COMPONENTS OF REGIONAL INNOVATION SYSTEM

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Abstract

Regional innovation systems (RIS) are a relatively new instrument in regional policy. It was developed from the National Innovation System in 1990s according to the fact that innovation was the most important instrument for regional development. There is huge literature about RIS and many studies about its application or operation. There are also many definitions of RIS and many approaches to its proper use. However, there could be some problems with its successful application in the region. Because of that this paper will provide summarization of the basic information on RIS.

The paper will summarize the useful information about the definition of RIS and about approaches to dividing RIS into categories according to the development of each region where this tool is used. The core information of this paper will be in the definition of the components of RIS, which provide us the methodology, which can be used to identification of successful RIS in regions.

Introduction

These days,the role of innovation and knowledge in economy in general is very important and during the last ten years is has been even more so in regional economy. We could say that innovation is the foundation stone of economic development. There are many authors who are interested in innovations. We can say according to them that innovation may be understood as an interactive learning process, which is socially and territorially embedded and culturally and institutionally contextualized. [2]

Every region tries to support innovation by some tools. But there are not any universal solutions of how to create the effective "innovation friendly" nature. The first researcher who dealt with production of innovation was Porter, who was looking for links between firms and research institutions which could lead to innovation. He claimed that the best form of this link could be in clusters.

The idea of clusters led to the creation of innovation systems. The first step was founding the national system of innovation (NIS), which has been used since 1980s. There is no clear definition of this approach. The most suitable definition is by Freeman (1987): "NIS is the network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies." [13] and Lundvall (1992) adds that "this interactions are located within or rooted inside the borders of a nation state." [13]

However, there is one problem with the frame of the nation state. Because the nation state can be divided into several regions, and each of them needs different tools to support the innovation process, because each of them is on the different level of innovation and in each region there are different geographical and economic conditions. Thus we cannot use the same regional policy tools in each region.

Aaccording to this problem, the Regional system of innovation (RIS) was developed and a region became the central point in the innovation process. It is so as on the regional level innovation is produced through regional networks of innovators, local clusters and the cross-fertilizing effects of research institutions [4]. And as Cooke [5] adds the "regional innovation interaction among firms and other innovation organizations has been regarded as playing an important role in fostering regional innovation potential".

This paper will inform about the latest trends and facts about the Regional system of innovation. In the first part there is a definition of RIS. In the second part there are definitions of the components of RIS, which is the focus of this paper. What follows is a comparison of RIS and clusters. In the final part, there is conclusion and recommendations.

1   Regional System of Innovation

At the beginning we have to explain the term of region. There are two proposed definitions of a region. In the first definition, a region is described as a geographically defined, administratively supported arrangement of innovative networks and institutions that interact heavily and on a regular basis with the innovative output from regional firms. In the second definition, emphasis is placed in the cultural aspects of the region. It means that a region does not need to have a determinate size; it can be distinguished from bordering areas by a particular kind of association or related features, and it possesses some type of internal cohesion [9].

According to the above mentioned definitions of the region, we can state that a region is a dimension with a key importance. There are some reasons which were summarized by Tödtling and Trippl [16]: First, regions differ with respect to their industrial specialization patterns and their innovation performance (Breschi 2000, Howells 1999, Paci and Usai 2000). Second, it was shown that knowledge spillovers, which play a key role in the innovation process, are often spatially bounded (Anselin et al. 1997, Audretsch and Feldman 1996; Bottazzi and Peri 2003). Third, the ongoing importance of tacit knowledge (Polanyi 1966) for successful innovation has to be considered (Gertker 2003, Howells 2002). Finally, policy competences and institutions are partly bound to subnational territories (Cooke et al. 2000).

If we accept the fact that a region is the most important area for innovation, then we need some framework or tool for supporting the innovation process in the region. For this reason the Regional system of Innovation (RIS) was founded in 1990s. Since this time there have been many researchers who are interested in RIS and who have been trying to define RIS. All of them finally agreed with the definition of RIS by Cooke [5] which says that RIS is useful for studying economic and innovative performance; there are also functional tools to enhance the innovation processes of firms. This is accomplished by knitting together knowledge flows and the systems, by building trust and confidence in institutional reliability; and above all, by generating institutional self-knowledge and a certain kind of collective dissatisfaction with the status quo. RIS comprises a set of institutions, both public and private, which produce pervasive and systemic effects that encourage firms in the region to adopt common norms, expectations, values, attitudes and practices, where a culture of innovation is nurtured and knowledge-transfer processes are enhanced.

We should try to imagine RIS as a framework which includes, according to Cooke [7], two sub-systems:

- the knowledge application and exploitation sub-system,
- the knowledge generation and diffusion sub-system.

The first is principally concerned with firms, while the second is mainly concerned with public organizations like universities, research institutes, technology transfer agencies, and

regional and local governance bodies responsible for innovation support practices and policies. In reality there may be some overlaps since firms conduct knowledge creation activities, especially where they have formalized R&D laboratories, and universities and public or private research institutes conduct knowledge application activities.

Tödtling, Trippl [16] add another subsystem to those mentioned above. The third is the regional policy dimension because policy actors on this level can play a powerful role in shaping the regional innovation processes, provided that that there is a sufficient regional autonomy to formulate and implement innovation policies. [16]. Tödtling, Tripple [16] further add that in the ideal case, there are intensive interactive relationships within and between these subsystems facilitating a continuous flow or exchange of knowledge, resources and human capital. On the other hand, there are several types of RIS problems and failures, such as deficits with respect to organizations and institutions and a lack of relations within and between subsystems.

1.1 Components of RIS

As you can see at the *Fig. 1* the RIS is not a homogenous system. RIS consists of many components and there are linkages among them, which may be more important than the components themselves.
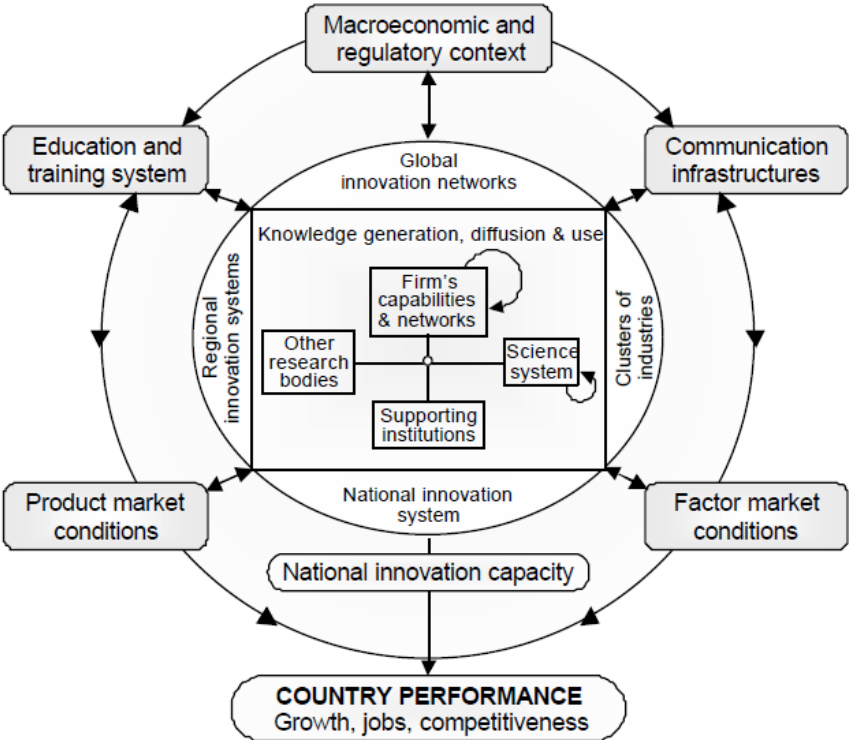

Fig. 1   Components of RIS and linkages among them

This figure captures the components which are common to the regional and national innovation systems. It is obvious that the regional innovation system was developed from the national innovation system and the core of this system is formed by firm's capabilities and networks, science system, supporting institutions and other research bodies. There are linkages among core institutions and other important factors which interact with these institutions. And all the mentioned parts together create the successfully working regional innovation system.

In my opinion the core institutions are the most important ones, and we can say that these institutions are the foundation stones of the regional innovation system. Because the linkages among them bring very important spillover effects and provide the background for innovations.

Let us focus now on core institutions of RIS. The first of the institutions are firm's capabilities and networks which are important for the innovation process. Namely the networks among firms are important for successful cooperation and for the innovation formation process.

Next strategic component of RIS is the science system. In this system we may include universities, R&D organizations or techno parks, etc. It is obvious that these institutions contribute to the creation of the environment for innovation formation. A particularly important link is between these institutions and private companies. Jointly they develop new technologies and create innovations for a particular company. This company should provide financial support to R&D institutions or universities. This cooperation contributes to the effectiveness of linkages among firms and the science system.

Another part of RIS is represented by supporting institutions. These institutions play a very important role, because these organisations provide information to the two above mentioned parts. Supporting organisations inform about grant possibilities and about cooperation possibilities. These organisations support developing innovations in the region and therefore they are indispensable.

The last of the core institutions to mention are other research bodies. We can include in this category R&D institutions which are paid from private funds. These institutions complement the science system which is, on the other hand, paid from public finance.

From *Fig. 1* it is clear that the core institution of RIS is connected with the "external environment", which consists of the country performance, product market conditions, education and the training system, the macroeconomic and regulatory context, communication infrastructures and factor market conditions. These components which are in the external ring represent the environment in which we explore RIS.

We can compare the core institutions of RIS with organizations in a cluster. For clarity we can use the *Fig. 2*.
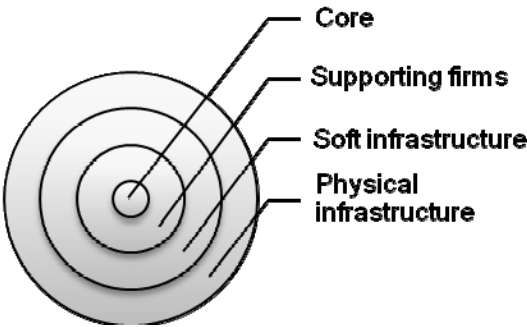

Fig. 2   Components of cluster

The *Fig. 2* shows components like the core, supporting firms, soft infrastructure and the physical infrastructure. In the core of the industrial cluster there are, for example, manufacturing companies. Along the core there are supporting firms like the subcontractors which cooperate with the core firms. The soft infrastructure in the cluster is similar to the science system in RIS. In the soft infrastructure there is the public sector which has the supporting role in the cluster, and there are also universities, R&D institutions and techno

parks, etc. The last part of the industrial cluster is the physical infrastructure, which means the connections among firms like roads of computer networks or telecommunication. So as we can see the industrial cluster could be in the core of the regional innovation system.

2   RIS in practice

At the beginning of thinking about successfully working RIS is very important to summarize the knowledge about this question. This case was very well summarized by Uyarra, who provided the comparison of meanings about successful RIS this way:

Cooke claims that the existence of a RSI is a special case, a rare event. Evangelista et al. in their study of Italian regions based on CIS data, similarly conclude that it is very rare to find the necessary ingredients to identify a regional system of innovation. The European Commission funded REGIS project identified only four regions out of 11—Wales, Baden-Württemberg, Basque country and Styria—that could fit the characteristics of RSI. A strict reading of the literature would, however, suggest that the only three regions that could be considered true regional innovation systems are Silicon Valley, Emilia-Romagna, and Baden-Württemberg [16].

According to this we can say that is very difficult to decide if there is a successfully working RIS in the region. The situation in the Czech Republic is similar to above mentioned regions. On the one hand there are some regions which can be called the regions of good practice of Regional innovation systems in the Czech Republic. The most successful region of them is the South Moravian Region. This region was the first one which began with implementation of Regional innovation strategy and building Regional innovation system. There are well established the innovative infrastructure, the system of supporting organizations as a South Moravian center of innovation which is responsible of implementation of regional innovation strategy. In the South Moravian region there are very good linkages among the universities, research and development centers and private corporations. The result of these linkages is the production of innovations and new technologies, which is goal of Regional innovation systems.

On the other hand there are many regions in the Czech Republic where Regional innovation system was not established. There are mostly bad conditions for successful RIS. These regions try to build regional innovation system and they try to use the experiences from the regions of good practice. But there is the problem, that each region has its unique conditions and specifications. In each region is for example different industrial structure, different level of educational system, somewhere is no university or research and development institutions. This type of regions cannot only apply the strategy from above mentioned regions, but at first they have to make the analysis of its strong and strategic industrial branches. After this analysis they should start with building Regional innovation system.

There is one big problem with making the clear decision if there is the successfully working RIS in the region. Because we need clearly defined characteristic, which should be find in the region and then we can positively say that RIS is existing and working in the region. If we did not have this we cannot judge this problem. I will try to solve this problem during processing of my dissertation.

Conclusion

The paper summarizes the fundamental information on the regional innovation system. There is a huge literature about RIS, and according to it there are many RIS definitions. Most authors agree with the definition by Cooke, which is mentioned in chapter No.2. The

definition itself is very general. We have to define the components of RIS to decide if RIS in a particular region works successfully.

The components of RIS could be divided into two main groups. The first group of the components consists of the components in the core of RIS. The second group of components includes those which determine the condition and level of the regional development. These components could be called positive (external) entrepreneur environment.

However, the components themselves do not play the key role in the innovation process in RIS. The linkages play the most important role among components. If these linkages do not exist, we cannot talk about RIS. The main objective of RIS is the innovation process and the improvement of the status of the region or the regional competitiveness, and it does not work without linkages.

The objective of RIS is very similar to the objective of industrial clusters. Therefore the similarity among components of RIS and the components of cluster exists. Simply we can say that the network of clusters could be the core of successfully working RIS.

According to the properly defined components of RIS we could make an analysis about the existence of RIS in a proper region, or we can rate the effectiveness of RIS. Or we can make predictions to the future about regional economic indicators. We have to implement the components of RIS into practice to ensure the effectiveness of RIS in a region. There are 12 RIS in the Czech Republic. Some of them can be called the region of good practice of applying RIS and some of them have no functional RIS. How can we find if RIS are functional? We must clearly define the components and try to find all of them in the proper region including the linkages among each of them. If we do not find all of the components which we defined or we do not find working linkages, we have to improve the RIS with a better definition of the main components or we could change the regional policy to support the missing components and we will have an effective RIS.

Literature

[1]   ANDERSSON, Martin; KARLSSON, Charlie. Regional Innovation Systems in Small & Medium-Sized Regions: A Critical Review & Assessment. *CESIS*. 2004, 10, s. 2-25.

[2]   ASHEIM, Bjorn T.; COENEN, Lars. Knowledge bases and regional innovation systems: Comparing Nordic clusters. *Research policy*. 2005, 34, s. 1173-1190.

[3]   ASHEIM, Bjorn T., et al. Regional Innovation System Policy: a Knowledge-based Approach. *Circle*. 2005, 13, s. 1-23. ISSN 1654-3149.

[4]   ASHEIM, Bjorn T.; ISAKSEN, Arne. Regional Innovation Systems: The Integration of Local "Sticky" and Global "Ubiquitous" Knowledge. *Journal of Technology Transfer*. 2002, 27, s. 77-86.

[5]   COOKE, Phil. *Regional innovation Systems as Public Goods*. Vienna: United Nations Industrial Development Organization, 2006. 33 s.

[6]   COOKE, Philip; URANGA, Mike Gomez; ETXEBARRIA, Goio. Regional Innovation System: Instituional and organizational dimensions. *Research policy*. 1997, 26, s. 475-491.

[7]   COOKE, Philip. Regional Innovation Systems: General Findings and Some New Evidence from Biotechnology Clusters. *Journal of Technology Transfer*. 2002, 27, s. 133-145.

[8]   COOKE, Philip. Regional Innovation Systems, Clusters, and the Knowledge Economy. *Industrial ans Corporate Change*. 2001, 10, 4, s. 945-974.

[9]   DOLOREUX, David; PARTO, Saeed. Regional innovation systems: Current discourse and unresolved issues. *Technology in Society*. 2005, 27, s. 133-153.

[10]   DOLOREUX, David. What we should know about regional systems of innovation. *Technology in Society*. 2002, 24, s. 243-263.

[11]   FEINSON, Stephen. Nattiionall IInnovattiion Syssttemss Overviiew and Counttry Cassess. *Knowlege Flows, Innovation, and Learning in Developing Countries* [online]. 1999, 1, [cit. 2011-03-05]. Dostupný z WWW: <www.cspo.org/products/rocky/Rock-Vol1-1.PDF >.

[12]   FRITSCH, Michael. Measuring the Quality of Regional Innovation Systems: A Knowledge Production Function Approach. *International Regional Science Review*. 2002, 25, 1, s. 86-101.

[13]   National Innovation System. In *National Innovation System* [online]. Paris : OECD, 1997 [cit. 2011-03-07]. Dostupné z WWW: <http://www.oecd.org/dataoecd/35/56/2101733.pdf>.

[14]   OUGHTON, Christine; LANDABASO, Mikel; MORGAN, Kevin. The Regional Innovation Paradox: Innovation Policy and Industrial Policy. *Journal of Technology Transfer*. 2002, 27, s. 97-110.

[15]   TÖDTLING, Franz; TRIPPL, Michaela. One size fits all? Towards a differentiated regional innovation policy approach. *Research policy*. 2005, 34, s. 1203-1219.

[16]   UYARRA, Elvira. What is evolutionaty about "regional systems of innovation"? Implication for regional policy. *Springer-Verlag*. 2009, 20, s. 115-137.

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KOMPONENTY REGIONÁLNÍHO INOVAČNÍHO SYTÉMU

Regionální inovační systémy (RIS) jsou relativně novým nástrojem regionální politiky. V návaznosti na Národní inovační systémy jsou RIS využívány od 90. let 20. století, kdy se nejdůležitějším nástrojem rozvoje regionů staly inovace. Existuje velmi obsáhlá literatura a mnoho studií zabývající se RIS, jejich aplikací a fungováním. V této souvislosti je publikována celá řada definic RIS a mnoho přístupů ke správnému využití RIS, čímž může docházet k problémům s jejich úspěšnou aplikací v rámci regionu. Proto je v tomto příspěvku uveden souhrn základních informací týkajících se RIS.

Příspěvek jsou shrnuty jednotlivé definice RIS a přístupy k jejich členění do jednotlivých kategorií dle stupně rozvinutosti regionů. Hlavním přínosem tohoto příspěvku je definování jednotlivých komponentů RIS, které poskytují základ metodologie, jež lze použít k identifikaci úspěšně fungujícího RIS v daném regionu.

KOMPONENTEN DES REGIONALINFORMATIONSSYSTEMS

Die Regionalinformationssysteme (RIS) stellen ein relativ neues Instrument der Regionalpolitik dar. In Verbindung mit nationalen Informationssystemen werden RIS seit den Neunzigerjahren des 20. Jahrhunderts genutzt, als die Innovationen als wichtigstes Instrument der regionalen Entwicklung eingestuft wurden. Es stehen eine umfangreiche theoretische Grundlage und viele Studien zum Thema RIS sowie deren Applikation und Funktionsfähigkeit zur Verfügung. In diesem Zusammenhang existiert eine Reihe von Definitionen von RIS und viele Ansätze zur richtigen Anwendung von RIS, was jedoch auch Probleme mit ihrem erfolgreichen Ansatz auf regionaler Ebene verursachen kann. Deshalb ist in diesem Artikel eine Auflistung grundlegender Informationen zum Thema RIS durchgeführt worden.

Der Beitrag beinhaltet eine Zusammenfassung einzelner Definitionen von RIS sowie Ansätze zu ihrer Kategorisierung je nach der Entwicklungsstufe der Regionen. Der Hauptbeitrag dieses Artikels ist die Definition einzelner RIS-Komponenten, die die Grundlage der Methodologie zur Definierung des erfolgreich funktionierenden RIS bestimmter Regionen bieten.

ELEMENTY REGIONALNEGO SYSTEMU INNOWACJI

Regionalne Systemy Innowacji (RIS) są stosunkowo nowym instrumentem polityki regionalnej. W ramach Krajowych Systemów Innowacji są one stosowane od lat 90. XX wieku, gdy za najważniejsze narzędzie rozwoju regionów zaczęto uważać innowacje. Istnieje bardzo obszerna literatura oraz wiele badań dotyczących RIS, ich stosowania i funkcjonowania. W tym kontekście opublikowano wiele definicji RIS i wiele podejść do ich właściwego stosowania, co może utrudniać ich skuteczne wykorzystanie w ramach regionu. Dlatego w niniejszym artykule przedstawiono kompendium podstawowych informacji na temat RIS.

W artykule zawarto poszczególne definicje RIS i sposoby ich klasyfikowania do różnych kategorii według stopnia rozwoju regionów. Podstawową zaletą niniejszego opracowania jest określenie poszczególnych elementów RIS, które stanowią podstawę metodologii, która może być wykorzystana do identyfikacji dobrze funkcjonującego RIS w regionie.