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The Italian Industrial Renaissance: science parks and their role in cluster creation¹

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Executive Summary

Clusters have been recognised as economic forms of organisation important to supporting the economic development and growth of regions and nations and holding significant implications for the competitiveness of territories (Porter, 1998).

Cluster development activities can be defined as: organised efforts to enhance the competitiveness of a cluster, involving private industry, public authorities and/or academic institutions (Sölvell et al., 2003).

Being an economic model driven directly by the production, dissemination and use of knowledge, knowledge-driven economy requires a high level of interaction between all actors involved. In this model, innovation (be it technological innovation, business model innovation, innovation in work organisation or innovation in the relationship between the research system and the production system) has a central role in economic development, well-being and quality of life.

The European Union considers the dimension of territorial clusters a key element in enforcing policies and actions supporting the development of sectors linked to Life Sciences. Such an approach has guided the take-up, over the last decade, of several actions aimed at raising awareness, on a European level, on the need to develop innovative and competitive clusters in the world, and at identifying shared tools, actions and initiatives to support both the development of the management and animation mechanisms of excellence clusters and the sharing of infrastructures, experiences and synergic services for the growth of enterprises, particularly SME.

In Italy we can find examples of success both at regional and national level in particular in the Life Science sector; with this paper we would like to focus on them in order to reinforce the concept that industrial innovation is key for the economic development of any country in Europe.

Full Text

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Despite the impact of the economic crisis the territorial economies are getting more and more important towards the Globalisation challenge giving to STP an additional opportunity and responsibility to play a pivotal role to support companies' success.

Science parks are moving from physical facilities to concentration of know-how.

The 3rd generation science park and 4^o generation science park are key element for developing local ecosystems and is very important to understand their role and positioning in conjunction with Regional and National Cluster development.

The science park impulse action at territorial level will pass from services to digitalisation, to "added value development and manufacturing". In the last 30 years in developed countries the focus passed from the growth of services sector to the era of "digital companies" refocusing on manufacturing with strong attention to medium-high tech sectors and/or innovation in traditional sector to maintain entry barrier and differentiation factors for the domestic markets.

The Italian situation: From 2008 to 2015 the resilience of SMEs economic based structure and the opportunities emerging led to renaissance through cluster creation. Italy is known for the excellence in different sectors (italian researchers are leading top R&D institutions in the world) and in the current economic structure the industry is still based on SMEs. Half of workers in manufacturing are employed in companies with less than 50 employees.

In period of economic crisis this peculiarity is both a strength, increasing overall resilience and a problem for the small dimension of single companies sometimes unable to supply big market's need.

Clusters and in general innovative and competitive local ecosystems could be the way to compensate the lack in the economic structure and the small dimension of companies trespassing the "old" industrial district model where at local level the integration of the value chain in specific sectors was complete.

In particular, following the Communication "The contribution of regional policy to smart growth in Europe 2020" 1, the European Union urges the national and regional governments to develop smart specialization strategies, so as to maximise the impact of regional policies combined with other Community policies. Smart specialisation leads companies, research centres and universities to work together in order to identify the most promising areas of specialisation of individual regions, but also the weaknesses that hamper innovation.

Among the main tools to support smart specialisation strategies, the EU identifies Science and Technology Parks and Clusters for their significant role. The emphasis on regional clusters, however, was already contained in the previous policy framework drawn up by the Lisbon Strategy. Although there were no universal models of cluster policies, still an increasing number of situations have been observed in which long-term public policies and industrial or academic highly qualified research initiatives had allowed the emergence of particularly strong clusters, acting as a catalysts helping to make the best of the economic and scientific potential of particular regions.

During the period of the Lisbon Strategy, important initiatives have been undertaken on clusters, such as the presentation of a European Cluster Memorandum and the establishment of the European Cluster Observatory. Furthermore, in addition to the tools available within the Cohesion Policy and the Programme for Competitiveness and Innovation, the initiative Regions of Knowledge, implemented under the Seventh Framework Programme, was

further enhanced with the objective of strengthening the research potential of the European regions, thanks to the implementation of research based strategies, encouraging cluster development focused on research, associating universities, research centres, enterprises and regional authorities, and supporting their cooperation.

As it was for the Lisbon Strategy since its early stages 6, even in the Innovation Union initiative Life Sciences and biotechnology for health are central to the scientific, technological, economic and social development of the European Union. The programmes and initiatives to support this sector derived firstly, from earlier programmes and, to a large extent, from new tools and programmes, as a result of the new approach adopted by the European Union to meet the Europe 2020 challenges, and the Horizon 2020 ones in particular.

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Case study: The life science sector in Italy, a model of cluster creation and development based on science parks.

This is a possible general model of relations between local science parks and regional-national clusters.

The life sciences sector is encompassing health related applications, agro-food and green chemistry markets (the so called bioeconomy).

In life sciences the partnership chain is at the basis of the success and is made by different actors: public and private applied research, SMEs, services providers and big companies that not necessary are located in the same territory.

The “innovation gap” in pharma is generating the success of the outsourcing model in the last 15 years increasing the number of SMEs specialized in some pieces of the entire value chain which needs to supply a global market anyway.

The presence of concentration of actors in one particular territory, the so called clustering effect, is also today the engine for growth. But the simple physical concentration could be not enough to activate the process. Lack of know-how, financial resources, networking and global perspective are all typical limits of companies at the beginning of their activity. At the opposite big companies are global by definition, with no or limited local roots. University and public research are quite frequently not able to exploit properly scientific results. So there is a space for a “smart interface” able to integrate all components of the local systems, animate relations, stimulate the R&D project packaging and give impulse to international development. A survey carried out on the major international pharmaceutical groups shows that today, in 80% of cases, the most efficient innovation originates from the acquisition of projects born in small biotech companies or centres of excellence, and that



only in 20% of cases innovation is generated by the big corporate research laboratories. A proportion that shows a real and proper paradigm shift, caused by a deep change in both the demand and supply of innovation on an international level.

This put in place on of the typical role of science parks that, thanks also to the physical dimension could activate local positive dynamics operating “out of their boundaries” following a clustering approach based on partnership with other local actors (University incubators, big companies, academy and TT offices, etc).

In Italy, a significant number of firms located in scientific technological parks are operating in the Life Sciences sector. These are often micro or small sized organizations, looking for partnerships with other companies to take advantage of technology platforms, external expertise and professional skills to support their development. Hence the role of the STP, both as means of creating a network of collaborations, and entities entity able to offer consultancy services in different fields (legal, tax, marketing, partnering, intellectual property, human resources, etc.), as well as to support activities to promote companies incubated therein for fundraising purposes. Italian STP too, have a vast and complex network, such that the incubated companies can easily get in contact with each other, and with possible investors, both domestic and international.

This approach, based on the possibility to share and exchange resources, is an absolute winner for companies operating in global and highly competitive sectors, and whose development is linked to projects with a high level of innovation, where the outcome is often influenced by the lack of critical mass and the necessary resources. Indeed, Science parks and incubators act as intermediaries between the demand for skills and resources not available in-house by companies located therein, and the supply of innovation and financial resources from research centres and investors respectively.

In Italy there are about thirty STP, the dimensions of which are not yet comparable to those of active parks in other countries. The most important sciences parks in terms of number of companies and networks are about fifteen and, as already mentioned, there is a certain correlation between their geographical location and the concentration of red biotech companies of micro or small size.

Within the Italian STP a total of 127 entities operate ranging between enterprises, research institutes and consortia active in the field of Life Science. making a selection of the companies operating in Italian STP according to the definition of biotech company, 113 companies were able to be identified, with a total turnover of around € 87 million, investments in R& D for € 147million, and a number of employees in R & D over 600 units. Although the reality of Italian STPs is still in the starting phase, their development product pipeline looks very promising indeed.

Italian Success stories:

The National Technological Cluster Life Sciences Cluster - ALISEI aims to introduce and launch in Italy, an innovative strategic approach to the creation of new products, technologies and services, as well as new business opportunities in the field of Life Sciences and human health care, in particular .



As a Generator of 'Innovation and Business Ideas', ALISEI intends to propose itself as Catalyst for dialogue between different actors, emphasising the multiplicity of cultures, vision, know-how and experience of which each of these is a carrier.

The fundamental conception of ALISEI is, in fact, the objective of implementing and harmonizing at a national level the model, already experienced in some Italian regions, of interaction between the research system, the entrepreneurial and manufacturing sector, the system of added value development services, and the public administration on the territories. ALISEI wants to create a system of territorial innovation of national significance, by means of networking, inter-regional integration and cross-functional governance of skills and public and private R&D / production resources, management of technology and of innovation, promotion of research, technology transfer, business incubation, attraction of investments and dedicated finance. A system conceived in this way, will be able to create value for the national territory, and promote the development of an innovative and competitive bio-Italian industry in the global market.

ALISEI Cluster Mission can be defined as follows:

"ALISEI National Technological Cluster is the engine of Italian innovation in the field of Life Sciences, being a system capable of constructing a map of innovation, and to manage it in its entirety. It is a generator of networks based on specific goals and new organisation forms; it is an aggregation of territorial solidarity; it is a catalyst for development processes".

The objective of comparing continuously and directly the world of research and industry in the diversified inter-regional context, harmonising and sharing the development strategies, methodological bases and knowledge of the different Italian regions belonging to the Cluster, is undoubtedly the central aspect of this mission. All successful international experiences show, in fact, that where the cluster is well entrenched in the social, economic and productive environment of the territories, a strong boost in innovative production can be seen, as the development of a culture of innovation, or rather a significant increase in the ratio of demand for knowledge and innovation by companies, and the providing of knowledge and innovation by the research system.

PTP Science park in Lodi specialised in the agro food and bioeconomy sector, Toscana Life Sciences and Bioindustry Park Silvano Fumero/bioPmed in the health sector.

Activities are based not only on the local level but also on a strong international positioning and result oriented strategy.

Their effort in cluster creation will define a clear added value in the role of science parks in cluster creation and management due to the presence of strong local network, specific competencies and international business development activities.

The excellence of cluster management has been also certified by the European Secretariat for cluster Analysis (ESCA) through the award of Bronze label to PTP-Science Park e Toscana Life Sciences and the Gold label to Bioindustry Park Silvano Fumero/bioPmed.

PTP-Science Park is the nucleus and the engine of the Research and Innovation Campus of Lodi, which is based in an excellent logistical location, also given its proximity to Milan, and in the heart of the Lombardy and Emilia Romagna food macro district, conveniently close to major agribusiness companies.



Since its creation, PTP has rapidly grown into a reference point inside Lombardy region for agro-food and agro-biotech sectors. It is now the coordinator of “CAT.AL - Lombardy High Tech Agrofood Cluster” (Regional Decree No 5981 07.05.2012) which currently involves about 500 partners among research centres, SMEs, large enterprises, private and public stakeholders. The mission of the cluster is to foster the sustainable economic growth of the agrifood sector of Lombardy and to contribute to the development of regional smart specialization strategies. Due to its preminent role in the regional cluster PTP-Science Park is also among the founders of CL.AN the national agrifood cluster which is representing more than 11 regional strategies in agrifood in Italy and several of the most important firms and research centers such as Barilla, Ferrero, Inalca, University of Bologna, CNR.

PTP-Science park includes in an area of circa 30 HA universities facilities, private and public R&D centres and ALIMENTA the business incubator. Alimenta founded in 2007, was devised for high-tech start-up companies in the Life Sciences and Agro-Food sector. The bio-incubator, managed by FPTP, is aimed at fostering the creation of start-ups and spin-offs to develop the enabling factors needed to promote research and support the creation of new innovative enterprises and technology transfer. In this context the incubator offers over 2,400 square meters of laboratories and offices, as well as specialist services to support start-ups and was recently ranked (2015) among the top ten hottest bioincubators by the newspaper Labiotech.

Bioindustry Park Silvano Fumero SpA identified as the Managing Body of the Centre for biotechnology and biomedical innovation of the Piedmont Region. The Piedmont cluster, coordinated by BioPmed (www.biopmed.eu) is based on a community of more than 7,000 employees from about 360 companies, three universities and a number of research centres, foundations and associations operating in Life Sciences. From May 2009 to date, approximately 80 member organisations of the regional community have signed a specific agreement to create and develop its activities with particular orientation towards issues related to human health. These organisations are the "key" to the development of bioPmed. The Piedmont cluster is based on the integration of significant strong points in the research field (4 Universities, one Polytechnic and a number of research centres operating in the field, such as IRCC Candiolo, Bioindustry Park, INRIM, foundation Deo Temple, the CNR laboratories, etc.), synergistic centres and training activities, the presence of large companies of international importance (Bracco, Merck-Serono, Sorin Cardio, Diasorin, Sanofi, Takeda, etc.), SMEs which are growing fast and were able to attract over € 55 million, in the last 5 years, from venture investors including foreigners (Creabilis, AAA, Bioman, CID, Nanovector, Aethia, Agrolabo, Procelltech, EPHORAN, Intrauma, Wisident, DIPRO, Constantine, etc.), as well as synergistic and enabling organisations such as specialised incubators and science parks (2I3t, I3P, ENNE3, Incubator Bioindustry), together with activities of technology transfer and support to growth (Piemontech, Eporgen). The cluster also makes use of companies of absolute excellence in synergistic and "integrable" areas, such as electronic (Bio-electronics, diagnostics, etc.), data processing (Bio-informatics), mechanical (Bio-mechanics), environment, etc. The cluster bases its development both on its ability to return to the territorial system positive effects on the implementation of strategic initiatives such as Bioindustry Park, BioPmed, "city of health" initiatives, and on an international standpoint based on the European system of projecting as well as on agreements and cooperative activities with neighbouring land areas such as the Rhone-Alpes.



Toscana Life Sciences Foundation as Technical Secretariat of the Tuscan Technological Cluster for Life Sciences and Managing Body for the relative Innovation Centre. In Tuscany the Life Sciences sector is based on an advanced training offer conferred by the presence of three major universities, three high schools (Scuola Normale and Sant'Anna in Pisa, IMT Lucca) and public and private research centres recognised internationally, as well as a quality health care system, with excellent skills and important health centres where numerous clinical trials are carried out. A third element is represented by a rich and varied entrepreneurial fabric, of a highly specialised vocation and particularly active in R&D. A recent mapping of the companies operating in the field of Life Sciences, showed 368 active enterprises in Tuscany, of which 206 have Life Sciences as their core business. In the main areas of Life Sciences, Biotech, Pharmaceutical and Medical Devices, companies of the Tuscan region represent 14%, 10% and 6% respectively of Italian companies. Based on the turnover the leading sector is seen to be the pharmaceutical industry, which represents 13% of the national figure thanks to the presence of companies such as Eli Lilly, Novartis Vaccines & Diagnostics and Menarini. According to data from Farindustria 2014, the total number of employees of the pharmaceutical industry in Tuscany is approximately 11,000 units, of whom 3,657 work in the biotech industry, a factor that helps to position Tuscany in third place after Lombardy and Latium.

As regards the number of employees in R&D, the dominant role of Tuscany is in in the Biotech sector which, with 677 employees, accounts for 40% of the national figure. The current framework is completed by a solid banking system, and major banking institutions sensitive to the concept of innovation as a driver of economic growth and well-being and open to support scientific research. Last but not least, the Region of Tuscany has always paid particular attention to the funding of R&D activities, with the view to enhancing the scientific results, ensuring the implementation of projects based on private-public partnership.