

REGIONAL INNOVATION IN EUROPE  
Evolution of Theory and Policy since 1980  
and Lessons for Developing countries

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# 1. Introduction

It is common sense to say that the world is changing. A new economy is emerging from the opening up of national borders, globalisation, and the diffusion of information and communication technologies in manufacturing and services. Whatever term we use to characterise this new regime of accumulation and growth, be it 'new economy', 'knowledge-based economy', 'innovation economy', it is certain that it stands on the association between R&D, innovation, and competitiveness; this means that the creation and application of knowledge is among the most important drivers of contemporary development and wealth.

The new configuration of development is based on regions at different levels of technological and innovation capacity. The regional distribution of the new factors of development and wealth (knowledge, R&D, innovation, high tech activities, patents, etc.) is much more uneven than GDP and employment distribution. Regional technology and innovation gaps are sharper and more profound than development gaps. This is the major contradiction of our time. While knowledge-intensive activities, high technology industries and technological innovation are central forces of development, the geography of the new innovation-driven economy is very uneven. The drivers of contemporary development and wealth are concentrated in few areas and localities. Market forces and agglomeration economies tend to cluster technological innovations into a few islands.

All regions are trying to cope with this challenge, seeking to improve their position in the innovation economy, advance their innovation performance, and increase their share of innovation and high tech activities. However, there is no universal formula on how to achieve this goal. It is clearly not possible for a region to just replicate the path that another region has followed. Even the most successful regions go through successive waves of growth, decline and restructuring shaped by continuously changing products, technologies, and innovations.

This challenge was very soon recognised as a major barrier within European regional development and cohesion policy. Thus, since 1995, the European Union has deployed the largest effort globally to sustain innovation through regional innovation strategies and programmes. With respect to these experiences, this paper will outline the thinking and policies behind regional innovation in Europe:

- It will describe the evolution of a theoretical and policy paradigm of knowledge-based regional development through its three major stages. The first stage deals with innovation communities and clusters; the second with learning regions and regional systems of innovation; and the third one with intelligent cities and regions. What is of interest here are the elements constituting each successive stage, the internal mechanisms of innovation production, the emerging character of the respective territorial system of innovation, endogenous or exogenous formation, the barriers to development, and characteristic cases as well.
- It will then focus on the system of governance characterising each stage, which assures the sustainability and long-term continuity of innovation: local alliances with a strong presence by chambers of commerce and industry and other sectoral agencies in the case of clusters; regional authorities, national programming

authorities, the European Commission in the case of regional innovation strategies; multiple associations and private-public partnerships in the case of intelligent cities.

- Finally, it will discuss what the RIS platform, as the dominant model of regional innovation governance, has to offer to less favoured regions and regions in developing counties.

Discussing the evolution of this theoretical and policy paradigm, we will try to explain how regions contribute to innovation, how different types of innovation systems are formed at the regional level, how these systems work as collective mechanisms of learning and innovation, and what principles determine their governance. Small innovation systems, based on physical proximity within clusters, evolved into larger-scale regional systems due to the introduction of institutional agreements and regional regulation policies; actually, with the use of advanced information and communication technologies they have even become further enlarged to wider national and global scales. In the dynamics of innovation, cities and regions are cohesive factors contributing to the formation of territorial innovation systems with increasingly complex physical, institutional, and digital dimensions.

It is important to emphasise that the theory and policy paradigm under discussion is proposed equally for advanced and less favoured regions. However, when it comes to the question of transfer of policy models from advanced to emerging regions, the main question is whether this is just an uncritical and non-informed transfer of policies or whether the creation of endogenous learning and innovation mechanisms is not sensitive to the level of regional wealth and development.

## 2. Regional innovation in Europe

Regional innovation is now at the core of EU regional policy. This is clearly reflected in the three new objectives for 2007-2013 (convergence, competitiveness and employment, and European territorial cooperation), in which innovation appears as the top priority. The 5<sup>th</sup> periodic report on the social and economic conditions of European regions showed that innovation and learning were among the most important drivers of regional competitiveness, and more recently, the Innovation Scoreboard (2003) presented a linear correlation between GDP and the revealed regional summary innovation index ( $GDP/capita = 0,5147RRSII + 0,1208$ ).

European regional innovation policy covers the entire European territory, having completed 152 regional innovation strategies in 25 Member States, 145 Programmes of Regional Innovative Actions supporting the implementation of strategies, 13 thematic innovation networks, the Innovating Regions of Europe network, and numerous parallel activities and projects for innovation funded under the mainstream Regional Operational Programmes. This large-scale, but also strategic orientation of regional development through innovation rests on two viewpoints: first that innovation is a challenge for all regions, regions are key players in the dynamics of innovation, and all regions should improve their innovation performance; and second that the different

regional trajectories apart, a common policy model has been applied to sustain innovation performance: The RIS platform.

Fig.1: Regional innovation strategies and programmes



Source: <http://www.innovating-regions.org/>

### 3. Clusters and technology districts

The first analytical account linking innovation and territory appeared in early 1980s in writings about industrial districts. In 1977 Bagnasco published his study on the Third Italy describing small cities and communities of central Italy flourishing on the basis of local vertical integration among small companies belonging to the same industry. Later Becattini explained how the industrial district works as a creative milieu.

Michael Porter popularised the concept of industry clusters in *The Competitive Advantage of Nations* (1990), recognising that at regional level the majority of economic activity takes place in a limited number of industry clusters/ sectors. The basic meaning of a cluster is the geographical concentration of industries that gain advantages through location in proximity, which refers to agglomeration economies, either of scale or scope. Porter distinguished two types of clusters: vertical clusters, and horizontal clusters. Vertical clusters are made up of industries that are linked through buyer-seller relationships. Horizontal clusters include industries, which might share a

common market for the end product, use a common technology or labour force skills, or require similar natural resources.

Over the last 25 years since the opening of this discussion, clusters and industrial districts have continued to occupy a central place in the debate about regional innovation, especially as a major instrument enabling the improvement of local innovation capabilities. Much has been written on the diversity and the typology of clusters which includes a wide range of cases:

- Industrial districts in traditional sectors, such as food, paper, plastics, mechanics, jewellery, leather, shoes, furniture, clothing;
- Technologically advanced districts in new high tech sectors of electronics, computer related sectors, telecommunications, biotechnology, shaped by applied research, venture capital, and specialised services;
- Horizontal clusters, in which companies cooperate with other companies and technology providers sharing collective goods and services, such as public infrastructure, training, information and R&D;
- Planned clusters, science and technology parks, focusing on technology transfer and/or the attraction of high technology activities and investments.

Clusters, technology districts, science and technology parks are communities of innovation in which innovation emerges from multiple (even chaotic) combinations of skills, creativities and specialisations. The innovation mechanism within the cluster / district is based on three factors:

- The concentration of many and diverse skills in the cluster / district covering various fields of knowledge and production. Even in cases where the whole cluster focuses on a single industrial sector, the multiplicity of skills comes from specialisation in different stages of the production process.
- The cooperation networks between the members of the cluster. Cooperation produces innovation, as the latter stems from the combination of skills, knowledge, and qualities that are put together. A minimum number of cluster members is necessary, and 100 companies has been considered as a threshold for the definition of a production complex as an industrial district.
- The presence of “catalysts” which facilitate networking among the many and diverse skills and production units. In the case of industrial districts, the role of the catalyst is played by the *impannatori*, who constantly re-organise the productive processes of the district in relation to the orders they get. Venture capital functions as a catalyst in high tech clusters, as do the technology transfer departments and the liaison offices in the case of technology parks.

The governance of clusters is extended to four different areas of management.

**Innovation and technology management**, focusing on:

- R&D open doors policy
- Technology transfer, licensing, IPR
- Promotion of R&D / technology platforms
- Creation of technology transfer centres and networks

**Spin-off management**, focusing on:

- Construction of incubators

- Provision of seed capital / equity capital
- Provision of innovation services
- Spin-off support

**Attraction** of external organisations and investments, focusing on:

- Definition of target groups
- Global marketing
- Provision of incentives: attraction package
- Attraction of sectoral technology centres
- Aftercare services

**Land and infrastructure management**, focusing on:

- Acquisition of public / private land
- Planning regulations
- Infrastructure creation
- Land promotion and construction

#### 4. Learning regions

In the 1990s innovation theories turned towards learning organisations and regions, while policies started experimenting with regional innovation strategies. The focus has shifted to institutions and systems. As Nelson (1993) pointed out, the innovation system is a set of institutions whose interactions determine the innovative performance of companies; there is no presumption that the system is consciously designed or that the institutions involved work together smoothly and coherently.

This change was fuelled by three transitions:

- *From inter-firm cooperation and district theory to learning firms*: The contribution of the District theory write Lawson and Lorenz (1999) was more in the area of understanding the territorial foundations of inter-firm cooperation than in understanding the contribution of territorial clustering to a firm's capacity to learn and generate new knowledge.
- *From individual to organisational learning*: Individual learning refers to the acquisition of information, knowledge, understanding and skills, through participation is some form of education, training, whether formal or informal. Organisational learning depends upon individual learning and builds upon it. Organisational learning amplifies the knowledge created by individuals, by appropriating knowledge from outside or by creating new knowledge in interaction and collaboration to other organisations
- *From linear to systemic innovation*: A process (innovation) hermetically sealed within the research lab of the large company has been transformed into a system that covers an entire city-region connecting actors from the finance, technological, and production communities.

The region was conceptualised as a living organism with technology learning, management, selection, and knowledge development capabilities. Innovation is based

on a system of clusters and institutions in the fields of production, R&D, tech transfer, and finance. The system contains both demand and supply institutions, and integration is due to knowledge, financing and marketing networks. Networks allocate 'formal' and 'tacit' knowledge and enable collaborative innovation. Institutions work as switches selecting (on) and rejecting (off) innovations. Priorities are on intangible infrastructure, skills, human capital, finance, cooperation and social capital.

In 1994, core concepts of the 'learning region' paradigm (collaborative networks, organisational learning, institutional agreements, social capital, political consensus) were adopted by the European Commission, which introduced a new family of policy schemes having a strategic view of technology and innovation at regional level: Regional Innovation and Technology Transfer Infrastructures and Strategies (RITTS), Regional Technology Plans (RTP), Regional Innovation Strategies (RIS), and Programmes of Regional Innovative Actions (PRIA). These initiatives provided co-financing and guidance to regional governments to undertake an assessment of their regional innovation potential, to define and implement strategies that promote innovation in small companies, and introduce informed public innovation management and assessment. The objective was to create **regional systems of innovation** capable of sustaining and facilitating innovation in small companies in manufacturing and services.

Regional innovation strategies follow four key methodological principles:

- RIS are based on public-private partnership and consensus. The private sector and the key regional R&TDI players should be closely associated in the development of the strategy and its implementation.
- RIS are demand-led focusing on firms' innovation needs, and bottom-up with a broad involvement of R&TDI regional actors in their elaboration.
- RIS are action-oriented. At the end of the process new innovation projects in firms and/or new innovation policy schemes will be implemented.
- RIS exploit the European dimension through engaging in inter-regional co-operation and benchmarking of policies and methods.

In parallel, common monitoring of regional innovation was developed by the Trend Chart action. The Innovation Scoreboard publishes an annual report that highlights the performance of EU Member States, regions, and industry sectors in the innovation economy. Based on the Oslo Manual methodology, the scoreboard includes indicators measuring performance in education, knowledge creation, innovation capabilities, and the innovation market. Member States and regions are compared with respect to 20 indicators and the Revealed Regional Summary Innovation Index I, and the Revealed Regional Summary Innovation Index II.

## 5. Intelligent cities and regions

At the turn of the century new trends appeared linking regional innovation to knowledge management and the information society. Key processes that initiated the convergence between innovation and IT were the dematerialisation of infrastructure

through IT, the development of online learning and technology management, the creation of virtual communities and clusters, and the possibility to promote innovation digitally.

Intelligent cities and regions correspond to territories combining strong innovation systems with IT infrastructure and digital innovation services. They express the quest to create environments that may improve cognitive skills and capabilities to innovate. The idea is of a superior cognitive capacity and creativity, which is collectively constructed, emerging from the combination of individual cognitive capabilities and information systems that operate within the physical and digital space of cities and regions.

In the EU, this type of regional innovation and development is supported by the newest generation of regional innovation programmes (PRIA), the framework R&D programmes, while the link between innovation and information technology is at the core of the new Competitiveness and Innovation Programme (CIP). However, the initiatives for intelligent cities and regions are still in their early stages. The first applications are being developed in terms of intelligent clusters, intelligent technology parks, and physico-virtual innovation networks.

Two different forms of intelligent cities and regions governance have appeared:

- A nodal form, dealing with the management of physico-virtual clusters focusing on:

- The creation on a digital layer upon clusters, science and technology parks
- The development of online innovation services, and
- The management of cluster-based innovation processes (infrastructure, attraction, technology transfer, spin-off creation) using physical and digital infrastructure.

- A diffused form dealing with the management of physico-virtual innovation systems, focusing on:

- The creation of multiple virtual innovation spaces by private and public initiatives supporting the regional innovation system
- Integration of dispersed information systems, at different levels of institutional, software, and content integration, and
- The management of key innovation processes (intelligence, technology transfer, incubation, new product development, promotion) combining institutional networks and digital communication platforms and tools.

Intelligent cities and regions add two more dimensions to territorial innovation systems based on proximity (clusters) and institutions (learning regions):

- A 'global' dimension emerging from the widening of regional innovation systems on a global scale, enhancing the co-operation of regional actors with strong global players; and
- An 'intelligent' dimension emerging from the use of information and communication technologies, sustaining the global reach of regional innovation systems through advanced information processing, intelligence, and communication capabilities. The digital infrastructure and online innovation service is changing radically the way companies obtain information and assess world markets, the way they transfer and absorb technologies, and how they develop new solutions, products, services and organisation.



## 6. The governance of regional innovation

Regional innovation strategies offer the methodological and institutional framework for governance of innovation in the EU regions. They are based on a rich body of regional experience gathered over 12 years, with 8 RTP pilot projects, 101 RIS projects in EU-15, 39 RIS ongoing projects in New Accession Countries (RIS-NAC), a series of accompanying support measures including the IRE network, national innovation networks, 13 thematic innovation networks, post-RIS implementation support, the Trend Chart on Innovation and the yearly publication of the Innovation Scoreboard, as well as many other implementation tools from the mainstream operational programmes of the EU regions.

RIS integrate multiple innovation support actions into a coherent regional perspective: from cluster development, to institutional building for R&D and innovation, and the creation of virtual innovation environments. The regional innovation system, which RIS govern, is simultaneously developing in physical, institutional, and digital spaces, with hard infrastructure, institutions, and online innovation services. The aim of this multidimensional deployment is to combine the advantages that different forms of territorial innovation systems offer, while minimising their weaknesses.

Table 1: Territorial systems of innovation

Territorial systems of innovation	Advantages	Weaknesses
<i>Clusters/ Technology districts</i>	<ul style="list-style-type: none"> <li>• Direct participation of companies</li> <li>• Well known and wide spread concept</li> </ul>	<ul style="list-style-type: none"> <li>• Planning barriers</li> <li>• High development costs</li> <li>• Innovation through infrastructure?</li> </ul>
<i>Learning regions/ Regional systems of innovation</i>	<ul style="list-style-type: none"> <li>• Wide system of reference</li> <li>• Participation of R&amp;D institutions</li> <li>• Emphasis on institutions - Long term intervention</li> </ul>	<ul style="list-style-type: none"> <li>• High level of institutional thickness</li> <li>• Strong public-private partnerships</li> </ul>
<i>Digital innovation environments/ Intelligent regions</i>	<ul style="list-style-type: none"> <li>• Low development cost</li> <li>• Easy access</li> <li>• Global communication and networks</li> </ul>	<ul style="list-style-type: none"> <li>• Internet diffusion</li> <li>• IT literacy</li> <li>• Complex environments</li> </ul>

The core of the RIS methodology is to sustain systemic innovation: networks between regional stakeholders from the production, technology, R&D, and finance fields enabling them to set-up dynamic supply chains of innovation. As Lundvall and Edquist (2000) point out in their study of the Danish and Swedish systems of innovation:

‘A system of innovation is constituted by institutions and economic structures affecting the rate and direction of technological change in society. The innovation system is larger than the R&D system. It includes not only the R&D system and the system of technological diffusion, but also institutions and factors determining how new technology affects productivity and economic growth.’

## 7. Applying the RIS platform in developing countries

RIS codify the methodological and institutional framework for the governance of regional innovation in Europe. They follow standard methodologies and procedures and are equally applied to all regions, regardless their level of development and wealth. It should be emphasised that the objective in creating clusters, territorial systems of innovation, virtual innovation environments, and many other support infrastructures, makes no distinction between advanced and less favoured regions. As soon as the EU enlarged with 10 new members, RIS started to be implemented in all RIS-NAC regions, using the same principles and tools. The process, concept, and methodology were exactly the same as in RIS of EU-15. The same holds for Intelligent City initiatives. Among the top 7 intelligent cities of the year selected by the Intelligent Community Forum are many cities / regions from developing countries: Piray, Brazil (2005), Tianjin, China (2005), Bangalore, India (2002), Bario, Malaysia (2001). The emphasis is more on the institutional capacity and the cultural conditions of the region than its level of wealth and GDP.

There are however a number of issues that the governance of regional innovation in developing countries should consider carefully and take into account. They correspond to usual risks and failures of innovation strategies in regions lagging behind in terms of institutions, technologies, and cooperation practice.

- First, identify the projects that specify a regional innovation strategy in consultation with the principal regional actors and more importantly justified by demand. There are three main risks in this undertaking. The selected projects may suffer from weak sustainability due to insufficient demand or high cost of maintaining the service they offer. They may suffer from weak consensus because of limited support from regional stakeholders. They may not find an appropriate implementation framework, either in institutional or financing terms.
- Second, manage clusters taking into account the emerging and bottom-up dynamic of inter-firm collaboration. The usual risk is adopting top-down planning procedures not taking into account the members' needs and the complexity of flexible collaborative networks. An equal risk is to invest highly in the hard infrastructure of technology parks neglecting technology transfer and spin-offs activities or to overemphasise attraction leading to devastating interregional competition between attraction packages and incentives.
- Third, develop carefully selected forms of virtual innovation environments, such as regional intelligence, online innovation management, virtual clusters and communities, digital promotion platforms, corresponding to the needs and capabilities of local users. The usual risk is to create digital services that do not correspond to defined target groups and real communities of users.
- Fourth, create appropriate innovation monitoring and assessment systems. There are many options and solutions for this task: from the Oslo manual and the EU innovation scoreboard, the Massachusetts innovation economy index, the UNIDO industrial performance scoreboard, or the UN millennium indicators. Each

solution has different advantages and weaknesses and the point is to find a solution enabling one to monitor the progress of targets and actions with the progress made on the performance of the regional system of innovation.

## 8. Clusters, IT services, and global supply chains: A top priority for developing countries

Regions in developing countries, like many less favoured regions in Europe, suffer from low R&D investments, limited patent activity, a low presence of high tech sectors, limited innovation capabilities in the small business sector, and a low level of higher education of the population. A series of actions, integrated into a regional innovation strategy, might be proposed to cure these weaknesses. Any attempt has to sustain regional innovation through regional systems, networks and alliances.

What we have seen, however, in the recent history of regional innovation in Europe is a gradual building of territorial systems of innovation. Small company clusters based on trust and cooperation within a local community have evolved towards larger regional systems integrating R&D, technology transfer and innovation finance institutions, and are further enriched with IT infrastructure and online innovation services. What this trajectory reveals is a movement from simple to more complex territorial systems of innovation: an institutional dimension is added to the physical dimension of clusters, and then a digital one (Komninos 2002).

If there is a message from the European experience to the less favoured regions and the regions of developing countries it is the message of building local innovation systems starting from simple ingredients and enriching them gradually with new qualities coming from institutions, technologies, and infrastructures. In regions with low organisational and technological capability this route from simple to more complex innovation systems seems to be the only viable route.

Starting point of this process is the cluster. The cluster represents the elementary form of a territorial system of innovation. Thus among the various possible measures and actions that regions in developing countries should undertake is the creation and/or support of **innovative clusters** which is to my opinion the top priority. But, these should be clusters with a **strong IT** dimension facilitating their integration into global value chains of suppliers, producers, and customers.

Innovative cluster building should follow a process of awareness involving:

- The setting of priorities
  - Overview of existing regional clusters
  - SWOT for the main clusters
  - Selecting which sectors and clusters to support in priority.
  
- The reconstruction of the regional innovation system around the selected cluster(s)

- Mapping company networks with Universities, R&D, financing, technology transfer organisations, information providers
  - Mapping internal and external capabilities of the cluster
- The development of capabilities within the cluster in various field of innovation related practices, such as:
- Cluster / business intelligence, enabling them to overview the internal and external environment of a company, with the intention of finding information that can be incorporated into management processes;
  - R&D and technology acquisition, defining technologies that should arrive at the company floor and streamlining innovations-to-the-market towards innovations-to-the-company;
  - New company creation and incubation capability;
  - Cooperative product innovation, linking small new product development units within the companies with external specialised product development centres at different stages of the new product development process;
  - Global marketing and placement, marketing of the cluster products and services and marketing of the cluster itself, development of digital marketing strategies allowing remote producers and customers to be reached.

Considering the regional environment as source of innovation and competitive advantage means that every region has to find its own appropriate solution. Theory and policy models may define a framework for action and help avoid mistakes and proven impasses. However, the challenge for regional innovation goes beyond established models. Every region needs an original route to follow, valorising its particular mix of resources. At the end of the day, the very meaning of innovation is the capacity to challenge the validity of theory paradigms and policy models. This is a central message of systemic approaches.

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