

A "GLOBAL" STRATEGY ON CONSTRUCTING "REGIONAL" ADVANTAGE BY REGIONAL INNOVATION SYSTEMS (RIS)



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ABSTRACT Studies on regional innovation systems in various geographical levels are gradually increasing. The aim of this study is to reveal the importance of region spatially in the development of innovative capacity. By the regionalization of innovation policies, needs of a specific region or company are exhibited more effectively and it becomes easier to monitor and apply the precautions to be taken. Creating a regional advantage starts with identifying the environments where knowledge production, innovation and entrepreneurship actualise. From this point of view Regional Innovation Systems (RIS) play a strategical role on competitive ability and innovation ability of regions. Systematic malfunctions than can prevent innovation system from operating efficiently can be in question. In this case the intervention of the public need to focus on the malfunctions in the relations, not to overall system. In this sense the regulatory role of the government needs to focus on process-based issues such as developing regional knowledge infrastructure, catalysing to access external knowledge sources, increasing the human capital quality, supporting clusters, establishing networks among innovative actors and supporting them.

Keywords: Regional Innovation, Regional Innovation System (RIS), Related variety

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BÖLGESEL AVANTAJ YARATMAK İÇİN KÜRESEL BİR STRATEJİ BÖLGESEL YENİLİK SİSTEMLERİ (BYS)



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ÖZ Çeşitli coğrafi düzeylerde Bölgesel Yenilik Sistemleri (BYS) üzerine çalışmalar giderek artmaktadır. Bu çalışmanın amacı, inovasyon kapasitesinin gelişmesinde mekânsal olarak bölgenin önemini ortaya koymaktır. İnovasyon politikalarının bölgeselleşmesiyle, belirli bir bölgenin/şirketin ihtiyaçları daha etkin bir şekilde ortaya konmakta ve alınacak önlemleri izlemek ve uygulamak kolaylaşmaktadır. Bölgesel avantaj yaratmanın ilk adımı bilgi üretimi, inovasyon ve girişimciliğin gerçekleştiği ortamları tanımlamaya başlamaktadır. Bu açıdan Bölgesel Yenilik sistemi yaklaşımı, bölgelerin inovasyon kapasitesi ve rekabet yeteneği üzerinde stratejik bir rol oynamaktadır. Yenilik sisteminin verimli bir şekilde işlemesine engel olabilecek sistematik aksaklıklar da söz konusu olabilir. Bu durumda kamunun müdahalesi sistemin geneline değil ilişkilerdeki aksaklıklara odaklanmalıdır. Bu anlamda devletin düzenleyici rolü, bölgesel bilgi altyapısının geliştirilmesi, dışsal bilgi kaynaklarına ulaşımın kolaylaştırılması, beşeri sermayenin niteliğinin artırılması, kümelenmelerin desteklenmesi, yenilikçi aktörler arasında ağ yapının kurulması ve desteklenmesi gibi süreç odaklı konulara yönelmelidir.

Anahtar Kelimeler: Bölgesel Yenilik, Bölgesel Yenilik Sistemi (BYS), İlişkili Çeşitlilik

JEL Kodu: O18, R58, R11

Alanı: Ekonomi

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1. INTRODUCTION

Globalization poses significant problems for the economies of developed countries. Increase in the use of external source, foreign capital investment and information network being controlled by multinational corporations cause the economy to be reconstructed. Developing countries have difficulty in competing with developed countries to produce goods and services due to the fact that they use labour-intensive and low-skilled work force. At this juncture the only way for the nations that have high prime cost is to encourage the increase of innovation capacity through research-development (R&D) and entrepreneurship based on knowledge. However, it should be taken into notice that innovation activity does not have a homogenous range. It is seen that economic agglomerations exist in knowledge-intensive regions. This tendency related to spatial concentration becomes more evident in time and creates geography with distinctive knowledge generation process. By the advent of globalization knowledge, which has become a production factor, has been the basic determinant of economic welfare. Creation of knowledge through innovation and entrepreneurship has become a factor affecting economic growth directly. Empirical studies have revealed the importance of region spatially in the development of innovative capacity. That is why, studies on regional innovation systems in various geographical levels are gradually increasing (Roelfsema & Zhang, 2012, p.4).

At this point knowledge and innovations should not be associated with only R&D. Fund of knowledge in a region also matters in innovative activities. Knowledge base of a region is larger than its scientific basis. In this respect, it is important to remember Porter's perspective on competitive advantage of regions and companies. According to Porter it is not enough to focus on R&D for competitiveness but knowledge and continuous innovation matter as well (Dodgson, 2018).

2. CHANGING GEOGRAPHY OF INNOVATION AND REGION IN EVOLUTIONAL PERSPECTIVE

In globalizing economy social scientists and policy makers have put more emphasis on regions as designated areas of innovation and competition. For this reason, long-term innovation based regional development strategies have been built on regional innovation systems, learning regions and clusters. By the regionalization of innovation policies, needs of a specific region or company are exhibited more effectively and it becomes easier to monitor and apply the precautions to be taken. (Fritsch & Stephan, 2005). The fact that innovation processes are not homogenous can be considered as a disadvantage in terms of accomplishing the goals at national level. That is why; application of innovation

systems in regional level has a more effective role in achieving national goals. Another factor indicating the importance of the region is that policies aiming at regional development are the starting point. In this respect, tendencies to territorialise innovation policy are becoming more crucial and the key strategy of creating regional advantage is seen to be regional innovation system (Schrempf, Kaplan & Schroeder, 2013, p.10).

The way to create competition advantage with globalization is built on two main factors. These factors are innovation based product differentiation and cost efficiency. These two factors increase the competitive capacity by being synthesized. (Cooke & Leydesdorff, 2006).

Creating regional advantage is also shaped depending on regional endowments. Regional endowments contain economic, socio-institutional and political conditions representing diversity of the regions in addition to historical and geographical background. Access to natural sources, centrality level and features originated from geographical position and population of a region generate the prerequisites required for economic and social development.

A stable political environment, adequate level of knowledge infrastructure, a strong institutional structuring as well as historical and cultural pattern have significance for an understanding of constant development. Regional development process can be considered as a synthesis of regions' traditional structures and new contemporary structures formed as a result of technological development. It is possible to define these regions as following (Tödting & Tripl, 2005).

Peripheral regions are defined as being less innovative when compared to more central and clustered regions. These regions have less R&D concentration and less innovation capacity. Moreover they are weaker in terms of developed knowledge infrastructure (R&D foundations and universities).

Old industrial regions are considered as a different kind of problematic region as ripe industry sectors. Excessive expertise and high-addiction in ripe industry sectors can create negative lock-in. main subject on which innovation activities in these regions focus is process innovations. Entrepreneurship and product-oriented innovation do not generally exist.

Fragmented metropolitan regions are considered as innovation centres since they contain R&D foundations, universities, business services and centres of international companies within themselves. As a result of this, R&D activities are usually better than average. However, some metropolitan regions lack dynamic clustering formed by innovative firms due to disunity problem. These kinds of regions display an individual structure named as 'unrelated variety'. Several sectors in these regions do not complement or support each other. That is

why no knowledge sharing or distribution is experienced in these regions. This situation can create a significant innovation obstacle in the regions in the same ballpark. Therefore, expectations to develop new technologies and forming new firms may not be met.

Innovative regions are the ones having high technology and high R&D level. They have extremely good conditions in relation to regional advantage. However, they need to form various sectors that support each other and they need to gain acceleration of innovation by clustering.

It may not be possible to see the regions mentioned above in their pure form. For instance, old industrial regions can become peripheral regions in time; fragmented metropolitan regions are actually old industrial regions. What is emphasized here is that regional development is an evolutionary process and path dependency occurs resting upon technological change. (Boschma & Lambooy, 1999; Boschma 2004, 2005a; Frenken & Boschma, 2017). Creating regional competitive advantage can only be carried out through suitable policy choice.

2.1. First Steps to Create Regional Advantage

Creating a regional advantage starts with identifying the environments where knowledge production, innovation and entrepreneurship actualise. Afterwards development of regional clustering and identification of significant factors for innovation are also required. This process is foreseen to be actualized under three aspects as *related variety*, *differentiated knowledge bases* and distributed *knowledge networks*.

Firstly, local economies specialized in only one sector and miscellaneous urban economies are required to be determined by a distinction of related variety and unrelated variety. Because these concepts have different meanings and they have influence on different performance indicators. Secondly, distinguishing among industrial knowledge bases represent a different aspect of unpacking strategy (Asheim & Gertler, 2005; Asheim & Coenen, 2005). It is thought that specific knowledge base possessed by the firms and industries has a significant effect on the innovation processes they have (Laestadius, 1998). Thirdly, it is important to reveal how knowledge bases change in different sectors as a result of globalization while necessary prerequisites are being discussed in order to create regional advantage.

2.2. Independent and Dependent Diversity

Diversity in urban or regional economies is acknowledged as one of the driving forces behind economic development. Sectorial diversity in a region

catalyses new ideas and creativity during innovation processes; in addition it reduces the risk of being exposed to sectorial shocks. *Independent diversity* is defined as the diversity in the sectors that do not complement each other in a region. This case is expected to protect the region from external shocks. The concept of independent diversity can be associated to the concept of risk distribution in portfolio investments. The fact that independent sectors exist together protects regional economy by distributing the risk and helping other sectors tolerate impacts of adverse event, which can occur in any of the sectors. This risk distribution effect of independent diversity also alleviates the pressure on regional unemployment (Ascani, 2012).

Dependent diversity is expected to create a positive effect on regional development. It possible that knowledge can spread among the sectors that complement each other thanks to dependent diversity. Sectors being located all together can lead to a higher economic growth by creating knowledge distribution and source to innovation. In brief, existence of different technological and industrial sectors within the context of dependent and independent diversity helps positive results emerge in terms of growth (Frenken, Van Oort, Verburg & Boschma, 2004)

A political framework that grounds on dependent diversity is highly significant while regional advantage is being formed. Studies in the literature reveal that dependent diversity is one of the driving forces behind the urban and regional growth (Frenken, Van Oort, Verburg & Boschma, 2004). These kinds of policies applied are especially effective on generic technologies (like ICT). Because generic technologies create positive influence on economic growth due to the fact that they contain many potential execution areas and they cause many new sectors to be formed. In other words, creating regional advantage grounding on dependent diversity combines advantages of regional specialization in sectors complementing each other and advantages of regional diversity, thus it reduces the risk of experiencing regional shocks (Boschma 2005b).

2.3. Differentiated Knowledge Bases

Knowledge production and innovation processes have become more complicated in the recent years. New knowledge sources and data than institutions and firms can use have emerged; division of labour and mutual dependence have increased a lot. Knowledge and learning processes have become more important for the sectors having low technological levels (Smith, 2005). In this process, tighter collaborations are essential among the shareholders for knowledge production and use. Thus knowledge production process gradually transforms into various network forms in regional, national and international

level (Nonaka & Takeuchi, 1995, Lundvall & Borrás, 1998). This diversity extending in knowledge process (due to the differences among sectors) increases the need for specific ‘knowledge bases’ (Asheim & Gertler, 2005). These knowledge bases are categorized into three as “analytical”, “synthetic” and “symbolic”.

Analytical knowledge base uses codified knowledge based on scientific knowledge. Communication networks are important because analytical knowledge is based on university-industry collaboration when compared to other knowledge kinds. New knowledge comes out depending on the interaction between learning process and knowledge infrastructure. Firms partaking in an industry with analytical knowledge base are less sensitive to geographical proximity because global communication networks are dominant. Biotechnology and nanotechnology can be given as examples for analytical knowledge base. Synthetic knowledge base contains more traditional industries such as food, food engineering and textile production. It is mainly based on such factors as interaction including tacit knowledge, experience, knowledge obtained as a result of learning by doing and practical skills. Firms having synthetic knowledge base are more dependent to geographical proximity. Symbolic knowledge base includes industries that require creativity such as industrial design, advertising and fashion design. Symbolic knowledge base is quite complicated, dynamic and tacit. Innovations are done to meet consumer demands and firms are sensitive to geographical proximity (Plum & Hassink, 2014, p.249)

Table 1: Characteristics of Knowledge Bases

Subject	Analytical Knowledge Base	Synthetic Knowledge Base	Symbolic Knowledge Base
Knowledge base and kinds of innovation processes	Scientific codified knowledge What do you know? Why do you know	Uncodified knowledge Knowledge base related to traditional craft and production Know-how is dominant. Learning by doing and interaction are important	Uncodified knowledge, knowledge based on practical experience expressed by aesthetic and artistic forms. It is important whom you know. Learning by doing and interaction are important
Important knowledge sources and channels	Knowledge reaches the sector via formal relations resulting from R&D collaborations.	It comes out in the sector as new people and machine enter the sector. Strategic collaborations and other industrial actors provide knowledge flow. Actors in value chain are important sources in knowledge circulation.	Knowledge obtained in common projects done with people from different and creative disciplines. Knowledge flow can also actualise via informal channels.

Important spatial impact areas and environments	Urbanization economies and global R&D communication network.	Local economies and multi-level spatial learning networks.	Urbanization economies and distribution of local knowledge
Susceptibility to geographical distance and openness to innovation	It depends on national and international relations rather than regional one.	It depends on regional sources rather than international ones.	It depends on regional sources rather than international ones

Source: Aslesen and Onsager, 2009

2.4. Distributed Knowledge Networks

Some difficulties are experienced while internal knowledge bases of firms are being transformed into open and globally distributed knowledge networks. Actually this case reflects main characteristics of globalization and it is a result of development from vertical integration to vertical disintegration in production organization of Post-fordist economy (Amin & Cohendet, 2003). The concept of globally distributed knowledge networks is defined as “systematic and compatible knowledge networks that are sustained among factors and institutions integrated economically and socially (Smith, 2000, p.19). For instance, food and drink companies (they are mostly based on synthetic knowledge base) make functional production of nourishment depending on the data of biotechnology firms (they are mostly based on analytical knowledge base). This case reduces the significance of the difference between the industries using high technology and the ones using low technology. This reduction has an important effect on creating regional advantage and forming innovation policies. This case also indicates that in many industries the relevant knowledge base is not limited to that industry and it is distributed among various technologies, factors and industries (Smith, 2000, p.19).

Importance of common knowledge networks points that codified knowledge is gradually becoming a prevalent source. However, it is necessary to make a distinction between local/regional and global distribution of knowledge networks. Verbal, empirical and codified knowledge maintains its importance in the sectors that especially work on luxurious products in the circumstances in which production depends on historical and technological developments. Similarly, knowledge transaction can easily be provided in the cases where product and service are adapted to customer and where proximity to markets and customers matters. This case makes the production depended more on local knowledge and learning relatively. Thus, production faces to locally and

regionally distributed knowledge networks more while it tends to global networks less (Smith, 2000, p.20).

Dependent diversity emphasizes that a traditional and narrow-minded sector perspective needs to be surpassed to create a regional advantage in globalizing knowledge economy. Therefore, idea of policy platforms containing key components of various policy areas is inevitable. The concept of platform has been used to define generic technologies having an implementation potential within the range of a large industry such as software and biotechnology so far. That is why, the approach required to create regional advantage must incorporate various factors composing regional platform policy.

3. FACTORS TO CREATE REGIONAL ADVANTAGE

Territorial competence bases, small and medium sized enterprises (SME) and entrepreneurship policies and creative knowledge settings are to be formed to start platform policies intended to create regional advantage and to form innovation systems.

3.1. Territorial Competence Bases

While regional competence bases are being identified, human capital structure in the region and regional abilities need to be examined more closely (Florida, 2002) and knowledge structure of the region (universities and public and private sector R&D structures) is to be evaluated. It is suggested that absorbing capacity related to accessing information in theory and knowledge distribution are dependent to knowledge level of the firms (Giuliani & Bell, 2005). That is why, abilities of the firms and regions and their knowledge bases have significance for intracompany learning processes as well as for knowledge distribution. Absorbing capacity level of a region has a strategical importance to create knowledge economy and to sustain it. Configuration of absorbing capacity depends on human capital considerably and thus it is dependent to significant role of local universities that train human capital.

Formation of production ability and qualified labour force are essential factors for the welfare of regions and whole nation in a knowledge based economy. For this reason, people providing ideas, creativity and imagination, which plays a significant role in the fields of knowledge intensive production and innovation, creates an explicit advantage for economic success. Creating values in many sectors of economy is gradually dependent to non-tangible assets to a great extent. For instance, it used to be of great importance to have natural harbours, raw material and cheap energy sources whereas these concrete values are not as irreplaceable as they were in the past (Cooke & De Laurentis, 2002).

To sum up, distribution of abilities and human capital is a significant factor in economic geography; in addition abilities act an important role in creating high-tech industries and increasing regional income (Florida, 2002).

In the era of knowledge economy, regions are in need of skilled people who promote innovation and develop technology intensive industries. These kinds of skilled people are not equally distributed every part of nation/region and they are especially concentrated in urban regions. Within this context, the most successful urban regions have the characteristics of social settings open to any kind of creativity. When this factor is taken together with other factors, it reveals that labour force markets need highly qualified human force. For this reason, it is not adequate to attract only the companies. It is also essential to attract the right people. In this context, it is suggested that policies to attract firms including policies to attract people should be implemented in addition to workplace environment. Human capital and ability are the necessary factors to obtain economic growth in cities and to develop high-tech industries (Florida, 2002).

3.2. Regional knowledge infrastructure

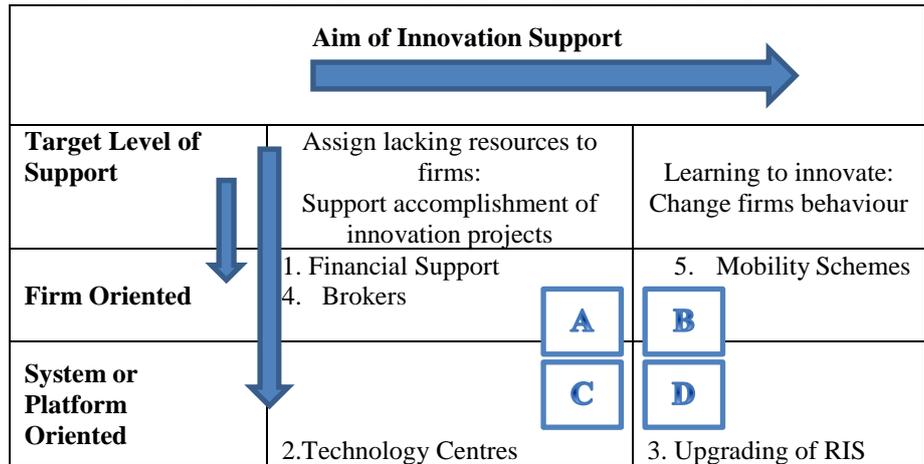
Regional competency base affected by human capital existence as well as worker environment and workplace quality is also sustained by knowledge infrastructure of the region. As long as learning economies become dominant, access to education and knowledge is becoming important (Hommen & Doloreux, 2004; Lawton Smith, 2003, p.900). Providing local highly skilled labour force to labour force markets and qualifying labour force through up-to-date training programs are factors that contribute considerably to the effort of increasing regional innovative capacity (Hortz-Hart, 2000). Concrete examples related to human capital include establishing connection between local firms and students and increasing the skills of local managers. Traditionally universities have a responsibility to provide national labour force market with qualified labour force (Chatterton & Goddard, 2003; Charles, 2003). Several universities have focused on increasing signals in regional economy and they have worked in cooperation with industry aiming for train expert labour force (Lawton Smith, 2003, p.904). This traditionally means that technology transfers, knowledge intensive firms, science parks and incubators need to be established. Access to knowledge produced by regional universities provides a location advantage in terms of the regional firms. While regional advantage is formed, regional innovation performance can be provided with a relatively lower cost as regional firms make use of knowledge reserves of local universities (Jones-Evans, Cooke, Klofsten & Paasio, 2001).

3.3. SME and entrepreneurship policies

Distinction between firms and worker environment can also be used to support SMEs and entrepreneurship policy. SME innovation policy needs to include strategies to allocate workplace environment financially, establish technology centres, promote technology-based entrepreneurship and train qualified labour force. SME policy indicates that a system-based policy is needed besides proactive innovation based regional policy aiming at innovation. (Asheim, Isaksen, Nauwelaers & Todtling, 2003) SME innovation policy tools are classified into two factors and this classification is indicated in Table 2.

Table 2: Two-factor Classification of Basic Innovation Instruments

Aim of Innovation Support		
		
Target Level of Support	Assign lacking resources to firms: Support accomplishment of innovation projects	Learning to innovate: Change firms behaviour
Firm Oriented	1. Financial Support 4. Brokers	5. Mobility Schemes
System or Platform Oriented	2. Technology Centres	3. Upgrading of RIS



Source: Asheim et. al., 2003

A distinction between two main purposes of support tools is made in the table above. Some policy tools aim the firms to access sources. The content of this support includes some issues such as allocating the necessary financial support, providing aid to solve specific technological problems and getting support from consulting firms. It is thought to increase innovation capacity of the forms by enabling firms to access these sources. Other kinds of instruments significantly focus on learning and they try to change the behavioural patterns. Factors such as innovation strategy, management and awareness level in the firms are included in this.

A suitable way of designing instruments that aims to allocate sources to firms actualizes within the frame of learning and innovation. In accordance with this perspective, the aim of policy instruments is not only to provide only the scarce sources (for example financial support) but also to promote learning about innovation within the scope of R&D and firms. Lack of demand causes a bottleneck about financial incentives in terms of the firms that do not feel the

need of innovation in the beginning. That is why, some policy instruments should front to increase the demand for beginning innovation activities of the firms and policy aims of the firms related to innovation activities should be determined.

Other factor includes target group for instruments. Some tools focus on innovation and learning to reduce the innovative obstacles of the firms such as lack of capital and technological competence. Other instruments extensively focus on regional production and innovation systems as target group and they aim to develop their synergy in the regions. Cases such as inadequacy in regional knowledge organization or user-producer interaction can be given as examples of these obstacles (Mayor et al., 2012).

4. SIGNIFICANCE OF RIS TO CREATE REGIONAL ADVANTAGE

Policy makers and academicians developed the concept of Regional Innovation Systems (RIS) the foundations of which was laid by Cook (2001) (Asheim, 2005; D'Allura, Galvagno & Li Destri, 2012). Innovation systems are classified as Regional Innovation Systems (RIS), Sectorial Innovation Systems (SIS) and National Innovation Systems (NIS) in the Oxford Handbook of Innovation (Fageberg, 2006). NIS is the oldest innovation system developed by Lundvall, Nelson and Edquist in the 1990s (Hajek, Henriques & Hajkova, 2014). They laid the foundations of regional innovation system by carrying NIS into regional dimension. RIS added organisations and institutions named as stakeholders into the process, which was different from NIS. In this new system institutions are defined as actors of innovation system. In addition institutions are fictionalised as an element directing the relations among the actors who govern the rules, norms and innovation system.

As NIS approach focused on the hypothesis of that there is homogeneity among countries, it was not accepted as a realistic approach. For instance, the fact that indicators such as economic performance, poverty and R&D investments differ prominently from one country to another detracted this approach from practicality. That is why, researchers studying on innovation systems claimed that a regional based system approach was needed (D'Allura, Galvagno, & Mocciano Li Destri, 2012).

Although NIS approach allows a regional based practice, RIS shows prominent structural differences (Korres, 2012, 2013). When examined in regional level, internal organisations of firms, relations among firms and role of public and public policies can be different from its functions at national level. The RIS approach thus highlights the regional dimension of the production and the exploitation of new knowledge, thereby helping to explain regional differences in innovation capacity and economic strength (Schrempf et al, 2013,

p.10).

Regional innovation systems (RIS) play a strategic role on competitive ability and innovation ability of regions. It is necessary to empower RIS approach in order to increase the competitive capacity and innovative ability of the regions. Regional innovation system can be seen as innovation supporting knowledge infrastructure that is interacting with production structure in a region. Success of RIS depends on the success of performance of factors that are all together, which are reified below (Cooke, 1998).

(1) Regional production structure or knowledge usage infrastructure is fundamentally composed of firms.

(2) Regional promoter infrastructure or knowledge formation sub-system are composed of organizations such as public and private sector research laboratories, universities, technology transfer offices and vocational training organizations and so on.

The researchers classified regional innovation systems differently. Asheim & Gertler (2005) classified regional innovation systems as Embedded Regional Innovation System, Networked Regional Innovation Systems and Regionalised National Innovation System.

Territorially Embedded Regional innovation systems require innovation related to learning processes based on localised and synthetic knowledge base. For this reason, role of regional knowledge infrastructure focus on services basically special to industry, concrete factors and short-term problem solution. In this system innovation activity of the firms are based on geographical, social and cultural proximity and local learning processes (Asheim & Gertler, 2005).

When compared to Territorially Embedded Regional innovation system, Networked Regional Innovation Systems include more developed and systematic connections between universities and local industries besides higher technology that entails the combination of analytical and synthetic knowledge. While territorially embedded RIS are often found in mature industries and regionalised national innovation systems found in emergent industries, networked regional innovation systems can typically support various types of industries in different life cycle phases. In this system firms and organisations are embedded in specific regions. These can be characterised with a local interactive learning. This system is indicated as an ideal kind of regional innovation system because it has a strong infrastructure, number of local institutions is high and the network structure is systematic and planned (Asheim & Gertler, 2005).

Regionalised national innovation system is partly integrated in national innovation system due to existence of exterritorial actors. Moreover cooperation among the organizations is linear. R&D activities and scientific studies have

become more explicit. Being based on analytical knowledge base basically forms innovation. Connection between local industries and industries based on knowledge infrastructure develops more weakly. In this context, role of regionalised knowledge infrastructure has a pivotal significance (Asheim & Gertler, 2005)

5. CONCLUSION

The recent tendency is to develop policies based on clustering and regional innovation system. In order to promote regional advantage, a more proactive innovation resting on regional policy system based is essential. Developing internal capacity of firms and regions about carrying out innovation to promote regional advantage requires the formation of a more conscious and systematic approach. This case focuses on production, absorption and distribution of knowledge in specially knowledge based globalizing economy and it emphasizes the significance of R&D studies in local and non-local knowledge networks. On the other hand, this case also means that it is not adequate to be in a locally stacked environment any more. It is revealed that a more proactive planning is needed to develop internal innovation capacity of the regions and within this context it comes out that non-local knowledge flows need to be connected through global channels. It is seen more important to empower knowledge-based learning and innovation capacity of firms than to gather the firms into the same repository (Giuliani, 2005).

However, singular performance of the firms does not determine the whole performance of regional innovation systems due to systematic nature of innovations. In this process, networks formed with other institutions are determinant on the whole performance of the system. Therefore, the fact that firms start an interactive learning process with other firms and supporting institutions will provide an advantage by improving regional innovation capacity.

Systematic malfunctions than can prevent innovation system from operating efficiently can be in question. In this case the intervention of the public need to focus on the malfunctions in the relations, not to overall system. For instance, in case the system deadlocks, it is necessary to focus on relations between firms and science - technology infrastructure instead of traditional interventions like increasing R&D expenses. In this sense the regulatory role of the government needs to focus on process-based issues such as developing regional knowledge infrastructure, catalysing to access external knowledge sources, increasing the human capital quality, supporting clusters, establishing networks among innovative actors and supporting them.

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