"Science Park or Innovation Pole? Descriptive results of a questionnaire investigation about physical and virtual locations"

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Abstract: The originality of this research work is given by the idea of investigating which are the differences and similarities between the agglomeration phenomena inside a science park and an innovation pole. To this goal, the Bioindustry Park Silvano Fumero and the innovative cluster BioPmed, located in Piedmont region in Italy, are deeply analysed through a structured questionnaire sent to a sample of firms, located in the park and/or member of the innovative cluster. More specifically, we focus on the recent novelty of creating innovation clusters based on a membership. These innovation clusters include companies that may be hosted also in a science park-incubator or not. Therefore, besides the patterns followed in the agglomeration phenomena, our questionnaire survey aims at understanding which are the main motivations for the location and the membership and which are the main perceptions and verdicts about these two possibilities. Finally, an interesting aspect is given by the comparison between the "physical" location inside a science park-incubator and a "virtual" location in an innovation pole.

Keywords: science park; incubator; innovation pole; cluster; location; business ecosystems

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1. Introduction

The present paper focuses on the agglomeration phenomena of firms inside a science park and an innovation pole/cluster[1], being the former a "physical" location and the latter a "virtual" location. To this goal, the Bioindustry Park Silvano Fumero and the innovative cluster BioPmed, located in Piedmont region in Italy, are deeply analysed through a structured questionnaire sent to a sample of firms, located in the park and/or member of the innovative cluster.

More specifically, the paper aims to investigate: (i) the pivotal motivations and the similar or different patterns driving these two agglomeration phenomena; (ii) the main similarities and differences between a "physical" location inside a science park or an incubator and a "virtual" location inside an innovation pole; (iii) the main problems/obstacles firms face in their growth process within the two structures.

The originality of this research work is given first of all by the idea of investigating which are the differences and similarities between the agglomeration phenomena inside a science park and an innovation pole. In the literature, several studies have been focused on the effectiveness of science parks and incubators (Colombo, Delmastro, 2002; Link, Scott, 2007) as well as on the differences between on-park and off-park companies (Lindelof, Lofsten, 2004; Squicciarini, 2008). Nevertheless, the debate on the effectiveness of these structures is still open (Rothaermel, Thursby, 2005; Schwartz, 2009; Sofouli, Vonortas, 2007; Siegel *et al.*, 2003; Mian, 1996).

This paper is one of the first attempts at providing evidence on an aspect not deeply investigated till now. More specifically, we focus on the recent novelty of creating innovation clusters based on a membership where the cluster is identified and managed by a dedicated organisation for the realization of activities of common interest, the so-called "cluster management company". Usually such clusters are a component, frequently the most dynamic and high-tech one, of larger regional communities identified by sectorial communalities/markets or by the use of the same technologies. These innovation clusters include companies that may be hosted also in a science park-incubator or not. Therefore, besides the patterns followed in the agglomeration phenomena, our questionnaire survey aims at understanding which are the main motivations for the location and the membership and which are the main perceptions and verdicts about these two possibilities. Finally, an interesting aspect is given by the comparison between the "physical" location inside a science park-incubator and a "virtual" location in an innovative cluster. Can we

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[1] "*Innovation Clusters are pools of enterprises – from innovating start-ups to large multinationals – and research organizations, coordinated by a managing body and focused on specific sectors and geographical areas*", (Conicella, Baldi, 2011: 10). See also Conicella, Bassi (2011).

argue that the Internet and the ICT technologies (Benghozi et al., 2009) can be useful alternatives and/or complementarities to a physical location inside a science park-incubator? How? Our questionnaire survey sent to all the members of the cluster BioPmed has the goal to provide first insights to these questions and to provide useful policy suggestions for future improvements in this field.

The paper is structured as follows. The introduction is followed by a literature review on "traditional" science parks and "emerging" innovation poles/clusters in high tech sectors. The Italian Bioindustry Park and BioPmed innovation cluster are described in section two. Section three focuses on the methodology applied. Section four describes the results of the questionnaire investigation through descriptive statistics. Discussion with policy recommendations and conclusions follow.

2. Traditional science parks and emerging innovation clusters

According to Link and Scott (2003: 1325) and to Link and Link (2003: 81), "*the definition of a research or science park differs almost as widely as the individual parks themselves*". Several definitions of a science park have been proffered in recent years (Link, Scott, 2006): the emphasis is on technology transfer from the university, on the knowledge flow and on regional economic growth. Generally speaking, the term "science park"[2] is usually used to describe a property based initiative that has formal and working links with a university or other higher education institutions or research centres. A science park is a business support and technology transfer initiative that encourages and supports the start up, incubation and development of innovation led, high growth, knowledge based businesses, provides an environment where larger and international businesses may develop specific and close interactions with a particular centre of knowledge creation for their mutual benefit (Parry, Russell, 2000; Ferguson, Olofsson, 2004).

The earliest parks were established in North America in the 1950s (Cesaroni, Gambardella, 1999; Colombo, Delmastro, 2002; Sofouli, Vonortas, 2007; Link, Scott, 2003; Link, Link, 2003; Wessner, 2009), while in Italy the first science parks were established in the 1980s: Area Science Park of Trieste in 1982 and Tecnopolis Novus Ortus of Bari in 1985. Since the end of the 1990s, almost every Italian Region has at least a science park (Sancin, 1999).

Notwithstanding their dimension and heterogeneity, the rationale for the creation of science parks has traditionally been considered proximity to university laboratories and research centres, the

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[2] The term "science park" is more prevalent in Europe, while the term "research park" is more prevalent in the United States and the term "technology park" is more prevalent in Asia (Link, Scott, 2007: 661).

presence of an incubator, the creation of networking opportunities, the role as bridging institution providing tenant firms with suitable accommodations and technical and business services (Colombo, Delmastro, 2002; Link, Scott, 2003, 2006, 2007). Nonetheless, thanks to the ICT revolution and the diffusion of the Internet (Benghozi *et al.*, 2009) in recent years new strategies need to be implemented. In particular, the "physical dimension" of a science park seems to be not enough in a globalized world. In other words, "*quantitative dimension and physical concentration of assets alone are not enough to assure growth and prosperity*" (Conicella, Baldi, 2012: 4). Key words such as networks, open innovation, communities, clustering, business ecosystems, innovation poles, are emerging as renewed interest and enabling factors of a new science park strategy. This new approach requires a sort of cultural change and mind attitude not only on the side of the managerial structure of the park, but also on the side of company attitudes as well as changes in skills and organization. A *co-opetition* approach (Brandenburger, Nalebuff, 1997), meaning cooperation and competition, has to face several challenges in the era of the Internet and the ICT revolution, also because "*collaboration is competition in a different form*" (Hamel *et al.*, 1989: 134). And according to Moore (1993: 76), "*it's competition among business ecosystems, not individual companies, that's largely fueling today's industrial transformation*". Moore (1993) makes the example of the US Wal-Mart: an ecological analysis reveals how a relatively small company could turn its original isolation to advantage by the creation of a complete business ecosystem. In this context, science parks and incubators have always a key role to play in the first years of life of newly established companies and they now have the opportunity to build innovation poles/innovative clusters among different companies but with the same goal of surviving and improving innovation performance or growing. Traditional clusters may be defined as "*geographic concentrations of interconnected companies, specialized suppliers, services providers, firms in related industries, training institutions and support organizations linked around technologies or end product within a local area or region*" (Porter, 1990). At territorial level "*through their value networks and proven channels between businesses, research and academics, clusters provide efficient catalysts for innovation policy interventions...possibilities exist to further enhance the quality of cluster activities*" and therefore contribute to Europe 2020 strategy (Reiner, Gelzer, 2010: 2). Clusters are nowadays a pivotal element of Europe's economic context: while most successful clusters[3] are market-driven and are a spontaneous factor, since the end of the 1990s an increasing

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[3] Traditionally, "a cluster can be broadly defined as a group of firms, related economic actors, and institutions that are located near each other and have reached a sufficient scale to develop specialised expertise, services, resources, suppliers and skills", (Commission of the European Communities, 2008: 2).

number of clusters is the result of forward-looking public policies (Commission of the European Communities, 2008). More and more innovative clusters are perceived as a tool both for the maintenance of "economic welfare" at regional level and for the support to growth of innovative sectors. Such last aspect has to be outlined. In recent years, particularly at EU level, attention has been moved from the concept of innovative clusters as a way to stimulate a particular technological field (the so called "technology based clusters") to a different approach that fosters clusters that are regrouping actors synergistic from a market point of view and based on different and complementary assets. The so called "smart specialisation approach" is a direct consequence of such a vision. Following this approach *"it should be understood at the outset that the idea of smart specialisation does not call for imposing specialisation through some form of top-down industrial policy that is directed in accord with a pre-conceived "grand plan"* (Foray *et al*., 2009). This approach is different and opposite to the one used to plan, develop and implement science parks that usually are conceived following a "top-down approach". At the same time science parks and industrial associations are in the best position to develop such smart specialisation clusters: the reality of science parks allow the development of high sensibility towards the final market and the ability to integrate complex "systems", e.g. in technology transfer projects, in launching converging technologies, R&D activities and in supporting the development of innovative start-ups. This is particularly true in high-tech sectors and in market that are continuously based on innovations such has health care, energies, new materials and so on. As a consequence, the establishment of innovation poles/clusters, fostered by the science park-incubator involvement, seems to be an interestign phenomenon that contributes to this aim. From these considerations it can be assumed that science parks have frequently now "*a "double role": manager of the physical science park and coordinator of the local ecosystem*" and "*they have to build communities of actors also out of the physical boundaries of the science park*" (Conicella, Baldi, 2012: 8 and 12).

3. The Bioindustry Park Silvano Fumero and BioPmed innovation cluster

The Bioindustry Park Silvano Fumero[4] (BIPCa SpA – Colleretto Giacosa, TO, Italy) is located 40 km far from Turin (Piedmont region – North West of Italy) and it has been realized with an entrepreneurial approach in order to promote and develop biotechnology research. The park is a joint stock company with over 12 million Euro of registered capital (31 December 2011). It has been conceived as a challenge for revitalizing the regional industrial policy through a territorial

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[4] www.bioindustrypark.eu

strategic tool supporting the introduction and the growth of a new sector - "life science" - in a territory based mainly on mechanics, electronics and ICT (Conicella, Baldi, 2011). The Bioindustry Park is a science and technology park with an area of 70,000 sq.m. equipped for production activities and 16,000 sq.m. of laboratories, offices and pilot production plants. It is the second biotech science park in terms of size and importance in Italy (Buchi *et al.*, 2010; AA.VV., 2010).

It is operational since 1998 and it has as shareholders public institutions and private companies. The Bioindustry Park has been realized in the context of European Union Structural Funds, with contributions from the European Fund for Regional Development, and is jointly financed by the State and the Regional Authority, who granted a total investment of 52 million Euro. The Park promotes and develops research in biotechnologies and life sciences. More specifically, it hosts national and foreign companies, small and medium enterprises, that intend to undertake research activities and experimental production in the chemical, pharmaceutical, diagnostic, veterinary, agro-food, cosmetics, bioengineering and information technology (Conicella, 2010; Conicella, 2011; Conicella, Bassi, 2011). Attracting companies, creating start-ups, realising technology transfer activities and acting as hub for international networking are still the main aims of the Park (Conicella, 2010). Bioindustry Park in this role is acting as a real System Integrator that enables the use of synergies between public and private initiatives (Conicella, 2011). The international dimension is particularly important: biotech sector is global in its nature. Critical mass, systemic approach, internationalisation are key factors (Conicella, 2011). Another pillar of the structure is supporting the creation of innovative and focused start-ups. Clustering activity, last but not least, allows the Park to be a contact point for more than 100 companies located in the Region not only for partnering research at the world level but also for supporting them in marketing activities. The Bioindustry Park has also a Bioincubator realized in the context of Piedmont region 2000 - 2006 DOCUP (programming single document of the Region).

"*The science park developed a quite interesting governance model based on a triplehelix, private public partnership approach*" (Conicella, Baldi, 2011: 9) with a shared vision of fostering entrepreneurship development and research results transfer. The Park is a private company with public majority and the presence of two major pharma companies (Merck-Serono and Bracco), local public administrations and regional financing institutions as shareholders. According to Conicella and Baldi (2012: 9) "*results of the first 10 years of life of Bioindustry Park are confirming that it is possible to develop an high tech sector through a science park approach: around 35 different organisations (big companies, SMEs, start-ups, universities, associations) with*

a total of around 500 workers are located in the Park area. Other 4 companies with around 300 workers are located in a 10 kilometres distance from the Park. All those organisations except 2 have located in the area after the creation of the Science Park". Furthermore, "*after more of 10 years of activity Bioindustry Park has a percentage of occupation of 95%, hosts around 30 different organizations and more of 500 employees and is well positioned at local, national and international level*" (Conicella, Baldi, 2011: 10). The Bioindustry Park hosts more than 35 different organizations (December 2011) and it is in contact with more than 360 companies[5], many of them are formally committed to boost the cluster BioPmed. After ten years of successful initiatives in the life science sector, the Park "*has realized that to maximize the return from the territory it is necessary to "go out" of the physical boundaries of the science park*" (Conicella, Baldi, 2011: 11). Therefore, in order to foster the further development of the park, an innovative cluster policy scheme seemed to be a good opportunity (Conicella, Baldi, 2011) and the Bioindustry Park developed the BioPmed initiative[6] as a focused and sectorial life science cluster project. BioPmed is the Innovation Cluster for the biotechnology and medtech sectors in Piedmont region, launched in May 2009. "*According to the EU recommendations, it is a grouping of independent undertakings — innovative start-ups, small, medium and large undertakings as well as research organisations — operating in a particular sector and region and designed to stimulate innovative activity by promoting intensive interactions, sharing of facilities and exchange of knowledge and expertise and by contributing effectively to technology transfer, networking and information dissemination among the undertakings in the cluster*" (Conicella, 2011: 13; Conicella, Bassi, 2011: 11; Conicella, 2010: 48).

BioPmed is one of twelve innovation clusters promoted by Piedmont Regional Authority within the POR-ERDF 2007-2013[7] program. The Bioindustry Park has won the call for managing body and it has been appointed as the managing company of this cluster that has a focus on life sciences for healthcare. As of December 2011, BioPmed comprised 80 organizations, including large companies, SMEs, universities and research centres working in the life sciences sector, signatories of a formal agreement on its creation and development (Conicella, Baldi, 2011; Conicella, Bassi, 2011).

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[5] The list of companies part of the enlarged network of the Bioindustry Park is on-line at the following address: www.BioPmed.eu

[6] For further information, see the websites www.BioPmed.eu ; www.piemontebiosciences.org

[7] "*The Regional Operating Programme (POR) Regional Competitiveness and employment is the planning tool of the European Fund for Regional Development (ERDF),whose financing aims to boost competitiveness of the regional system, leveraging both the capability to produce and absorb new technologies and the ability to use natural and environmental resources in a sustainable model of development*", (BioPmed report 2009/2010: 7).

Main pillars of BioPmed are: project building, community building, sharing facilities, information and promotion at international level. The overall aim of this initiative is to develop the local bio/med-tech cluster in order to sustain the growth of all its players, particularly the companies. The cluster is thus focused on issues related to company start-up, to development of the entrepreneurial system and of local and international synergies, to the study and resolution of intellectual property concerns and, of course, to the development of networks with academia and the research world (Conicella, Baldi, 2011; Conicella, 2011; Baldi *et al*., 2010; BioPmed report 2009/2010). The Bioindustry Park, with a role of cluster leader, plays the following roles: it is in charge of the innovative cluster project; it acts as an interface between regional authorities and the cluster members; it inspires, coordinates and promotes the overall activities (BioPmed report 2009/2010). The managing body enables also the participation of the cluster in several Italian, European and worldwide projects. These projects have the goal to foster technology transfer and spreading of know-how and skills. In such a way, services, knowledge and tools not previously available in the Region, are therefore available for the members of the cluster.

4. The methodology

The idea of a questionnaire as a method of analysis was introduced because of the difficulties in collecting face to face interviews and because of the necessity to have a standard set of questions for a comprehensive investigation. The questionnaire included multiple-choice questions usually with the use of the Likert scale and some open questions for collecting ideas and suggestions from respondents. The questionnaire has been divided in the following sections:

Section 1: general characteristics of the company

Section 2: hospitality in a science park-incubator

Section 3: innovation pole/cluster

Section 4: differences between the location in a science park-incubator and in an innovation pole/cluster.

Descriptive statistics from the questionnaire answers will be illustrated in the following section.

5. Results from the survey

The questionnaire has been sent through e-mail to the universe of companies in contact with the Bioindustry Park between February and March 2012. The sample of company respondents has been 33 in total. This low percentage of questionnaire respondents is anyway enough for providing

a sort of case-study analysis. In fact, these 33 companies provided interesting answers that can be considered a useful starting point for future research and policy strategy improvement.
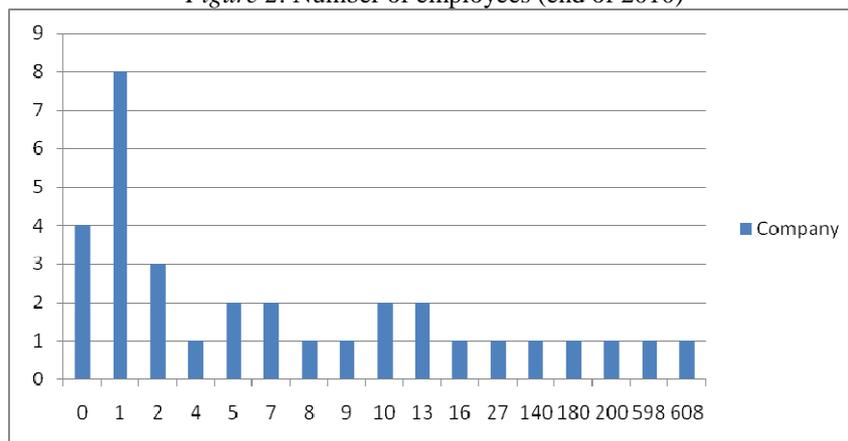
According to *Section 1*, most of the questionnaire respondents are limited companies (srl) and they have been created with an increasing trend in the last ten years (Figure 1).

Figure 1: Year of creation
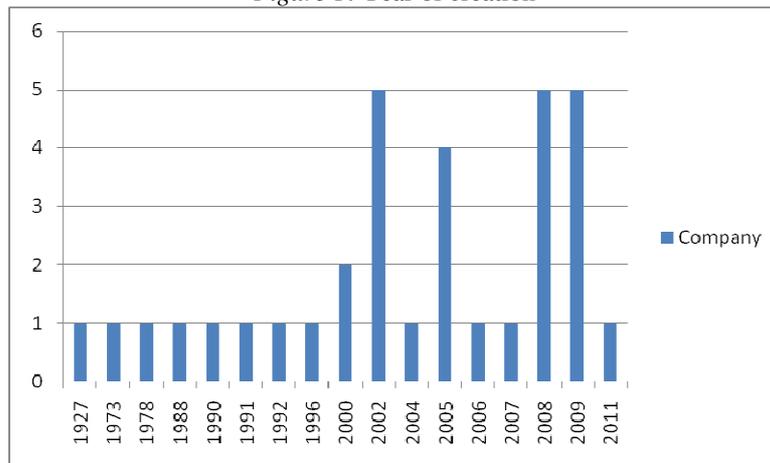
The number of employees is very low (Figure 2) with few exceptions.

Figure 2: Number of employees (end of 2010)

Many companies did not report any turnover both in 2009 and in 2010, with few cases of medium or very high turnover (Figures 3 and 4).

Figure 3: Turnover (2009)
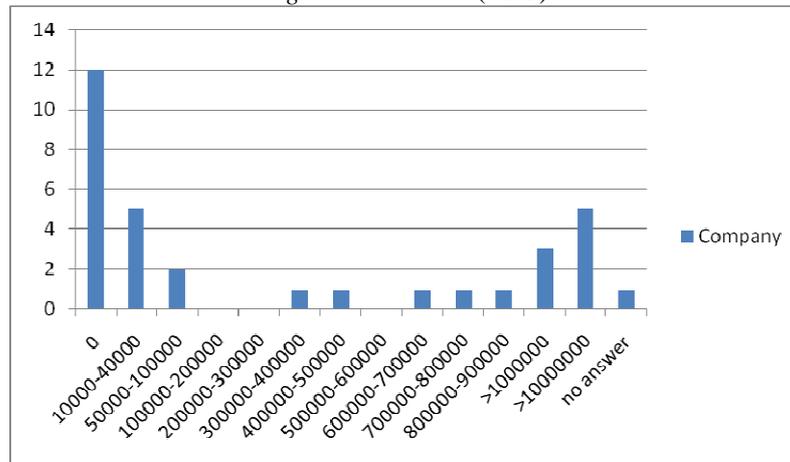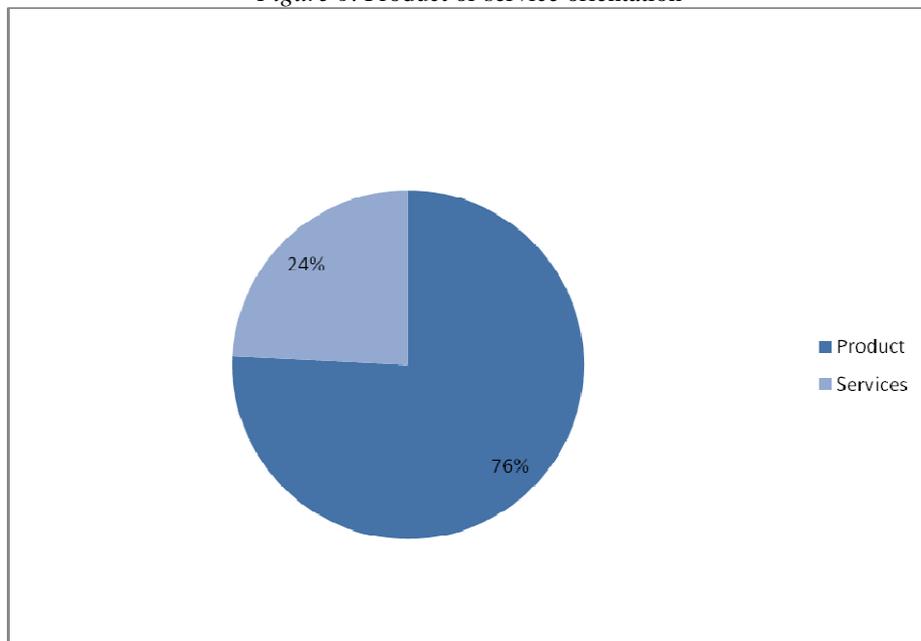

Figure 4: Turnover (2010)
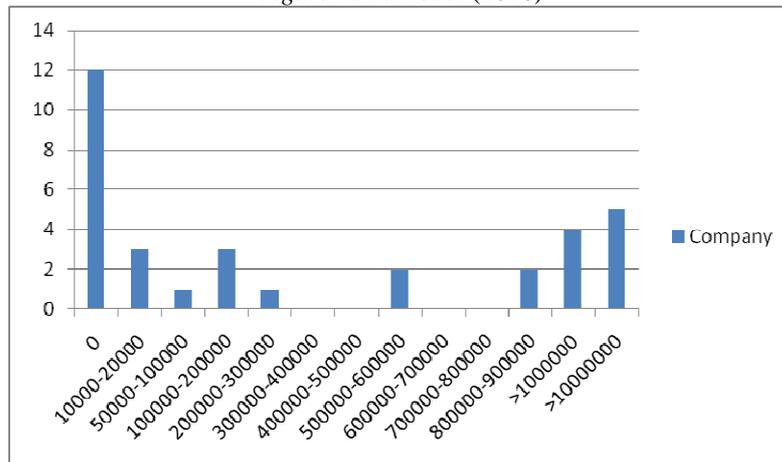
These companies have a very high international attitude: the international market is clearly predominant and for the most part in extra-EU countries (Figure 5).

Figure 5: Market
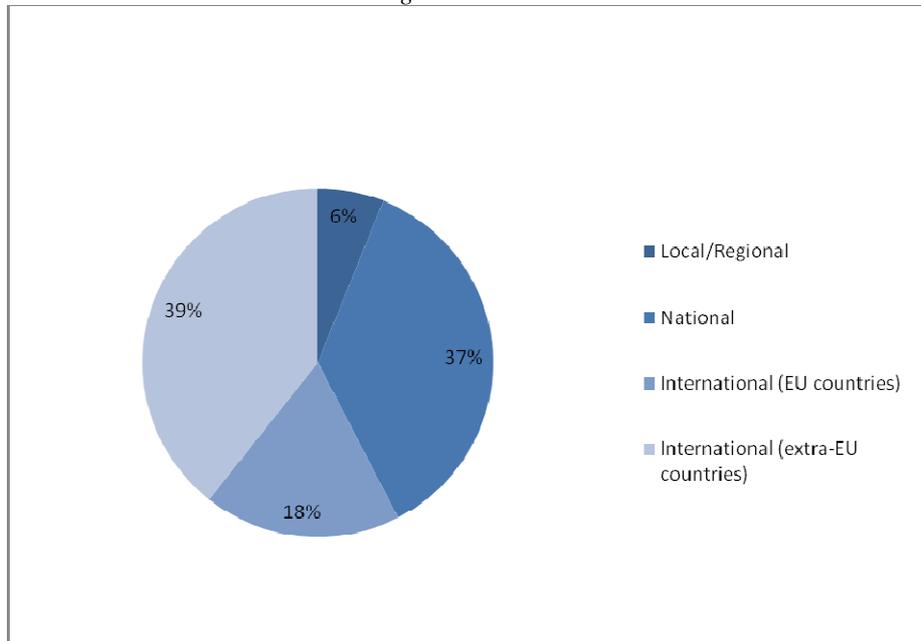
The question about the business model (Figure 6) has shown a majority of product companies (76%) compared to service ones (24%).

*Figure 6*: Product or service orientation

Notwithstanding the strong international attitude and the product orientation, this sample of companies has no patents or only one or two patents with few exceptions that have sometimes many patents (Figure 7).

*Figure 7*: Number of patents
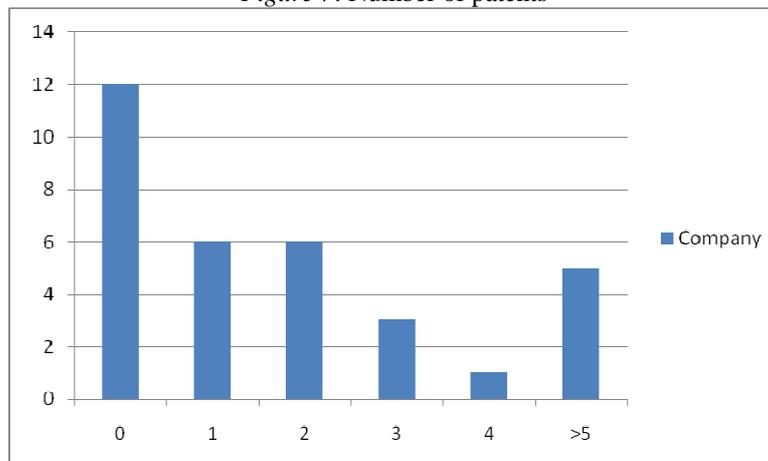
The first patent was obtained mostly in the last ten years while the most recent patent was obtained between 2009 and 2011. According to the company's international attitude, these patents have an extension at the international level (Figure 8).


Figure 8: Extension of patents
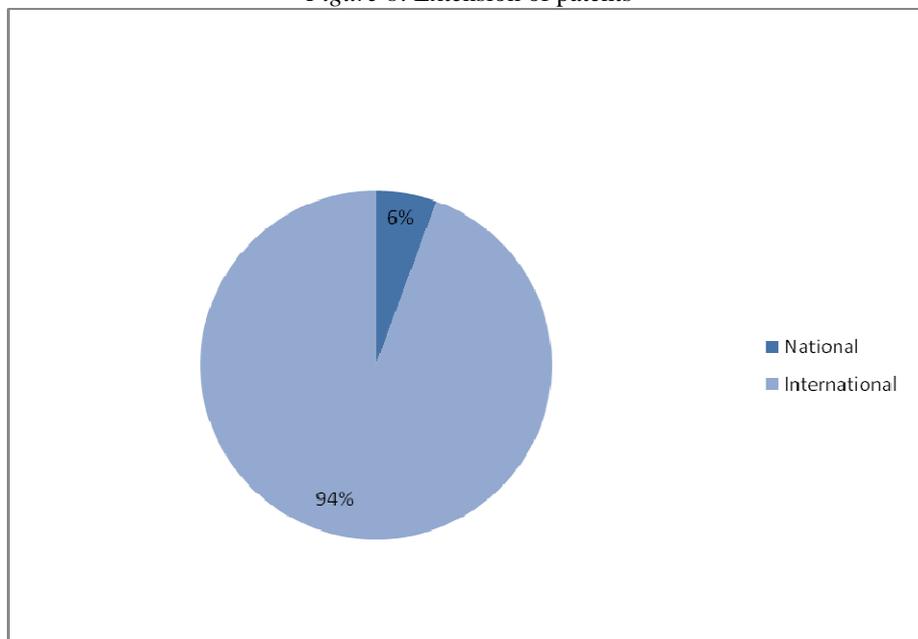
The distribution of companies hosted in a science park and/or member of BioPmed or of another innovation pole, has revealed the following results: most of these companies are both hosted in the Bioindustry park and member of BioPmed (40%) or they are only BioPmed members (39%), (Figure 9).

Figure 9: The company is:
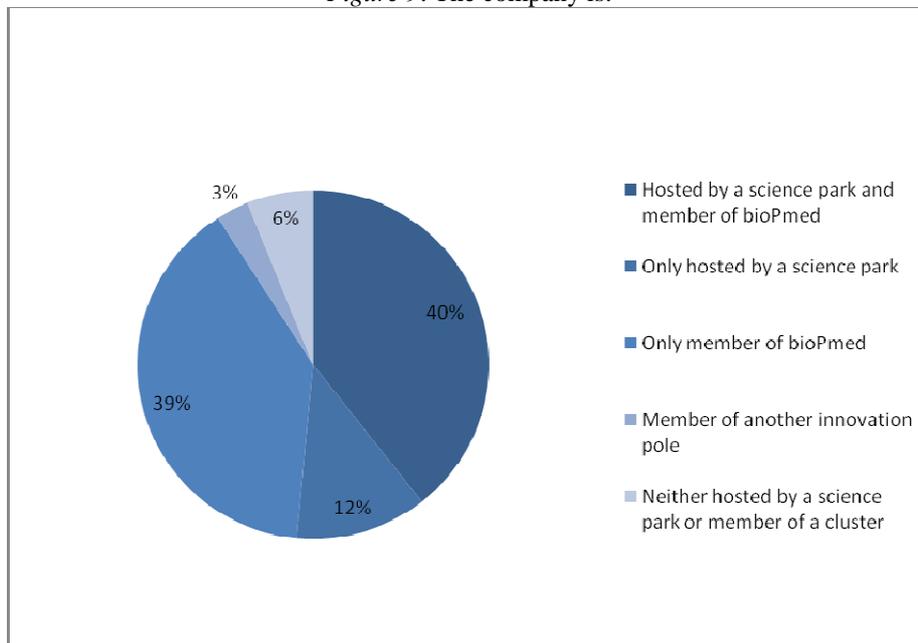
According to *Section 2*, on-park questionnaire respondents are hosted in the science park-incubator since recent years (Figure 10).

Figure 10: The company is hosted in a science park since the year:
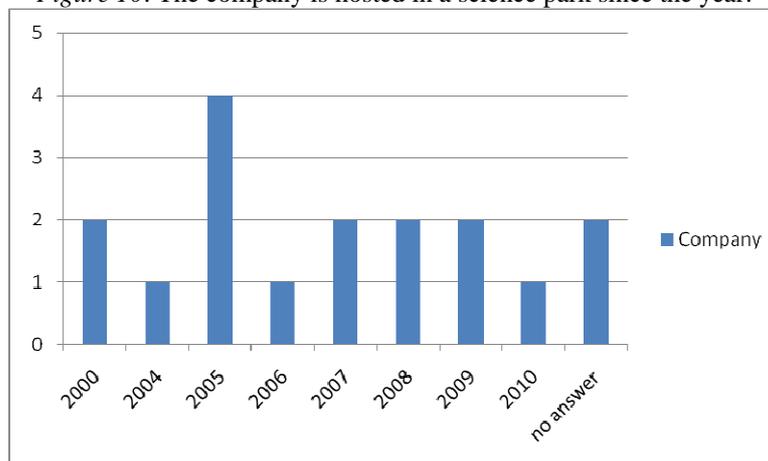

Main reasons for the hospitality in the science park-incubator have been investigated through a Likert scale question with several possible answers and choices between 1-no influence at all, 2-low influence, 3-medium influence, 4-high influence, 5-very high influence. The rating average of the collected answers has revealed an higher score for the possibility to use the resources provided by the park as well as for prestige and visibility motivations and guarantees of reliability (Figure 11).

Figure 11: Main reasons for being hosted in a science park (rating average between "1-no influence" and "5-very high influence")
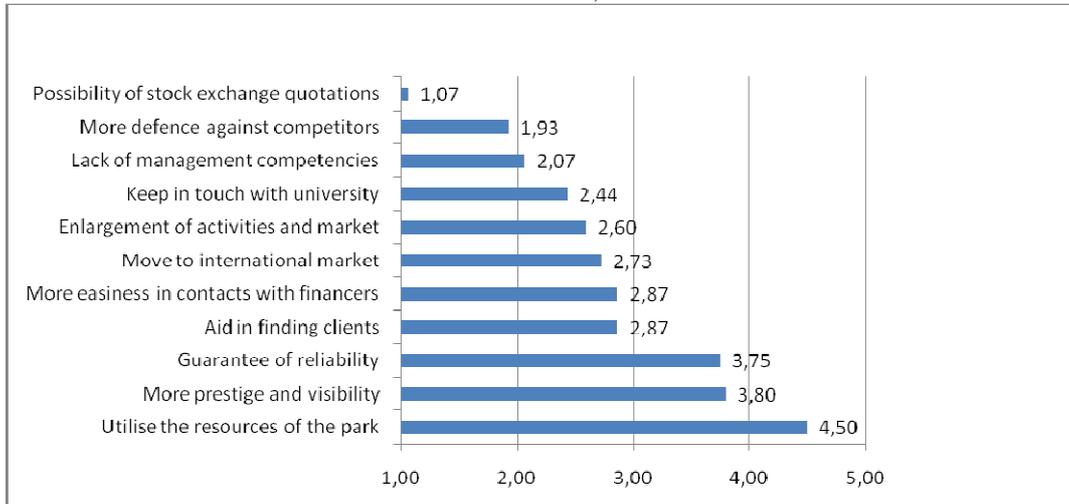

In line with the results for the hospitality motivations, main advantages coming from the hospitality in the science park-incubator have been a greater visibility and the possibility to use the services provided by the structure (Figure 12).

*Figure 12*: Main advantages of hospitality in a science park (first and second choice)
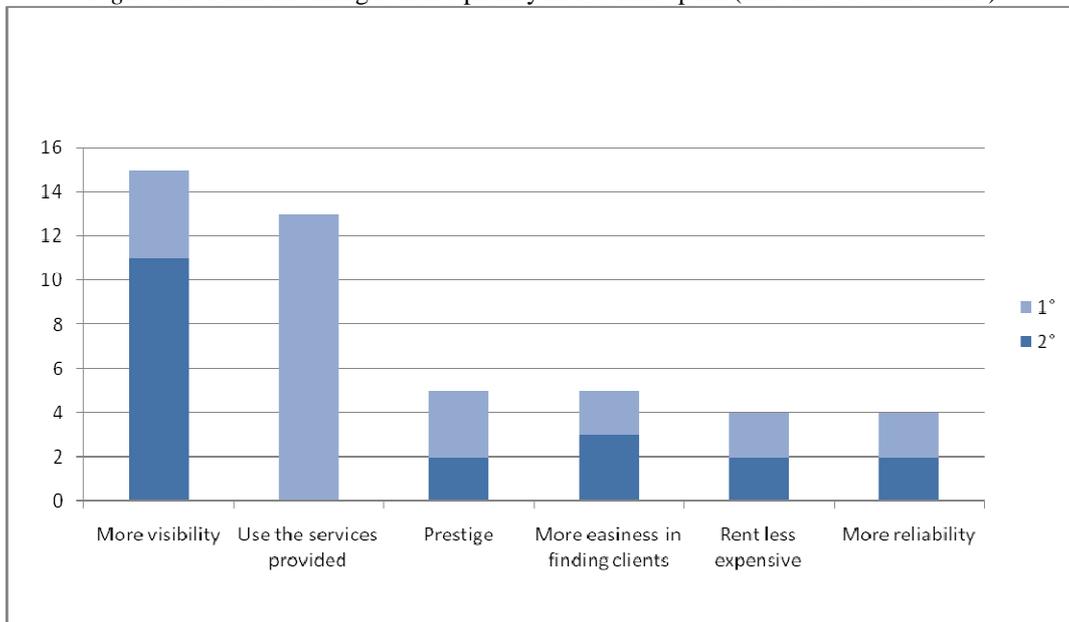
Furthermore, the answers about the main services utilized by on-park companies have revealed a very similar distribution among all the possibilities in answer, meaning that these companies have a tendency to use all the services provided by the structure, with the only exception of a tutorship service (Figure 13).

Figure 13: Main services utilized by hosted companies
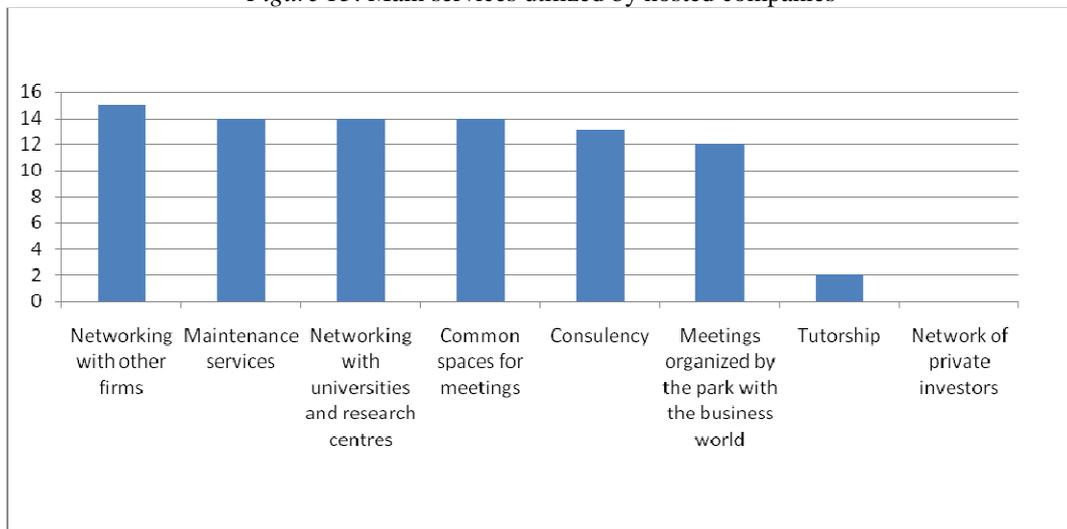
The overall verdict on the hospitality provided is very good (Figure 14).

Figure 14: Verdict on the hospitality provided by the park
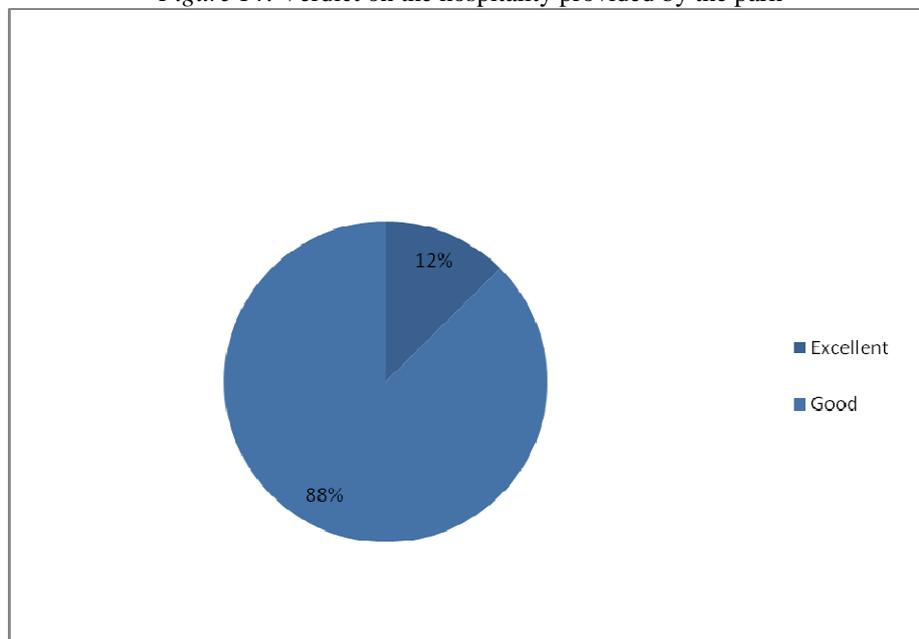
And according to their strong international propensity, these companies have chosen *international promotion activities* (72%) as the main service to be further implemented and developed (Figure 15).

Figure 15: Main services to be improved
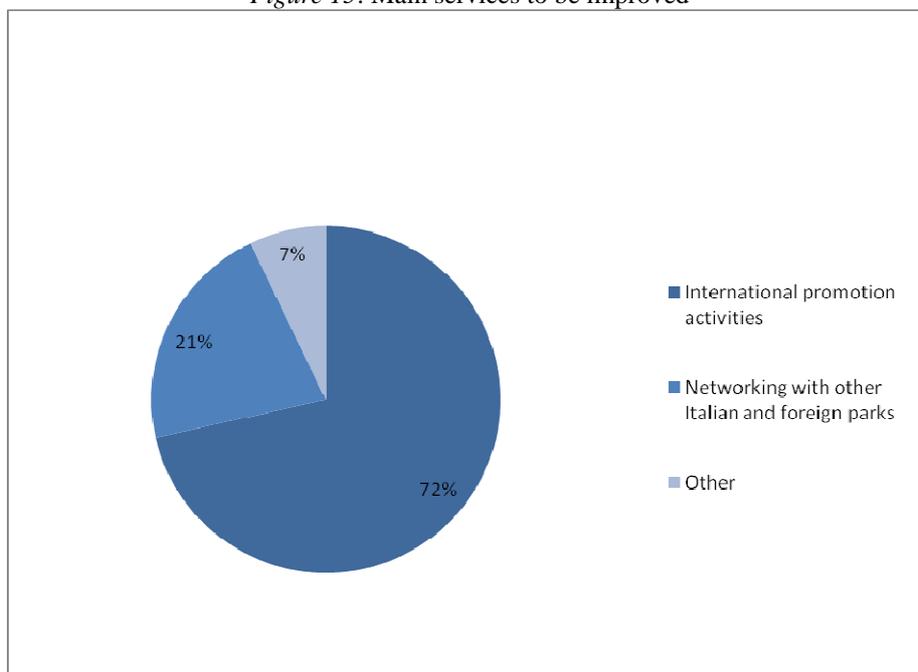
Questionnaire respondents were invited to indicate also the main advantages coming from the location in the park: this open question has revealed the following answers. First of all, the park is considered as a suitable solution for developing ideas and innovative projects and it is useful for networking contacts; secondly, the services provided are appreciated; thirdly, the possibility to become member of a group of excellence and have access to high quality human resources is an important advantage. On the other side, the main disadvantage highlighted by the respondents is linked to the transport infrastructure, meaning the lack of a good train connectivity to the park as well as the distance from Milan and other main cities. As a consequence, this could mean a perception of little visibility. Notwithstanding, the question about the importance of location has revealed an overall lack of importance of the distance of the park from universities and other research centres (Figure 16).

Figure 16: Distance of the park from universities and research centres
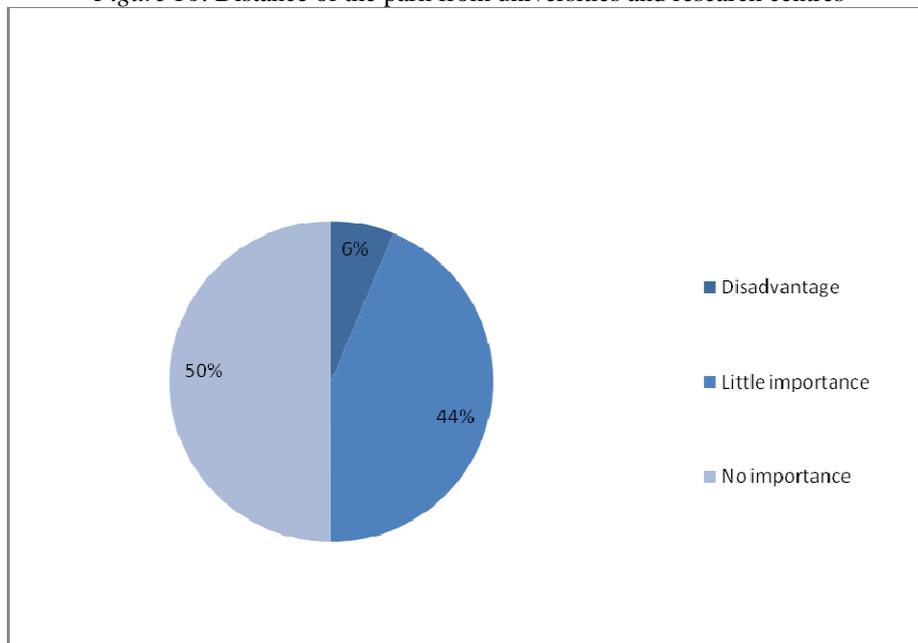
According to *Section 3*, most of the respondents are members of the cluster BioPmed since the year 2009 (Figure 17).

Figure 17: Member of BioPmed since the year
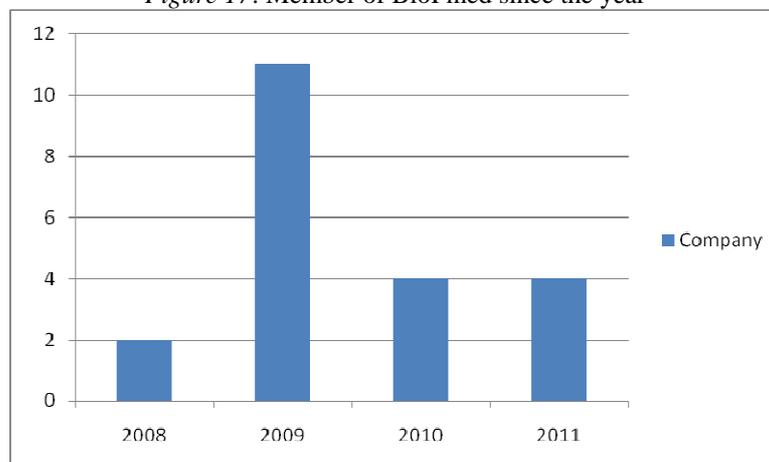
Main motivations and expectations for joining BioPmed have been: the opportunity to establish collaborative research projects, followed by the possibility to improve innovation performance as well as collect new ideas and improve company competencies. Other key motivations have been networking opportunities and the possibility to undertake feasibility studies, followed by new products and company competitivity and visibility improvement. The choices that have been considered of minor importance are the ones linked to solutions for company problems, lower company costs and reduce the time-to-market (Figure 18).

Figure 18: Main motivations for joining BioPmed (rating average between "1-no influence" and "5-very high influence")
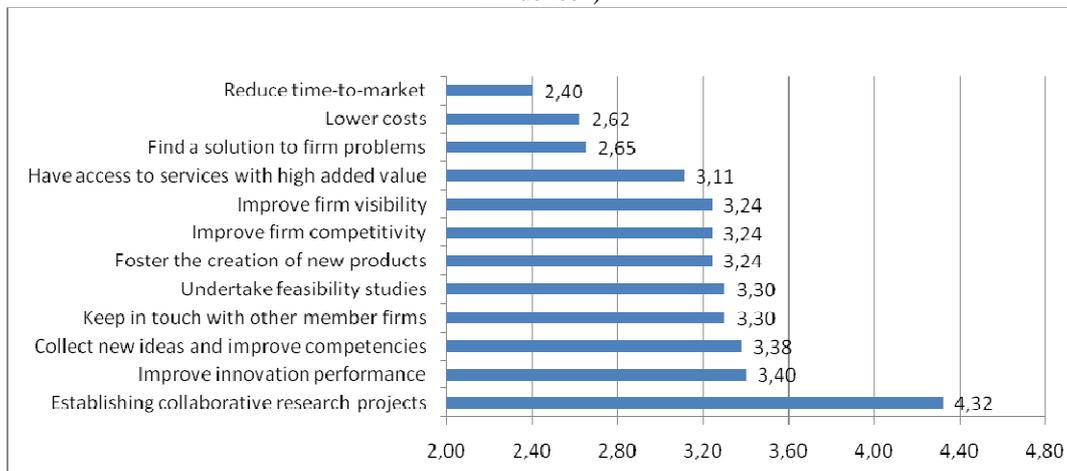
Main risks and barriers to be afraid of have been: lack of time, administrative burdens and lack of collaboration among the BioPmed members, followed by communication and IPR problems. Lack of trust among the members has been a risk of minor importance (Figure 19).

Figure 19: Main risks and barriers to be afraid of (rating average between "1-no influence" and "5-very high influence")
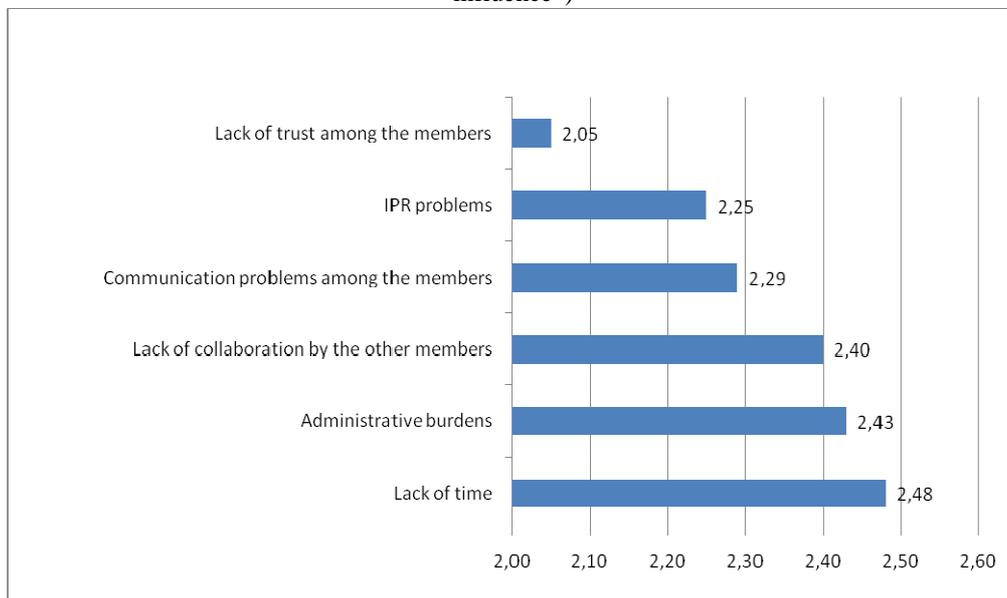
Thinking about the experience of being a BioPmed member, main advantages coming from this membership have been: company competencies improvement, networking establishment, more visibility and the creation of collaborative agreements. According to Figure 18, ideas for new products and reduction of the time-to-market have not been considered as first key advantages (Figure 20).

Figure 20: Main advantages from BioPmed membership (rating average between "1-no influence" and "5-very high influence")
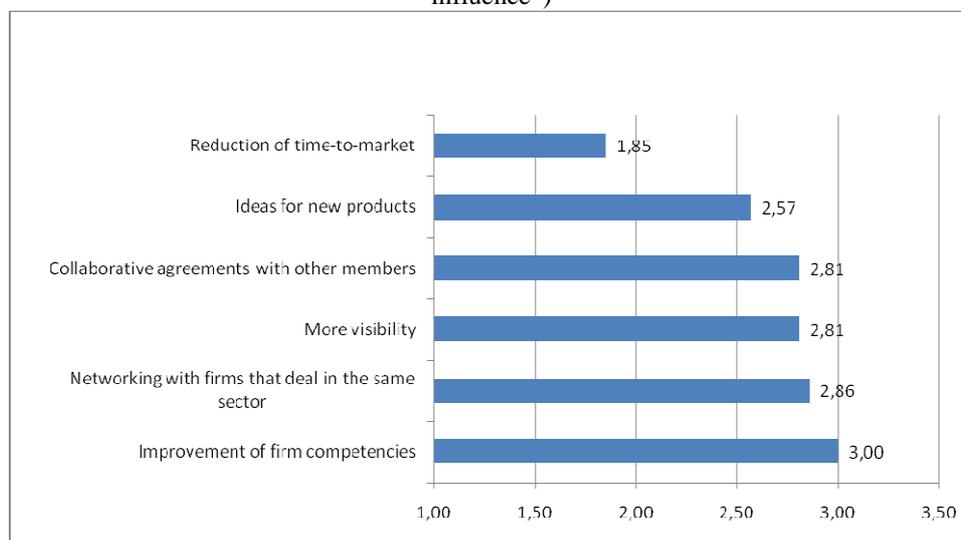
A last question of this section has investigated the main aspects that need to be improved. According to the questionnaire respondents, this open question has revealed that BioPmed members need to have a faster communication channel between BioPmed manager and public institutions as well as more information, advice and aid in filling the calls for projects and in fostering networking among the cluster members through meetings and common initiatives. Furthermore, more visibility and transparency could help the creation of a sense of community: to this aim, the establishment of a chronological repository of all the common communications from BioPmed and other actors to the cluster members would be a good solution.

Finally, *Section 4* has focused on the difference between a physical location in a science park and a virtual location in a cluster-innovation pole. Questionnaire respondents have indicated a science park (57%) as more important for the creation of aggregation phenomena with other firms compared to a cluster (Figure 21).

Figure 21: Cluster or science park location?
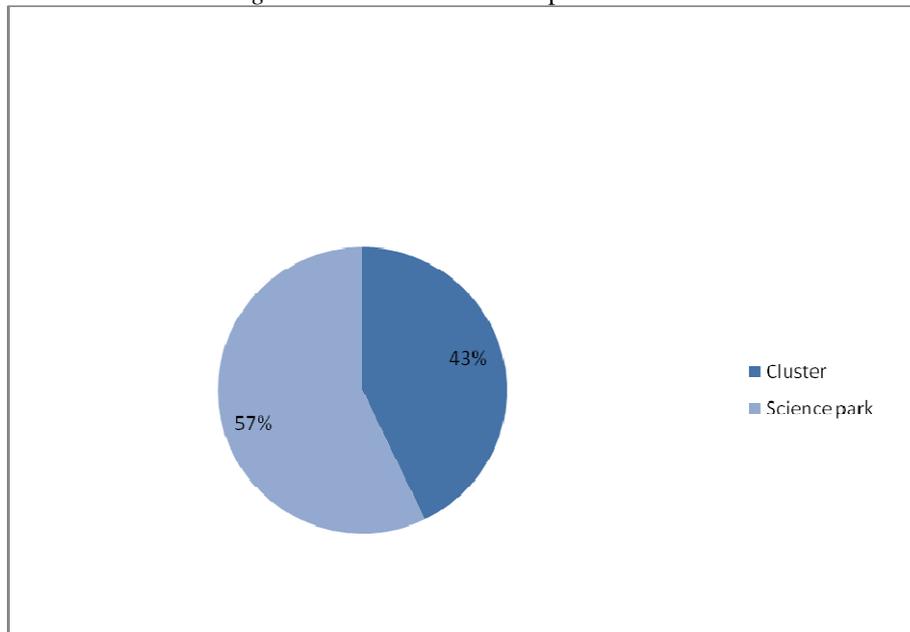
Main reasons for this choice are linked to the fact that a location inside a science park provides more opportunities and more possibilities of networking and exchange of opinions among firms located one near to the other and coordinated at central level by the park structure.

Among the factors that are strictly linked to the location in a cluster-innovation pole, questionnaire respondents have chosen collaboration opportunities as the most important aspect, followed by new products and market enlargement. The creation of social links has been considered of minor influence (Figure 22).

Figure 22: Which of the following aspects mostly come from the location in a Cluster? (rating average between "1-no influence" and "5-very high influence")
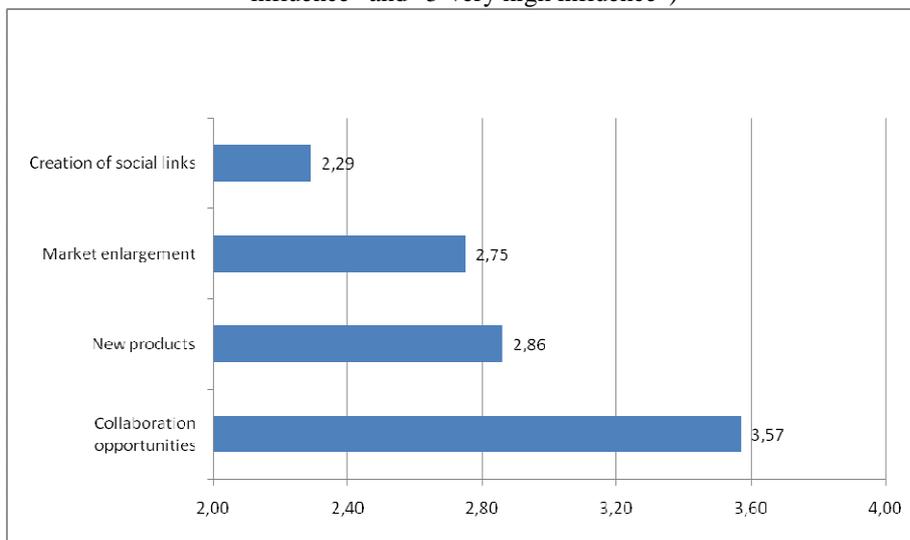
On the other side, among the factors that are strictly linked to the location in a science park, questionnaire respondents have chosen again collaboration opportunities as the most important aspect, followed by the creation of social links and new products. Market enlargement has been considered of minor influence (Figure 23). Therefore, the creation of social links has been clearly perceived by questionnaire respondents as more linked to the physical location inside a science park than to the virtual location inside a cluster-innovation pole.
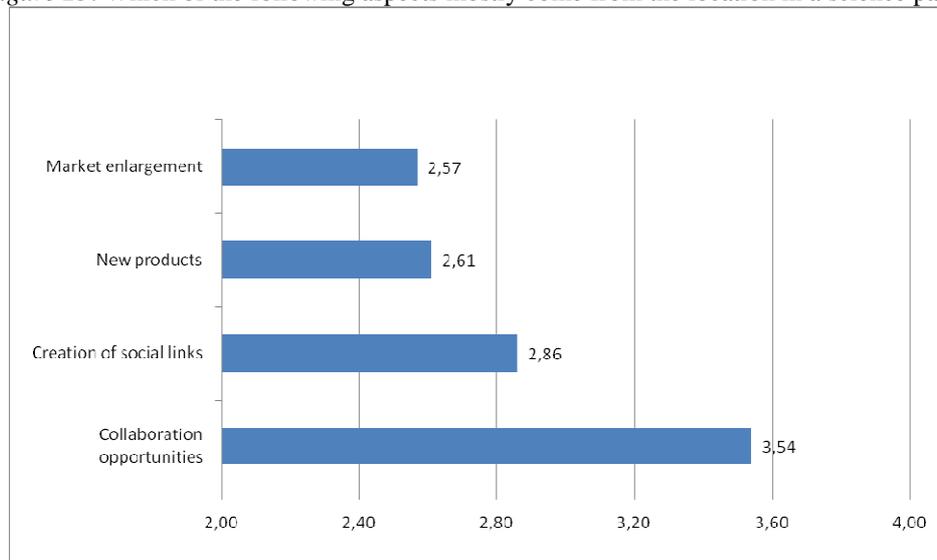
Figure 23: Which of the following aspects mostly come from the location in a science park?

Finally, a last question investigated the main similarities and differences in aggregation phenomena between the location inside a science park or a cluster-innovation pole (Figure 24). Questionnaire answers have revealed a prevalence of absence of difference, because aggregation phenomena follow similar patterns (39%), followed by little difference among the two locations, with a prevalence, as expected, of a science park location (29%) compared to a cluster one (21%). 7% of the respondents underlined the stronger usefulness of a science park location compared to a cluster one (4%).

Figure 24: Similarities and differences in aggregation phenomena between a cluster and a science park

- No difference, because aggregation phenomena follow similar patterns
- Little difference, but Cluster is more important for aggregation phenomena
- Little difference, but Science park is more important for aggregation phenomena
- High difference: Cluster is more useful
- High difference: Science park is more useful
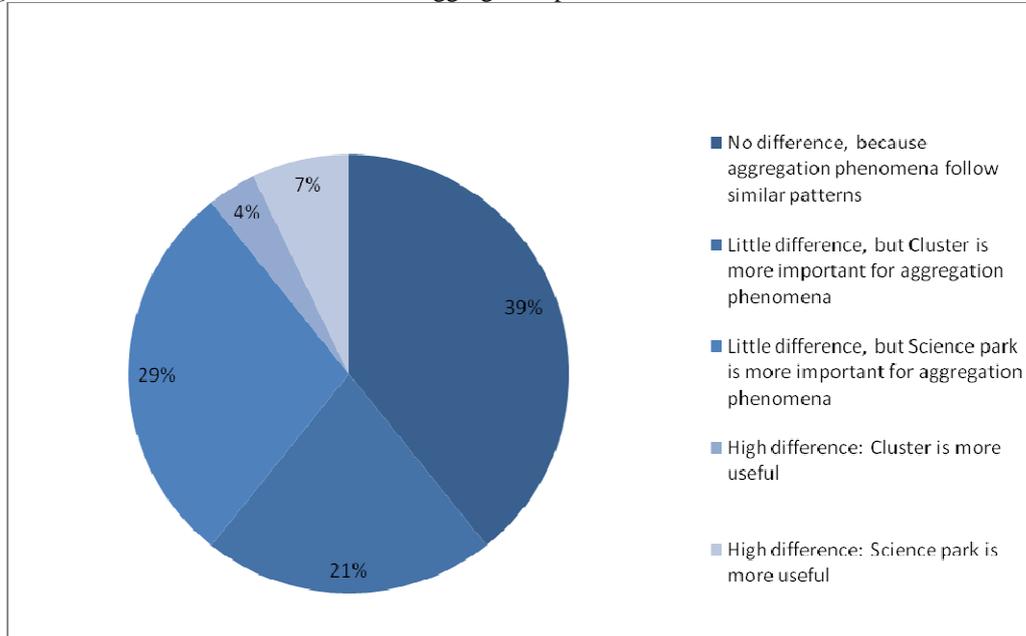
6. Discussion and some concluding remarks

The original idea of this survey has been to try to understand better a new reality: in recent years companies are looking for new forms of agglomeration and not only a physical hospitality inside a science park or an incubator. The Internet and the ICT technologies are key tools to this aim. Business ecosystem is an emerging concept besides the traditional cluster. "*Clusters are defined by the co-location of producers, services providers, educational and research institutions, financial institutions and other private and government institutions related through linkages of different types. There is huge diversity among clusters: they differ in terms of their stage of development along the cluster life cycle; some are networks of SMEs, some are organized around key anchor firms, and yet others have developed around universities*" (European Commission, 2007: 3). "*The two thousand European clusters are highly heterogeneous. Some of them can be described as ecosystems, that is, as geographic concentrations of businesses and research centres in a particular field of activity – we may call these "area clusters"...The others are more like alliances of businesses and research centres coordinated by a management team, with the goal to set up a complete value chain in a growth market – they may be called "power clusters"* (White Paper, 2010: 5). Therefore, "*their specific nature, including their spatial coverage, differs according to technology, market conditions, and other factors that influence the geographic extent and relative strength of linkages*" (European Commission, 2007: 4). And the Internet revolution plays a key role because "*the development and use of advanced ICT tools would be expected also to*

facilitate the interactions between partners within a cluster as well as between clusters across Europe" (European Commission, 2007: 12).

This research work attempted at investigating the perceptions of companies hosted in the Bioindustry Park Silvano Fumero and/or members of the BioPmed innovative cluster: therefore, primary data have been provided by the questionnaire respondents. Unfortunately, the number of respondents was not very high. Nevertheless, this small sample of companies provided interesting answers and comments, that can be considered a useful starting point for further research in this field.

Before providing some comments on the results, it is necessary to outline that the cluster and the science park analysed are dealing in a specific industrial/market sector, the health care sector. It seems that the cluster approach is following more a "smart specialisation approach" than a "traditional" technology sector approach. It involves companies active in different technological fields, biotechnology, new materials, ICT, electronics, chemistry, and dealing in different market segments such as pharmaceutics, diagnostic, medical technologies, services, e-health, bioinformatics. Such context, where the quality of activities is probably more important than the simple quantity and dimension in terms of members and employees, focuses on a converging technologies approach where it is less important the technology used, while it is more important the solution delivered. This is an approach that enables the identification of complementarities and integration possibilities with other clusters, at local and international level, and an high degree of flexibility and adaptability to external environment. It is highly based on a bottom-up approach where the cluster managing company has the goal to integrate the complex system resulting from the different assets that coordinate with a top-down approach the technology/strategic paths of their members. These insights have to be taken into account for the discussion of the questionnaires results.

Main interesting aspects of our analysis were as follows. We collected 33 questionnaires, that provided useful policy suggestions for improving the science park-incubator strategy and supply services. This sample of companies has a strong international attitude, direct consequence of the sectorial focus, and international promotion activities is the first aspect that they want to be improved by the science park structure. They appreciate the services provided by the science park and they underline the visibility and prestige perception coming from the hospitality in this structure. Similarly, regarding BioPmed these firms highlight the importance of improving competencies as well as innovation performance and establishing collaborative research projects.

Visibility and networking opportunities are also important. In order to create a real sense of community, more communication channels and more interaction between the members and the managing actors would be welcome. To sum up, from the overall analysis did not emerge a strong difference in motivations, perceptions and advantages coming from the location in the science park and the one in the innovative cluster. Furthermore, the difference in percentage between questionnaire respondents that chose a science park (57%) as more important for the creation of aggregation phenomena with other firms is not so higher compared to respondents that indicated a cluster solution (43%). And, in general, questionnaire answers revealed that aggregation phenomena in a science park or a cluster follow similar patterns (39%), followed by little difference among the two locations, with a prevalence of a science park location (29%) compared to a cluster one (21%). But, again, the difference in percentage is not very marked. What is significant, is that the creation of *social links* has been clearly perceived by questionnaire respondents as more linked to the physical location inside a science park than to the virtual location inside a cluster-innovation pole. This is the main gap that needs to be filled by further policy strategy. We have to outline that some cultural issues (e.g. traditional entrepreneurial culture, fear of "bad competition" inside the cluster), some policy issues (change in regional priorities, changes in cluster based policies) and some systemic issues (lack of funding for R&D, lack of risk capital) could affect the development and the reality of bioPmed cluster and of all the other clusters focused on the development of an innovative sector. Some aspects such us open innovation advantages in a cluster environment could be an interesting aspect to investigate in future studies relating to the possibility to be a powerful tool for project building and common shared approach on innovation.

Therefore, from these considerations and the overall description of the questionnaire results, we can try to analyse the main strengths, weaknesses, opportunities and threats (SWOT analysis) for the future development of the innovative cluster BioPmed (Table 1).

In general, "*clusters in the EU do not always have the necessary critical mass and innovation capacity to sustainably face global competition and to be world-class*", because of market fragmentation, lack of cooperation and weak university-industry relationships (Commission of the European Communities, 2008: 5). As a consequence, "*there seems to be a general agreement about the need to develop and further strengthen collaboration between three key actors in the RTD domain: the public sector, the business community and higher education institutions*" (Saublens, 2008: 8). Therefore, we could say that business schools and entrepreneurship education programmes (Bureau et al., 2012) may have a key role to play in partnership with science parks-

incubators in order to improve the potentialities of innovative clusters like BioPmed. If it is true that the creation of "social links" is one of the most difficult aspects to develop in a virtual location like BioPmed, science parks-incubators and business schools could work in partnership in order to schedule a sort of education programme including not only short education initiatives aimed at creating a "mind attitude" and "cultural change" in order to foster the advantages of an innovation pole but also in order to improve the potentialities of an initiative that, thanks to the ICT technologies, could be a useful alternative and/or complementarity to the traditional physical location inside a science park.

Table 1: SWOT analysis

Strengths	Weaknesses
✓ **Focus on new and emerging markets and sectors: life sciences and med-tech** ✓ **Wide range of networking and collaboration opportunities** ✓ **Strong international orientation** ✓ **Collection and sharing of ideas with the other members** ✓ **Smart specialisation approach**	✓ **Lack of the physical dimension** ✓ **Lack of a "mind attitude" towards the advantages of a virtual community** ✓ **Lack of perception of "social links" creation** ✓ **Cultural issues** ✓ **Systemic issues**
Opportunities	**Threats**
✓ **Collaborative projects** ✓ **International synergies** ✓ **Participation in European projects** ✓ **Potentialities offered by the ICT revolution** ✓ **Improvement of firm competencies** ✓ **Open innovation**	✓ **Lack of trust in a "virtual" community** ✓ **Lack of time** ✓ **Lack of establishment of "aggregation phenomena"** ✓ **Policy issues**

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