

Master's Degree Thesis IN **MANAGEMENT - INNOVATION & ENTREPRENEURSHIP**

Subject: **Markets, Regulation & Law**

Title: **Research and Innovation Strategies for Smart Specialisation (RIS3) – The case of Apulia**

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### **1 - Introduction.**

The realm of Research and Innovation Strategy has entered strongly into the activity set of every policy-maker around the World. In this Master's Degree Thesis the Author tries to analysis this sector of policy-making firstly theoretically analysing the main literature and introducing the European Commission regional-based strategy. Finally the theory will be corroborated with the Italian Region Apulia's practical case.

### **2 - An Overview on the Research & Innovation sector.**

The analysis of the Research and Innovation sector in the European Union could start from the following statement from the EU Committee of the Region's Smart Specialisation Strategies Conference held on 18<sup>th</sup> June 2014:

“New ways of thinking are needed for dealing with these challenges: more ecosystem thinking, more creative thinking, more synthesis, more thinking about outcomes and impacts, more attention to pattern recognition and awareness of weak signals. More thinking about solutions and less focus on problems. We have to practice thinking together, synthesising and comprehending: collective and distributed thinking about societal change, real challenges, contributing relevant support, building renewal capital.”

In this chapter will be described two important trends strongly biasing the shift in the innovation creation and exploitation context: Open Innovation and Crowd-sourcing.

When the policy-maker tries to maximise the impact of innovation practises, as we already reported above, the enabling condition is to operate into an Open Innovation Environment (referred recently to an Open Innovation 2.0. Environment, to point out a shift towards a

more crowd-oriented one). This concept has got some fundamental principles, which lead to needs for new skills among all the actors in the innovation process.

### **3 - Why regions matter for innovation policy today**

In order to understand why research and innovation policy action could bring to better results when put in place at regional level, we should analyse this particular layer of public administration is crucial enough to be in the middle of such an actions.

Knowledge and innovation diffusion has to be tailored according to the specific regional context. Knowledge absorption, creation and diffusion rates across different areas (often within the same country, as in the case of Italy) tend to persist. Some experience shows that the process of virtuous catching up is possible. In the meantime one should take into account these growth paths are usually biased by a series of complementary factors, not all into the realm of the policy-makers management.

The “opportunity costs” of not updating the regional economy towards the shift to a socially and environmentally sustainable growth are paramount.

That’s why an inclusive innovation agenda is needed. Regions are key players in this journey, together with the fact that different layers of government are asked to effectively co-operate.

#### **A policy paradigm shift**

Many OECD regions are formulating innovation strategies to increase their competitiveness. For some countries, like the new EU member States, this trend is corroborated by others including the increased democratisation, devolution and decentralisation. For others, such as Canada, Germany, Spain and the United States of America (which have a federal institutional layout), this habits is more longstanding in the innovation context.

In the European Union a crucial role has been attributed by the so-called Structural Funds: they have helped regions mobilize more resources for knowledge-based growth than the ones they might have gathered in the scenario of no help from the sub-national level.

Even though the European funding system has been often accused to be built on a too much rigid architecture of checks, it helped tremendously regions (and also central States, indeed) to focus their development projects towards a more or less common path.

Zooming our discussion on the innovation landscape, it has increasingly become one of the pillars of EU regional and cohesion policy. Here there are some quantitative data from the Structural Fund expenditure helping us understanding how steep the increase slope has been. In the funding period ranging from 1989 to 1993, 4% of regional policy funds were finalized at financing innovation projects (2 out of 50 billion). The share of innovation-related project for the period 2007-2013 is attended to be around 25%, totalling EUR 86 billion.

Unfortunately this very positive shift in sector funding hasn't been enough to fill the persistent knowledge, technology and innovation gaps existing between and within countries. It urges the need to better targeted policies.

Another factor strongly affecting the quality of innovation policies is the need to advance in the capacity of evaluating the impact: in a nutshell Governments are concerned need to increase policy accountability and show their on citizen well-being.

There are a few peculiarities making tougher the quantitative evaluation of innovation projects. First, R&I are characterized by high level of uncertainty, rendering the cost-benefit analysis not suitable for taking into account the value added of innovation (the biggest part of which is represented by indirect externalities). Second, the majority of policy actions in innovation field produce results in the medium/long run, so to be effective requiring investments over this time window.

This scenario pushes the fostering of institutional capacity for policy accountability by the Countries and Regions, along with outcomes monitoring (as opposed to the simple immediate impact of outputs measurement).

Obviously this Public Administration attitude has to be shared among the different institutional actors contributing and interacting in the innovation outcomes. This collaboration across the different layers of government is key in the creation of performance accountability mechanisms.

Originally, regional development (cohesion) policy usually targeted marginalized areas in order to mitigate the undesired consequences of the un-balanced wealth among different areas of the same Country (or Continent as in the case of the EU Structural Funds): regional development policy was basically resource transfers to lagging regions from the wealthier ones. Compensating for regional disparities in employment and other economic proxies were the main causes of such a policies.

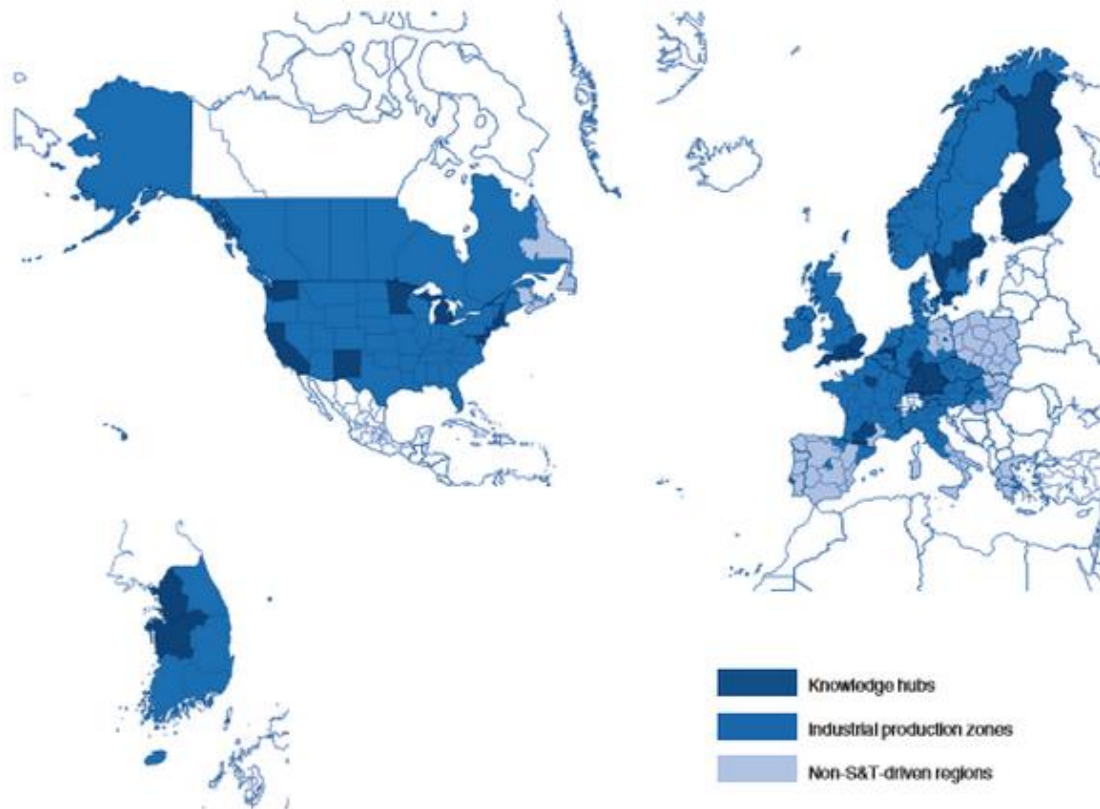
It's fair to say that the results have been, in several cases including Italy, quite disappointing.

By consequence since the late Nineties, the so-called **institutional school** (Amin and Hausner, 2007) has started to define a new vision for cohesion policy: the idea was to conceive as a set of cross-sectoral initiatives with a more balanced development pattern and, above all, taking strongly into account the existing local strengths and assets. This new paradigm has been progressively adopted, and “Regional development policy now increasingly aims to create the conditions for endogenous growth in each territory on the basis of local assets, capabilities and economic potentialities” (OECD, 2010a).

This represents ultimately what is reported in the paragraph title: the policy paradigm shift which brings innovation to the core of the cohesion agenda.

To point out a proxy to look at when valuing the effectiveness of this paradigm shift could be measured in terms of regional public accounts.

Figure 1.2. Categorisation of OECD regions



Note: This map is for illustrative purposes and is without prejudice to the status of or sovereignty over any territory covered by this map.

Source: Ajmone, G. and K. Maguire (forthcoming), *Categorisation of OECD Regions Using Innovation-Related Variables*, Regional Development Working Papers, OECD Publishing, Paris.

The image above reports the results of a study made by OECD (Organisation for Economic Co-operation and Development) on a sample of 240 regions from 23 members States. This sample covered around 78% of OECD GDP and 71% of the total population and was based on 12 regional variables.

On the basis of regional data they have been grouped into eight categories, further clustered in three main groups: Knowledge hubs, Industrial production zones and Non-S&T-driven regions (as, again, reported on the map above)

The so-called **Knowledge hubs** the places where mainly where innovation is created: the heart of the world system. They account for 30% of GDP and 25% of population. Here we

could find the Knowledge-intensive Cities and the Capital districts with a far above average GDP per capita and benefiting from knowledge flows coming from neighbouring areas. Apart from these just mentioned very particular cases in this kind of Regions stand also the “normal” Knowledge and technology hubs which are mainly areas from knowledge intensive Countries (like USA, UK, Germany, Japan, Korea and the Nordic Countries, as already mentioned in the beginning of the chapter).

It’s safe to say in these Regions one might find the highest rate of Research, Innovation & Research expenditure and patenting.

The second category is the so-called **Industrial production zones** which cover around 60% of GDP and population sample.

The empirical data report that fall under this set of regions:

- some 38 US States, referred to as “with average Science & Technology performance”. They’ve got good levels of GDP per capita, number of workers employed in high and medium technology sectors and use of knowledge-intensive services (KIS) by the firms. On the other hand they report a low portion of workers with tertiary education;
- the sub-group “Service and natural resource regions in knowledge-intensive Countries” (28 Regions) from Canada, the Netherlands, Denmark, Norway, Finland and Sweden. They represent a relatively small share of GDP and population in the sample analysed; it seems that source of wealth from services and natural resources, given the good level of education. It’s mainly the case of second-tier regions in wealthy States;
- the “Medium technology manufacturing providers” category with 49 Regions. They represent around 20% of GDP and population and their principal strength is the educated work-force and manufacturing performance;
- at last the “Traditional manufacturing Regions”, counting 30 areas from Austria, the Czech Republic and Italy. They report the highest share of secondary sector workers of any group and the lowest of the work force with tertiary education.

The third category, the **Regions non-driven by Science and Technology** accounts for 14% of the population and, much more interesting, just around 8% of GDP. These areas report a very

low level in patenting and, mainly public, Research & Development and they've been split into:

- the sub-group “**Structural inertia or de-industrialising Regions**” including 38 Regions from Spain, Hungary, Italy, Poland, Slovak Republic, Canada, Germany and France. The average rate of unemployment is the highest;
- the sub-group “**Primary-sector intensive Regions**” from Greece, Hungary, Poland and Portugal.

### **Multi-level governance in innovation policy-making.**

We mentioned a number of times how crucial and central the role of Regions should be elevated into the creation and implementation of policies for innovation in a Country.

National and supranational governments (such as the European Union) are developing strategies to reach their growth and innovation targets strongly involving regions to achieve them: the Research and Innovation Strategy for Smart Specialisation is one of them.

Once the “ball” has passed to the sub-national level, Regions need to develop their smart policy mixes, based on their own assets and specialisation. At this stake they need to take into account their position and contribution in the multi-level governance framework.

An important feature in the study of what a Region could do contributing to the national innovation sector development is, actually, a “Region” is. This silly question is given by the fact that almost every OECD Country list their sub-national institution differently, according their statistical and administrative (or political) areas.

Moreover, and shifting from the mere theoretical and statistical matter, often for the innovation strategy sake one should refer to the so-called “functional Region” for Science Technology and Innovation policies. This functionality means economic and innovation system linkages, not stopping just at their administrative or political boundaries.

In fact the two usually do not match, because such linkages change more rapidly than administrative borders, which often were defined in the deep past of the history of one Country.

Furthermore, and this last fact gives a wide range of consequences to the policy-makers, functional regions may be part of a Country, or might cross national boundaries: as the

ever-boosting development in technology these linkages could even span the entire Globe. It's obvious such a feature gives enormous difficulties to the institutions once they develop the innovation strategy. As for this part of the paper it's enough just to point out that often a political Region is simply not sufficient to elaborate a thorough policy agenda.

Another important matter is what the role of Regions in the policy development is. Constitutions in a number of Countries define the matters in which Regions could competences. Moreover, in some Countries, this role in STI is not explicitly defined. But even when a Constitution explicitly assign this right to the sub-national level, there is evidence in recent years that Regions and National Governments often share this power, pointing out the importance to "orchestrate" the two policy realm. In the case of Regions having formalised powers in this field, once should also consider the differences in regional capacity (financial or administrative), which in the end might de-fact push to a re-centralisation of the matter.

Given the participation in different degrees of the sub-national level of Government, the final objective of National policy-maker should be the complementarity of the whole work.

National policies start significant financial resource flows to actors in Regions, in the Science, Technology and Innovation sector.

Regions are orienting their strategies, at least in part, towards national and supranational targets. The fact that a number of Regions are prioritising the same innovation sectors, for example, is also a rational response to funding flows from national and supra-national levels of government. The latter shouldn't be consider as a whole positive consequence: in the action of "running" together in the same direction a Region might lose their specific priorities given its fields of specialisation.

As the last one is a real issue for Regions, given the often non-independence of STI resources, the goal to create a smart policy mix is crucial. National, or supranational, programme funds arriving from different sources should be pooled together into different programmes and instruments to push in the same direction, not just to thank the financier.



The proliferation of policy streams has also created a complicated framework of support for beneficiaries (firms, research institutions, other layers of government such as municipalities, etc.). Furthermore, efforts to rationalise the whole resources offer across levels of government are tough to put in place. A possible alternatives are the so-called one-stop-shops or also the brokers assisting firms, mainly SMEs, in accessing the wide range of programmes available in the public and private sector.

In this paragraph we will make a general review over the most used policy instrument in the sector of innovation. They are in total six families of instruments: Science and technology parks; Systemic initiatives: clusters, networks, competitiveness poles and competence Centres; Innovation support services for existing SMEs; Support for innovative start-ups; Innovation vouchers; Research infrastructure.

#### **4 - Research & Innovation Strategies for Smart Specialization (RIS3).**

The Research and Innovation Strategies for Smart Specialisation is a European Commission initiative is part of the 'Innovation Union' flagship initiative in Europe 2020.

It sets out a comprehensive innovation strategy based at Regional level to enhance Europe's capacity to deliver smart, sustainable and inclusive growth. The concept of smart specialisation is seen as a mean to achieve these goals.

##### **The Strategy design.**

A Research and innovation strategy for smart specialisation should be considered as complete economic and social transformation agenda: having at the concept base innovation, nothing but changes would be brought by applying it.

It is based on four general principles, summarised by the European Commission itself by four 'Cs':

- **Choices and Critical mass:** the main aim of the Strategy is limit the number of priorities in order to strongly focus on specific regional strengths and specialisation (able to be competitive in the international stage). This would bring policy-makers avoiding duplication and fragmentation, and thus concentrate funds to most effective areas also taking care of budget;
- **Competitive Advantage:** the creation of growth and development opportunities mobilising local talent is a must in the Strategy. This could be obtained by matching

Research and Innovation capacities to the private-sector business needs through the above-mentioned entrepreneurial discovery process;

- **Connectivity and Clusters:** industrial districts and cluster have always been at the base of any innovation-related strategy. The general idea is that the development succeeding clusters would provide automatically the opportunities for cross-sector linkages. This would drive to specialised technological diversification considering the local firms as part of a worldwide hyper-group of firms one gaining from the co-operation with the other;
- **Collaborative Leadership:** any actor could be leader in the economic realm, from private firms, to universities, research centres, public institutions and even normal citizens with their demand-side contributions. An efficient innovation system has to be seen as a collective discovery process, with cross-field collaborations. This is well-synthesized in quadruple helix concept.

These four 'Cs' are the leading elements of a Research and Innovation Strategies for Smart Specialisation process that incorporate its main inspiring the whole strategy design.

Not to go too deep in the explanation of a rather theoretical argument here we simply list the simple six-step approach to the Strategy as indicated in the document by the European Commission:

1. Analysis of the regional context and potential for innovation;
2. Set up of a sound and inclusive governance structure;
3. Production of a shared vision about the future of the region;
4. Selection of a limited number of priorities for regional development;
5. Establishment of suitable policy mixes;
6. Integration of monitoring and evaluation mechanisms.

It is important to highlight that this steps above are likely to be overlapping one another where new actors taking part to the process, or new on-the-field analysis show further and different regional potential or even when ongoing projects give results which could modify the fundamental context during the process.

## **5 - SmartPuglia2020: RIS3 in Apulia.**

### **Introduction to the new Innovation Strategy.**

The document describes the main constituting elements of the Regional Strategy for Research and Innovation linked to RIS3 2014-2020.

One of the starting points is the need to find or propose a new development and growth model for the Region, given the social, economic and environmental criticalities.

The chosen pattern of the strategy is to mix the “horizontal” policies for research, innovation, competition, internationalization, education and training, with the “vertical” policies often arriving from the central government (with whom a coordination is needed): environment, transport, welfare, wealth, etc.

But how is the condition of the innovation sector in Apulia before the launch of the policies related to RIS3. A comment following the publication of the European Commission Regional Innovation Scoreboard 2012 was “the emerging picture gives us an Apulia at a halfway position in innovation rankings: some steps forward have still to be done, while generally the regional actors are aware of the environmental, cultural and social potentialities”.

At this regards, a regional agency – ARTI Regional Agency for Technology and Innovation has created the Apulian Innovation Scoreboard. This has been thought to give useful insight about the Innovation Regional System, for both a better law-making in the S3 field and to benchmark other Italian and European regions.

UNIVERSITÀ	Campo Scopus	Area CUN	Posizionamento ITALIA	Posizionamento EUROPA	Posizionamento MONDO
Università del Salento	Modelling and Simulation	01-09	1 / 27	18 / 158	65 / 419
Università del Salento	Mechanical Engineering	09	3 / 34	42 / 248	133 / 682
Università del Salento	Mechanics of Materials	08	5 / 29	36 / 228	139 / 614
Università di Bari	Instrumentation	09	2 / 28	8 / 140	41 / 331
Università di Bari	Theoretical Computer Science	09	8 / 33	81 / 310	207 / 618
Università di Bari	Electronic, Optical and Magnetic Materials	02	6 / 41	77 / 333	218 / 777
Università di Bari	Nuclear and High Energy Physics	02	10 / 35	55 / 191	127 / 406
Politecnico di Bari	Computer Science Applications	01-09	4 / 41	63 / 311	189 / 753
Politecnico di Bari	Electrical and Electronic Engineering	09	14 / 41	85 / 341	255 / 824

Legenda Top 10% Top 30% Top 50%

Some insight from the data: in our Region haven't been reported a considerable scientific production in the Statistical and Economic Sector; there are no Apulian Universities in the Top 10% World in any Scopus Field; some good results in Physics with 3 Scopuses in the Top 30% World and one in the Top 10% Italy; a good representation in the field of Mathematics and ICT and Industrial/Information/Communication Engineering.

KETs – The Key Enabling Technologies.

Here are listed the KETs as reported in the Project Document<sup>1</sup>:

1 – Micro and Nano-electronics: smart grid, smart metering and smart energy technologies; technologies for ITC;

2 – Nano-technologies: technologies for reducing the environmental and climate change impact; support technologies for the development and launch on the market of nano-materials and complex nano-systems;

3 – Biotechnologies: technologies for agriculture and quality and safety of food; bio-ITC and bio-sensorial technologies; advanced biotechnologies for the use of biomass;

<sup>1</sup> KET 4 Photonics has been canceled due to the side importance in the economic landscape.

5 – Advanced Materials: technologies for material development in the field of energy and environment; technologies linked to materials for the a sustainable industry, for a low carbon production systems and energy saving;

6 – Advanced Production and Transformation: Innovative technologies for Agricultural-food, robotics, advanced tools, virtual prototyping, etc; technologies for energy sector; technologies for the development of regional traditional handcraft products

### **The social challenges and public innovation demand.**

The challenges and issues faced in this paragraph could be positively applied to the whole cases of the Southern Italy economic and social conditions. It's fair to say the recent prolonged crisis has widened up the differences between our territories and the rest of the Countries: the South has experienced a 13% growth rate of GDP between 2000 and 2013 (Italy as whole +20.6% - the worst result in EU18 averaging +37.3% - Greece has scored +24%, while the average of EU28 Convergence Regions has reached +53.6%)<sup>2</sup>.

It so urges an expansion in the rate of industrialisation and internationalisation of the Area, paying attention to the social and environmental sustainability of this activities. This is strongly linked to the persistence (crucial for the regional economy) of the “old-fashioned” low-technology base productions, well-represented by the steel cluster in Taranto (led by Ilva). The latter is a paradigm case: render this industries competitive against the push of the new-comers on the international economy scenario (like BRICS Countries and whole the plethora of the Emerging markets) should be accompanied by the environmental requalification of the area they exploit. A green economy paradigm is the only way to create value from the Southerner territories.

Another factor, and here we cross again our urgency/opportunities for demand-push innovation, is the development, management and enhancement of Cities. The big part of the lag with the other Italian Regions and the rest of Europe could be attributed to the Apulian (and Southern Italian) Cities to be the boost for local economy: a place in which Universities and Firms (together with the Public Institutions) meet the citizens to create great value for

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<sup>2</sup> Rapporto Svimez sull'Economia del Mezzogiorno 2015, Associazione per lo sviluppo dell'industria nel Mezzogiorno.

all. It's safe to say the innovation potential of Cities given by the cluster of people they live in is a far unexploited resource.

This should obviously pass through an enhancement of the role of Public Administration (the Region itself and the Municipalities). The thing which seems ever-easily noticeable lacking in our institutional bodies and policy-makers is a modern and active administrative capacity (the inadequate one which makes our Region lags far behind in the list of EU Structural Fund spending).

## **6 Conclusion.**

After having analysed the policy-making sector of Regional Innovation Strategies we focused on a practical case regarding the creation and partial implementation of Apulia Region's Research and Innovation Strategy for Smart Specialisation (RIS3). With a brief comparison with what the Spanish "Region" Comunidad Valenciana has done on this field we gave a sense of how differently could shape the Research and Innovation Strategies given a number of internal and external factors.

The basic principle driving the whole work has been always one: the main and mostly unique way by which European Regions, especially those ones lagging behind in the growth and development indexes, is to invest and "bet" on the innovation and knowledge environment growth. In order to render this sector of the economy a boosting force for the rest of sectors, a good and working innovation and creativity environment and ecosystem must be created. In doing so each and every actor has got to contribute to this paradigm shift: from the public sector itself, to the private businesses, the research institutes, the universities and the normal citizens.

The Research and Innovation Strategy for Smart Specialisation has been ideated by the European Commission to let Regions better focus on our source of strategic advantages and helping them avoid wasting funding on un-successful and wrong policy field. It has to be used as a general framework to leverage the whole approach to policy-making at regional, national and supra-national level towards the step forward our continent needs to keep acting a key role in the world economy.

The emerging Countries are doing so, meaning they are strongly investing on this sectors because they are seizing the chance to be a primary agents of change in the economy and

social realm. Europe as a whole needs to counter-act properly and could really take back the leading force slot it has always occupied.