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THE ROLE OF COMPETENCE CENTRES IN THE REGIONAL INNOVATION ECOSYSTEM

Abstract

The purpose of this article is a brief characteristic of competence centres and the role which they play in the regional innovation ecosystem. The ecosystem of innovations is treated as a multilevel, multimodal, multi-node and multi–agent system of the systems, which on the one hand consists of planned sets of elements and linkages between them, but is also a system which lives of its own, is dependent on activity of existing and new actors, open for experimentation and creation of new ideas and concepts, but also looking for the key fields and values that will differentiate the region and build its innovative identity. In this system the competence centres are the key nodes which provide a common environment for the scientific and industrial world, they improve the networking and knowledge transfer between different RTDI actors.

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1. Introduction

In the wake of the 2008 financial and economic crisis, innovation is viewed as central in boosting job creation and economic growth in the quest to build stronger, cleaner, and fairer economies. Two policy trends contribute to the rising role of regions:

- the paradigm shift in regional development policies favours strategies based on the mobilisation of regional assets for growth, bringing innovation to the core of regional development agendas;
- there is a growing recognition of the regional dimension in national innovation strategies in harnessing localised assets and improving policy impacts.[1]

The key role in shaping the development of the region meet the competence centres, which aim to bridge the gap between technological and economic innovation by combining academic excellence with industrial and/or public needs. Competence Centres or Competence Research Centres (CRCs) are

[1] *Regions and Innovation Policy. Executive Summary*, OECD 2011, p. 19

structured, long-term RTDI collaborations in strategic important areas between academia, industry and the public sector[2].

The purpose of this article is a brief characteristic of competence centres and the role which they play in the regional innovation ecosystem.

2. Innovation ecosystem model

In the knowledge–based economy building the networks, developing and maintaining relations, setting up partnerships as well as establishing cooperation, allows different types of organizations to use and increase their own capitals, the use of knowledge and experience of others, achieve the synergy effect, which affects the local and regional development in a significant way. The competitiveness of European economy concerns two issues: the ability to create social networks and to provide the conditions favouring the creativity and innovativeness, which corresponds with the new paradigm of entrepreneurship[3]. Innovation processes occur in a particular environment – an ecosystem of innovation.

A 21st Century Innovation Ecosystem is a multilevel, multimodal, multinodal, and multiagent system of systems. The constituent systems consist of innovation meta-networks (networks of innovation networks and knowledge clusters) and knowledge meta-clusters (clusters of innovation networks and knowledge clusters) as building blocks and organized in a self-referential or chaotic fractal knowledge and innovation architecture[4] (Carayannis, which in turn constitute agglomerations of human, social, intellectual, and financial capital stocks and flows as well as cultural and technological artefacts and modalities, continually co-evolving, co-specializing, and co-opeting. These innovation networks and knowledge clusters also form, re-form, and dissolve within diverse institutional, political, technological, and socioeconomic domains including Government, University, Industry, Nongovernmental Organizations[5].

The ecosystem assessment indicators are as follows: the possibilities of experimentation and discovering, the atmosphere encouraging risk taking and allowing making mistakes, enthusiasm or unconventional context to make a range of initiatives, the environment in which diversity of opinions and creativity of others is respected, the environment characterized by openness to the possibilities to generate ideas and thoughts.

The introduction of the concept of ecosystem to the regional innovation system is primarily associated with having a broader recognition of issues related to the role of the region in the development of innovative economic environment, scientific and civil society. The last element has paid particular attention to highlight the diversity and value of the region. Moreover, the concept of the open innovation points at the resources that may have a crucial impact on the innovative development of the region, but does not have to be a component of the region, in accordance with the principal of R = G (resources equals global). Hence it becomes the most important to localize the resources (or to create them), and to find the right talents, to build appropriate competences and their effective use in the region. However, it is not possible without development of relevant relationships on the global scale, which thanks to the key actors in the region allow for the development and efficient implementation of innovations. As a result, previously developed and created infrastructure for innovations becomes a kind of biotope (inanimate, material elements of the innovation system), while the main actors, their relations and created knowledge is a biocenosis of the region, the whole of "living organisms" in a given area, connected with each other into one unit by various dependencies. It is much easier for the regional authorities to influence directly

[2] *Competence Research Centre. Programmes in Europe*, COMPERA Project , 2007, p. 7.

[3] *GREEN PAPER. Unlocking the potential of cultural and creative industries*, EU, Brussels, COM(2010) 183.

[4] Carayannis E.G., *The Strategic Management of Technological Learning*, Boca Raton 2001, FL: CRC Press.

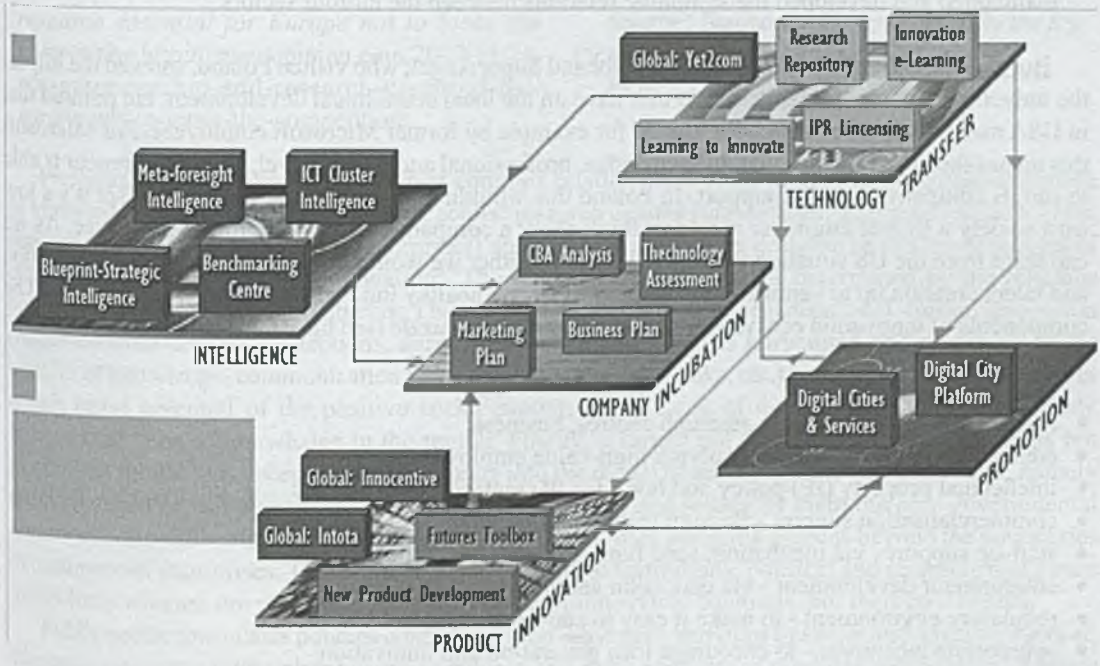
[5] Dioguardi G.: Network Enterprises. The Evolution of Organisational Models from Guilds to Assembly Lines to Innovation Clusters, Springer 2010, p. XIII.

or indirectly (using the appropriate tools to support market–based solutions) the tangible innovation system, which is forging on certain indicators. Much more difficult is to influence the development of relations and creating appropriate climate for their development, talents searching, etc. This launches a lot of dynamics to the innovations system and the necessity of its presenting as a set of processes and projects that have different owners, challenges and goals that form the basis for building the foundations of the region's development or network solutions, which takes various forms of structures – from more organized, to fractal, hypertextual and chaotic.

Therefore, when one adopt the assumptions of biological sciences, it may be spoken about ecosystem of innovations which is a multilevel, multimodal, multi-node and multi–agent system of the systems, which on the one hand consists of planned sets of elements and linkages between them, but is also a system which lives of its own, dependent on activity of existing and new actors, open for experimentation and creation of new ideas and concepts, but also looking for the key fields and values that will differentiate the region and build its innovative identity (see fig. 1).

Innovations are not the incidental events, but some kind of continuum, a process, result of interaction of interdependent organizations which through extensive contacts acquire the necessary specialists skills. The ability to collaborate with other entities, the innovations ecosystem is becoming to be seen as decisive for the development of innovations.

Figure 1. The Innovation Ecosystem (example)



Source: URENIO Research Unit, http://www.urenio.org/virtual-innovation-environment.html.

Authors of the OECD Report New Nature of Innovation[6], formulated the principles for the development of innovations, among which the special attention deserve the following:

- co-creating values in the organization, which should be carried out in cooperation with users/customers, as well as based on the search for knowledge about these users/clients, organizations should carefully listen to the customers and in the spotlight of the entity should not stay the organizational needs, but the customers needs. Active and broad participation of the users/customers in the processes of value creation in organizations is possible thanks to new technologies;
- organizations should learn both from global sources, and by building partnerships and participation in collaborative networks. Partnership in innovation allows the organization to gain a fuller knowledge, derived from sources from which one would not be able to use. Organizations must cooperate in the networks forming the partnerships for innovation. A single company, regardless of size, does not possess all the knowledge and resources which are needed to be innovative. Active partners of innovation networks should also be the subjects from the public sector, whose role in the creation of such networks is crucial;
- the challenges of globalization should be seen as the opportunities – because they are the drivers of innovations. Requirements for cleaner energy, sustainable production, responsible waste management influence the modernization processes which take place in organizations (manufacture, service, distribution, consulting and others)
- partnership and cooperation within the network allows development of innovations if there are maintained and developed the symbiotic relations between the all four sectors.

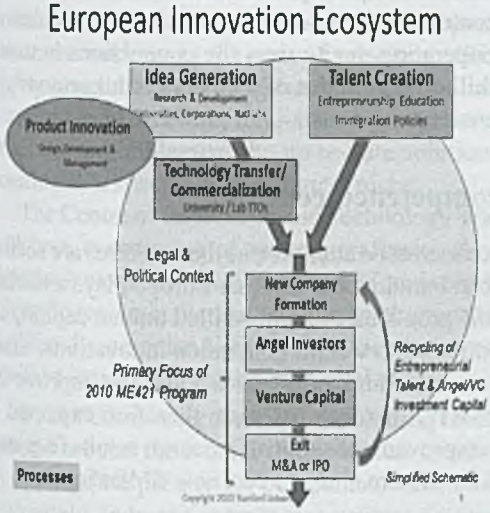
Burton Lee, a Stanford University professor and Super Angel, who visited Poland, showed the impact the universities and their business spin offs have on the local economical development. He pointed that in USA many companies have been started for example by former Microsoft employees. For Microsoft this means they can rely on a certain knowledge, professional and quality level. The entrepreneur is able to run its company with this support. In Poland this wouldn't work like that. Due to the fact it's a low trust society a former employer wouldn't think about a company started by a former employee. As we can learn from the US situation this is a real pity. Together we would be stronger. From idea generation and talent creation up to venture capitals it has to be one healthy innovation ecosystem (see fig. 2). The components of innovation ecosystem we can present like a puzzle (see fig. 3). An innovation ecosystem comprises[7]:

- research - from universities, research centres, business
- education - to create problem-solving high-value employees
- intellectual property (IP) policy and law - for IP creators and exploiters
- commercialisation support - through technology transfer
- start-up support - via incubation, seed fund, business development
- entrepreneur development - via education and training
- regulatory environment - to make it easy to start, grow and sell businesses
- appropriate incentives - to encourage idea generation and innovation

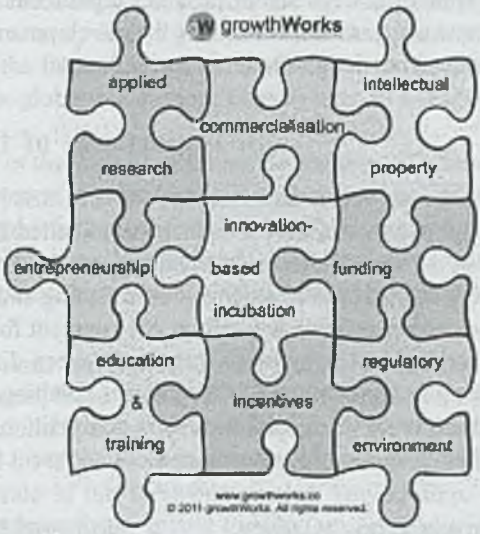
[6] *Raport New Nature of Innovation*, OECD 2009, pp. 2, 18-35, 43.

[7] *Innovation Ecosystems: Why the Big Picture is Important* 2011http://growthworks.co/?p=135

Figure 3. Innovation ecosystem like a puzzle



Source: Horsten P., *Entrepreneurship and research essential for Europe not to loose the competition* http://petersopinion.com/2010/11/24/entrepreneurship-and-research-essential-for-europe-not-to-loose-the-competition/.



Source : *Innovation Ecosystems: Why the Big Picture is Important* 2011 http://growthworks.co/?p=135.

Previously it was believed that mutual complex relations that occur in the process of capitalization of knowledge between the three types of actors: research centres (universities, scientific research units; supporting institution), industry (enterprises) and regional authorities describe in full the processes of creation and development of innovation[8]. The potential of the region is determined by the relations between these three types of subjects. Those relations are formed in organizational–formal dimension (organizational–formal connections, agreements, etc.), cognitivistic (structures and processes of the transfer of knowledge, communication links, databases and data banks, etc.) and socio–cultural (structures which build potential of the positive social capital, trust). Lack of these connections significantly impedes the flow of knowledge in the region. Finally, it turned out that the triple helix model is not a complete model. It is necessary to incorporate into the model of innovation the fourth element, namely the civil society [9], which consists of the conscious citizens and setting by them the non–governmental organizations, whose aim is not the profit, and whose activities generally extends beyond the boundaries of commercial enterprises. Therefore they are both social institutions, political and scientific and aware individuals who are not merely passive consumers of innovative solutions, but their co–creators.

Public sector formulates policies concerning innovativeness, provides financial and advisory support. The business sector undertakes business ventures, develops concepts of products and services. Science

[8] Leydesdorff, L., Etzkowitz, H., A Triple Helix of University-Industry-Government Relations, w: H. Etzkowitz & L. Leydesdorff (red.) Universities and the Global Knowledge Economy A Triple Helix of University-Industry-Government Relations Pinter, Londyn, 1997, pp. 155-162.

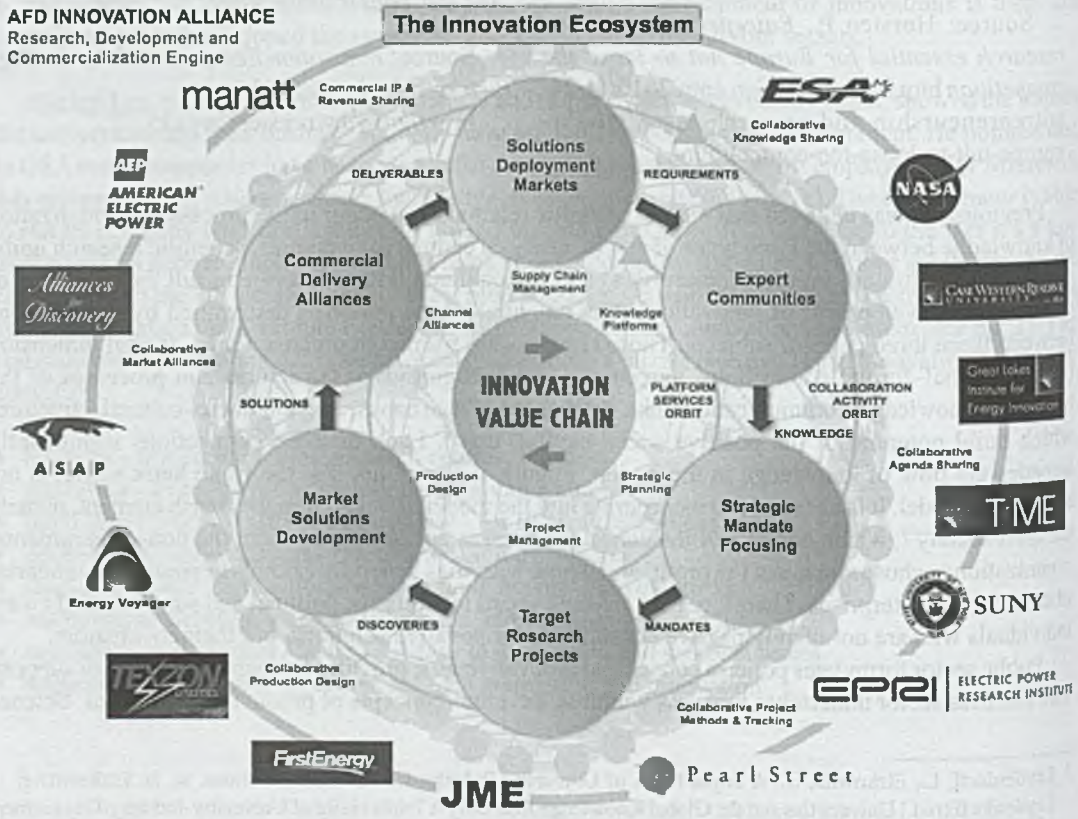
[9] Lindgren M., Packendorff J., A framework for the integration of a gender perspective in cross-border entrepreneurship and cluster promotion programmes Quadruple Helix reports KTH – Royal Institute of Technology School of Industrial Engineering and Management, 6/2010.

sector "creates" human resources necessary to the development of innovations (employees who will have the knowledge and skills in the scope of introduction and development of innovation, as well as users who will have the skills to use them), and also contributes by introducing the R & D, incubators and spin–offs. Civil sector provides a platform for cooperation, legitimizes the connections between the network partners, influences the development of skills and attitudes of members of all sectors and provides knowledge about the social needs.

3. Importance of the competence centres

In the last years, the concept of CCs or CRSs receives increased attention, as these centres are seen as an important instrument to reduce the so-called European Paradox: the fact that Europe plays a leading role in the world in terms of scientific excellence and the provision of highlyskilled human capital, but largely fails to convert science-based finding and inventions into wealth-generation innovations. Since these centres provide a common environment for the scientific and industrial world, they improve the networking and knowledge transfer between different RTDI actors. CRCs are therefore expected to develop demand driven RTDI strategies resulting in an improved utilisation of research results (e.g. new products or services, added value in competition, transfer of human resources, new SMEs/jobs).[10]

The example of Competence Centre present fig. 4.



[10] Competence Research Centre. Programmes in Europe. COMPERA Project , 2007, p. 7.

In the European Union Scientific–Research Competence Centres concerns the cooperation in the narrow areas, and are created as independent entities on the basis of agreement between leading research institutions, industry – and business development. They are strong centres of a multi – disciplinary character working in the area of pre–competitive research and in education and lifelong learning for highly specialized professions. They engage in their activity from 20 to 100 scholars. By combining a unique infrastructure, long-standing experience in the field of science and practice and the skills to produce and implement the up-to-date solutions on a global scale, these centres tend to a leadership position in a specific technological niche.

The Centre of Innovation and Technology Transfer of the West Pomeranian University of Technology will be a coordinator of several professional competence centres (operating in industries including: chemical, wood and furniture, food, IT and construction),which provide an interdisciplinary platform for scientific research, focusing on the development of new solutions together and for companies operating in the West Pomeranian Voivodeship, thereby supporting them in achieving and maintaining a competitive position in national and international arena.

By the combining forces of the leading research teams and experts from the science and economic spheres around the crucial competencies in narrow areas, those centres within their own fields will be an appropriate partner for companies, which offer solutions at the level of best available techniques. Ultimately, industry competence centres will operate on the basis of strategic programs prepared and co-financed by members of the clusters, which operate in the West Pomeranian Voivodeship. This allows companies to gain more time, companies will have faster access to solutions tailored to their needs and will be able to transfer knowledge into market values more effectively. On the basis of the flexible forms of cooperation in various configurations, the processes from ideas generation, through the preparation of the research works, their realization and subsequently testing and implementation of new solutions, may be run in a more efficient way in the future. Building Research Competence Centre on strong foundation means:

Capacity

The competence centre must gather resources which ensure the position of a leader in the given field. This means that the first step to be taken is making a critical evaluation of the possessed potential in relation to the condition of technology and market situation.

The centre must be able to quickly adapt to new events in the market. It must, therefore, be in the possession of proper skills of observing the market events, interpreting signals and establishing the strategy of actions.

The ability to stimulate entities cooperating with the centre, ensuring their consistent involvement in long-term research programs and readiness to co-finance particular initiatives will constitute a significant success factor.

Environment acceptance

The competence centre cannot operate separately from its environment. Thanks to close cooperation with the environment we are able to trace new opportunities, form new solutions and introduce them into the market. The model of cooperation based on consensus reaching will allow to guarantee stability of the initiative. Intercollegiate consortiums, partnership with entities on the national and international level and involvement with scientific and industrial councils or steering committees of eminent experts, who represent the key players, will show the environment's readiness to support the centre in realizing its strategic assumptions.

Reliability

In a relatively short period of time, the centre should become a reliable partner for the cooperating entities. Before they bestow trust upon the centre, it must prove the fact that it is able to anticipate new situations, take advantage of the occurring opportunities and use them for creating proper solutions, as well as demonstrate the possibilities of their implementation. In other words, the centre must be perceived

as an institution which has access to: equipment, experts, the results of research, publications, intellectual property etc. Furthermore, the center in its actions should take into consideration both theoretical and practical knowledge, yet it is necessary to form teams consisting of scientific experts and practitioners from the economic sector.

Stability

The competence centre must be vested with a strong base to assure stability, especially when it comes to access to financing, eminent experts, intellectual property and knowledge. When the competence centre is a new phenomenon in the environment, its stability is based on the compatibility between the centre's activity and general development strategy of an organization, in whose structure the centre was created. When the centre is created in the organizational structures of a university, the rector's duty is to release a clear statement about the compatibility between the centre's objectives and the given university's objectives and vision of its development.

Predictability

The competence centre must prove, that it functions in accordance with international standards and on the basis of knowledge supported by the actual condition of technology. The laboratories involved in and functioning within the structure of the centre ought to be accredited and able to cooperate with transactors without restraint. The centre's activity supported by certificates and accreditations will have increased reliability and at the same time increased predictability, which will have a positive impact on the external entities' decisions of external concerning financial involvement in long-term strategic programs.

Competitive offer

Similarly to other centres in the sector of research and development, the competence center operates in an environment where the client decides what determines the attractiveness of a given offer. A competitive offer does not necessarily mean the cheapest offer. What counts is particularly the ability to generate solutions in accordance with the best, currently available knowledge, competence, accuracy in establishing a path to achieving the right research results, rapidity and transparency. The competence centre must select appropriate partners in the research and development sector as well as in the economic one, with which it will be able to gain a unique position in the international market.

Public Relations

The competence centre must be vested with the required public relations skills. Clearly defined messages directed at particular target groups will have impact on the way the centre will be perceived and appreciated by the environment. The centre's brand establishment will be possible only when its activity and achievements will be provided to the right group of recipients at the right moment and through the right content.

4. Competence centres in the Silesian Voivodeship

Creating competence centres is one of the key objectives of the regional innovation strategy. Forming a network of competence centres (anchors of knowledge and support) is based on building a consistent platform of institutions and connections in favour of the development of intelligent markets. This involves indication or creation of key centres responsible for realizing challenges and processes describing them. In consequence, the aim is to create:

1. Research competence centres (RCC) – organizational units (universities, scientific entities, etc.) consisting of scientists, analysts, specialists, who being the key connecter between science, business and local authorities, will hold the responsibility for completing the following tasks:

- analysis of global trends in the context of realized specializations
- the preparation of innovative projects connected with the development of intelligent markets
- gaining and developing competences, searching for talents in the analyzed area

- coordination of substance of the key projects related to the development of intelligent markets
- personnel preparation
- training and competence development in the field of intelligent markets development

2. Functional and operational competence centres (FOCC) – organizational units gathering experts in the field, responsible for implementation, coordinating innovative projects, carried out in favour of the development of intelligent markets. The centres' objective is to focus on:

- technology commercialization
- financing innovation
- supporting the activity of networking projects connected with the development of intelligent markets
- substantive support of particular enterprises related to the development of intelligent markets
- analyzing and monitoring the development of intelligent markets in selected specializations

3. Creating a system of regional knowledge management in the field of intelligent markets as a platform of cooperation between the centres of competence. The platform will turn into one of the subsystems of the ecosystem of innovation in the region.

The actions that will enable the realization of the objectives involve identifying centers of competence and the system of their connections. The essential steps to be taken are:

1. Mapping knowledge in the field of intelligent markets
2. Establishing the rules of centres of competence functioning – the processes of concentration and specialization of competence centres
3. Identifying and/or creating competence centres (RCC, FOCC)
4. Developing RoadMap to create a network of competence centres
5. Developing a system of knowledge management for the development of intelligent markets

The activities should have a global character, centres ought to rest on the development of resources and according to the R=G rule (resources = global) create knowledge on the basis of global resources. Nevertheless, the resources of the region should be exploited.

135 research institutions, employing 6600 people (in 2001 there were 116 units and 11 760 employees in the R&D activity) function in the Silesian Voivodeship. Across the country, the Silesian region occupies the second position, right after the Masovian Voivodeship, in the number of R&D units, which attests to big research potential of the region. In the Silesian Voivodeship the level of capital invested into R&D as the per cent of GDB remains at low levels, yet as announced by Main Statistical Office, 421,4 mln and 165,7 mln are assigned to current expenses and investment in fixed assets, respectively.

At present, the biggest number of innovation and entrepreneurship centers in Poland operate in the Silesian Voivodeship - 88 (in total: 735), amongst others including 8 technology parks (2 in start-up, 3 in preparatory phase), 3 technology incubators, 7 preincubators and academic incubators of entrepreneurship, 11 entrepreneurship incubators, 6 centres of technology transfer, 4 centres coordinating polish technological platforms. The Silesian Voivodeship is one of the biggest scientific and academic centres in the country (it holds the third position in Poland).

In accordance with the assumptions of competence centers' functioning in UE and the USA, emphasis is put on their role in building long-term cooperation in the field of research, technology, development and innovation (RTDI) in the academic and industrial environment, public sector and civil society. The centres' objective is to bridge the gap between the ability to create ideas and their implementation and commercialization. Competence centres have a wide range of: acquiring knowledge, concentration of infrastructure, creating new knowledge through carrying out different kinds of research (precompetitive and competitive research), training, and providing knowledge to target groups.

It is assumed that the centres have a high level of autonomy in defining own strategies and actions, however, the extent to which its activity will be supported, is dependent on the centre's influence on the development of the region. It is expected from the centres to establish demand strategies - the strategies

for more efficient use of research results. As indicated by global examples, the main objectives of the competence centres include:

For RCC:

- increasing the enterprises' ability to implement innovation through financing research conducted in close cooperation between the companies carrying out the research and recognized research groups
- conducting research aimed at increasing the attractiveness of the region, as a place oriented towards intelligent markets
- supporting the development of research clusters (knowledge clusters), which are one of the international leaders in research supporting the development of intelligent markets
- reinforcing scientists' education in the areas important for the development of intelligent markets

For FOCC:

- supporting the processes of commercialization and the processes of implementing innovation by enterprises and networks of enterprises
- supporting the development of cooperation network and technology clusters expanded in the field of intelligent markets

Main rules of the centres' functioning:

Resources and capacity – Competence Centre must gather resources which ensure the position of a leader in the given field, in the region, important in the country and recognized in the international market. In accordance with the R=G principle, it is vital to mobilize powers to cooperate with entities on an international scale.

Identity - the model of cooperation between the centre and other centres should be based on the centre's image and reputation in the environment. The centre's participation in various research, scientific, scientific and practical consortia, research councils, steering committees, proves the environment's readiness to support the centre in realizing its strategic assumptions.

Reliability – the centre as a reliable partner for the cooperating entities. The centre should be perceived as an institution which thanks to its reputation guarantees reliability and knowledge at the highest level. The competence centre must prove, that it functions in accordance with international standards and on the basis of knowledge supported by the actual condition of technology.

Stability - the stability of the structure, access to knowledge and experts, continuity of funding.

Competitive offer - the ability to generate solutions in accordance with the best, currently available knowledge, competence, accuracy in establishing a path to achieving the right research results, rapidity and transparency.

Public relations - clearly defined messages directed at particular target groups will have impact on the way the centre will be perceived and appreciated by the environment.

Basic indicators of the evaluation of objective realization: the number of actively operating centres, the number of key projects, the number of implementations, the implementation effects, the number of researchers.

5. Conclusion

1. Competence centres play the key role in the ecosystems of innovation. Their function is to create and implement new ideas, from which all the environments of the quadruple helix benefit.
2. Global solutions indicate a number of solutions, which support the development of competence centres. It is vital that the programs in Poland are systemic and regional in nature in order to increase the effects of specialization.
3. The solution suggested in the Silesian Voivodeship is a double bridge between science and business. The task of the first, scientific and practical bridge, is to indicate new trends and verify them on

a practical ground, with the assumption that basic research, important for economic progress will not be neglected. The second, scientific and practical bridge, aims at a number of practical applications, enabling cooperation with particular enterprises and particular projects.

4. The role of the systems of innovation is changing and autonomous competence centres become fundamental in their evolutionary development. The problem of the way in which the ecosystems of innovation should be formed is an issue currently investigated not only by Europe.

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