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Clusters as absorbers and diffusers of knowledge

Summary: The last two decades have been characterized by rapid developments in networking and clustering. The first clusters emerged spontaneously, led by internal forces oriented towards competition. Temporary clusters are much more dynamic, searching for other sources of competitive advantage, and cross national borders. This paper is an attempt to identify the effects of knowledge spillovers and knowledge transfer within regional business networks, especially business clusters. These effects are associated with the innovations which appear within such networks and clusters. The paper indicates those barriers and solutions that support innovativeness within the networks under study. Knowledge transfer within business networks that shape the innovative environment in the Wielkopolska region has been described using both a theoretical and practical approach. The findings and conclusions of the research provide an opportunity to increase business efficiency within business networks.

Keywords: cluster, network, innovation, knowledge transfer, knowledge spillovers.

JEL codes: L14, O31, D22.

Introduction

The last two decades have been characterized by rapid developments in networking and clustering. These processes have become a source of competitive advantage for local and regional economies as well as a challenge for economic policy and research. The initial observations of the European Cluster Observatory have shown that clusters indeed play a crucial role in economic reality. It can be assumed that roughly 38% of all European employees work in enterprises that are part of the cluster sector [European Commission 2007]. Further observations suggest a positive

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correlation between the strength of regional portfolios (human resources, patent applications, employment in medium- and high-tech manufacturing) and regional innovation performance. Thus clustering is vital for the output of innovation as well as for the growth of productivity and competitiveness.

The first clusters emerged spontaneously, led by internal forces oriented towards competition. Their existence was based on the static advantages of agglomeration, such as lower transaction costs, availability of skilled labour force, vertical disintegration of production and better interactions between the companies in a cluster. However, as time goes by, changes in their foundations have transformed the reasons for clustering. Temporary clusters are much more dynamic, searching for other sources of competitive advantage, and cross national borders.

This paper is an attempt to identify the results of knowledge spillovers and knowledge transfer within regional business networks, especially business clusters in one region of Poland. The results are associated with innovations which appear within the above mentioned networks and clusters. The authors present the entities engaged in knowledge spillovers and knowledge transfer, devoting much attention to the barriers which hinder cooperation between the business sector and the R&D institutions crucial for innovation throughout networks along with their actors and those solutions which can support cooperation aimed at increasing innovativeness.

To clarify their terminology the authors point out that the term business network is broader than the term cluster. Each cluster is a network, but not each network is a cluster. Clusters are networks characterized by the spatial proximity of their actors.

1. Clusters and knowledge – conceptualization and operationalization of the terms used in the research

In the literature one can come across many definitions of clusters. As the aim of the paper is not to review them, the authors present only the one they used in their empirical research. The most popular concept of a cluster was developed by Porter [Porter 1998], according to whom a cluster is “a group of companies existing in a geographical neighbourhood along with the institutions which are related to them and deal with a particular activity, connected by similarities and competing with one another”. According to Ketels and Memedovic [Ketels & Memedovic 2008] the definition of clusters is built on three pillars: geography, creating value and the business environment. Geography refers to proximity – clusters as groupings of entities which are concentrated in one region within a larger nation or in one town. Creating value means that clusters include different industries, are networks of supportive and related industries engaged in bringing value to the customers.

The functioning of clusters is connected with creating a specific business environment which is developed thanks to cooperation between the business sector, R&D institutions and the public sector. Researchers have been trying to identify the most typical attributes of clusters. Above mentioned Christian Ketels [2004] defined the attributes of clusters as follows:

- Proximity: the entities need to be sufficiently close spatially to permit positive spillovers and enable the sharing of common resources to occur,
- Linkages: their activities need to share a common goal for them to be able to profit from proximity and interactions,
- Interactions: being close and working on related issues does not seem to be enough – some level of interaction is essential,
- Critical mass: a sufficient number of participants being present are required for the interactions to have a meaningful impact on companies.

Quite a similar set of attributes was defined by the experts group working on a cluster project for the European Commission. It uses Porter's basic concept but adds a few finer points to it [European Commission 2003]:

“Clusters are groups of independent companies and associated institutions that are:

- Collaborating and competing,
- Geographically concentrated in one or several regions, even though the cluster may have global extensions,
- Specialized in a particular field, linked by common technologies and skills,
- Either science-based or traditional,
- Clusters can be either institutionalized (they have a proper cluster manager) or non-institutionalized.”

Due to the recent effects of globalisation, cluster research has moved away from putting an emphasis on agglomeration economics (in terms of the availability of skilled labour or certain infrastructure), minimisation of transaction costs and greater market access as the factors that constitute cluster performance. A knowledge driven economy along with globalisation and its main feature – liberalisation – have strongly affected the whole philosophy of clustering, becoming a very interesting issue for researchers as well as policy makers. The concept of clusters developed by Porter was adopted by politics very quickly. Many governments have implemented cluster policies as a part of their industrial and innovation policies. According to the EC's Green Paper recommendations [European Commission 2007, pp. 4–23], Europe should support emerging research driven clusters. This can be done by better integrating the science base with private R&D in new and existing clusters. In this way Europe can face the challenge of globalization. The competitiveness of the European economy can be significantly increased through close cooperation and by interlinking innovative enterprises with market-oriented research institutes. Understanding, explaining and describing the mechanisms of creating and sharing both knowledge and innovation should facilitate the identification of the correct

cluster policy instruments and encourage policy makers to engage in the process of increasing the competitiveness of local economies.

However, why could such access to knowledge not be gained through web techniques or even just the old-fashioned telephone? According to the available evidence, even high tech firms and knowledge based industries that should obviously be well acquainted with Internet technologies and less sensitive to the need for agglomeration, tend to cluster [Lawson 1999]. To explain this phenomenon, we have to analyse the concept of knowledge. Knowledge flows comprise a set of processes, activities, behaviours and events through which data, information and knowledge are transformed.

The General Knowledge Model distinguishes four basic areas of activity: knowledge creation, retention, transfer and utilisation [Newman & Conrad 1999, pp. 1–20]. Following the creation of knowledge and its entry into the system, we have to preserve it and secure its viability, then share it within a system and finally apply it to business purposes. Each phase of the activity has its own small cycles and knowledge flows and people's involvement in these flows is through various artefacts (files, papers, documents, ideas, pictures, etc.). These knowledge artefacts can be either explicit or tacit in nature and Nonaka and Takeuchi have examined both in their research [Nonaka & Takeuchi 1995]. Tacit knowledge can be considered as experience, gained through an action (learning by doing); while explicit knowledge can be stored and published in the form of a book or other learning material. The premise of the tacit knowledge approach is a belief that knowledge is essentially personal in nature, cannot be extracted from the heads of individuals and therefore the only possible method of dissemination is a transfer of employees – “knowledge carriers” – from one part of an organisation to another [Sanchez 2004, p. 3]. Some kinds of interaction have to be arranged between various individuals while performing certain tasks, realizing projects, organising joint ventures, etc., which in a structured form can be a social network. In this network people have to collaborate, as it intensifies interaction and increases the chances of transmitting the ideas that exist in an individual's mind to others. As the knowledge is “subconsciously understood and applied” and “difficult to articulate” people have to collaborate, since interaction itself is an insufficient condition for embedding the knowledge [Zakk 1999, pp. 45–48]. The process of transmitting tacit knowledge between people in an organisation and its conversion into explicit knowledge is a real challenge to the managers and researchers exploring the issue. This transfer is also a major factor in the emergence of knowledge clusters. The more important the tacit knowledge is for production, the more localised the production is likely to be [Evers 2008, p. 6]. Pinch and others have argued that, over time, agglomerations can develop a cluster-specific form of architectural knowledge that facilitates rapid dissemination of knowledge throughout the cluster by increasing the learning capacity of proximate firms and thereby conferring cluster-specific competitive advantages [Pinch et al. 2003, pp. 373–388].

Evers defines knowledge architecture as “the institutions of communications and the type and intensity of knowledge flows (knowledge sharing), based on the formal and informal interaction between persons and organisations” [Evers 2008, p. 8]. Going further we can assume that the quality of human capital in a specific location, the intensity of interactions, mobility factors and the internal dynamics influence the efficiency of the whole system, determining the capacity for acquiring, assimilating and adopting new knowledge. Systems of knowledge sharing and dissemination can exist within cluster, but also beyond. Therefore, we have to distinguish between a cluster hub, considered as a local innovation system (a node in networks of knowledge production and sharing), and a knowledge cluster, considered as an agglomeration of organisations that have the organisational capability to drive innovation and create new industries [Evers 2008, pp. 9–10]. This implies that a knowledge hub can be found even in a single organisation full of creative human resources and an effective information system, but a knowledge cluster requires an agglomeration of organisations that are ready to cooperate, share and transfer knowledge among themselves. A knowledge hub consists of various linkages to suppliers, competitors, co-operators and customers that enable knowledge transfers into the cluster. The nature and type of knowledge flows in a specific cluster depends on three inter-related dimensions [Basant 2002, p. 3]: the internal characteristic of the cluster (internal structure, linkages, capabilities, etc.), the types of external linkages, plus the external policy and economic environment faced by the cluster. The first dimension is based on endogenous factors, such as industrial sector, number of organisations, level of collaboration, similarity or diversity of organisation, etc. The second and third dimension are determined by external linkages, and the quality of these connections influence a cluster’s innovative performance.

The next issue to be explained is: what are the sources of knowledge? The main sources of knowledge can be highlighted thus: a firm can develop new sources within the company (R&D), exploit past discoveries, develop new solutions by sharing knowledge within the company or they can acquire knowledge from outside [Crespi et al. 2008, p. 1]. Acquiring knowledge from outside can be in a form of inheriting, purchasing or imitating. Through the innovative performance of a cluster there can be many spillover effects. According to Levin and Reiss’ definition, spillovers are the “side effects of a firm’s strategies investing in R&D” [Levin & Reiss 1988]. When knowledge is exchanged between people or organizations, is a “knowledge transfer”, everything that goes beyond the boundaries of a system is a “spillover”. The unintended use of exchanged knowledge is called “Knowledge Externality” [Fallah & Sherwat 2004, p. 8]. The relationship between cluster innovation and spillovers has been the object of research many times. Jaffe used “knowledge production function” to describe the relationship between clustering and innovation [Jaffe 1986, pp. 984–1001]. Other research used patent citations to prove the geographical localisation of innovations [Maurseth & Verspagen 2002] or the effectiveness of vari-

ous channels of R&D spillovers at the intra-industry level [Harabi 1997]. Spillovers can occur on at least three levels [Fallah & Sherwat 2004, p. 10]: Individual (across people), enterprise (across firms) and global (across nations). As spillovers benefit other firms, societies and nations, this is an issue of great importance for encouraging clustering. Having knowledge clusters, effective knowledge architecture, high quality human resources and an effective innovative system, it is necessary to translate new ideas into productive economic capacity. This process should be supported by policy makers in the framework of National Innovations Systems. The capacity to acquire new knowledge, new technologies, and to transmit and apply them should be considered as a national attribute and a source of competitive advantage on the international market. Knowledge spillovers and knowledge transfers are to some extent processes of knowledge diffusion and knowledge absorption. Some entities diffuse and absorb knowledge intentionally (knowledge transfer) and some do it unintentionally. Regional networks or business clusters of Porter's type create convenient circumstances for these processes to occur.

The concept of clusters is related to the concept of knowledge spillovers. Clusters, thanks to their attributes, are predisposed to foster knowledge spillovers. Knowledge spillover effects are an inseparable element of a cluster.

The issue of spillover effects and their relationship with the location factor was raised by Marshall, who indicated that one of the objects of a spillover is knowledge. This spillover can occur even if relations between companies are non-existent. Porter emphasises the significance of local competition for innovativeness and the stimulation of knowledge spillover effects. Continuing Porter's argument, it could be stated that knowledge within a cluster is determined by the interrelations among companies operating in the same location [Henry & Pinch 2002]. Storper [1993, 1995], similarly explains that the acquisition of knowledge occurs thanks to relationships among companies which have nothing to do with market exchanges typical of knowledge acquisition through licensing, alliances or takeovers.

Attempts have even been made to build a knowledge-based theory of regional geographic clusters [Maskell 2001; Morgan 1997]. Maskell [2001] finds the key cause for cluster creation to be company's appreciation of the fact that such solutions generate knowledge. Cluster-level knowledge is similar to industry routines, recipes for success and know-how for performing particular activities. While studying Taiwanese high-tech companies, Tsai [2005, pp. 126–127] found that intra- and inter-industrial spillover effects in the field of R&D have a greater significance from the viewpoint of production growth than do individual companies' efforts in the field of R&D. The phenomenon of clusters as "devices" fostering knowledge flows is clearly visible in the concept of clusters as triple helix. This defines clusters as subjects existing on the boundaries of the business sector, public sector and R&D sector. The more or less visible presence of R&D institutions in clusters can be a kind of measure for the intensity of potential knowledge spillovers and knowledge flows.

Knowledge spillovers and knowledge flows appear due to two interdependent processes – knowledge diffusion and knowledge absorption.

Bearing in mind some of the above mentioned points, it can be stated that clusters are a phenomenon which, on the one hand, fosters the diffusion of knowledge: if this takes place within a cluster it can be called inter-cluster knowledge diffusion; and outside the cluster – between it and its environment – intra-cluster knowledge diffusion. On the other hand, it is a means of absorbing knowledge. Such absorption appearing within clusters – among the cluster participants – is inter-cluster absorption of knowledge; and from the cluster to the environment, intra-cluster absorption of knowledge.

In the following parts of the paper the authors will look at knowledge diffusion and the absorption of knowledge in respect of twelve regional and local networks functioning in one region of Poland. The core of the study is inter-cluster diffusion and inter-cluster absorption of knowledge.

2. Methodology of the study

In the period from September to December 2009 field research was conducted on the subject of the potential of regional and local networks in Wielkopolska to develop in the future. The study was done within a broader project commissioned by the Marshal Office of the Wielkopolska Region as part of the Human Capital Project 8.2.2. “Construction of the Wielkopolska System of Innovation”; co-financed by the European Union through the European Social Fund. In this paper only that part of the results obtained which focused on innovations and knowledge transfer within the networks under the research is presented.

2.1. Research population and research sample

The general population of the research was business networks (clusters among others) operating in Wielkopolska. Institutionalized, formalized and non-institutionalized networks were taken into account. They have different legal and organizational forms, specific to Poland.

In the first phase of the research a list of the different networks operating in Wielkopolska was prepared. To complete the list an in-depth critical analysis of reports on the subject of networking in Wielkopolska was conducted. The authors used Internet websites presenting data about regional and local networks and conducted telephone interviews with representatives of fourteen business environment organizations engaged in fostering the innovativeness of companies. The aim was to prepare a list of networks which could potentially participate in the research.

Altogether 164 different networks were identified. To select the networks which have the highest potential for growth the authors asked four regional experts from Poznań University of Economics, the leading University in the region in the fields of clustering, competitiveness and innovation, which of the identified networks should participate in the next phase of the research. After discussion twelve networks were selected as the research sample. The selected networks had to be real operating objects, performing real tasks and activities not just existing as artificial arrangements on paper. In the research sample there were networks of regional and local scope. Ten of them were formalized, institutionalized clusters with dedicated cluster initiatives and functioning cluster organizations. Additionally, two more networks were taken into consideration - one institutionalized network in tourism, and one network in the food industry which can be treated as a cluster though without a cluster organization.

Table 1. Subjects in the research sample

Local economic networks	Regional economic networks
Boiler-making Cluster	Wielkopolska Telecommunication and Information Cluster
Printing and Advertising Cluster	Wielkopolska Automotive Cluster
North-Wielkopolska Tourism Cluster	Wielkopolska Food and Agriculture Network
Wielkopolska Renewable Energy Cluster	
South-Wielkopolska Food Cluster	
Wielkopolska Aviation Cluster	
Wielkopolska Horses and Carriages Cluster	
Wielkopolska Advanced Automation Technique Cluster – ELPROTECH	
Poznań Local Tourist Organisation	

Looking at Table 1, clusters and networks focused on the same industry can be seen, e.g. food or tourism. The explanation for this is that in one case the network is formalized and operates with the support of cluster initiatives, and in the second case there is no cluster initiatives dedicated to it. The division between local and regional networks depends on the geographical scope of the network. In the region of Wielkopolska there are four sub-regions and the city of Poznań. Networks with participants coming from one sub-region, or with the domination of participants coming from one sub-region, are local ones.

The research sample comprises 12 different networks. Ten of them are clusters. They are represented by their coordinators. In the case of formalized clusters the coordinators are associated with the chairmen of cluster organizations. The two networks which

are not formalized clusters were represented by the chairmen of industrial self-government institutions associated respectively with tourism, and food and agriculture.

2.2. Research method

The authors used a postal survey as a method for collecting data. The questionnaire was sent to the formal or non-formal coordinators of the networks, as mentioned in 2.1.; to the chairmen of cluster organizations and industrial self-government institutions – altogether to 12 people and each of them fully completed the survey. This was the qualitative research.

The questionnaire consisted of screening, research specific, demographic and archive parts. The respondents opinions were assessed on a rating scale (1-the quality exists and 0-the quality does not exist), but in some cases a five degree ordinal scale was used [Greek, Tull & Album 1988, pp. 305–308], where 1 meant –“definitely not important”; 2 – “rather not important”; 3 – “difficult to say”; 4 – “rather important”; 5 – “definitely important”.

There were 22 questions in the survey. The first section was devoted to general data about a network – core industry, name and location of the coordinator of a network. The second section gathered data about the actors involved in a network – their number, sector of operation, and the activities performed by coordinators of network actors. The intensity of linkages, their quality and diversity as well as the innovativeness of the network were the focus of the third part. In the fourth part there were questions regarding the relationships of a network with outside entities and the instruments supporting innovation processes.

3. Results of the research

3.1. Innovation as a sign of effective knowledge transfer and knowledge spillover

The research was an attempt to identify the knowledge spillovers and knowledge transfers within business networks, especially business clusters. The authors tried to investigate how effective knowledge transfer is and what kinds of barriers are met in business networks (including clusters) in the Wielkopolska region. Based on the findings in the first part of the paper, the authors tried to measure the effectiveness of knowledge transfer using the number and diversity of innovations that appeared in the networks over the period 2007–2009. The respondents were asked about the level of novelty and the type of innovations which appeared in their networks. Bearing in mind the methodology of the Oslo Manual, it was assumed that

there are four types of innovation: product, process, organizational and marketing. Each type can be a novelty for a company: regional scale novelty, national scale novelty or international scale novelty. Among the 12 networks, 9 indicated product innovations and 7 market innovations that were novelties at the national level.

Table 2. Innovation matrix

	Product	Process	Organization	Market
Novelty for company	7	6	5	2
Regional scale novelty	6	6	2	2
National scale novelty	9	5	2	7
International scale novelty	0	0	0	0

Going into more detail, one can look closer at the types of innovation. In the set of organizational innovation, the first position goes to the deployment of an IT system. More than half the networks declared they had introduced new information systems. One third had started to use a new logistic system and changed their organizational structure. None of the networks studied declared they had deployed modern cost calculations (Figure 1). The types of organizational innovation indicated by the majority of network representatives highlight their awareness of the

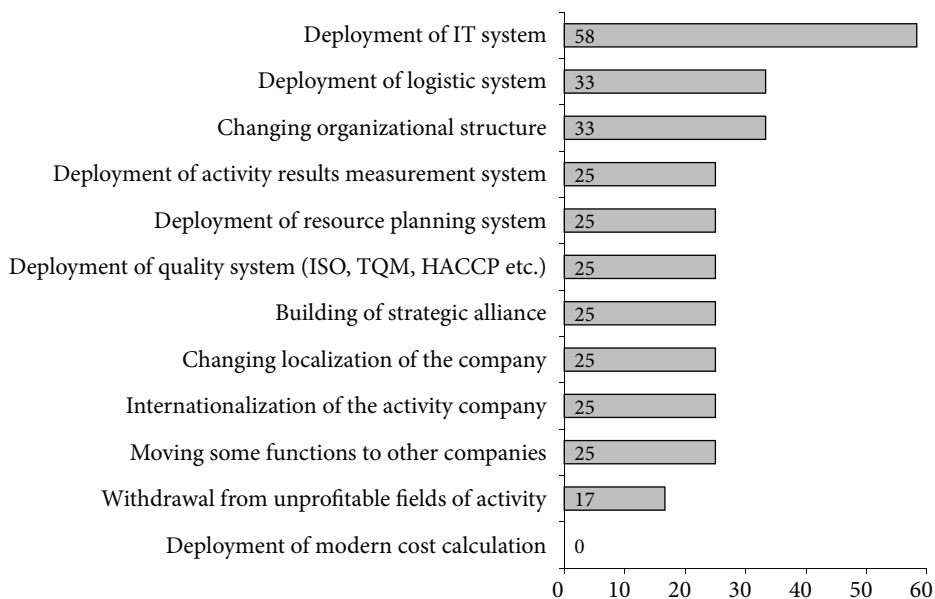


Figure 1. Organizational innovation (in %)

Source: Own study based on survey

importance of new information technologies to the existence of networked companies in the market.

As regards market innovation, 67% of respondents declared using new forms of promotion and over half of the investigated companies indicated new distribution channels. An optimistic note is that over half of the investigated companies indicated entry into new markets (Figure 2), which implies that being in a network does matter when considering the internationalization of a company. However, from the interviews with network coordinators, it turns out that other markets are conquered by only a few firms. Just one third of the entities participating in the research were involved in creating new needs in the market. This type of market innovation is of great importance when taking into consideration the process of value migration which is experienced by many industries.

The data relating to examples of innovation in the investigated networks show

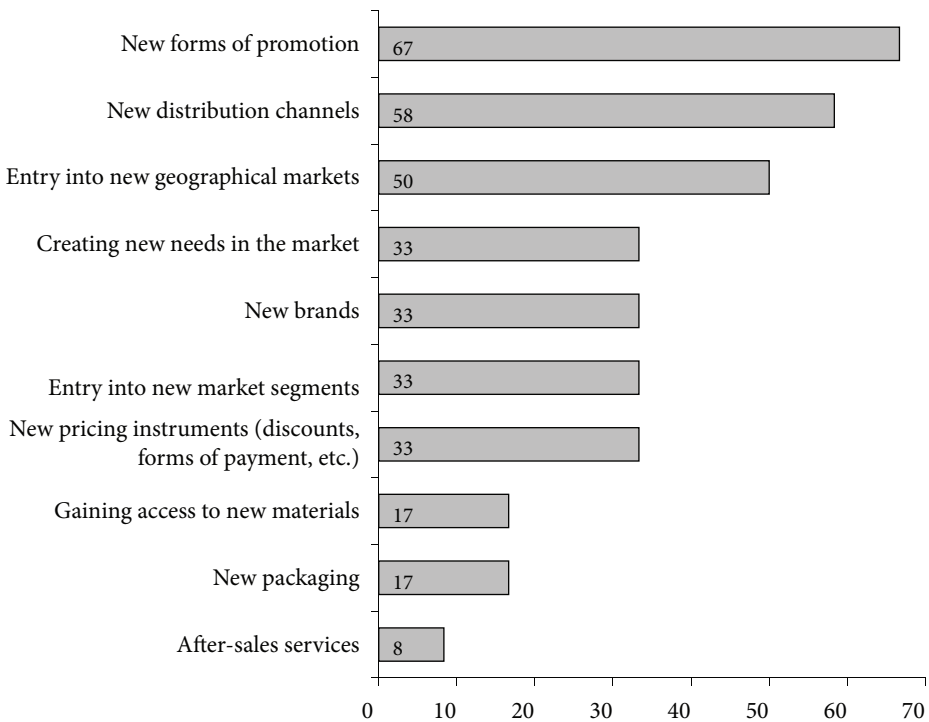


Figure 2. Market innovation (in %)

Source: Own study based on survey

that they have the capacity for innovative performance, and that this capacity is used. From the results obtained, the networks can even be ranked according to their level of diversity in market and organisational innovation. The greatest num-

ber for organisational innovation seen was 9; the number for market innovation was 8. Highly ranked are the following: an organisational network cooperating in the agro-food sector, Wielkopolska Horses and Carriages Cluster and the Poznań Local Tourist Organisation. However, it should be pointed out that the most important number is not the one for innovation, but its diversity. Networks can be characterized by numerous innovations, but be limited to 2 or 3 types. One also has to keep in mind that these evaluations have been made by network coordinators themselves, which can raise concerns about their objectivity. Among the networks with the widest spectrum of market and organisational innovation, there are clusters generally perceived as not innovative. **This assessment should be interpreted with great care.**

3.2. The support for diffusion and absorption of knowledge

Innovations which are defined as novelties implemented in the marketplace, and in some cases recognized along with others as the results of successful knowledge spillovers and knowledge transfer, can be fostered by cooperation between actors representing the business and R&D sectors. The cooperative efforts aimed at generating innovations are quite often supported by the authorities of the region where they are located. Regional and local authorities have the opportunity and ability to encourage companies as well as educational and research institutions to cooperate in order to improve their innovativeness. The explanation for this may be the fact that regional or local authorities through various information campaigns can reduce the asymmetry of information which very often hinders effective and trustful cooperation. An assessment of the capacity of the networks studied to be innovative required a review of the cooperation between business and R&D institutions. As can be expected, and as was mentioned earlier, the interactions which promoted knowledge flows were supported by the regional authorities. The capacity for being innovative was determined by the support experienced while building cooperative networks between companies in the network and scientists (Figure 3). Eight out of the 12 investigated networks (67%) indicated that support for cooperation between the R&D sector and firms in a network took the form of mediating between various entities in searching for information about opportunities for technology transfer and other entities that could contribute to this transfer. Strong support was also expressed for joint projects in the local business environment and recourse to schemes enabling cooperation between companies and scientists. Also listed was support in the form of developing common laboratories for business and science, but it was not very widespread. One more option for cooperative support between business and R&D institutions are programmes for spin-offs. This solution was not used in respect of the networks under research.

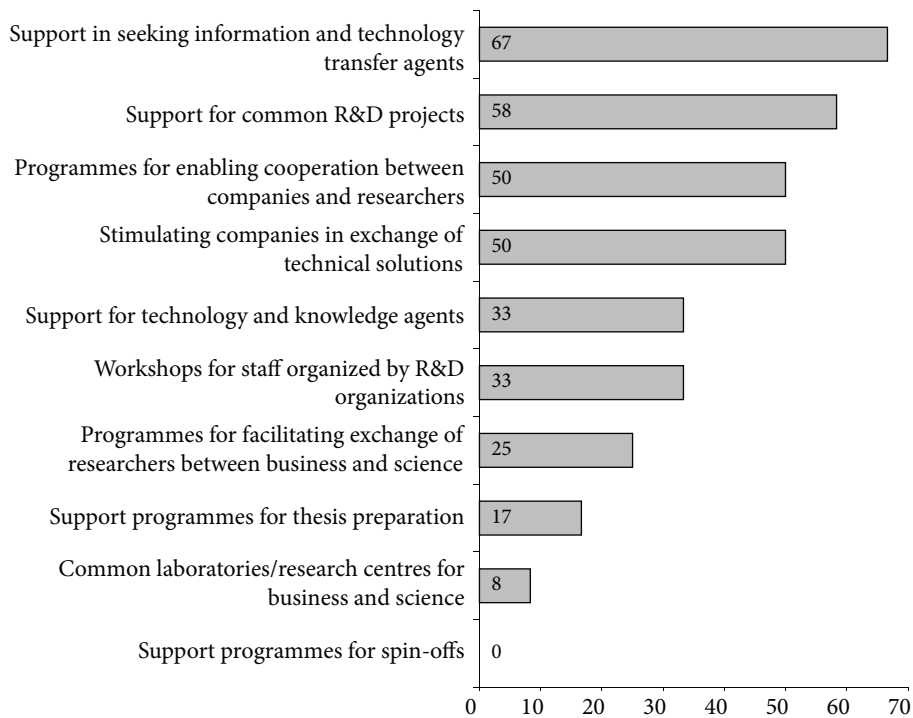


Figure 3. Ways of supporting cooperation between business and R&D institutions 2007–2009 (in %)

Source: Own study based on survey

3.3. Main barriers to diffusion and absorption of knowledge

The capacity to be innovative is also determined by the number of existent barriers to cooperation between firms and the R&D sector. These barriers can hinder the processes of innovation through blocking knowledge, information and the transfer of ideas. Such obstacles can appear not only when transferring knowledge and ideas, but even later when there is a new solution, a new process or a new product and there are difficulties in commercializing them. Figure 4 shows the perceived barriers mentioned by the network coordinators. The barriers were assessed through the use of a 5-point scale; where 1 stood for unimportant, 2 for less important, 3 for important, 4 for very important and 5 for crucial. Each of the 16 barriers has been assessed from the most to the least important. Crucial barriers were ranked as follows: a lack of information about R&D activity (score 4.55), different time perspectives, discrepancies in formulating the goals of R&D activity and a lack of funding in enterprises (score 4.45). The first two crucial barriers are related to the phase of generating new ideas; the third one can hinder not only the search for novelties but

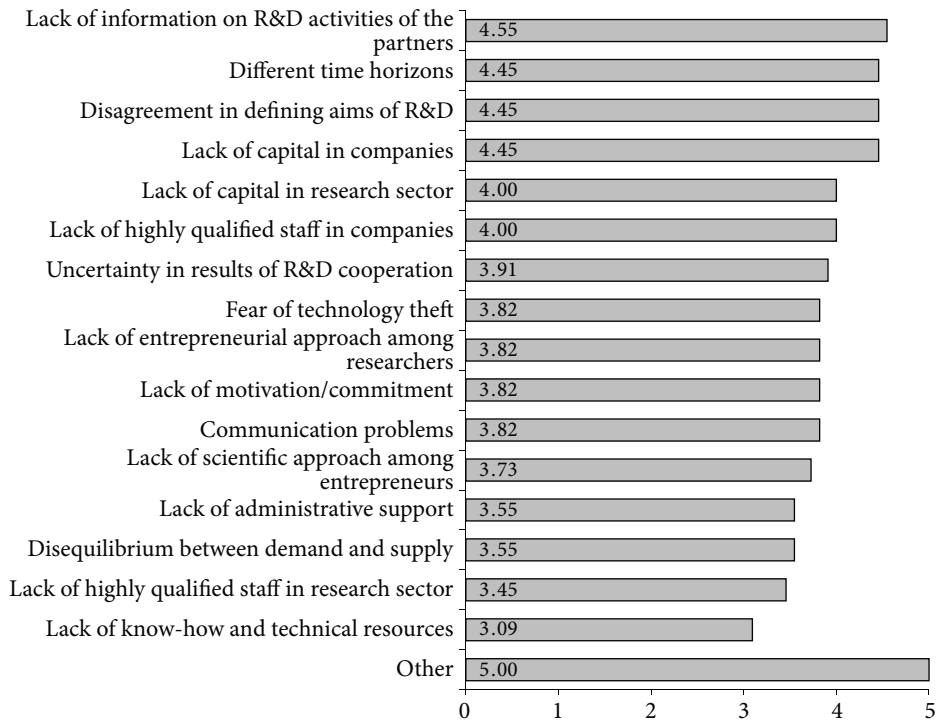


Figure 4. Barriers to cooperation between business and R&D institutions

Source: Own study based on survey

especially their commercialization. The barriers indicated by the network coordinators indirectly show why there may be problems in extending the capacity to be innovative and suggest what has to be done to improve the intensity of knowledge transfer and processes aimed at increasing the innovativeness of networks.

3.4. Financial instruments supporting effective knowledge transfer

Being innovative is particularly sensitive to financial considerations. Companies are very concerned about the risks associated with innovation, which was often indicated by network coordinators, as well as the significance of the companies' participation in Framework Programmes. The capacity for being innovative is in this way strongly determined by the financial instruments supporting such innovativeness. Respondents were asked which financial instrument in support of innovativeness and entrepreneurship they used in the period 2007–2008 and how they assessed these instruments. The assessment was done again on a 5-point scale; where 1 stood for unimportant, 2 for less important, 3 for important, 4 for very important and 5 for crucial. The majority of respondents indicated instruments for refunds or grants

for the creation of new workplaces (8 networks – 67% of total), grants for consultancy services, credit and loans, credit lines (58% – 7 networks), then refunds or grants for staff training (6 networks); see Figure 5.

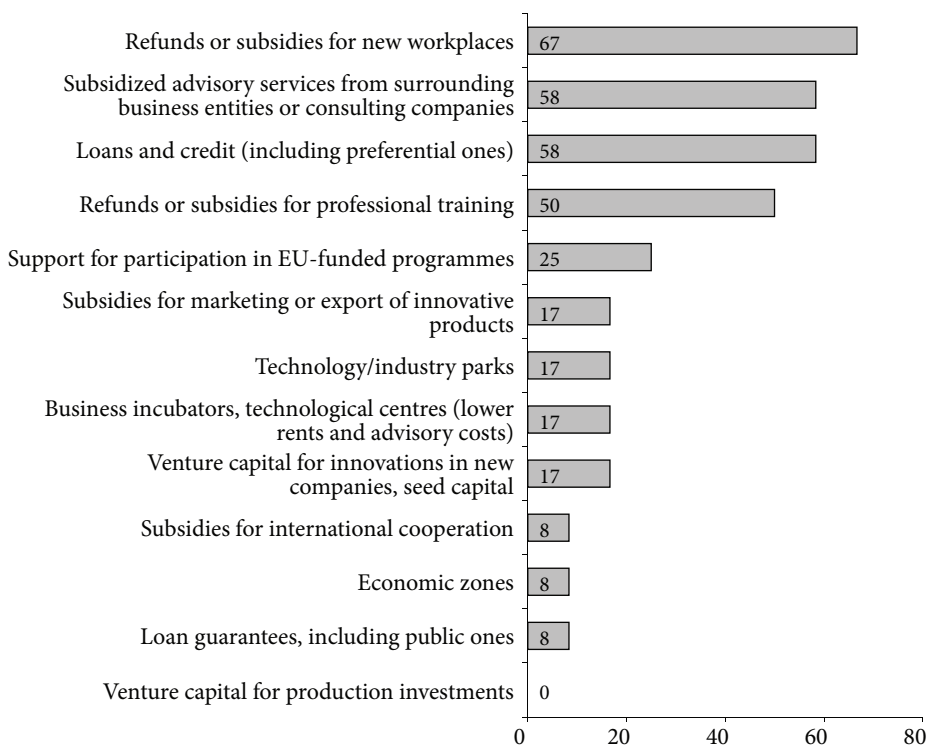


Figure 5. Financial instruments supporting innovativeness and entrepreneurship utilized by networks in 2007–2008 (in %)

Source: Own study based on survey

The network coordinators were asked to assess the importance of the available instruments to companies involved in the networks. A number of financial support instruments were assessed and ranked according to their importance for the company. The provision of high risk capital for production investments was assessed at (5.00), then support for participation in programmes financed by the EU and grants for international cooperation. The latter is particularly important since it could increase the internationalisation of companies. A similar assessment was seen in the case of grants for marketing or the export of innovative products, which again is related to the competitive position of a firm in foreign markets (Figure 6).

According to the research results, though high risk capital for production investments is crucial, astonishingly, firms have not used it. It would be interesting to

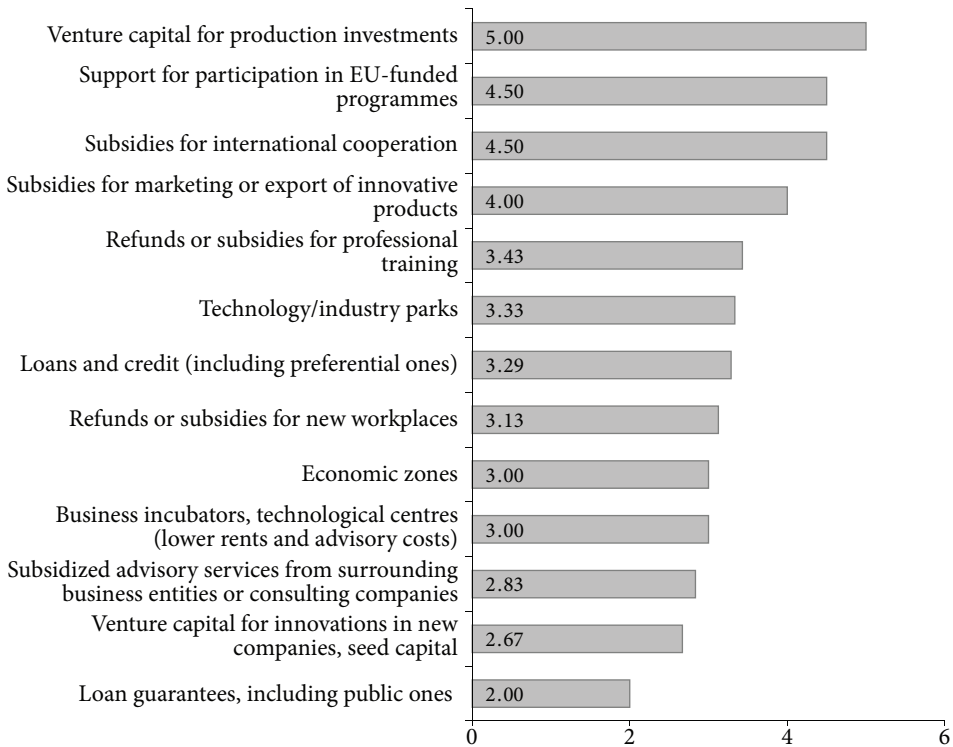


Figure 6. Importance of financial instruments supporting innovativeness and entrepreneurship

Source: Own study based on survey

find out what the reasons of such behaviour are. Low ranked were high risk capital for innovative ventures of new companies, but network coordinators explained this by the lack of a market for this kind of capital in Poland, which at the same time should be an encouragement to develop this market. There are a lot of barriers that decrease the benefits from the financial instruments supporting innovativeness and entrepreneurship in networks (Figure 7). The most important barriers indicated by the respondents were as follows: long procedures for receiving funding (score 4.20), the necessity to deliver additional documentation (score 3.82), then a lack of trust by financial institutions towards local entrepreneurs (score 3.73). The network of entities actively cooperating in the agro-food sector indicates that the risks associated with using this financial instrument is a barrier. Assessments by coordinators could be a help in rebuilding the system of external financing regarding innovativeness and entrepreneurship in the region.

The capacity for being innovative is also determined by the linkages which a network has with R&D entities and outside institutions in the business environment. The

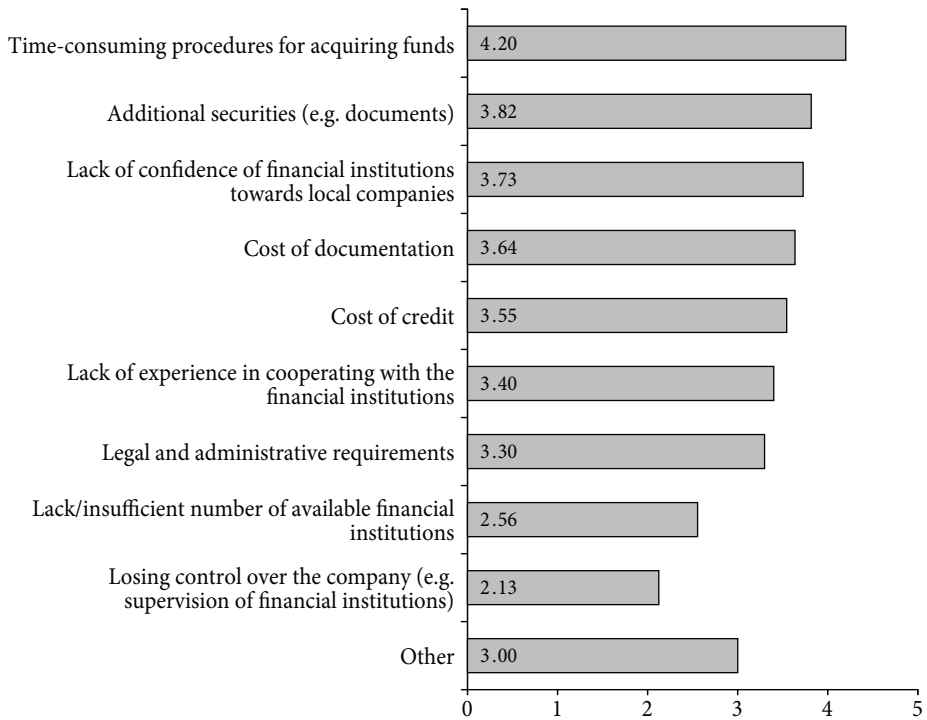


Figure 7. Barriers to the utilization of financial instruments supporting innovativeness and entrepreneurship

Source: Own study based on survey

intensity of interactions also indicates how a network is embedded in the Regional Innovation System, whether it is an integral part or an external element. Figure 8 shows the most common partners for the networks investigated. Apart from the location of such partners (municipality, district, region, country or abroad), crucial partners are consultancy firms and universities (58% of total – 7 networks). This rating of universities in the top group of cooperation partners is a good sign, as it increases the probability of knowledge and technology transfer which is crucial from the perspective of network innovativeness. Next in the pecking order were technological and industrial parks as well as R&D entities. Universities along with technological and industrial parks which cooperate with firms are localized in the regions. Among regional partners there were also Chambers of Commerce and Industry Associations. At the local level the most important partners are financial institutions. Looking at partners at the national level, universities should be considered; and the Boiler-making Cluster had a partner from abroad. Others were quality control laboratories and certification bodies.

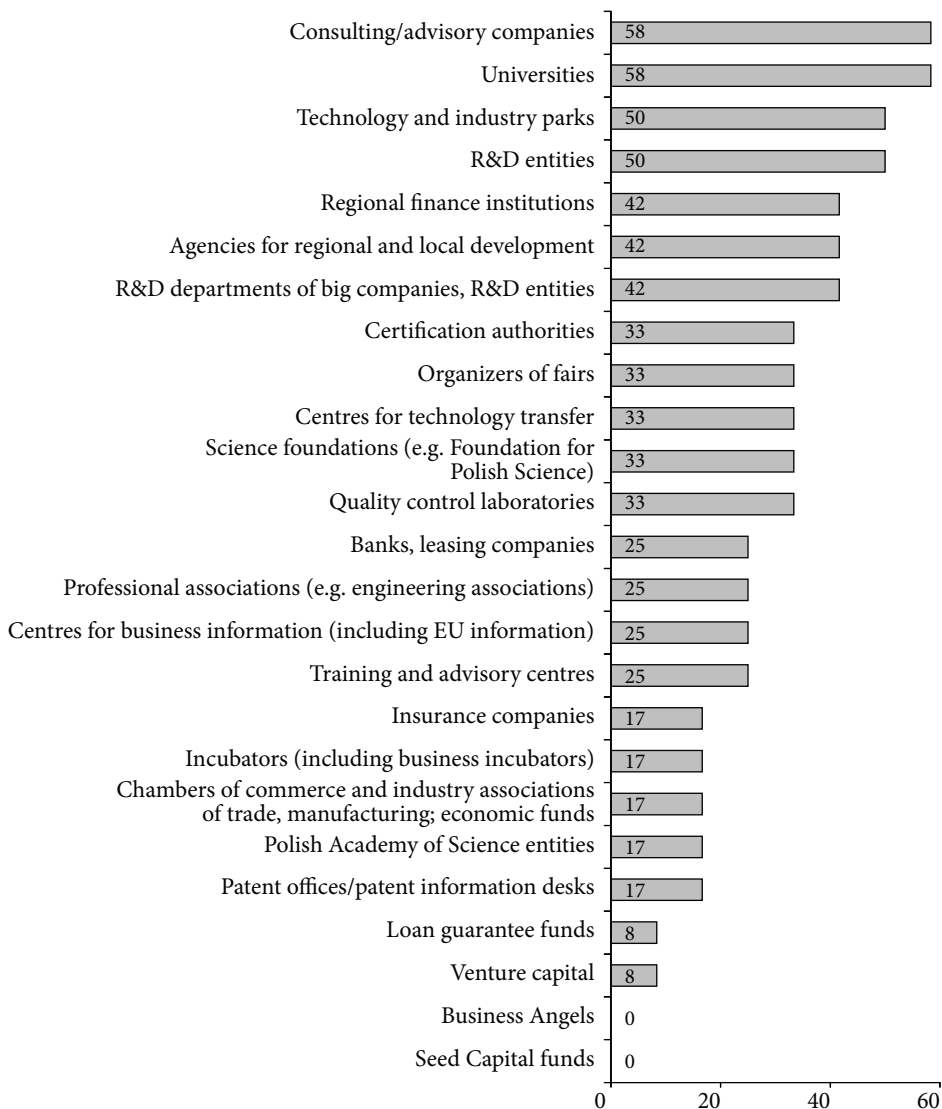


Figure 8. Main partners of networks (in %)

Source: Own study based on survey

Conclusions

Successful economies are those which have the ability to learn. They are able to take the ideas embodied in the existing academic knowledge and technologies, and translate them into an innovative capability at the level of the firm [Bozemann et al. 2003] and at the level of the state.

The research presented here and carried out in the Wielkopolska Region has provided an insight into the threats that hinder the fostering of innovativeness through economic cooperation within networks, including clusters, and motivated by the need to formulate some recommendations for regional and local authorities. The threats related to the phenomenon of innovativeness can be associated with the barriers to cooperation between companies and R&D institutions involved in networks. The most important barrier is still a gap in the financial system which supports networking performance and the lack of any final conclusion whether such a system will be established. Establishing such a system is not easy since there are many divergent interests among the regional actors of the Regional System of Innovation. It is a challenging task for the regional and local authorities to think about such a system and especially to decide whether to finance or subsidize the activities of network and cluster organizations. Beside the financial system, there is also the barrier in an entrepreneur's mind which blocks undertaking attempts at cooperation. To break this barrier the regional and local authorities should promote the good practices of such cooperation and show their benefits.

Fostering knowledge spillovers and knowledge transfers in regional networks and clusters in Wielkopolska requires an increase in the vital, though ethical and simultaneously based on economic values, cooperation among various actors. It is a prerequisite for the success of building a knowledge economy in this region. The importance of this fact is even greater if one takes into account recent trends in clustering – the internationalization of clusters. Clustering in Europe crosses borders; European initiatives are enhancing cross-national scientific cooperation and building strong and close relationships between research institutions and the business community [European Commission 2006]. There are therefore projects focused on building international clusters, e.g. projects developed by Europa Innova like BelCAR, Innotex or CASTLE. To take advantage of these processes it is crucial for the Polish firms and other cluster participants to develop the strategic capabilities of collaborating with others.

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