growth and productivity change, whatever perspective is selected" (Howells 2005, 1223).

With knowledge high uncertainty and asymmetry are inherent (Audretsch and Lehmann 2005, 1195). The results of knowledge usage are generally under high uncertainty and it is relatively quite difficult to estimate the final value of a new idea. Moreover, with knowledge information asymmetry is involved. Such asymmetry might be recognized primarily in the process of knowledge evaluation when level of education, experience, etc. results in a divergence in the final value of a new idea.

It is claimed by Przygodzki, with reference to Mathur (1999, 203) and Strojny (2004, 29), that knowledge is inexhaustible, simultaneous and nonlinear (Przygodzki 2011, 13). The inexhaustible property of knowledge means that it is not limited but — on the contrary — it has the tendency to

increase while being used. A simultaneous feature of knowledge indicates that the same knowledge might be employed simultaneously by many people in various places. It should be said also that the usage of knowledge might lead to the achievement of diverse outcomes. Hence, the significant attribute of knowledge is its nonlinearity (Przygodzki 2011, 13).

The substantial significance of knowledge in a region might be related to its spillovers. As Fritsch and Franke argue "it can be assumed that knowledge spillovers constitute an important factor in shaping the regional conditions for innovation activities" (Fritsch and Franke 2004, 245). On the ground of empirical research on more than 1800 cases from companies in three German regions (Baden, Hanover, Saxony) they argue that productivity of R&D activities leads to increasing diversity between regions (Fritsch and Franke 2004, 253). They also noticed the tendency to form clusters in space if innovative activities in the same industry or field of technology is concerned (Fritsch and Franke 2004, 250). However, they provided evidence showing that knowledge spillover brings a higher level of innovation output, while it does not lead to increased R&D productivity (Fritsch and Franke 2004, 248).

Knowledge absorption might be regarded through its transfer. The transfer in question might be recognized through patent data, citation analyses, spin-off creation and licensing (Landry, Amara, and Ouimet 2007, 563–564). According to Siegel, Waldman and Link, knowledge transfer might be also regarded through the number of university technology transfer offices (Siegel, Waldman, and Link 2003, 27–48). The evidence for knowledge transfer might be seen through collaboration between universities, industry and government (Landry, Amara, and Ouimet 2007, 564). It should be stressed that the process of knowledge transfer is not automatic, therefore as Etzkowitz and Leydesdorff (2000, 109–123) maintain in their triple-helix model, transfer of knowledge should be related to relationships between universities and other research institutes, firms and public institutions. Hence, it might be assumed that differences in relationships related to knowledge transfer might be regarded as one of the main factors which influence knowledge absorption differences and, as a consequence, innovative activities in regions.

An important issue which should be involved with the transfer of knowledge is its success. It seems apparent that successful knowledge transfer increases regional competitiveness. On the basis of literature studies, Cummings and Teng identified different approaches to a description of knowledge transfer success. These approaches are as follows:

- the number of knowledge transfers to recipients over a certain period of time
- a transfer which is on time, does not overrun budget, and satisfies the recipient
- knowledge transfer which results in new products, manufacturing processes, etc.
- the degree to which recipients of the knowledge transferred are satisfied with this knowledge (Cummings and Teng 2003, 41–42)

Apart from definitions of the success of knowledge transfer it should be emphasized that first of all this success depends on recognition of factors which influence such transfer, and subsequently, actions undertaken to restrain limitations and, on the other hand, to explore capabilities.

2 Essential factors affecting knowledge transfer in a region

The issue of factors which are likely to influence knowledge transfer is relatively often considered in research literature not only related to endogenous growth theory (e.g., Hulsbeck and Pickave 2014, 121–138) but also in a 'new' growth theory (e.g., Fritsch and Franke 2004, 245–255), evolutionary theory and economics of proximity (Coccia 2008, 105–122), as well as in a knowledge spillover theory of entrepreneurship (e.g. Audretsch and Feldman 1996, 630–640; Audretsch and Lehmann 2005, 1191–1202). It should be said nevertheless that most of the papers focus on certain factors and there is a need for a holistic study on determinants affecting transfer of knowledge in a region. The attempts to provide such an approach were made for instance by Cummings and Teng, as well as by Landry, Amara and Ouimet. Laundry et al. maintain that determinants of knowledge transfer comprises: attributes of knowledge, financial and organizational assets, relational assets, and personal assets (Landry, Amara, and Ouimet 2007, 564–565). Cummings and Teng (2003, 40)

claim that determinants of knowledge transfer might be regarded in four contexts: knowledge, relational, activity and recipient.

Knowledge context includes knowledge embeddedness and articulability. It is related in the first place to comprehension of knowledge and its usage by all parties of the knowledge transfer (Cummings and Teng 2003, 41). As Audretsch and Feldman emphasise, "a transfer of knowledge may considerably benefit from emdeddedness into networks and spatial proximity to network partners" (1996, 630–640). The importance of attributes of knowledge for the process of its transfer is also regarded by Landry et al. (2007, 565). They claim that the attributes of knowledge might be reflected in a number of high quality publications, research fields, research projects incorporating the needs of final users, the novelty of research findings, as well as in the articulateness of knowledge to its users, and the possibility to recognize expected benefits by final users of knowledge (Landry, Amara, and Ouimet 2007, 565–568).

The success of knowledge transfer in a region might also be connected with a recipient context. This is related mainly with motivation of the final users of the knowledge to support the transfer (Cummings and Teng 2003, 48). If knowledge transfer to firms is considered, firm size might be regarded as another factor in question. As Acs, Audretsch and Feldman (1994, 336–340) argue, small enterprises are more willing to cooperate with public universities whereas large companies mainly exploit their own knowledge divisions. From this point of view, it should be said that transfer of knowledge in a region might be determined by the previous experiences of knowledge recipients related to knowledge transfer. It seems relevant for knowledge transfer if recipients have cooperated before with universities and other research institutes, have their own R&D departments, employ graduate students, or take part in industry projects (Coccia 2008, 117–119).

Knowledge transfer in a region requires a series of activities to be carried out. Cummings and Teng refer to it as the "activity context." They suggest that knowledge transfer demands an established transfer mechanism and even the creation of an administrative structure to support the transfer in question (Cummings and Teng 2003, 49–50).

Financial resources are also important for knowledge transfer. They are required first of all to produce knowledge. According to Landry et al. financial resources "may influence knowledge transfer by providing different incentives" (2007, 568). On the ground of empirical studies based on a survey conducted on 1554 Canadian studies in 2002, Laundry et al. provided evidence showing that considering different types of financing research (private firm funding, internal university funding, government agencies funding), knowledge transfer is determined positively by private funding in chemistry and computer sciences (Landry, Amara, and Ouimet 2007, 581).

Knowledge transfer might be also determined in terms of an innovation base. As Audretsch and Feldman (1996, 630–640) state, regions with high knowledge investments are exposed to a significantly higher level of knowledge spillover than the regions with a low amount of knowledge investments. It should be emphasized that for knowledge transfer smart specialization of a region might also be relevant. For increased regional competitiveness it appears significant to concentrate on knowledge transfer with regard to a particular industry within the capacities of a specific region.

3 Distance as a major determinant of knowledge transfer in a region

According to Cummings and Teng, knowledge transfer might involve organizational, physical, knowledge and norm distances (so-called: relational context). Organizational distance is a knowledge transfer factor which is related to "the organizing mode through which the source and recipient transfer knowledge" (Cummings and Teng 2003, 45). It might have the form of, for instance, acquisitions, strategic alliances, networks, etc. It is said that social relationships, cooperation and trust work favorably for knowledge transfer in a region. Hence, one of the factors of knowledge transfer in a region might be regarded as interactions between transfer actors. The interactions in question are related to the interpersonal contacts which occur in knowledge transfer. Because such contacts might have diverse forms it should be said that face-to-face interactions might be considered one of the best methods of knowledge transfer. This statement is in accordance with an observation made by von Hippel (1994, 429–439) who provides evidence that repeated personal

contacts are substantially important for knowledge transfer. As Landry et al. state "knowledge transfer depends on the opportunities created by the linkages between research and research users" (Landry, Amara, and Ouimet 2007, 569).

On the basis on literature studies it might be said that an important factor of knowledge transfer in a region is connected with physical distance. With respect to the research made, inter alia by Meagher and Roger (2004, 237–260), it should be concluded that proximity both of the knowledge source and the recipient enhances transfer of knowledge. In this area, Coccia claims that "geographical proximity leads to a faster technology and knowledge transfer" (2008, 107). It should be underlined therefore, that the proximity in question is often regarded as a main factor of knowledge transfer (Audretsch and Feldman 1996, 630–640; Boschma 2005, 61–74; Coccia 2008, 107; Howells 2005, 1221–1223). However, it should be indicated that a significant issue here is the quantity and quality of networks which occur in a region. As Fritsch and Kauffeld-Monz argue, on the basis of Lissoni's (2001, 1479–1500) studies, "the spatial proximity as such is not important for the transfer of knowledge, but rather the factual existence of network ties within spatial proximity" (Fritsch and Kauffeld-Monz 2010, 23). It should be emphasized also that as Todtling and Trippl argue "local connections do not suffice to sustain innovativeness" (2005, 1206). They maintain that in some circumstances competitiveness of a region might gain from distant knowledge transfer. Hence, knowledge transfer might be determined by the character of the region. Regarding regional innovation strategies, Todtling and Trippl distinguished three types of regions with respectively three profiles of knowledge transfer (tab. 1).

Tab. 1. Knowledge transfer and type of region

Peripheral regions	Old industrial regions	Fragmented metropolitan regions
Some services available but in general "thin" structure; lack of more specialized services. Often too little orientation on demand	Many and specialized transfer organizations but weakly coordinated. Often too little orientation on demand.	In general a high density of such services, mostly commercialized.

Source: Todtling and Trippl (2005, 1209)

According to Todtling and Trippl (2005, 1213–1214) to strengthen peripheral regions it is recommended to employ knowledge not only from internal sources but also from outside a region whereas old industrial regions might benefit from attraction of foreign direct investment with complementary knowledge. For fragmented metropolitan regions it is advised to support both emerging clusters related to the regional knowledge base, as well as starts ups and spin-offs in knowledge-based industries.

Another determinant of knowledge transfer in a region might be related to knowledge distance. As Cummings and Teng state "knowledge distance is the degree to which the source and recipient possess similar knowledge" (2003, 46). They also argue that knowledge transfer might be influenced by a norm distance. Such distance is related to the value systems of all parties of knowledge transfer. It should be said that similar (or the same) cultures and values might create the grounds for transfer success. These issues were studied by, inter alia, Landry et al. They indicate that the "compatibility [of knowledge] with the potential users' existing values" is one of the significant knowledge attributes which impact the transferability of knowledge (Landry, Amara, and Ouimet 2007, 568).

Summary

Knowledge transfer is an important issue nowadays, since it is regarded as a significant factor of regional development and competitiveness. Hence, the recognition of determinants which are likely to influence knowledge transfer seems quite important. The literature studies in this field provide a way to identify the determinants in question. It should be said then that the process of knowledge transfer in a region is relatively highly complex, with various factors which influence on its success. The nature of those factors is non-identical, and frequently dependent on the specific transfer process and its features.

In the paper the discussion of determinants of knowledge transfer in a region was made on the basis of literature studies. It is important now to verify those results in empirical studies. It appears promising to research determinants of knowledge transfer in Polish regions to find the empirical evidence.

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