LUISS Guido Carli

LIBERA UNIVERSITÀ INTERNAZIONALE DEGLI STUDI SOCIALI

TESI DI LAUREA MAGISTRALE IN **MANAGEMENT**

Major**: INNOVATION & ENTREPRENEURSHIP**

Dipartimento di**: Impresa e Management**

Cattedra**: Markets, Regulation & Law**

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

RELATORE

Prof. Francesco Di Ciommo

CANDIDATO

Daniele Maglio

Matr. 661801

CORRELATORE

Prof. Giuseppe Colangelo

ANNO ACCADEMICO **2014/2015**

INDEX

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.

Chapter 2 " An Overview on the Research & Innovation sector" will introduce some important phenomena operating in recent years and strongly biasing the innovation and creative-related industries, like open-innovation and crowd-sourcing.

Chapter 3 "The Regional Innovation Policies from the OECD point of view" will provide a theoretical overview on the sector: moving on from the general rationale of a Regional Research and Innovation Strategy they will be provided the main policy tools widely used around the Globe.

Chapter 4 " Research & Innovation Strategies for Smart Specialization (RIS3)" will analyse the European Commission action part of the "Innovation Union" spotlight initiative.

Chapter 5 "SmartPuglia2020: RIS3 in Apulia" will analyse the application of the general policy framework RIS3 in the Italian Region Apulia.

Chapter 6 “The case of the Comunidad Valenciana (Spain)” will give a brief comparison on what has been done in the policy-making sector in a comparable Region.

Chapter 1

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 18th 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.

1.1 A systemic renewal process needs integrated instruments

Part of the renewal process is the mentality needed to fuel the spirit of enterprise and the mind-set of entrepreneurial discovery that needs to be embraced by large portions of society; citizens and third-sector engagement are essential for making new things happen. Nothing will happen without sufficient curiosity, creativity and courage. A start-up mentality, both in the economic sphere and for society as a whole, along with voluntary activities are important ways to contribute to society, and together they are becoming crucial success factors.

Challenges of the knowledge economy

We need to marshal our resources: Europe has enormous expertise in its regions, intelligence and talent in its citizens and diverse new and existing technologies, methodologies and instruments — promising potential *and* proven practice — for realising innovation in practice. There are many ways to engage stakeholders at all levels to participate in and actively contribute to these processes. We need new ways to orchestrate

ecosystems so that they are invited to do so. We have to move faster and more effectively from thinking and talking to discovering, doing and learning.

This is the practice we call entrepreneurial discovery. It is the key mind-set defining the new knowledge economy.

There are many ways to create value and many ways for stakeholders and citizens to contribute, but there are also diverse challenges along the way. Horizon 2020 invites us to Integrate Excellent Science, Industrial Leadership and Societal Challenges, but not how to do this in practice. RIS3 asks us to identify what we do well and find appropriate partners to help us excel, but not how to deal with the dynamics of power, status and entrenched interests on the one hand, and blind spots, short-termism and multiple distractions of thinking-in-the-present on the other.

The Entrepreneurial endeavour as the basis of any innovation-related activity

"Innovation is a paradoxical process, which requires a leap into the unknown and at the same time complex management processes and efforts for rigorous planning. How can we support innovative companies, both large and small, across all business sectors in Europe? How can we innovate our own governance structures? How can we create a culture of innovation and a permanent ecology of innovation? These are the challenges and questions that Europe urgently needs to address."[1]

One of the first feature a policy-maker should state as a target for his/her action is the needed shift/change of the innovation environment or ecosystem. Bearing in mind that the ecosystem is, in political economy terms, a commons a good-working ecosystem needs diversity.

A second issue is the thought the ecosystem will behave as self-organising entity. This is not true and in this case an important role is needed to intervene: the so-called orchestrators who are aware to the larger context, recognise patterns of innovation creation and intervene supporting key processes. Their final target would be the creation

[1] European Commission (2015) - Directorate-General for Communications Networks, Content and Technology, Open Innovation Yearbook 2015, ISBN 978-92-79-43962-9

of orchestrated process, with the whole actors and entities operating in it pushing towards the same direction.

1.2 The So-called Open Innovation 2.0

In this paragraph we will elaborate the new framework of innovation space for innovation and creativity. 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.

Modern innovation spaces span beyond clusters mainly in two dimensions: firstly, the traditional triple helix innovation model with enterprises, research and public sector players (being often top-down) is replaced by the co-creative quadruple helix innovation model where users have an active role too, in all phases of the innovation, from the early ideation to the co-creation of solutions. Secondly, the ecosystem drives for multi-disciplinarily rather than clusters, which tend to be quite monolithic.

Let's introduce an important concept that we will develop throughout the whole paper: the quadruple helix. It's fair to say it is essential as only by involving the users as active agents from the beginning of the innovation process can we create genuine new markets for products and services. And, by involving the citizens (as customers) for the new developments, we also see at an early stage which elements of the idea are successful and scalable, and which parts just simply do not scale up. This in turn helps to adjust the innovation process correctly and does not squander time and resources on the least successful paths.

A participatory and co-creative approach is also essential when we look at the very strong assets we in Europe have in the most advanced, demanding and creative communities of users.

To find out what is successful and scalable at an early stage we also need to bring the ideas very early to the real-world settings with strong interaction in the quadruple helix innovation model.

In *Table 1* there are summarised some key trends of the innovation landscape, with a comparison between the past and the present features.

Table 1: Innovation in the past and in the present

Innovation process before	**Innovation process now**
R&D focus	S&D and/or A&D
Technology driven	Business value driven
Knowledge ownership	Knowledge access
Product orientation	Business model orientation
Engineering job	Everyone's job
Market push - technology driven	Market pull - need driven
Closed innovation	Open innovation
Calculated risk	High risk investment

Companies are now adapting new processes and business models, shifting from traditional Research and Development strategies to the so-called Search and Development (S&D) and even Acquire and Development (A&D) one.

Business competitiveness no longer depends on companies' internal capabilities but on their ability to absorb, adopt and exploit external knowledge and resources. The ability to stay agile and recognise market trends and needs is becoming a question of survival. In

addition there are stronger opportunities to experiment with potentially risky technologies outside the company's boundaries using venture capital support and finances.

While companies are reshaping their organisational boundaries, universities are playing an ever-increasing role in contributing to knowledge-based economies.

According to a thorough analysis conducted by the researcher Chesbrough[2] here we list some redundant characteristic driving open innovation. We here point out this features affect either universities, public institutions and private businesses:

- Information, capital, people are becoming global assets. The mobility and availability of highly educated people and researchers has increased over the years. As a result, large amounts of knowledge exists outside the research laboratories of large companies. In addition there is an increasing trend of employees moving between industry and universities or keeping dual appointments. This results in knowledge flows between universities, companies and external stakeholders;

- *Knowledge is becoming a source of competitive advantage*. This trend positions universities as key partners for industrial companies and places them in the epicentre of regional and national innovation ecosystems;

- *Technology pace is increasing*. This drives universities to transform from classic academic institutions with an ivory tower mentality to entrepreneurial institutions proactively managing their knowledge. Universities are building and managing strategic partnership and alliances with industry and technology companies;

- *IP management is becoming a vital component of universities' strategies*. Universities are becoming more business savvy in order to protect, manage and profit from their proprietary knowledge;

- *Innovation across the entire value chain*. This process positions universities as a key contributor to regional innovation and competitiveness. In the era of open innovation universities play a more strategic and wider role as suppliers of an educated work force,

[2] Chesbrough Henry, Wim Vanhaverbeke and West Joel (2006), Open Innovation: Researching a New Paradigm, Oxford University Press, http://emotools.com/static/upload/files/Openinnovationparadigm.pdf

knowledge, expertise and emerging technology. At the same time universities act as partners and customers of regional services, SMEs and large companies;

- G*rowth of venture capital markets.* This trend makes it possible for promising ideas and technologies to be further developed outside universities thus allowing universities to profit from their knowledge and research outputs;

- *Customer expectations are increasing.* Universities are also affected by increasing customer sophistication, increased transparency and digitisation. Such trends force universities to adapt innovative marketing strategies embracing social networks, interactive websites, intranet and content marketing techniques in order to enhance their conversation with potential students, staff and public;

- P*ressure on universities to demonstrate impact from their research.* All economic players experience a growing economic and fiscal pressure. As publically funded institutions, universities are required to demonstrate impact from their research. There is a growing public scrutiny of government funding, which places additional pressure on universities to carry out cutting-edge research balancing between pure academic curiosity and translational outcome.

1.3 The New Era of Crowdsourcing

The innovation ecosystem is described as being open for new ideas and one that has the courage to test and prototype ideas with all the actors in real world. It also has the courage to early filter out the less promising ones: without describing the source of the idea as a failure but more taking that as gaining experience. These ecosystems have also different rewarding mechanisms than only monetary. It can be recognition in the community, in the area, orchestration responsibilities etc.: all based on gaining reputation.

This new innovation ecosystem is self-directed and it is based on the common interest of all actors in the quadruple helix to discover the unexpected. Often the approach needs the open engagement platforms enabling full spectrum prototyping.
The Digital Agenda for Europe and the Single Digital Market are important tools for the scale-up. In addition, we need to have those open innovation hubs practising open innovation in its different forms. The regions will develop their own smart specialisation

strategies, and hopefully bring them further towards taking on board modern innovation, like Open Innovation 2.0. Certainly, with this engagement of all stakeholders, there is a lot better possibility to capture the best ideas, select the scalable ones and bring prosperity to the whole of society.

The open innovation paradigm emphasises the importance of the efficient use of all available knowledge and information. In addition to knowledge inside company borders, it emphasises the significance of particularly the knowledge residing outside company borders, because valuable innovation-related knowledge is being increasingly widely distributed to different actors, organisations (e.g. companies, customers, suppliers, universities etc.) and communities.

Crowdsourcing is a phenomenon which is not a fully new one, but quite clearly, its significance for different industries has increased strongly during the last few years. Howe[3] defines crowdsourcing as an *'act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call'*.

Generally, crowdsourcing has been used mainly by consumer-sector companies, and the main applications have been the outsourcing of relatively simple tasks, such as marketing videos, photographs and simple design tasks, which have no need for very in-depth expertise from the crowds. The idea of crowdsourcing by business-to-business companies and companies developing complex industrial products for other companies has been considered irrelevant and even absurd. This is probably at least partly due to B2Bs not being able to locate sufficiently large and competent crowds for such tasks, or existing crowdsourcing approaches and competences that would allow the crowdsourcing to be extended to their proper use, for instance by handling the related challenging IPR issues.

Therefore, it is well-grounded to state that crowdsourcing has recently entered a new phase which could be called the new era or new wave of crowdsourcing — the era of Industrial Crowdsourcing. Many pioneering companies have quite recently shown that even innovation-related tasks that require very in-depth and specialised expertise can be

[3] Howe Jeff (2006), The Rise of Crowdsourcing, Wired

crowdsourced within certain conditions. Such tasks are typical in the development of complex business-to-business products and services.

During the last few years, many things have taken place simultaneously to make crowdsourcing possible, on a large scale, for industrial companies. First, many crowdsourcing platforms have been founded that are dedicated to the crowdsourcing of industrial companies: for instance, GrabCAD, Atizo, TopCoder, uTest and Solved are all platforms that did not exist a few years ago, and have been designed and dedicated to specific, even very complex and expertise-intensive tasks related to industrial crowdsourcing. Such platforms have also matured only recently to the point, regarding their operational processes, technologies and competences that large scale crowdsourcing can be carried out feasibly and in a competitive way also from the viewpoint of industrial manufacturing companies

Accordingly, some of the leading consultancies such as Gartner and Accenture that have investigated crowdsourcing have recently come to the conclusion that crowdsourcing is now a phenomenon which is among the most central phenomena that will have a significant impact on the ways that manufacturing companies will carry out their business.

General Electric is an example of a large multinational industrial company that has clearly noticed the business potential for crowdsourcing, and claims even that 'A Third Industrial Revolution' will be essentially based on crowdsourcing and digitalisation.

Several new crowdsourcing platforms feasible for industrial crowdsourcing have emerged that have rather recently gained a critical amount of crowds with in-depth expertise for the benefit of industrial crowdsourcing. InnoCentive is the most widely-known general-purpose crowdsourcing platform, but unlike the other presented crowdsourcing platforms below, it is not specifically designed for the needs of industrial companies.

The Ferris wheel of crowdsourcing

The Ferris wheel describes the major approaches where crowds can be used to create value for the various business development needs of industrial companies. The outermost sphere describes the added value derived from the crowds. The Ferris wheel model for crowds creating value for industrial and manufacturing companies consists of three main

crowdsourcing-related concepts: (1) crowdsourcing, (2) crowdfunding and (3) crowdworking. These concepts are referred to by numbers 1-3. These concepts are partly interrelated and intersecting. We will describe in more detail the major crowdsourcing-based functions related to the above concepts, using examples from various industrial companies.

Generally the examples and many others have demonstrated that even tasks related to the development of very demanding business-to-business products and solutions can be crowdsourced in many innovative ways. In these cases, however, successful crowdsourcing usually requires several new types of competences, which can be achieved partly via intermediaries, but also own efforts are often required. The examples also show that crowdsourcing can help to achieve significant results and benefits in the case of industrial manufacturing companies, which in most cases match or even top the results that would be gained by completing the tasks internally or by outsourcing them by more traditional means. Quite often, the crowdsourcing approaches have resulted in very innovative and out-of-the-box types of solutions that very probably would not have been reached by traditional approaches. These outcomes are due to various mechanisms behind the so called Wisdom of Crowds and Collective Intelligence concepts, which emphasise particularly the heterogeneity of participants, their backgrounds and their expertise, which crowdsourcing platforms enable with much more ease than the traditional methods.

The various outlined crowdsourcing approaches and industrial company examples described in this paper have several significant implications for the renewal and competitiveness of manufacturing companies in Europe and elsewhere. As we are dealing with a new and potentially a disruptive change phenomenon, industrial manufacturing companies should certainly no less than follow carefully the developments in the area of industrial crowdsourcing, and try to be aware of how the new trends in crowdsourcing impact their industry and what the competitors are doing with crowdsourcing. But they should also be aware that the bold companies that start early to experiment with and adopt crowdsourcing practices themselves in their business may be the ones that gain an edge, which could be tough to catch up with by the latecomers.

This contribution investigates the role, organisation and functioning of European research and innovation programmes in fostering innovation ecosystems that generate new markets and business. Publicly funded research and innovation programmes can be interpreted in terms of systemic innovation instruments, addressing societal challenges and driving economic development in specified impact areas. Based on cases taken from the European Commission programmes in the domain of Future Internet and ICT, the paper identifies the required key conditions, resources, structures and processes that need to be set in place and evolve over the lifetime of the programmes. The paper confronts practical experience and insight gained in Future Internet and ICT programmes with scientific literature on systems of innovation and policy instruments, and results in

University implications given by crowdsourcing moves out from the statement that this actors are placed in the centre of innovation ecosystems and are playing an ever-active role in knowledge creation, exchange and transfer. Whilst there are similar effects of openness on all organisations, universities have to consider specific factors in adapting to the open innovation paradigm. Such factors include a specific focus on knowledge co-creation and use-inspired research, the need to develop value networks, focus on stronger IP management, the need to review their curriculum to respond to new skills and market demands, the rise of open education platforms and

Knowledge co-creation and use-inspired research

A traditional role of university research is to conduct fundamental pre-competitive research while industrial labs carry out technology development. The UK Science & Innovation investment framework proposes a research model to combine fundamental and applied research 'to bring together public and private funding and research talent to work on major research challenges with major societal impact.'

Developing value networks and ecosystems

The European Commission report on improving knowledge transfer between institutions highlights strong European research base. At the same time it states that despite its high-quality research, Europe has a relatively low commercialisation rate. This so-called European paradox results from a number of reasons including a less systematic and professional management of knowledge and IP, cultural differences between business and

science communities, lack of incentives, legal barriers and fragmented markets for knowledge and technology.

Need for stronger IP management

Open innovation imposes new challenges on universities. They need to find a fine balance between sharing their knowledge via scientific publications and conferences whilst trying to protect their inventions, manage intellectual property and benefit from its commercialisation.

There is an observable trend within universities to review their research strategies focusing on developing core expertise and high impact technologies. Most successful universities run their own Technology Transfer Offices (TTO) and have strong teams of technology managers.

University approaches to managing their IP portfolio range from open access initiatives to technology commercialisation programmes.

The Easy Access IP is a growing initiative of more than 20 universities worldwide to offer free licences for their technologies to industry. The project aims to have more research translate into economic benefits and create more jobs.

At the other end of the continuum are university funds, which act as venture capital to spur innovation, entrepreneurship and economic growth. According to the Thomson One database there were 26 university funds established between 1973 and 2010. The main objective of such funds is to invest equity capital to university technology companies and speed-up commercialisation processes within universities.

The spread of open innovation and a greater permeability of organisational boundaries place new demands on skills and capabilities of employees. Universities need to respond to new requirements and prepare students who are market ready to embrace open innovation. There is a growing trend to develop T-shaped people with a core expertise and the ability to collaborate across disciplines.

A further emphasis is placed on incorporating entrepreneurship, creativity and innovation management subjects into university curriculum across subject areas.

University marketing in the age of open innovation

Open Innovation brings new opportunities and new challenges to universities in promoting their education programmes, research outcomes and engaging with students, researchers, industry and wider community.

We estimate that community engagement and crowdsourcing will continue to rise while universities build experience and confidence in using new tools and solutions. External channels for knowledge transfer have been already embraced by researchers. A study at MIT revealed researchers' perceptions of the relative importance of knowledge transfer channels. According to the study consulting and conversation channels resulted in staggering cumulative 44 %.

Finally we should say open innovation is affecting the way universities operate, collaborate, exploit their knowledge and technologies as well promote their services and expertise. It is fundamental for universities to find the right balance between openness and knowledge commercialisation in order to perform their mission, increase sustainability and remain

Chapter 2

The Regional Innovation Policies from the OECD point of view.[4]

In this Chapter Regional Innovation Strategy policies will be corroborated by theoretical and research weight.

2.1 – 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 analyze 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.

2.1.1 - 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.

[4] OECD (2011), Regions and Innovation Policy, OECD Reviews of Regional Innovation, OECD Publishing, ISBN 978-92-64-09780-3 (PDF), http://dx.doi.org/10.1787/9789264097803-en

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.

2.1.2 An evolving innovation scenario and some evidence from OECD.

The globalisation process is hitting strongly also the innovation production sector: together with the traditional innovating Countries historically leading the new technologies creation realm (Germany, Japan, USA and the Nordic Countries), there are new ever-pushing actors like South Korea, and some Eastern European Countries (in the Baltic area) and the rising global powers Brazil, India and China. There's a few effects on the whole cycle of newness production given by the waves of globalisation. One of these is the urgency, pushed on the already industrialised States and Regions, to seek internal sources of economic and social development: it's the basic principle at the hearth of smart specialisation strategy. Meanwhile, the possibility to be always and almost easily in contact with actors across the

world it opens up never-experienced opportunities for settling down research and business around the Globe with new and complementary partners with the mobility of talent and "brains" as an additional sources of collaboration.

It's fair to say the need to work together with foreign competitors (becoming partners) has got high potential and a burdensome fear, on the other hand, where this chance is not caught properly: the Regions with low-technology expertise and focus (category in which Apulia might be fairly listed) could be worst off whether the policies to boost this operations will not put in place. This open innovation landscape is not a completely new trend: firms in every market have started collaborations with other actors having strong expertise in fields not covered by the internal knowledge base and human resources. This phenomenon has especially occurred in technology-oriented markets, whereas low-technology firms has exploited external sources mainly for externalizing sake.

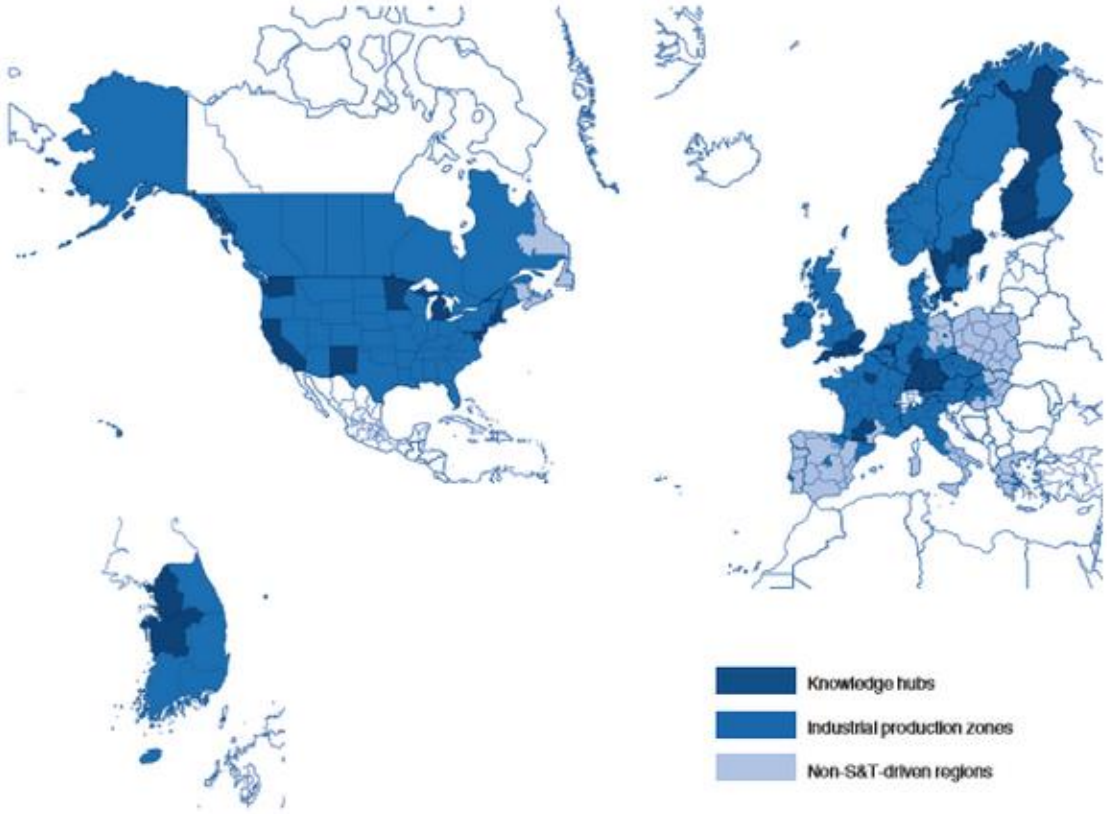
The new thing here is the speed with which this collaborations might work out today: ITC technologies have boosted tremendously the plethora of subjects to work with. In the same time this opens up rooms for the regional institutions role.

As for the theories supporting innovation policies the most important and acknowledged one is the so-called Regional Innovation Systems (RIS). This study has started from the shared understanding that different Regions follow often largely different knowledge development paths even when the investment in Research & Development are similar. The RIS concept was firstly discussed and used by policy-makers during late Nineties as a regional case of National Innovation Systems (NIS) (Cooke, 1992; Cooke and Morgan, 1998; European Commission, 1998).

The RIS theory framework moves from the fact that firms are generally the most important repositories of knowledge of a certain innovation system (being it local, regional or national). In this scenario innovation is seen as a "cumulative and non-linear systemic process" fostered by the interactions between firms and the other actors operating on the given territory: universities, research centres, public authorities and normal citizens (demand side interaction).

Also much important in all this is the framework conditions put in place by the Governments: regulations, standards and incentives.

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.

2.2 Smart strategies for regional innovation and policy instruments.

In this paragraph we will analyse the different set of policies the different Regional Governments and Institutional Bodies should use according to their particularities. Following you will find the main policy tools and instruments used as today.

2.2.1 Different types of innovation potential across OECD regions

A key task that every policy-maker should take into account while projecting the innovation actions for his/her own Region is to objectively understand what is the economic and social conditions to tackle in order to come up with an articulated set of punctual correctives.
More than in other policy sector the "one-size-fits-all" rule is not applicable.
That's why the researchers in this area often refer to the so-called "regional potential": it derives from different production structures and factor endowment of the Region and the relations occurring among the different innovation actors and the knowledge bases they "offer" to the public development.

Helping with this issue, economics researchers have come up with a number of quantitative analysis seizing the various Regions capacity and attitude to innovate. As long as innovation is such a difficult feature to quantify, focusing just on the quantitative side (often referring to a short-term period of time) could lead to mistakes and to misunderstand what a Region really needs to put in place to catch its own innovation potential. Moreover many of these analyses tend to look just at the heterogeneity between areas/regions, underplaying the national dimension.

Furthermore a finding from this studies is that generally all countries show a concentration of innovative activities in some places more than in others. A way to analyse the whole problem from a different point of view (meeting our cohesion targets meanwhile) would be:, what is the level of regional disparity in innovation expenditure that a country could handle without compromising aggregate results.

2.2.2 Priority setting.

The work to setting priorities in the regional/nation innovation strategy starts, as we mentioned before, from the identification of the main challenges and opportunities for regional socio-economic environment. These priorities, and hence the policies to tackle them, are strongly linked to the regional context and the given regional potential.
In the early 2000s the main priority in OECD Countries was to increase Research & Development investment and expenditures. This theoretical approach (with a higher level of R&D expenditure the level and quality of innovation would've been increased and hence the GDP growth pushed up) was followed thoroughly by the European Union itself: one of the Pillar of Europe2020 Strategy was to reach 3% on the GDP of public and private investment[5].

Recently, it's been recognised the poorness and incompleteness of such a strategy (even inside EU). As innovation policies are increasingly involved in addressing societal and environmental challenges, a mere quantitative target is insufficient. The direction and shape of technical change has started to be seen more crucial than its intensity.

Apart from the quantitative/qualitative attention on innovation investment, another important fact (stressed throughout the whole paper, here) is the national/sub-national field of applicability. Analysing the consequences of the new regional innovation strategies, representing a step further to the past ever-including national strategies, it's clear the policy-makers around the Globe have to face a big dilemma.
They've got two options:

[5] Andrea Renda, Istituto affari internazionali, 29 aprile 2015, 159 p. - See more at: http://www.iai.it/it/pubblicazioni/global-outlook-2015-rapporto-finale#sthash.WFbChVdt.dpuf

- Thoroughly including regional government layers in the strategy creation and implementation. By this approach it could be reached the target of growth and development in a more balanced way, boosting aggregate income through catching-up of lagging areas;
- Supporting national innovation champions, based on the fact that concentrating the resources, efforts and infrastructure would help reaching economies of scale. Dispersion could be detrimental for the whole result. This approach is nurtured by 8the decentralisation sceptical referring to the famous policy failures of big infrastructure investments in peripheral and lagging areas, resulting in the so-called "cathedrals in the desert".

Nowadays perhaps the whole reasoning could be leveraged taking into account the new innovation policies including the specific support to peripheral regions: enhancing firms's absorptive capacity and knowledge diffusion. Strategic investments with a thorough cost and benefit analysis, focused on building, developing and nurturing regional specialisation advantages, may be translated in successful project even in non-core Regions.

The dichotomy between Northern and Southern Regions is a well-known and persistent phenomenon of Italian socio-economic system. It's, though, a good example to analysis in the reality what we just pointed out theoretically.

As a starting point we should say that Italy invests few resources in Research, Development and Innovation. It reports, anyway, good results in non-R&D-based innovation in sectors such as design, fashion, etc.

To reach critical mass in the R&D-based investments, a national policy puts as a requirement the additionality between National resources and EU Structural Funds for innovation investments in the lagging areas. Furthermore from 2009 it's been created a new institution with the goal to improve the dialogue between Regions and central authorities: a "State-Regions Conference" (Conferenza Stato-Regioni).

Summing up a conclusion we should track is: "territorial considerations in innovation policies should supplement, not supplant, national efforts in pursuing excellence in research and generating technological and knowledge capabilities" (OECD, 2011).

2.2.3 Taxonomy of policy instruments

In the following chapter will be analysing analytically the different policy instrument mostly used in tackling innovation. At this point it would be helpful to introduce some criteria in categorise those instruments given their features of newness in the use by the Public Institutions.

Hence we can divide the instruments into three main categories: traditional, emerging and experimental. Moreover we grouped the instruments into three further categories given the objective they try to achieve: knowledge generation, knowledge diffusion and knowledge exploitation.

We should, anyway, consider the fact that the new generation of innovation policy instruments tends to pursue a more systemic approach. They seek to minimise boundaries between knowledge generation, diffusion and exploitation by supporting the various actors in all the three phases. For example, the S&T Parks, in addition to supporting researchers in the phase of knowledge diffusion, now offer complex and multi-disciplinary services thought to nurture both knowledge generation and knowledge exploitation.

We now list some examples of instruments grouped into the categories pointed out above.

Traditional instruments:

- knowledge generation: technology funds, R&D incentives/supports/grants, support for scientific research and technology centres, support for infrastructure development, human capital for Science & Technology;
- knowledge diffusion: science parks, technology transfer offices and programmes, technology brokers, mobility schemes, talent attraction schemes, innovation awards;
- knowledge exploitation: incubators, start-up support, innovation services (business support and coaching), training and raising awareness for innovation.

Emerging instruments:

- knowledge generation: public-private partnerships for innovation, research networks/poles;
- knowledge diffusion: innovation vouchers, certifications/accreditations;

- knowledge exploitation: industrial PhDs, support for creativity and design innovation benchmarking;
- general purpose: competitiveness poles, competence centres, new generation of scientific and technological parks and clusters, venture and seed capital, guarantee schemes for financing innovation.

Experimental instruments:

- knowledge generation: cross-border research centres;
- knowledge diffusion: open source-open science markets for knowledge;
- knowledge exploitation: regional industrial policy, innovation-oriented public procurement.

3.2.4 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 financer.

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.

Of course, this should be the realm of Regional innovation agencies, as we will point out in the next chapters.

The Regions, in approaching the economic environment to boost and exploit its innovation potential, need to focus on mobilising the right public and private stakeholders. The participation of the right actor is of key importance.

Vertical co-ordination mechanisms (multi-level governance innovation strategy) are more effective when there is also a horizontal co-ordination (between different actors operating on the same market or geographic area).

A starting point could be this statement from OECD: "the concept of governance is not synonymous with government. Innovation policies are seeking to provide conditions that lead to innovations in firms. However, it is firms that ultimately need to take the decision to invest in innovation. Public investment is designed to leverage private sector investment, in the long term if not the short term. But how do policy makers ensure the appropriate private sector involvement to both "do the right things" and "do things right"?"

The correct approach in tackling innovation challenges by the firms should be accompanied and inserted in the regional development strategy. It's safe to say many Countries have experienced a shift in encouraging regional planning functions to go beyond administrative and bureaucratic matters and including innovation-driven economic development.

Inputs from firms and the other actors are critical for these regional functions. In a study conducted by Benneworth examining several European Regions, it was found that when firms were actively involved in the region's innovation planning, the region was better able to address issues or to increase the use of relevant policy instruments (Benneworth, 2007).

The increasingly networked feature of innovation is another reason to involve a more diverse group of stakeholders. The private firms are generally more aware of the global trends conditioning their economic results and influencing their innovation-related investments. Universities and research centres, on the other hand, work in those areas of promise for basic research discovers. At last, for application of innovation to public services, civil society (meaning often normal citizens) might play a lead advisory and consulting role, shifting to a demand-side approach.

The challenge to effectively engage these non-public actors is hard to tackle by Regions and other public institutions.

OECD study has found several barriers to the private actor involvement and engagement. The target to reach fresh perspectives on the issue to tackle is often difficult: especially in the case of Countries were the presence of Small and Medium Enterprises is dominant (like Italy) involving actively those firms could be often translated in a waste of financial and administrative resources. We are not blaming SMEs: in fact they generally don't have the time (and then funds) to attend meetings for activities which, furthermore, will not show outcomes if not in the long run. Another difficulty experienced is the lack of appropriate information measures put in place by these committees for some aspects of the strategic decision needs. This somehow reflects the un-sufficient administrative capacity in the public sector in areas that are completely new for them.

Passing to the implementation phase, the public action of "doing things right" need to help private actors be more involved in developing certain policy instruments. Frequent complaints for public innovation support concern the administrative burden on firms for the application process, funding or service. As we already pointed out above there's also a lack of clear information on the public offering in the sector, creating confusion among firms and leading to a partial waste of resources or potential strongly-innovative activities. Another thorough way to obtain private feedbacks on public innovation instruments is the implementation of "Evaluation and monitoring studies" measuring the impact on agent behaviour of the whole strategy.

Cross- borders support in the innovation strategy.

We close this paragraph with an overwhelmingly important feature of the recent innovation sector: the linkages with actors from other Regions or States.

Many Regions are starting to recognise the need to work with firms or research institutes coming from areas beyond their regional boundaries in the sake of strengthening and improving their own development.

Here are listed some rationales which Regions should take into account while developing their innovation agenda:

- **Cross-border knowledge spill-overs:** the potential positive outcomes of a large scientific installation will span much beyond the regional. It is almost impossible, nor advisable, to restrict the knowledge diffusion within borders. By the way this cross-border spill-overs create some troubles in appropriation when the investment is made by one Region only, and not shared in a group of contributors;
- **Economies of scale:** the geographic size and funding opportunities of many Regions does not allow for big innovation investment. Namely, innovation support services need to reach a critical mass of activities in order to reach a good level of qualitative service. For example, specialised venture capital will better work when they will find a sufficient base of projects and cases to spread the risk;

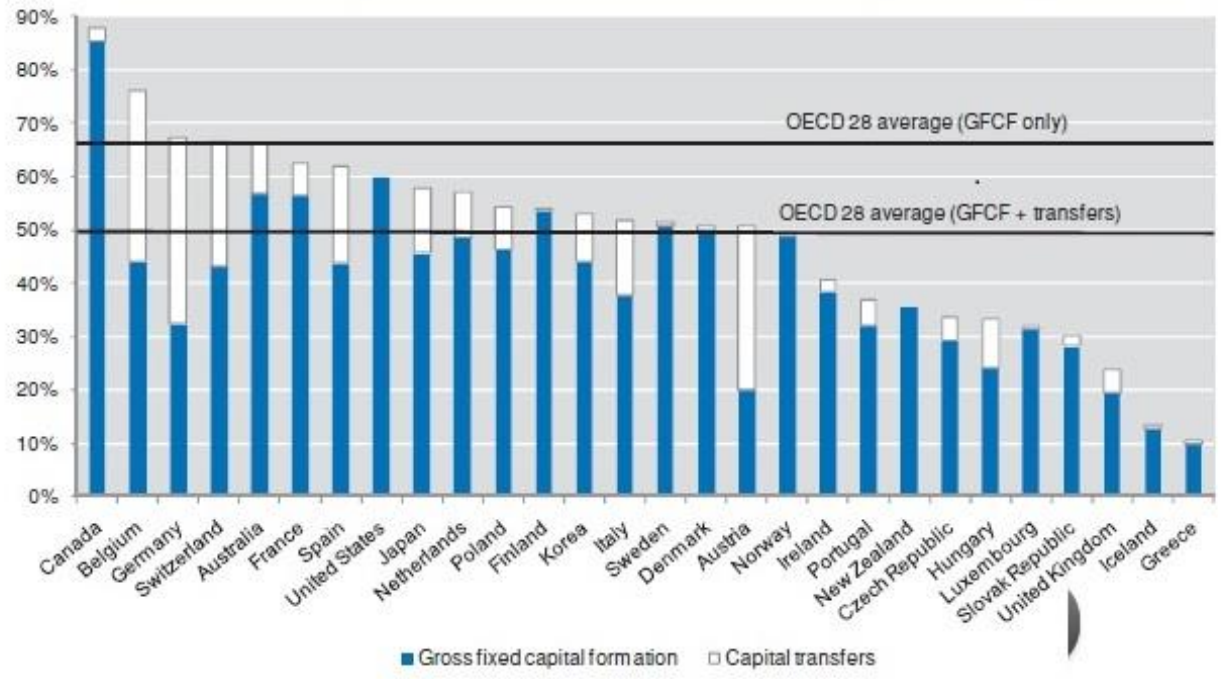
There are different methods to support cross-border collaboration, taking the form of projects, formalized institutional relationships or strategic alliances. When there is mutual recognition on the outcomes of co-operation it will be the case of bottom-up initiatives.
Often the most important feature of such collaborations is that the targets and the results to reach are clear and well-defined, in order to come up with the proper policy instruments and governance mechanisms. It's fair to say that high level of caution should be observed when seeking and promoting cross-borders collaborations: if the policy-makers target is to simply capture funds, the action might be better stopped on the beginning.
National and supranational Governments provide incentives in this field: the main goals this operations try to reach are problems of small region size (hence a lack of critical mass) or counter-productive competition among Regions of the same State.
A good example coming from the European Union is the INTERREG Programme supporting cross-regional Research, Development and Innovation projects. The European Research Area Initiative could be also inserted among the inter-regional collaboration promoter.

Concluding, all layers of government are seeking to maximise the impact and effectiveness of their investments.
Regions are mostly struggling in combining financing resources from different policy streams. National governments would mainly like to reduce duplication and competition among Regions. They are also delegating more responsibility in the sector, but the regional capacity to use effectively those resources is always under question.

Firms and normal citizens are at the core of the innovation system. Public institutions need proper mechanisms to engage the private sector in shaping and implementing any strategy. Regional innovation agencies might be a good governance tool: they are asked to serve as a strategic partner and an agent of change.

It's reported down here a graph showing the different expenditure percentage in regional development policies over the total in some OECD Countries. It clearly highlights how central the sub-national layers of government is increasingly becoming.

Figure 3.A1.1. **Sub-national public investment as a share of general government public investment**



Note: 2008 or latest year available: 2007 for Australia, Canada, Japan, Korea and New Zealand. No data available for Chile, Mexico and Turkey. Data for Finland, New Zealand and the United States only refer to gross fixed capital formation.

2.2.5 Policy advice

The economic environment in OECD Countries has given a certain weight to sub-national policy-making on all levels of government, pushing them to pay attention to regional development, employment and growth. Innovation has increasingly become a priority on national and sub-national agendas, and regions have emerged as central actors in the sector: national strategies more and more are incorporating a regional dimension in their framework. The role for the Regions is helping articulate a national and common vision for

innovation, providing support for development trajectories based on the exploitation of local specialities.

The world of technology-based innovation is not flat. Research and Development and Innovation-related activities are concentrated in a specialised hubs around the globe, including some areas in developing Countries. A good data to help seizing the whole framework is the following: less than 13% of OECD Regions account for half of R&D investment. Given this landscape, they still exist a wide variety of different development paths.

Regional innovation policies usually support national strategies with the purpose to creating science and technology hubs, but the choice regarding the location could be crucial and source of mayhems among different site options, also.

Moreover, here it comes again the already-displayed issue of "functional Region" which entails more corroborating information to take into account while making such an important choice. In fact, innovation frameworks are not contained within administrative borders extending and spanning beyond regional borders creating also a potential misalignment between the resources spent and the future gains and incomes, with the appropriate returns for those regional investments.
Yet, the cross-border functional innovation concept remains rather excluded by policies constituting an opportunity for European Regions, for example.
By this kind of activities the results would combining different starting regional and national endowments, so to exploit the complementarities between research environments and knowledge bases. Moreover the innovation networks would be expanded the larger geographical area would gain more visibility.

Make Regions agents of change.
Regional institutions could boost growth and social development while being an important source of ideas for national growth strategies, as well. Regions have got all the characteristics to play an active and strong role in innovation strategies: supporting new entrepreneurial activities in order to change development paths locked into past and

obsolete trajectories; encouraging linkages among knowledge providers and private businesses (also by public-private partnerships innovation-related); creating spaces favouring interactions among firms operating in different sectors, etc.

"Regions could foster outward linkages for regions poorly connected to global networks. Regions are, or can be, agents of change. Regional governments play a key role in recognising opportunities for change, mobilising resources towards diversification and identifying new frontiers. However, this search for new regional advantages needs to be part of a broader national strategy and will require input and collaboration from the community at large. Regions can transform themselves by what some have termed "constructing their regional advantages", based on a clear appraisal of their existing asset base and attraction of new talent and businesses. The focus of regional innovation policies should hence be on encouraging openness to change by agents in the system in place. Business support instruments should prioritise the development of human capital and learning processes, thereby cultivating behavioural change in people and firms."[6]

2.3 Policy instruments for regional innovation

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.

2.3.1 Science and technology parks

Science and technology (S&T) parks are a group of different kind of initiatives. The main aim is stimulating the growth of high-technology-related employment and, most importantly, to encouraging technology and knowledge transfer between the actors of the sector: universities and the other research organisations, not excluding the private sector. The main activities realized in a Science and Technology Parks are:

[6] OECD (2011), Regions and Innovation Policy, OECD Reviews of Regional Innovation, OECD Publishing

- economic development (new technology-based firms, attracting new operators, etc.);
- transfer of technology (between the research sector and the industry);
- local benefits (job creation, cultural change and image) (Massey *et al.*, 1992).

Generally S&T parks were created for commercialization sake: mostly as a university science and technology assets. In fact, at the beginning of their history this institution were not thought for regional engagement purposes.

In recen years, Science and Technology parks are increasingly viewed as both a national and regional innovation development tool. In this sector one couldn't avoid to mention the cases of Silicon Valley and Stanford: they are nothing less than a models for the recent parks. Thought by regional planners of that age, the general principle was letting university act as a growth pole.

Following these success stories, policy-makers and developers around the Globe started to move on providing new tools to the firms operating in their territories: development of the university-related right property; a liaison technology transfer office to stimulate contact and linkages with external actors; and, typically, social spaces to nurture the proper and creative atmosphere, fostering trust in the same time.

Science and technology parks have not to be looked at as a restricted realm of high-tech urban regions. National and Regional governments are also involved in these research parks with the aim to stimulate declining industrial areas or even foster innovation in rural areas.

Across Europe, often with the financial assistance of European Union Structural Funds, this new science and technology parks approach tended to become the dominant model, with regional governments investing mostly in innovation centres.

In lagging Regions, the creation of a Science and Technology park might compensate for the absence of the required regional knowledge-base: the risk is that it will keep working disconnected from the economic innovation and economic framework, developing few linkages with regional actors.

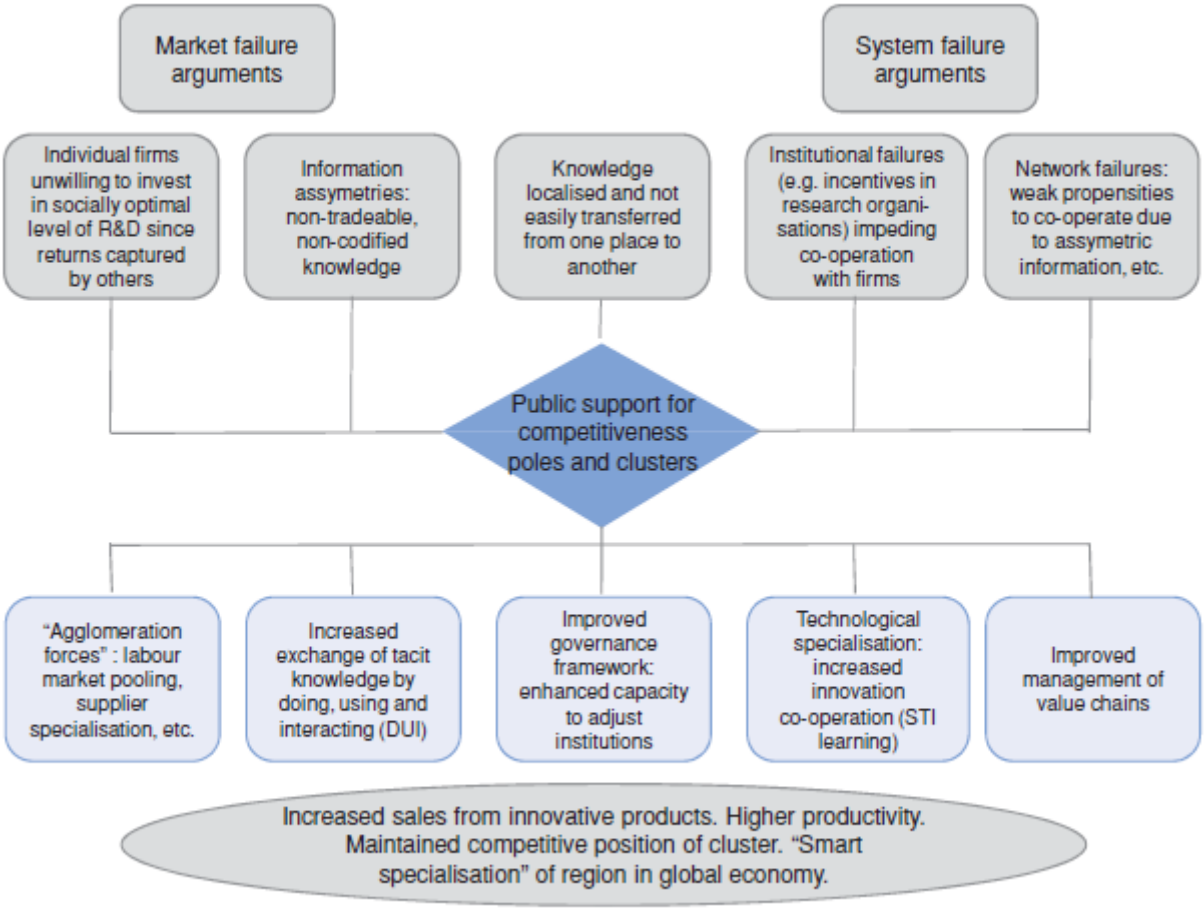
The technology transfer and providing services of innovation support in Science and Technology parks may also serve as the main providers to a big set of firms, often widening up across the regional or even national borders.
Size is also an important factor: small Science and technology parks, as far as incubators, would just provide a limited set of service. Again here would be a clever choice to create a Park according to the seize of the "functional Region" in which it is to be established.

Success conditions.
As always when evaluating an innovation-related instruments, it is a tough work to estimate quantitatively the results.
More the different goals of a Science and Technology Park might work against each other: the innovation and technology transfer objectives could be undermined by commercial targets.
A good move should be not to focus just on a narrow set of expectations linked to technology transfer results.

2.3.2 Systemic initiatives: clusters, networks, competitiveness poles and competence Centres.

The instruments mentioned in the paragraph title are traditional market failure correctives put in place governments all around the Globe. They try to tackle the Research and Development lack of private investment, especially for basic research projects.
The newer justification for the Public Institutions intervention in the market is linked to the importance acquired by the innovation in the economic theory. It highlights the crucial role of interactions between agents operating in this sector.
In the graph as follows they are listed the main markets failure divided into market-related and system-related. In the lower part of it, they are listed the resulted achieved by the Public intervention (OECD). This theory has been called the “triple helix” of innovation: they foster the involvement of public sector, private sector and the universities and the other research centres.

Figure 6.2. **Intervention logic for competitiveness poles and clusters**



Source: Technopolis (2010), "Review of Innovation Policy Instruments", background paper for the OECD.

The literature in this research sector has increasingly highlighted that policies focusing exclusively on fostering regional linkages are not optimal and it's important that engagement in such initiatives encourage firms to connect the so-called "regional buzz" to national and international networks. A strong arguments pushing for this kind of activity of connecting business people (operating mostly in the private sector) with the academy operators is that the last ones are often active in the international research environment: they could operate as bridges between private sectors of different Countries.

Clusters and networks

The cluster concept is similar but not equal to the Science and Technology parks mentioned in the previous paragraph. It has anyway gained a key place in regional innovation policies. Clusters are well defined by Porter: "a geographically proximate group of interconnected

companies and associated institutions in a particular field, linked by commonalities and complementarities".

According to the innovation researcher Nauwelaers (2003) the main features of the cluster are:

- geographical concentration**:** arguably, the new possibilities offered by information technology solutions can in part overcome the distance. In some cases the persistence of physical geographical proximity of firms;
- specialisation**:** when this commonalities among firms are not present, the agglomeration might reflect other phenomena, like metropolitan attraction ;
- presence of companies together with other institutions**:** for a cluster to be considered as such, private firms should be surrounded by other important and contributing factors, such as public institutions and training and research institutions, regulatory bodies, intermediaries, financial institutions;
- connectivity**:** inter-relations among actors are an essential component.
- structural character**:** one of the most important features is the long-term presence of such a linkages. The case example in Italy should be that one of the so-called Industrial districts present in Emilia-Romagna and Venice Region: they deep their root in the history of the areas back in the Middle-Age. Furthermore, they differ from temporary groups of firms, which lack almost completely the features to be classified (and promoted) as a cluster;
- critical mass**:** the cluster as one entity should have a certain weight in the local and national economy; and
- importance of innovation**:** it's safe to say and rather obvious but clusters are interesting for innovation policy-makers if they focus on innovation. Of course to innovation here we are not just referring to technological matters, but also organisational and commercial aspects, with an accent on successful creative combinations of technologies and ideas.

Competitiveness poles and competence centres

In this paragraph we will further our analysis over a systemic public actions which differ from cluster initiatives: competitiveness poles and competence centres.

While clusters are normally business focused with an emphasis on inter-enterprise co-operation, export, expenditures in R&D, competitiveness poles are broad partnerships of industrial, public and academic research organisations located in a particular region.
The keywords best describing this bodies are global networks, attractiveness and governance. The main aims are to gather firms, research organisations, management service working together on specialised activities in order to foster innovation-oriented regional growth and development.
Public institutions (at national, regional, and local level) normally contribute to this competitiveness poles, providing services to its members. They try to gather as many actors as to create the above-mentioned critical mass, in order to be competitive and have enough international visibility.
The best-known examples are the French competitiveness poles even if that's a strong presence in other Countries like Wallonia (Belgium), Greece and Hungary.

On the other hand, competence centres are organised as Research, technology, development and innovation (RTDI) collaborations in strategic areas between academia (including public institutions) and industry.
In this case their main aim is achieving stronger impact and concentration of research activities by involving enterprises actively and let them benefit from the results. Centres should be seen as important contributor in innovation networks and clusters.
Another important characteristic is the wide-spread public-private partnerships (PPP) competence poles start out in the areas they operate in.

The concept of clusters, strongly linked to the case of competitive and competence centres, became part of local and regional policy-making activities around the 1990s following Michael Porter's "*The Competitive Advantage of Nations" masterpiece.*
The main argument ist that firms and other organisations operating in close proximity one another are usually more competitive than isolated ones. The condition of working in close geographic proximity facilitate the creation and spread of knowledge and skills, even by competition: it's represent the main feature of a cluster or industrial district. Agglomeration and cluster economies occur when cumulative effect gives positive income and development results.

The number of cluster initiatives has represented an important feature of mostly European economics history. Well-known examples are the furniture industrial district in Northern Italy, shoe making in the Venice region, ceramics and porcelain in Emilia-Romagna.
Apart from this famous cases, almost all member countries of the European Union have developed specific measures or programme. There are a few trends highlighted analysing national cluster policies:

- a shift from smaller scale initiatives to promote Small and Medium Enterprises networks to broader programmes for national competitiveness;
- an increasing focus on innovation; and
- changes in the objectives and instruments over time to counteract the evolving internationalisation and globalisations forces (OECD, 2007).

Success conditions

The main issues with this kind of measures are that many cluster programmes do not include an ex-post evaluation.
Another problem is that often programmes are provided of a too short timeframe, where the targets to achieve are mostly long-term. Continuity characteristics would be clever in every cluster fostering initiative, especially for those programmes with a strong Research and Development component. Nevertheless and on the other end of the continuum, where firms and research institutions could count on too much long support, this might generate a moral hazard problem tremendously diminishing impact (OECD, 2007).
Policy-makers often try to duplicate ideal models proven to be successful elsewhere, in totally different environment conditions. They simply don't consider the historical circumstances having generated those ideal clusters: the availability of raw materials in a certain area, specific knowledge spread among firms and organisations like traditional know-how, and so on. As often reported in research studies: initial endowments matter (McDonald *et al.*, 2007).

Unlike clusters policy instruments, competitiveness poles and competence centres have been more systematically subject of quantitative and qualitative evaluation. The European

Union has provided a recent compilation of economic benefits from success stories on a number of initiatives (IRE, 2008):

- the knowledge spill-overs and the creation of linkages between firms, research institutions, public bodies and other local actors; and
- the attractiveness of the hosting Regions, spanning from the interest of foreign research to work there and new firm to operate.

Another typical impact worth to be mentioned is the use of a more strategic vision by the academic world towards industrial and economic-related use of research results.

2.3.3 Support services for SMEs on innovation sector.

Small and Medium Enterprises have gained more attention from policy-makers given its particular flexibility which suits well the needs coming from the fast-moving creative and hyper-competitive markets of nowadays. Within the SME world particular attention has been attributed to the so-called “gazelles” (high-growth high-impact enterprises). Such already-existing kind of firm is been receiving increasing recognition and attention as boost factor for wealth and development through the creation of income and jobs.

Gazelle enterprises as a sub-group of high-growth firms might be classified as follows: high-growth businesses born less than five ago, not necessarily operating in the high-technology industries, nor pioneering those sectors. They could even be second-movers copying and imitating (or improving) existing technology.

The key reason for their particularly fast growth is the source of their differentiation and the way they beat competition: innovation.

Here we are not compulsorily referring to radical innovation, which “accounts for less than 5% of all innovation” (OECD, 2011). In the great portion of the cases innovation is usually an incremental process, small changes to products, processes, organisational layouts and practices, etc.

Here are listed few traits which high-growth Small and Medium Enterprises (growth above 20% per year) seem to share, given an empirical study developed in the manufacturing sector in France, the Netherlands and Quebec (Canada) :

- **Innovation:** continuous changes to products, processes and organisational and managerial practices;

- **Market/technology linkages:** the ability to adapt their products to counter-act consumer trends and client demands given the ability to properly exploit their technological advantage in economic way;
- **Organisation and management:** the first feature is the adaptation capacity of organisation to changes and challenges;
- **Teamwork:** Is the rule of work among all staff through communication, shared decision-making, but also profit-sharing mechanisms;
- **Networking:** alliances and partnerships with other firms and public and private institutions;

This particular attention to smaller firms is due also to the fact this operators face higher barriers than larger firms in dealing with innovation matters: finding proper funds, development and exploitation of new technologies, limited internal capabilities and few links to external knowledge networks, among the most important factors.

The types of non-technological support services (the so-called Innovation Management) offered to Small and Medium Enterprises to improve their development and growth include:

- **Innovation strategy:** SWOT and scenario analysis, economic/technological intelligence, innovation audits, benchmarking, etc.
- **Innovation organisation and culture:** innovation awareness-raising (idea generation, workshops, etc.), creative tools for team building and social innovation;
- **Coaching and mentoring** to let firms able to keep growing and developing their business in all the steps of their lives;
- **Design and marketing** assistance.

A practical case.

A particular field of innovation, worth to be analysed further for its particularities, is design. It's been indicated as a driver of innovation, both in terms of industrial design and even on the general development of Regions.

Considering the special case of Italy, the Country usually that's a practical case useful to describe at this stake of our enquiry.

It's the so-called Design Centre Bologna[7] in Emilia-Romagna Region, a project led by the Academy of Fine Arts thought as a design services provider. The first goal is to help local firms implement the entrepreneurial activities. Furthermore, it manages a big database of design-related innovation cases; develops local, national and international projects; liaises among institutions and experts in the field of design; and provides a framework of global references as well as networks for the presentation of outstanding local services and products.

Success conditions.

To be successful, an important feature which SME-related innovation policies should have is addressing precise market or system failures.

Another key feature regarding enterprises must apply to receive funds is the need to ensure that it will cause the highest impact on productivity and expansion of international potential. There have been problems with regional SME innovation support programmes when some conflict of interest in the simultaneous roles of advisor and service provider resulted in funding waste.

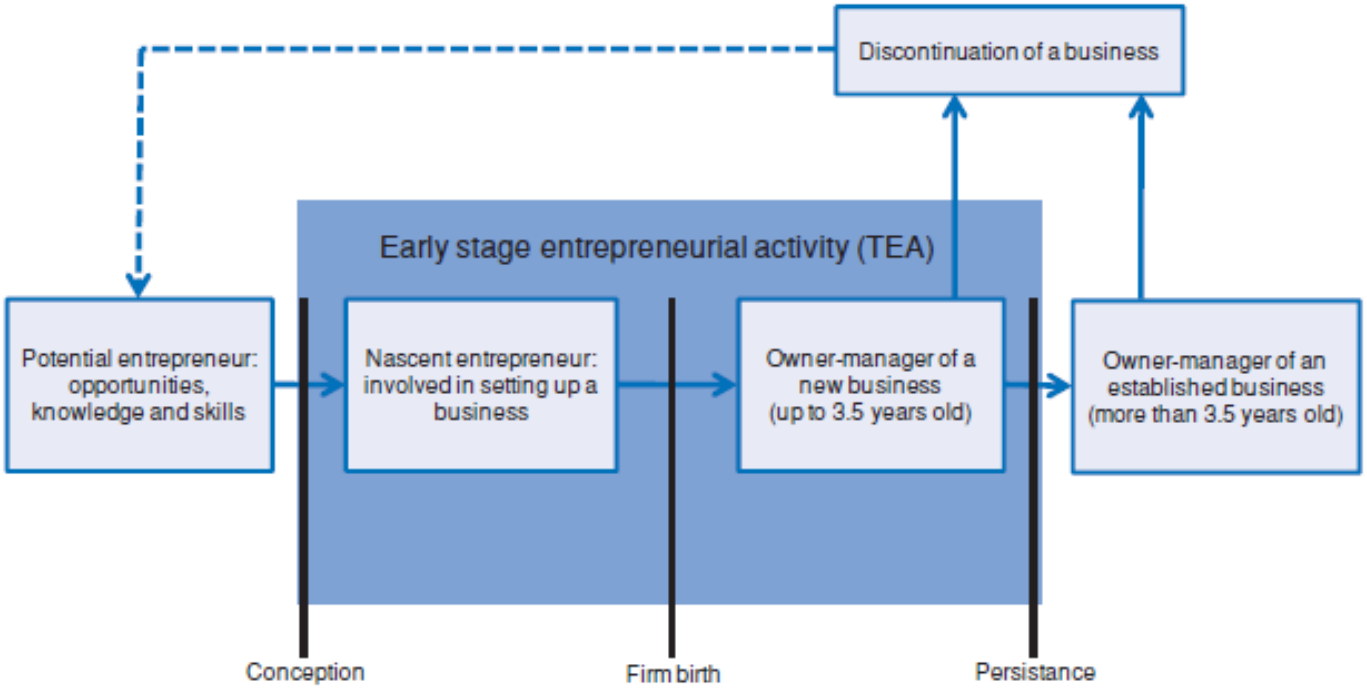
2.3.4 Support for innovative start-ups

In this paragraph we will focus our analysis on Innovative new firms or the so-called new technology-based firms (NTBFs), which are considered as an important agents of change for the economy. They introduce new products, services and more efficient ways of working. Entrepreneurs and their willingness to take risks are fundamental aspects of economic cycles, as they bring about innovation, create new companies and drive out non-competitive firms in a process of "creative destruction". Because of market and system failures, investments in innovation may fall short of the socially optimal level.

The aim of public support for start-ups and NTBFs is to address those failures by providing support at various stages of the entrepreneurial process (see following figure).

[7] *www.design-center.it*

Figure 6.4. **The entrepreneurial process and GEM operational definitions**



Source: Bosma, N. and J. Levie (2009); *Global Entrepreneurship Monitor (GEM) 2009 Executive Report.*

It is generally agreed in policy circles that there is a need to subsidise early-stage entrepreneurship. The financial system is often unwilling to finance high-tech and innovative start-ups. Among the main factors hampering innovation activities, the most relevant barriers identified by enterprises are: lack of access to finance; high costs of innovation; and lack of incentives facilitating cooperation among actors. To a lesser extent, difficulties in finding partners for innovation and lack of knowledge about support instruments also negatively influence innovation efforts by firms.

Proof of concept

Proof of concept or "from R&D to market" services include advisory services and grants for product development and commercialisation by start-up companies and NTBFs. These support instruments may be targeted to firms (see Box 6.13), but are often linked to university spin-off services.

Incubators

Incubators are infrastructures designed to accelerate the successful development of innovative companies through an array of business support resources and services. Services are provided by incubator management and offered both in the incubator and through its network of contacts. Incubators vary in the way they deliver their services, in their organisational structure, and in the types of clients they serve.

Incubators differ from S&T parks in their dedication to start-up and early-stage companies. S&T parks, on the other hand, tend to be large-scale projects that house everything from corporate, government or university labs to very small companies. Most S&T parks do not offer business assistance services, which are the hallmark of a business incubation programme. However, many S&T parks house incubation programmes.

Although most incubators offer their clients office space and shared administrative services, the core of a true business incubation programme is the services it provides to start-up companies.

Business angels and venture capital (VC)

Business angels and venture capitalists typically play a much more active role in the firms they invest in relative to lenders, since they own an equity stake in the firm. A considerable amount of risk is transferred from the entrepreneur to the investor. As a consequence, these investors provide managerial support to the founding team as well as links to customers, other investors and suppliers, and helping build the firm to the point it can be sold. VC is specialised: most investments take place in a very few sectors that generate extremely high rates of return that VC investors need to cover their high fixed costs. These sectors are mainly biotechnology and healthcare, information and communications technology, and increasingly green-tech. VC is a very specific form of investment that is only suitable for a tiny minority of firms in any economy.

Regional governments are active in several non-financial and financial initiatives for start-ups and NTBFs, covering the three forms of support: proof of concept; incubators and finance. Among the three sources of financial support to address capital constraints of such firms are: government-backed venture capital funding, the provision of loan guarantees, and government grants for R&D and innovation.

The main rationale for a regional dimension is the possibility to capitalise on proximity relationships. Such proximity facilitates access to resources and tacit knowledge, networking with partners, and the development of trust relationships. Trust is particularly important for venture capitalists and business angels.

Private venture capital funds are likely to cluster in particular regions. They require a critical mass of perspective deal flow. Therefore, another practice by regional governments where there are no local venture capital firms, is to organise events where venture capitalists come to the region to meet prospective firms.

Research results indicate that the vast majority of new firms will neither innovate nor grow, and hence have a very limited economic impact. The majority of new firms will never actually employ staff beyond the founder. For example, in Finland, the median size of new firms three years after creation was still one (MTI, 2007). Hence, there is an evolution of policy approaches from helping creation of new firms towards ensuring their sustainability and growth.

Innovation policies need to adapt to the diverse needs of different types of entrepreneurs seeking to start NTBFs. The development of the firm may require different support to the founders. On form of support is to optimise innovation management – whether in more open or proprietary (intellectual-property based) innovation processes.

Another is to seize selectively new opportunities in a global market, where speed of action and reliable partnerships are crucial. Regional system-oriented mechanisms serve to accelerate knowledge transfer, including towards those to start-ups and NTBFs.

Equally, support for the development of regional innovative clusters can be rationalized both in terms of joint development of innovative products and supporting rapid internationalisation of start-ups and NTBFs.

Success conditions.

Public financing schemes (grants, seed capital, venture capital, loan guarantees) to NTBFs and other start-ups is fragmented and fails to mobilise private sector investment efficiently or consistently (Innovation Unlimited, 2009). National and regional funds often lack size and expertise, while companies continue to lack growth financing.

Intellectual property and know-how developed by start-ups, NTBFs and universities typically remain undervalued and underutilised. Hence, there is a need for a radically new approach to financing innovation, which transforms the fragmented short-term approach of governments, private finance and long-established companies. This means new partnerships to share risk, better harnessing of the knowledge and skills of entrepreneurs and companies, and more intelligent ways to combine funding between instruments (e.g. grants, equity, loans and fiscal incentives) and across countries.

Not only is venture capital a very expensive form of capital, the high fixed operating costs call for minimum fund sizes and diversification of deal flow. In the United Kingdom, recent research suggests that the minimum size of a 10-year fund seeking to make a commercial return should be approximately EUR 40-60 million (Nightingale *et al*., 2009). Regional venture capital funds that are much smaller than this would have difficulties financing the required investment team and meeting private sector investor return targets. While the benefits of a working venture capital industry are very significant, the ability to build a successful venture capital industry is often lacking. While Israel has managed a successful VC industry, as well as the United Kingdom, most international attempts to develop a venture capital industry have been unsuccessful. Even in the case of the United States it is not clear that the venture capital industry could survive outside of major centres such as Silicon Valley and Boston without government support

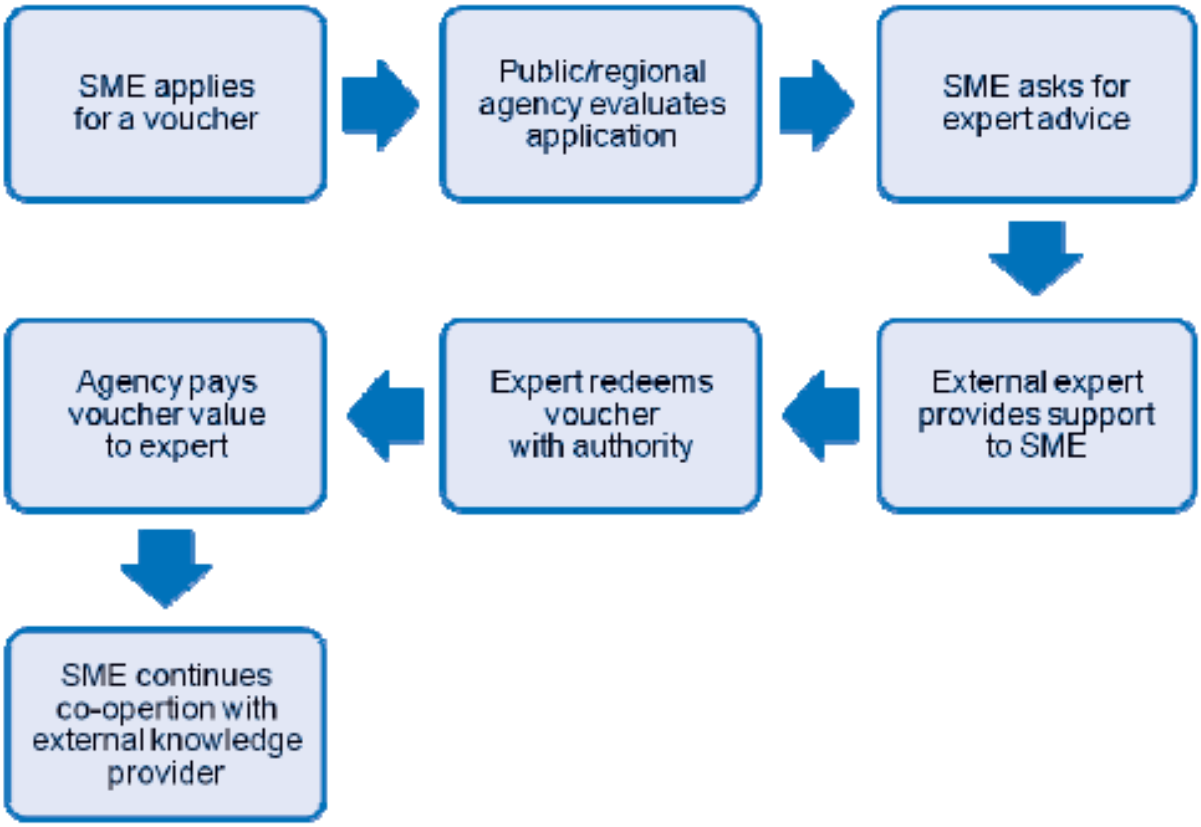
2.3.5 Innovation vouchers

Reducing barriers that hinder SME capacity to invent and successfully commercialise new products, services or processes is the main rationale for these regional innovation instruments. SMEs often lack in-house technical expertise and infrastructure for R&D, as well as innovation management skills. The capacity of many SMEs to hire skilled people for innovative projects and activities is also limited. Innovation vouchers are also used to overcome a co-operation barrier, by making them more aware of the opportunities which external know-how, available at RTOs, offers them. This instrument serves to change the behaviour of SMEs so as to integrate new knowledge and/or hire innovation specialists.

Only a small number of SMEs use funding schemes. Innovation funding schemes often involve high administrative costs, complicated administrative requirements and long delays (between the proposal submission, start of the activity or service and the first payment).

Innovation vouchers, as a versatile instrument, respond to the above-mentioned barriers through simple and fast procedures, generally a matter of days rather than weeks or months. An SME with a voucher can seek academic expertise, usually from pre-approved universities and research institutes, to solve a specific problem or develop a new business idea. The company pays the researchers or consultants with the voucher, which in turn is reimbursed by the issuer, such as a national or regional authority (see down). The SME decides for which concrete purpose it will be applying for the voucher.

Figure 6.5. **Typical innovation voucher workflow**



Source: Technopolis (2010), based on Krell, Katherina, "Innovation Vouchers: Versatile and SME Friendly Innovation Support Instruments", *www.greenovate.eu*, presentation at the ERRIN workshop, 25 June 2010, *http://errin.eu/en/upload/Events/june09/Innovation_vouchers_commercialisation_Krell.pdf*.

Figura 1 Tipycal innovation voucher workflow

Success conditions.

Although the innovation voucher scheme is a relatively new instrument, experience confirms positive results which are likely to contribute to their increased use by regions.

Their direct applicability and bureaucratic simplicity constitute an effective means of raising awareness in traditional SMEs. Innovation vouchers are found to stimulate innovation activities in SMEs not previously innovating and strengthen SME ties with RTOs and other knowledge providers.

Here we report "**Riga Declaration: realising the full potential of innovation vouchers programmes"**[8] namely ruling on the matter**:**

1. **The primary objective of innovation vouchers is strengthening the innovation capacity of SMEs**, by supporting them in the best possible manner to build new knowledge networks or to benefit from them. Innovation vouchers are demand-driven innovation support measures and should therefore be defined and implemented in a way that serves practical needs of SMEs. Innovation vouchers can be instrumental to better link SMEs with all forms of knowledge and creativity that are supportive to innovation.
2. **Innovation vouchers should support all forms of innovation.** This calls for providing access to innovation experts from diverse fields of expertise; the definition of eligible service providers should be based on transparent criteria that promote competition and support the further implementation of an internal market for services. This could be supported by commonly agreed definitions of innovation support services concepts that would facilitate their mutual recognition by innovation voucher programmes from different member countries.
3. **The administrative costs of implementing innovation voucher schemes should be kept as low as possible.** The administrative procedures and control mechanisms should be proportionate to the size of the innovation vouchers and continuously be benchmarked against the "best in class".
4. **Innovation vouchers schemes should be the subject of regular impact assessments.**
5. Main impact indicator should be the increase of the innovation capacity of SMEs, for which specific targets should be set in advance, depending on the scope and objectives of the innovation voucher schemes.

[8] European Commission (2010), Riga Declaration, Brussels.

6. **Innovation vouchers schemes should be implemented at local, regional and national level**, thus fully taking into account the subsidiarity principle. The European level is encouraged to develop with national and regional entities a voluntary collaboration and brokerage framework for innovation voucher programmes that aims at making excellent knowledge, skills and innovation support services from both public and private service providers across Europe more effectively accessible for SMEs.
7. **Innovation voucher programmes have the potential to raise the quality of innovation support to SMEs.** New and better approaches to innovation support should be developed and tested through European pilot projects and rolled out at local, regional and national level as widely as possible. In order to speed-up the implementation of better practices in support of innovation, new forms of policy coordination between the different policy levels may be considered.
8. The **European Commission, member countries and regions are invited to consider the wider use or promotion of innovation vouchers** wherever possible, with the objective to support all forms of innovation more effectively and cost-efficiently and to reduce the gap between innovation leaders and those still lagging behind.

The mobility of skilled human capital is a complex phenomenon involving social and economic reasons and trends. That mobility is determined by market forces (attractiveness of certain places), research policy (specific incentives and regulations), history (affinity between countries) and immigration policy, and which involves different types of movements (European Commission, 2009).

A second type of mobility refers to education mobility, the most important in quantitative terms. This kind of mobility cuts across different fields: vocational training; adult learning; and mobility of researchers and new graduates from higher education institutions to industry and the public sector. Such researchers can bring with them updated scientific and technological knowledge, promoting a higher level of competence in the host institution. International student mobility increases human capital, as students access new knowledge and develop linguistic skills and intercultural competences.

Therefore, its enhancement and qualitative improvement plays an increasingly important role in the modernisation of education and training systems worldwide.

The rationale for mobility grants and attraction-retention schemes is that mobility of people is one of the important mechanisms of knowledge transfer for innovation and growth. These "spill-over agents" transfer valuable knowledge from one region to another, and contribute to the upgrading of regional knowledge pools by means of their mobility, placing regions or national economies on a higher growth path (Doring and Schenellenbach, 2006). A knowledge-based society relies on highly qualified people in all sectors of the economy and society, not only for high-technology sectors and research.

This growing intensity of knowledge means that all industrialised countries have a greater need for highly-skilled personnel who are able to access, understand and use knowledge for technological, economic and societal development (OECD, 2008b). For receiving countries and regions, the inflow of talent has potential positive effects such as: increased R&D and economic activity; improved knowledge flows and collaboration with countries of origin; increased enrolment in graduate programmes; and potential firm and job creation by immigrant entrepreneurs. International talent attraction helps embed regions in international knowledge networks.

Future demographic challenges and the effects they give to the policy-making environment are another important rationale for these talent attraction and retention schemes. Apart from the importance of knowledge transfer**,** demographic and migration trends represent major challenges for regional development policy, where striking regional differences exist. Important local labour shortages can emerge as a consequence of ageing and significant out-migration. And while regional unemployment might decrease in the short term through out-migration, employment growth and productivity can suffer if those leaving are the most talented, educated and entrepreneurial (i.e. brain drain) (Brezzi and Piacentini, 2010). For these reasons, many countries and regions are actively promoting strategies to attract high-talent personnel.

There are substantial obstacles to attracting talent. Regulations regarding visas and residence permits for students and workers restrict international inflows. Another barrier is financial considerations, as high-skilled foreign migrants may be unclear if they can fund their living expenses plus the extra costs of being abroad. Financial assistance schemes in many OECD member countries are still insufficient to meet needs in terms of availability or timing of payment. Researchers in the early stages of their careers are particularly affected

by financial obstacles as they lack the experience, networks, economic safety and other qualities upon which more senior researchers often can rely.

While mobility of the highly skilled is accepted as a means to diffuse knowledge, there is little consensus among scholars on the exact contribution of different measures of human capital mobility to economic development. This is a consequence of a lack of instruments to measure mobility flows and evaluate the outcome of mobility programmes.
While many government agencies publish data on the grants they issue, e.g. on the number of mobile people, the amount they receive, their destination, or on the use of the grant (output), there are limitations in using short-term economic indicators to measure mobility success in terms of input (e.g. mobility funding) and immediate output (e.g. physical movements, new projects or co-productions), rather than assessing longer term outcomes.

Chapter 3

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.

3.1 Definition of RIS3.

We might define the whole strategy by the actions it wants to set out in the regional policy-making approach on innovation and, generally, on economic development:

- focusing policy support and investments on key priorities, challenges and needs for knowledge-based development, including ICT-related measures;
- building growth and development on each Country and Region's strengths, competitive advantages, potential and specialisation;
- support to technological and practice-based innovation (generally all kind of innovation and creative-related initiatives) aiming to foster private sector investment;
- involving every kind of stakeholder and encourage them to innovate (in every meaning);
- providing sound monitoring and evaluation systems to an area often famous not to use this ex-ante/ex-post cost-benefit approach (also for its unpredictable nature).

The Smart specialisation framework has a strategic and key function within the Cohesion Policy's contribution to the general Europe 2020 agenda. It's has been regarded as an 'ex-ante conditionality': every Member States and Region need to be provided by a strong strategy in place, before they can apply and receive financial support from the European Union Structural Funds. For completeness sake we here list the two thematic objectives of the European Regional Development Fund (in total they are eleven):

- strengthening research, technological development and innovation (the so-called Research and Innovation Target);

- enhancing access to and use of quality of ICT (the so-called ICT target).

The same conditionality applies to the European Agricultural Fund for Rural Development (EAFRD): namely "Fostering knowledge transfer and innovation in agriculture, forestry and rural areas".

3.2 The general rationale.

The underlying rationale supporting the Smart Specialisation concept is that by concentrating knowledge efforts and creating linkages among them (limiting the number of priority activities), Countries and Regions could foster competitiveness and operate successfully in the global economy. This whole framework would allow Regions to take advantage of scale and spill-overs in knowledge production, diffusion and exploitation: the main drivers of productivity.

It's fair to say this kind of approach is not the first initiative of its category put in place by the European Union or by the single Member State Governments. The point is that the previous regional innovation strategies have suffered from a number of weaknesses, worsening the whole result. We could point out the general lack of international and trans-regional perspective, the partial distance between the strategy and the industrial/economic regional framework. In some cases there were too much public participation in Research and Development activities, lacking of business driven push. In some other cases has been picked a random Best practices from best performing Regions which they haven't got anything to share with the local innovation context.

The initial aim of the whole process is to reveal what a Country or Region does best in terms of Research, Development and Innovation. From this starting point the entrepreneurial forces present in that area could be best aware to understand or discover what to produce in order to gain good spots in the global economy. Typically this work needs to a number of trials and errors (main characteristic of every innovation/creativity-related activity). Regions and the other public institutions involved need to pro-actively co-operate with entrepreneurial actors in strategy design and support them while facing risks.

In cases where industry structures and entrepreneurial capabilities are weak (regional knowledge over entrepreneurial activities is not clearly defined among firms), it is a key

activity to identify and activate the knowledge forces elsewhere. The Regional Institutions should involve actively the universities or public research institutes in collaborative projects, including also local firms.

It's safe to say there is no contradiction between a smart specialisation policy and the action encouraging entrepreneurship. Moreover we could say that a strong entrepreneurship framework is needed to let the strategy of smart specialisation succeed and then feed and nurture the innovation potential present at regional level.

Smart specialisation strategies will require structural changes in the regional economic and innovation framework. This set of changes could follow from one of the following processes defined by the European Commission itself:

- a Transition from an existing sector to a new one based on cooperative collective Research and Development. It will form the knowledge base for the new activity helping the Region facing the forces pushing from all over the World;
- a general technological modernisation of the existing industry, involving the development of the Key Enabling Technology (KET) improving efficiency and quality on economic sectors already exploited, and to span across different and more innovative ones;
- the radical foundation of a new domain of dealing with innovation and creativity as a prior part of the economic framework. *This new totally different approach will allow traditional sectors to up-grade their status.* A good example is the nurture of IT applications for the management and maintenance of archaeological heritage in Italy (Florence) as a response to the co-emergence of a Research and Development and Innovation area with a "traditionally traditional" market.

The smart specialisation concept is namely a regional set of policies and could be used in all kind of regions, from lagging de-industrialised to hyper-technologically advanced ones. The application of the general concept needs to be adapted accurately to the specific case and treated with high with care because the economic, social and institutional context varies strongly between and even within (as in the case of Italy, Spain or Germany as the most famous cases) European Countries.

This is could be translated as follows: a Regional Smart Specialisation Strategy needs to take into account several geographic features and characteristics to achieve what is thought for, economic and social growth in the Region.

Linked to this fact there are a few fact that should be considered while applying smart specialisation to the regional environment:

- Every Region will have different *entrepreneurial process* and these have to be studied accurately as they are at the base of the whole concept. This research exercise might be tougher in some regions where is low population, or a small number of leading industries characterised by few external links, as could be the case of Southern Italian Regions like Apulia. In this particular (and most interesting, in my opinion) case, linkages among private firms, universities, public institutions and research centres are the only way to boost the sleeping economy and are essential for smart specialisation concept to work out;
- The target to firstly *identify specific sectors* on which "bet" and give financial resources because they are thought to achieve critical mass. In this framework strong is the side concept of "embeddedness" which refers to the presence of industries that works out just because of some specific socio-economic conditions with a historical co-operative relations with other local actors. Research analysis on this phenomenon shows that industries not having these features, are keen not to succeed in the long run. However, it is crucial not to focus just on the principle mentioned above and based the Strategies also on another important concept, the so-called "relatedness". This principle is displayed when firms operating in different (but communicating and related, at least theoretically) sectors could find some point of overlapping in order to share and work on a common knowledge base, basing the collaboration on new techniques or processes of innovation. Summing up it is a matter of diversification while specialising;
- Also important is the level *Connectivity* in the regional innovation framework. A Smart Specialisation Strategy should act like a bridge between emerging knowledge-intensive industries to the other actors operating in the Region. This is not excluding interaction outside the Region (or even the Country). However, it has to be kept in mind that this connections will be beneficial only when ideas are

exploited to the benefit of local firms and actors, with special attention to avoiding the tremendous process of “brain-drain”;

- The existing policies at regional level have to be integrated with the Smart Specialisation Strategy: the latter would act like a boosting force to the other already put in place, a general framework;
- The Region subject to this Strategy would become more *attractive* for internal and external investors. A successful strategy would create a mix of demand-side policies and supply-side public-private partnerships.

3.3 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.

Working beyond regional boundaries in the Smart Specialisation framework.

Here we still refer to the “functional Region” concept explained in the previous Chapter. It’s fair to say the initial assessment of existing regional potential and assets implies looking at the internal dimension and represent the basis of the whole process.

It’s also clever how useless could be such an analysis whether the policy-maker will not take into consideration other and external factors. This lack of vision might be translated into an insufficient set of action inside the smart specialisation strategy.

In fact a strong step forward from the previous European strategies in this field is that the smart specialisation approach has to be namely put in place considering the role and

position of the Region relative to the other regions of Europe and even the World: looking beyond the regional administrative boundaries.

This is, again, of key importance in the case of less developed Regions which lack of internal knowledge base suitable for an exploitation of its potential: the possible solution would be obtaining this know-how and technology from the rest of the World.

This analysis would be also important because it will warn against 'blind' duplication of investments in other European Regions bringing to waste of financial and economic resources. Excessive fragmentation, loss of synergies and un-reachable required critical mass are the risks here incurred.

On the contrary, interregional collaboration should be the path to be followed where similarities or complementarities among Regions are displayed.

Chapter 4

SmartPuglia2020: RIS3 in Apulia.

4.1 Introduction to the new Innovation Strategy.

Apulia (Puglia) is a region located in south-east Italy with a population of about 4m inhabitants, with a general low rate of industrialisation. However Apulia Region is considered as the most dynamic Southern Italian Region and, even though the Research and Development investment quota is below the (already low) national average, regional institutions have recently promoted a number of initiatives in the sector, obviously including also the Strategy showed in this chapter. Together with Emilia-Romagna, Apulia was, by the way, the first Italian region to implement a Smart Specialization Strategy.

4.1.1 Economic context

Puglia lags behind the national and European economy: GDP per capita was on average €15 762 in 2012 corresponding to 62% of national GDP per capita (€25 436).[9]

The unemployment rate in Apulia is very high (20.9% in 2014-T1) grown by 80% during the economic crisis and well above the national average (12.6%).

Agriculture is much more important in economic terms in Apulia than in the rest of the Country. Puglia is an export leader of wheat, olive oil and tomato (the share of employment in manufacturing of food products is higher than in the rest of the Country). The greatest manufacturing specialisations are found in the manufacturing of food products, textiles and metal products. The greatest geographical concentrations of enterprises are found in the two provinces of Bari and Lecce.

In the sector of Research, Development & Innovation despite relevant progress in terms of capacity and awareness about innovation issues in regional policy-making, Apulia still occupies the slot of one of the least innovative Regions in Italy.

In 2011, regional GERD (Gross domestic expenditure on Research and Development) was only €517m, accounting for 0.8% of the regional GDP (Italy average is 1.4%). The contribution of the private sector is very low, indeed. The BERD value (Business Enterprise

[9] http://noi-italia.istat.it/index.php?id=7&user_100ind_pi1%5Bid_pagina%5D=91

Expenditure on R&D) contribution to GERD is more limited than in the rest of Italy: BERD accounts to 25% of GERD (55% in Italy). However, the regional BERD is growing at a faster rate than GERD.

In EU convergence Regions such as Apulia, the share of funding dedicated to innovation and R&D is lower than the national average: innovation policy is largely dependent upon EU Structural Funds Framework. The regional administration is the key organisation in Apulia for the promotion of the innovation sector, developing policy initiatives with the support of a number of in-house agencies created for the sake.

Over the last two EU Structural Funds ~~two~~ programming periods the regional administration has displayed increasing awareness about research and innovation policy-making. As part of its innovation strategy in 2004 the regional government created the regional agency for technology and innovation (ARTI) with the aim to consolidate the regional innovation system and contributing itself to the development of the whole strategy.

Apulia was one of the few Italian regions to join in December 2011 the S3 platform, coordinated by the Joint Research Centre IPTS in Seville, which provides a methodological support to regions and Member States in Europe in implementing S3 strategies and initiatives.

4.1.2 The new Smart Specialisation Strategy.

The new wave of regional innovation development in Apulia starts from 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.

This index is the result of two other projects Apulia has taken part in the recent years: IASMINE and SCINNOPOLI.

The first one (Impact Assessment and Methodologies for Innovation Excellence), of which Apulia is Coordinator Region, is one of the 8 projects approved by the European Commission as part of the Pilot Action "Regional Innovation Policy Impact Assessment and Benchmarking". The other partner regions are: Navarra – Spain, Weser-Ems – Germany, Lodz – Poland and Tirol – Austria.

As SCINNIPOLI (Scanning INNOvation POLicy Impact) is an INTERREG project based on sharing best practices about impact assessment and innovation regional policies benchmarking. The other partner regions are: Southern Austria – Austria, Britain – France, Flanders – Belgium, Navarra – Spain, Provence-Alpes – France, French Riviera – France, Schleswig Holstein – Germany, Western Transdanubia – Hungary, Wielopolskie – Poland.

Economic System SWOT analysis

Strengths: strategic position nearby Balkans and in the middle of the Mediterranean, diffuse presence of SME, widespread existence of high-educated young people (often unemployed), Touristic sector experiencing high growth.

Weaknesses: low GDP growth rate, high young people and female unemployment rate, low level of public investment, unsufficient public administration capacity to handle programs and projects of complex regional development, main export sectors in low-medium technologies areas.

Opportunities: growing demand of high value added services, creation of specialized industrial districts and growing demand of de-seasonal touristic services.

Threats: big presence of black market activities, racketeering, growing world competitive pressure, obsolete education and training market, inefficient public administration services.

4.1.3 What we learnt, so far?

After the 2008-2011 Crisis the Apulian economy structure has experienced a phase of substantial changes. The ever-growing pressure coming from the international markets has started a selective process on the local enterprises bringing to a shift to the entrepreneurial sector. The consciousness that SMEs are acquiring about the importance of research and innovation investments has contributed at the raise in competitiveness of them (often saving some firms from bankrupt, in the long run).

Listing some sector involved in this virtuous approach shift here there are: electronic-mechanic, automotive, textile, furniture and sofas, food.

4.1.4 A new pattern.

The customers should increasingly acquire importance as key innovation process drivers. Every policy-maker around the world is taking into account the demand driven factor of the research and innovation push, stepping forward to the only supply-side policies.

Linked to this, in the future firms need to become more open: learning from customers and collaborate with competitors and sharing a social responsibility with the public sector, as well. As for the latter it is required the State and the other Institutions (obviously including Apulia) to provide punctual policy tools, rules, standards, etc. to make the firms exploit as much as possible the opportunities given by the new markets and technologies.

The approach to innovation in Apulia has experienced a step forward, though. We could easily speak about an evolution towards an innovation policies pattern more opened and internationalised. To this sake there have been promoted new Bridge Actions, thought to link the two funding cycles (2007-2013 and 2014-2020): Regional Technology Clusters, OpenLab, Covenants for the Cities and Future in Research.

These policies have needed a strong re-thinking around the administrative capacity of the regional public institutions. This is a process still to be completed and its beginning phase has just started. An important gain might derive from the activation of the Agency for

Cohesion (differentiating from the "relatives" agencies usually created at Central Government level by the fact that is directly managed by the Government itself). Linking the consultancies deriving from the latter with the possible support coming from the Officers of the European Semester in Brussels (as indicated several time by the Committee of the Regions) the Administrative Capacity issue should experience a shift towards efficiency and effectiveness.[10]

To do so an internal resource activity has been to integrate the work of the several in-house regional agencies operating in the innovation sector: ARTI, InnovaPuglia and PugliaSviluppo. They've been involved from the very beginning into the creation process of the whole Research & Innovation regional strategy.

5.1.5 The target: Puglia 2020

Here is the time to state what we want our Region to be in the recent future and in the long run.

The Apulia 2020 as indicated into the Strategy itself will be constituted by a living community, inclusive and innovative. A community with an entrepreneurial system provided by a strong social responsibility, aware of the importance it has in the sake of revitalising and boosting the regional economy and development growth.

A key area of improvement, possibly the most important, will be a strongly interrelated and qualified education system, capable to provide to the entrepreneurial, private and public sector, with the necessary resources it is supposed to foster and nurture.

The prioritised Innovation areas - The Regional Innovative System and the KETs (Key Enabling Technology)

The Apulian industrial sector has got a stable and solid presence of both small-medium and large multinational firms. Generally they are provided by a good export and innovation capacity. Geographically speaking the area of major presence of this operators are in the surrounding of the three biggest industrial area – Bari, Taranto and Brindisi – with some

[10] Quaderni di Tecnostruttura - La Governance Multilivello nella Strategia Europa 2020 (Multi-Level Governance in the Europe 2020 Strategy, Daniele Maglio (29/06/2015) http://quaderni.tecnostruttura.it/quaderno/quaderno_del_26_giugno_2015/la_governance_multilivello_nella_strategia_europa_2020/

other small actor around Foggia and Lecce. It's fair to say all the large-scale firm have got a Northern Italian or Foreign equity, mainly operating in the steal, chemical, energy and aerospace sector.

An important boost towards promoting the aggregation of small-scale firms in the various sectors has been given by the Regional Law n. 23/2007 ruling the born of the so-called Productivity Districts. As today the regional offices have acknowledged eighteen districts:

- District of renewable energies and energy efficiency "The new energy";
- District of marble;
- Logistics District;
- Fashion Apulian District;
- Flower and nursery District;
- District of Communication, Publishing and Graphics;
- Wood and furniture District;
- DES Apulia – District of Sustainable Building;
- District of Recreational Nautical;
- DIPAR – District of Environment and Waste Management;
- District of ICT;
- District of Apulian Mechanics;
- DAJS – Agricultural-food Jonian-Salento District;
- District of Murgian Agricultural-food;
- District of Fishing and Aquaculture;
- District of Creative Apulia;
- District of Tourism in Apulia.

As for the research sector in Apulia the main actors are: the 5 Universities present in the regional territory (4 public and 1 private) and their ILOs (Industrial Liaison Offices), the public and private research institutions and the Technology Districts[11].

[11] DHITECH – Distretto Tecnologico High-Tech;
DITNE – Distretto Tecnologico nazionale sull'Energia;
DTA – Distretto Tecnologico Aerospaziale Pugliese;
MEDIS – Distretto Meccatronico Regionale della Puglia;
DARE – Distretto Agroalimentare Regionale;

To point out a particularity of certain research organizations present in the Region is the often shared characteristic of the cooperation for the Mediterranean Area. It is witnessed by the presence of: the IAM – Agronomic Mediterranean Institute in Bari; one of the four poles of CIHEAM, International Centre of High Agronomic Mediterranean Studies, the CMCC – Mediterranean Centre for Climate Change and EFSRI Centre for biodiversity Life Watch.

In the following tab are reported the results of the Global Research Benchmarking System (GRBS) which involved 1337 Universities around the Globe (as requested by the standards to take part to the study four Apulian Universities have been selected: Bari Polytechnic, University of Foggia, University of Bari and University of Salento).

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.

H-BIO – distretto delle Biotecnologie della Salute.

KETs – The Key Enabling Technologies.

Here are listed the KETs as reported in the Project Document[12]:

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

2 – Nano-tecnhologies: 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;

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 Productive Districts and the Export dynamics.

In this paragraph have been analysed the most important sectors (not only because of the current importance given the revenues or number employees, but also taking into consideration the future development and contribution to regional innovation growth).[13]

Aerospace.

This sector represents one of the strategic sector for the Regional Economy, fulfilling a respectful position in the international landscape given its capacity to interact with the various multinational actors present on our territory. In this sector operate 80 firms (both SME and large-scale) employing 5000 workers; moreover it's the only region in Italy where are firms operating in all the production phases, from the components production to the

[12] KET 4 Photonics has been canceled due to the side importance in the economic landscape.
[13] The sectors not listed here are: Amusement Nautical, Fashion, Wood/Furniture, Marble Industry, Green Economy, ICT, Creative, Traditional and Artistic Craftmanship,

aerospace softwares. The actors taking part to the Regional Aerospace Apulian district are: 42 firms, 5 public and private research institutions, 10 institutions and associations.

Starting from July 2008 Region Apulia has acknowledged the Aerospace Apulian District (DAP) with the mission to improve the competitiveness of the firms and generally the sector in the international arena. In the first quarter of 2015 the Apulian Export of Aerospace products has covered up to 10% of the whole Italian export in sector reaching 127.37mln€[14]. The main export partners are USA, Turkey, France, UK and Brazil.

Mechanics and Mechanical-electronics.

The production system in this sector is characterized by the presence of small and very-small enterprises (in 2012 they were 8 177, representing the 28.8% of the whole Apulian manufacturing universe and employing 53 700 workers). The actors taking part to the Regional Mechanics Apulian Production District are: 101 firms, 14 public and private research institutions and associations.

In December 2009 Region Apulia has acknowledged the Mechanics Distrisct to launch the sector towards international growth and enabling synergies between firms, widening the markets pivoting from the complementarity principle. The building idea of the district is to allow the firms facing with a major strength the ever-growing competition coming from various international sources.

The Apulian Mechanical industry has reached important results as regards the amount of export (2.1B€ in 2011) representing 26% of the whole regional export. The most active export sub-sectors are: “tool and apparels” (40% of mechanics), “automotive” (40.5 %), “electric apparels” (12.6%). The main export partner are: USA, France and Germany.

Logistics.

The Apulian Logistics System is characterized by a strategic network of link, a growing inter-modality mainly composed by: road connection (Bari-Naples linking Adriatic with Tirrenian Sea and the Adriatic Trajectory); railway; an harbour system well-developed, with Taranto

[14] The other regional shares are: Lombardy 35%, Piedmont 22%, Campania 17%, Lazio 9% http://www.varesenews.it/2015/06/aziende-aerospaziali-in-crescita-anche-con-la-crisi/380539/

(the third Italian harbour according to the number of containers and the Distripark/Inter-modal Hub), Bari (the important cruise docking, and Brindisi (developing a respectful numbers of passengers and goods exchange); and airport system.

With the creation of the Logistics Regional District the main goals that have been sought are “to create the conditions making the firms operating on the regional territory to face local and international markets, while creating value through synergies between public and private actors”. At this time have accepted to collaborate to the above-reported District: 42 firms, 5 public and private research institutions and 10 associations.

Agriculture-Food.

This sector, together with flower/plant, tourism and textile/fashion sectors, represents the most traditional area of the regional economy. This is mainly attributed to Mediterranean Climate and the wide plans it is provided: 90% out of 2mln hectares is, indeed, used for agriculture. As the dimension of the sector the GSP (gross saleable production) has been of 2.3B€ in 2012, confirming the Apulian leadership in the agriculture-food sector: 68% of table grape-fruit, 35% of cherries, 35% of tomatoes, 35% of olive oil; 31% of artichokes, 21% of wheat.

In this sector have been created two different Sub-Regional Districts: Murgian District (“Terre Federiciane”) in the Bari-Foggia with 868 local actors and the Jonian-Salento District in the Brindisi-Taranto-Lecce 767 local actors. The main export partners are: Europe (especially Germany), Russia and Canada.

The Industrial District: a process in evolution.

The creation and nurturing of Industrial Districts is a phenomenon to be certainly promoted and re-vitalised. This has been stated considering the Apulian characteristic of wide Small and Medium Enterprises presence (feature shared with the rest of the Country, but even amplified given the absence of local multinational actor with the “head” there). Facing a growing competition and push towards an internationalisation process, to collaborate is a urging scenario where the internal financial and practical skills often lack.

Having said that one of the factor mostly biasing the willingness to collaborate inside an Industrial District is the structure of the industry itself. An initial study have been done by

IPRES (Istutituto Pugliese per le Ricerche Economiche e Sociali – Apulian Institute of Economic and Social Research) in 2011[15]. One of the initial findings of this work is the following: it seems to be crucial the grade of integration in the supply chain (highly developed in the Aerospace sector) and the presence of one or more focal leading firms.

More difficulty is generally encountered in the horizontal relations development and nurture (among firms operating in the same phase of the supply chain, so mostly competitors). In the most part of the cases it's emerged the need of nurturing the above-mentioned relations for the sake of overtaking the dimension issues for efficiency, economy of scale and high-amount orders reasons. This need keeps, nevertheless, be stopped by a strong diffidence mainly in the traditional low technology sectors (marble and nautical, for example).

A factor which seems to positively bias the cooperation inclination is the growing presence of a young entrepreneurial class, culturally more aware of the potentiality linked to this new business approach.

4.1.6 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%)[16].

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 steal 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

[15] Distretti industriali e sistemi produttivi locali (Industrial Districts and Local Productivity Systems), Ipres, 2011

[16] Rapporto Svimez sull'Economia del Mezzogiorno 2015, Associazione per lo sviluppo dell'industria nel Mezzogiorno.

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.

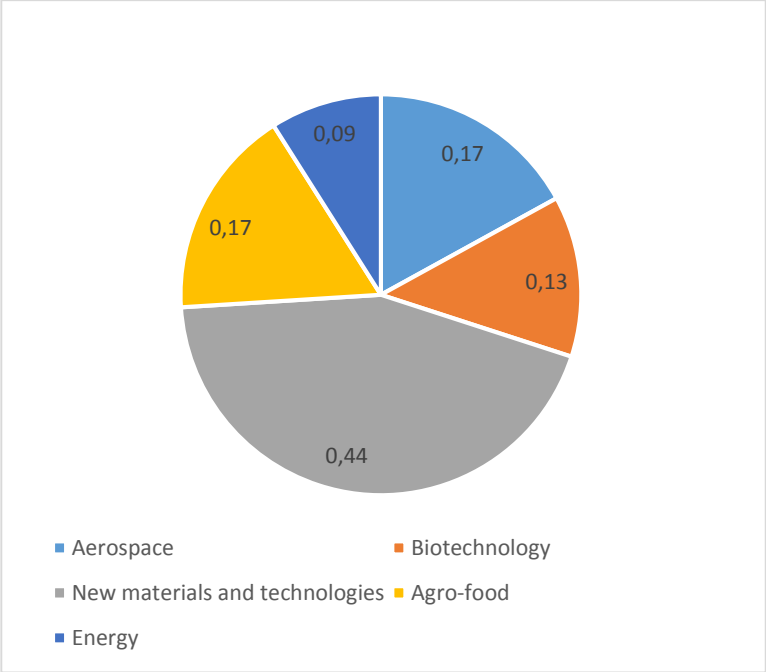
Another factor, and here we cross again our urgency/opportunities for demand-push innovation, is the development, management and enhancement of Cities. The big part of the lag with the other Italian Regions and the rest of Europe could be attributed to the Apulian (and Southern Italian) Cities to be 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 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).

4.1.7 The Regional Research Infrastructures.

In the European Commission "Regional Policy is contributing to smart growth in Europe 2020" communication, it has been acknowledged the key role of developing regional research infrastructure (Regional Partner Facilities – RPF) as one of the three pillars permitting Regions exploit their full research and innovation potential. It's though been given a central role to these entities also in the creation of RIS3 strategy: consolidating and empower regional strength (to become a contributing factor in the national and international scientific arena) and integrating their work in the European Research & Development Network.

Among the others the main target of a general improvement of the Apulia Research Infrastructure is to improve the appeal of high-technology cluster present on our territory. Working close to an important and internationally well-known laboratory gives a different and high possibility accessing tools to bring innovation in the internal process. Here's not just speaking about physical tools (computers, software, apparels, etc.) but also the knowledge base and the network of researchers helping sharing best practises, processes and ideas.



Last but not least it'll serve attracting (foreign) capitals: serving the whole economy the possibility to have daily contact with worlds far from ours in a wide range of things might be of tremendous boost to the innovative wave we – as policy-makers and normal citizens – all seek.

One of the current activities the Regional Government has pursued is the Regional Laboratory Network[17].

The network financed as now are 23 (in the graph here are reported the proportion given the topic of research) grouped by the area of expertise. The research infrastructures involved are 53 with an average researchers' number of 5.

An interesting datum regards the sector of New materials and technologies reporting 44% of the total. This should be attributed to the flexibility of such an area, applicable to different processes and supply chains.

4.2 Conclusions.

[17] "Reti per il rafforzamento del potenziale tecnologico regionale" (Networks for empowering regional technology potential) APQ – II Atto Integrativo; PO FESR 2007-2013, Asse I – Linea 1.2 – Azione 1.2.1 e PO FSE 2007-2013 Asse IV – Capitale umano, Avviso n. 16/2009

Generally we could say Apulia Region has been working properly, at least on the theoretical creation of the Strategy. It's fair to say the implementation phase is of a total different and tougher nature, given the high amount of issues and critical condition this Region, as the other Southern Italian cases, has to face.

The most comforting fact of the whole Apulia innovation picture is that policy-makers seems to have understood the high importance investing on the technological development of the economy has got. In the future we citizens could seize how far our political guides have seen and programmed.

Chapter 5

The case of the Comunidad Valenciana (Spain).

The Valencian Community is an autonomous community of Spain located in central and south-eastern Iberian Peninsula, it is divided into three provinces – Alicante, Castellón and Valencia – and 34 counties.

It has been chosen for the comparison with the case of Apulia Region because is the most similar entity using the European Commission tool "Benchmarking Regional Structure - Finding reference regions based on structural similarities"[18]

The Valencian Courts are the main government institutions with direct competences in subjects such as innovation. In this field, the courts have developed a regional innovation system based on linking enterprises, universities, research centres and public administrations.

The population of Valencian Community (5,129,266 people) represents 10.8% of the Spanish total population, making it the fourth most populated Spanish region. The primary sector represents only 1.99% of the regional GDP, and this the main difference compared to the Apulian economy, characterised by a strong presence of agriculture-related firms.

The strategic sectors in Valencian Community with a strong impact on the Spanish economy are:

- Ceramics and tiles;
- Shoe industry and leather goods;
- Games and toys;
- Wood and furniture;
- Textile and clothing industry; and
- Automotive industry.

As the Research, Development and Innovation sector the regional expenditure on R&D against GDP is 1.06% (Apulia 0.8%) compared with the Spanish average of 1.30% (Italy 1.4% - values of 2012). The overall R&D expenditure is divided into this sources: higher education

[18] http://s3platform.jrc.ec.europa.eu/regional-benchmarking-tool

institutions 44.43%, private companies (43.49%), public sector (12.04%) and non-profit private institutions (0.03%).

The Valencian innovation system is made up of five distinct types of agents: the Valencian society as a consumer of innovation and technology, the public sector, the science, technology and innovation offer together with support infrastructure for innovation, companies and financial agents.

Regarding the technological centres, REDIT is the network of technological institutes from Valencian Community and comprise 14 associated centres that offer a broad range of advanced services of R&D&I addressed to companies. Its mission is to contribute to recognition of the research institutes as an effective organisation model within science, technology and business system.

Support structures for innovation are integrated by OTRIs (Transfer Office of Research Results), University-Enterprise Foundations, BICs, Network of Technological Institutes of the Valencia Community (REDIT) and Network of Valencian Universities for the Advancement of Research, Development and Innovation (RUVID), together with technology and science parks.

During last years, the Valencian Community has made significant progress in strengthening infrastructure and agents making up the structure of R&D system. Research and technological development focuses on the network of public and private universities, which includes 5 institutions and several prominent research centres of international levels. Additionally, the network of 14 technical institutes that form the structure REDIT, has contributed decisively to research and innovation and the development of technological applications specifically demanded by the companies according to their needs. Industrial activities with greater presence of innovative companies are related to energy, sanitation and waste treatment followed by manufacturers of wood and paper, machinery and equipment, textile and footwear, rubber and plastic products and minerals metal.

During last years, innovation performance and R&D expenditure within the Valencian companies has decreased in a percentage up to 32.84% in the period 2009-2012, mainly due to the economic crisis, which have caused an important reduction in R&D investments. Additionally, during this period, a lot of companies, most of them small technology-based

companies with high R&D expenditures, have gone bankrupt. During the 2013, according to recent data, this negative trend has been changed, achieving an increase of up to 12% in comparison with 2012.

The regional policy of innovation in Valencian Community is managed by regional public administration. The aim is to foster interaction between different stakeholders (companies, research centres and also public administration) to ensure a higher competitiveness of the region through access and application of new technologies and the development of associated knowledge. It tries to improve technological capabilities of Valencian Community supporting the generation of scientific or technical knowledge that allow to obtain products, processes or services with a higher added value.

The main regional agent in charge of management, funding and evaluation of different policies is IVACE (Valencian Institute of Industrial Competitiveness). It is an autonomic body in charge of innovation promotion assigned by the Valencian Government and subordinated to the Regional Ministry of Economy, Industry and Trade. It has replaced the previous IMPIVA in the first half of 2013. In spite of being the main entity managing innovation, there are also other Regional Ministries (in the regional Government of Valencia) directly involved in many aspects or measures that promote innovation policies, e.g. the Regional Ministry of Education, Regional Ministry of Health, Regional Ministry of Economics, Treasury, and Employment, etc.

IVACE has programmes in support of SMEs and public entities and non-profit private entities that render their services to SMEs in the following areas:

- Technology and R&D;
- Creation and development of enterprises;
- Design;
- Quality and environment;
- Organisation and management;
- Training; and
- Technological cooperation.

The Regional Ministry of Industry, Trade and Innovation has a specific General Directorate of Industry and Innovation with two key programs:

- Industrial policy: supports activities of Sectoral Competiveness Plans and programmes in support of R&D Institutes; and
- Enterprise innovation creation and development of enterprise: supports strategic actions for sectoral diversification.

Policy trends profile:

The main objectives and trends of innovation policy developed in Valencian Community during the last years have been:

Actively promote innovation in enterprises as a way to improve competitiveness and wealth creation within a global environment of competition and cooperation;

Promote the development of innovative companies to encourage the diversification of the industrial structure of Valencian Community;

Promote cooperation between scientific and technological innovation suppliers, connecting with the needs of Valencian companies as a way of raising the technological content of the business network of Valencia;

Improve the training of human resources to suit the needs of business and the new knowledge society in general and their incorporation to the regional companies; and

Increase coordination in implementing innovative public policy applying an integrated approach to the various actuations that are designed.

The tools to fulfil these objectives are gathered in the following measures:

- Incentives for Technological Institutes and Entities;
- Incentives to companies for research and development;
- Incentives to companies for innovation actions;
- Incentives to recently created technology-based companies;
- Incentives to foster investment and jobs creation in industries; and
- Incentives to companies for technical jobs creation.

The main objectives of those priorities have not changed with the new policies that are being developed now for the region, which have been included under the Strategy of Industrial Policy in Valencian Region EPI2020. The new strategy proposes to continue the

shift in the Valencian industrial base fostering sectors and processes, which involve high technology. To improve productivity and competitiveness of the companies, five ambitious objectives are underlined:

Within the Valencian Community, there are specific sectors with very high potential to benefit from advanced manufacturing. For instance, automotive sector, being one of the main productive sectors of the region, is one of the potential beneficiaries of this kind of technologies. In the Smart Specialisation Strategy of the region, it has been identified as one of the technological pillars the field of Advanced Manufacturing, with influence in the sectors of Automation and Machinery.

Following this priorities, the region has developed specific policies oriented towards the implementation of advanced manufacturing in regional industries. With this regard, there are incentives to the incorporation of advanced ICT tools for optimising the management and operation of the machinery. These activities are linked with Advanced Manufacturing and with the new trend towards the development of Factories of the Future.

It’s safe to say Valencian policy-makers has succeeded in creating a changing forces into their region’s economy, stepping forward from the agricultural-based environment history gave them to a modern and competitive area.

The work to be done is still hard but following the path they already shaped it’s possible to raise the economy to higher level, even to lead the whole Spanish economy.

Conclusions.

After having analysed the policy-making sector of Regional Innovation Strategies we have 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.

Bibliography.

European Commission (2015) - Directorate-General for Communications Networks, Content and Technology, Open Innovation Yearbook 2015, ISBN 978-92-79-43962-9

Chesbrough Henry, Wim Vanhaverbeke and West Joel (2006), Open Innovation: Researching a New Paradigm, Oxford University Press, http://emotools.com/static/upload/files/Openinnovationparadigm.pdf

OECD (2011), Regions and Innovation Policy, OECD Reviews of Regional Innovation, OECD Publishing, ISBN 978-92-64-09780-3 (PDF), http://dx.doi.org/10.1787/9789264097803-en

European Commission (2012) – Regional Policy, Guide to Research and Innovation Strategies for Smart Specialisations (RIS 3)

European Commission (2010), Riga Declaration, Brussels**,** https://eu2015.lv/images/news/2015_06_10_EUurbanDeclaration.pdf

Apulia Region (Regione Puglia), Delibera della Giunta Regionale n. 1732 01/08/2014, http://www.sistema.puglia.it/portal/page/portal/SistemaPuglia/smart_puglia2020

SVIMEZ – Associazione per lo Sviluppo dell'Industria nel Mezzogiorno (2015), Rapporto Svimez 2015 sull'Economia del Mezzogiorno

Sitography.

Smart Specialisation Platform, http://s3platform.jrc.ec.europa.eu/home

RIS3, Benchmarking Regional Structure, http://s3platform.jrc.ec.europa.eu/regional-benchmarking-tool

European Commission, Research and Innovation – Regional Dimension of Innovation, http://ec.europa.eu/research/regions/index_en.cfm?pg=home&lg=en

Puglia 2020, Smart Specialisation Strategy Apulia Region, http://www.sistema.puglia.it/portal/page/portal/SistemaPuglia/smart_puglia2020

A.R.T.I. Puglia – Agenzia Regionale per la Tecnologia e l'Innovazione, http://www.arti.puglia.it/

European Commission, Growht – Internal Market, Industry, Entrepreneurship and SMEs, Valencian Community, https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/valencian-community

Spain Government, Ministerio de hacienda y administracione pùblicas – Secreterarìa de Estado de presupuestos y gastos – Direccìon general de fondos comunitarios, http://www.dgfc.sgpg.meh.es/sitios/dgfc/en-GB/Paginas/Inicio.aspx