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**ITALIAN SCIENCE PARKS AND INCUBATORS: SOME CONSIDERATIONS ARISING FROM A QUESTIONNAIRE INVESTIGATION ON RESEARCH SPIN-OFF FIRMS**

**Abstract:**

Research spin-offs highlight the potential importance of science parks-incubators. Italy has recently given considerable attention both to the research spin-off phenomenon and to these structures. In order to analyse the relationship between science parks-incubators and research spin-offs, the results of a questionnaire investigation is provided. It highlighted interesting findings on the most utilized facilities provided by science parks-incubators and on the main characteristics of on-park spin-offs. Furthermore, the Bioindustry Park Silvano Fumero has been chosen as a case-study because it is one of the most important in Italy, it introduced the life science sector in a territory mainly based on other sectors, it hosts research spin-offs, but it is quite far from higher education institutions. This characteristic makes the Park an interesting case-study, given the general importance of the proximity to the parent institute. It seems that the activities implemented by the park are able to fill the distance gap.

**Keywords:** research spin-offs; science parks; incubators; technology transfer; questionnaire.

**Introduction**

In February 2003 in a Communication about the role of the universities in “the Europe of knowledge” the European Commission underlined the importance of intensifying effective and close cooperation between universities and industry: “...it is vital that knowledge flows from universities into business and society. The two main mechanisms through which the knowledge and expertise possessed and developed by universities can flow directly to industry are the licensing of university intellectual property, and spin-off and start-up companies” (Commission of the European Communities, 2003: 7). This document assessed Europe’s critical needs in the epoch of “knowledge-driven economic growth” and the means to meeting those needs. Spin-off and start-up companies play a key role. In particular,

in recent years we have taken note of and encouraged an increased interest in the “research spin-off phenomenon”. Research spin-offs<sup>1</sup> are the most evident example of integration between the university world and the industrial world and are a mechanism that fosters the links between universities and SMEs. This particular kind of firm highlights the potential importance of structures such as science parks and incubators. Following the creation of science parks in the 1980s, business incubators have been the main tool used in the 1990s to promote the creation of new enterprises (Wright et al., 2007). These structures are linked to many initiatives that have emerged in recent years with the aim to foster entrepreneurial activities.

More specifically, the results of a questionnaire investigation undertaken between January and June 2008 of Italian research spin-offs highlighted interesting findings on the most utilized facilities provided by science parks and incubators as well as on the main characteristics of on-park spin-offs (located inside a science park-incubator). The aim of this paper is, therefore, to provide an overview of the main significant results of the questionnaire investigation<sup>2</sup> and to provide some suggestions for policy improvement.

The paper is structured as follows: section 1 provides an overview of the history and development of science parks and incubators, while section 2 describes the Italian scene. Section 3 provides a survey of the questionnaire investigation, and section 4 is a discussion of the case-study of the Bioindustry Park Silvano Fumero. Conclusions follow.

## **SCIENCE PARKS AND INCUBATORS: A SURVEY OF THEIR HISTORY AND DEVELOPMENT**

There is no uniformly accepted definition of a science park (Link, Scott, 2003; Link, Link, 2003; Wessner, 2009; Lofsten, Lindelof, 2005; Dettwiler et al., 2006). A number of definitions of a science park have been proffered in recent years (Link, Scott, 2006). The definitions emphasize technology transfer from the university, the knowledge flow and regional economic growth. Nonetheless, we can say that the term “science park”<sup>3</sup> is usually used to describe a property based initiative that has formal and working links with a university or other higher education institution or research centre. A science park is a business support and technology transfer initiative that encourages and supports the start up, incubation and development of innovation led, potentially high growth, knowledge-based businesses, provides an environment where larger and international businesses may develop specific and close

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<sup>1</sup> I define research spin-offs as all the firms coming from the research world with or without a university share and a patent, but established by current or former university/research centre members - professors, technical and administrative staff, PhD candidates – with the aim to exploit research results.

<sup>2</sup> The questionnaire investigation is analyzed in depth in Salvador, Rolfo (2011), Mariotti, Salvador (2011), Salvador (2011) while a comparison between the sample of questionnaire respondents and a sample of start-ups is investigated in Salvador (2011a).

<sup>3</sup> 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).

interactions with a particular centre of knowledge creation for their mutual benefit (Parry, Russell, 2000; Ferguson, Olofsson, 2004).

It is widely acknowledged that 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; Bellavista, Sanz, 2009). Park formations increased sharply in the late 1970s and early 1980s in all countries also under the stimulus of the Bayh-Dole Act and the passage of several technology initiatives in the early 1980s (Link, Scott, 2007, 2006, 2003). Silicon Valley with its Stanford Research Park and Route 128 in Massachusetts were the first successful initiatives. In Europe, science parks are concentrated in France and the United Kingdom (Sancin, 1999). In Italy the first science parks were established in the 1980s: Area Science Park of Trieste, which is the largest science park in Italy (Bigliardi *et al.*, 2006), in 1982 and Tecnopolis Novus Ortus of Bari in 1985. Several other examples followed in the subsequent years. Since the end of the 1990s, almost every Italian Region has at least one science park (Sancin, 1999).

In the absence of an agreed and clear policy, the Italian science parks context is characterized by particularities such that every science park possesses distinctive and almost unique characteristics, which are not only due to regional needs. Diversity is an important characteristic of science parks well underlined in the literature (Wessner, 2009). 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*”. In Italy it is, therefore, possible to find science parks of huge dimensions, like Area Science Park of Trieste, the Bioindustry Park of Canavese, now known as Bioindustry Park Silvano Fumero, and the Environment Park of Turin, as well as some less consolidated structures, found particularly in the South of Italy. Large science parks do not only have the possibility to host businesses, but are also able to foster research activities because of the presence of research laboratories, and thus they are involved in knowledge production. Smaller and less consolidated science parks are more involved in providing managerial assistance rather than in innovation activities (Sancin, 1999). Notwithstanding their wide dimensional range and heterogeneity, the rationale for the creation of science parks may be considered proximity to university laboratories and research centers, the 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).

The presence of an incubator is a pivotal factor. An incubator has the aim to support new young firms in their first years of life when newness and small size may place them at risk. One of the key goals of incubators is to accelerate the start-up process and minimize the rate of failure (Antonelli, 2004; Graberi, 2006). Main elements to be considered in analyzing incubators are: the territory, the network of embedded actors, the services provided, and the beneficiaries of these facilities. Therefore, since the 1960s (Hackett, Dilts, 2004b), structures providing a supportive environment and shared facilities — for helping the establishment of young firms as well as assisting their development and maximization of their growth and rate of survival — were established in the industrialized countries. These structures are referred to as “incubators”<sup>4</sup>. The incubator model is frequently developed within a science park structure, of which an incubator is an important cornerstone. There are different

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<sup>4</sup> An extensive review of the literature on incubators and a list of definitions culled from the literature is provided by Hackett, Dilts (2004b).

incubator models. It is possible to identify public, private, corporate, university, profit or non-profit, multi-purpose or specialized incubators (Antonelli, 2004).

The concept of incubation evolved over the years and there are currently three generations of incubators, characterized by differences in the business support services. The first generation incubators provided physical space and they shared basic facilities. The second generation provided more specialized business support services, like counseling. The third generation, referred to as networked knowledge incubators, appeared at the end of the 1990s. These knowledge incubators offered networking for the sharing of knowhow and the promotion of best practices among entrepreneurs. Networking, face-to-face interaction and trust in an incubator have been investigated in recent years (Cooper *et al.*, 2010). The incubation process was accelerated by the Internet revolution and its ability to supply positive feedback on high-tech businesses. Thanks to the ICT revolution and the diffusion of the Internet (Benghozi *et al.*, 2009), incubator projects began spreading first in the US and second in Europe. The growth since 1980 in the number of US business incubators suggests that it was desirable to try to help “weak-but-promising” firms to avoid their failure by incubating them (Hackett, Dilts, 2004, 2004b).

The main boundary between an incubator and a science park is the fact that the park hosts firms already in operation, even including multinationals and big firms, research centers, structures linked to universities and higher education institutions. Science parks are more focused on technology transfer and knowledge creation, so they offer networks among the several actors hosted. Incubators are, instead, more focused on fostering and helping the creation of new firms through determining the validity of the knowledge on which they are based (Graber, 2006). In principle, incubators and science parks alike should be considered as a means to reduce the so called “liability of newness” (Ferguson, Olofsson, 2004; Gilbert *et al.*, 2006; Sofouli, Vonortas, 2007; Schwartz, 2009; Schwartz, Horny, 2010; Salvador, 2011; Salvador, Rolfo, 2011). Liability of newness relates to the high failure risk young firms face in the first years of their life. Start-ups and young firms do not have stable business relationships and they do not possess any reputation and need some time to gain legitimacy in the market (Schwartz, 2009). According to Hannan and Freeman (1984), firms with low reliability and accountability will be eliminated from the population. Therefore, newly founded firms need to demonstrate that they are reliable and trustworthy business partners towards the market (Schwartz, 2009). Incubators and science parks are perceived as useful solutions. Their function is linked to the necessity to create a stable and effective network of contacts in terms of potential financiers, clients, suppliers.

Science parks and incubators have a key role to play in the first years of the life of newly established companies. The actual issue is whether the potentialities of these structures are translated in concrete effectiveness. The admission criteria are usually very rigorous in order to filter good entrepreneurial projects, but the potential success of these business ideas cannot be taken for granted. Therefore, the question whether science parks and incubators are really effective in supporting young firms is still without a conclusive answer<sup>5</sup>. In general, the growth in science parks has fostered an academic debate

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<sup>5</sup> See Rowe (2002), ANGLE Technology (2003), Parry, Russell (2000); Siegel *et al.* (2003) for the UK; Mian (1996) and Rothaermel, Thursby (2005) for the US; Colombo, Delmastro (2002), Salvador (2011), Salvador, Rolfo (2011) for Italy; Schwartz (2009), Schwartz, Horny (2010) for Germany; Sofouli, Vonortas (2007) for Greece.

concerning whether such initiatives directly enhance the performance of corporations, even universities and economic regions over time (Link, Scott, 2007). A specific interest in identifying best practices in the formation and operation of such parks emerged. “*Unfortunately, few academic studies directly address these issues*” (Link, Scott, 2007: 662). Furthermore, according to a recent study by Yang *et al.* (2009), despite the growing interest in the science-park phenomenon, empirical attempts at indentifying whether new technology-based firms located within these structures are more innovative are limited and the results are ambiguous. Schwartz (2009) argued that direct comparisons between survival rates of tenant companies and control-groups of off-park firms may not be meaningful. In fact, the incubator-specific selection process induces relatively low failure rates during incubation and thereby selection bias tends to result in an overestimation of the effectiveness of science parks and incubators for reaching this aim. Similarly, Lindelof and Lofsten (2004) asserted that one logical way to assess the technological innovation of science parks is to compare the performance of their tenants to off-park firms. But this approach has its limitations because of the difficulties in identifying a reliable comparison sample.

In Italy some contributions to the debate on the effectiveness of science parks and incubators emerged in recent years. Colombo and Delmastro (2002) compared a sample of 45 on-park Italian new technology-based firms with a control sample of 45 similar off-park firms through the use of a questionnaire (response rate 19.5%). Their findings proved that science parks are an important tool of a technology policy fostering the development of new technology-based firms. Grimaldi and Grandi (2005) reported empirical evidence from eight Italian incubators: going through the incubators’ characterizing variables they captured the main differences between the types of incubators and proposed a simplified classification consisting of two main incubating models. They emphasized the importance of a range of incubators offering different services. Bigliardi *et al.* (2006) researched a methodological approach to evaluate the performance of science parks and to identify the factors that create an efficient evaluation system. Four Italian science parks were investigated and the main results were that a performance evaluation system should be aligned with a science park’s actual mission, major stakeholders’ commitment, regional economic conditions, legal structures , nature of the scientific competence base, and science park’s life-cycle stages. The econometric analysis undertaken by Barbieri *et al.* (2008) on location decisions of biotech firms in Italy revealed that science parks are a significant location factor only if there are other biotech firms located inside while other factors are usually also taken into account by biotech firms when location decisions are considered.

According to Hackett and Dilts (2004b: 74) “*while much attention has been devoted to the description of incubator facilities, less attention has been focused on the incubatees*”: the following analysis fosters a positive move towards achieving this goal. More specifically, an increasing use of questionnaires aimed at investigating main perceptions of the “incubatees” is suggested.

## **AN OVERVIEW OF THE ITALIAN CONTEXT**

Italy provides a good setting for an investigation on the link between research spin-offs and science parks and incubators. Several initiatives have been carried out in recent years in order to improve the conditions for the establishment of firms of this kind: many Italian universities, since 2002, issued spin-off regulations following the Legislative Decree n. 297/1999 (Salvador, 2009); Technology Transfer Offices (TTOs), and Industrial Liaison Offices (ILOs) have been created following the law

262/2004 (Nosella, Grimaldi, 2009); specific attention has been devoted to science park and incubator structures. Furthermore, the regression model tested by Salvador and Rolfo (2011) found that the number of Italian science parks and incubators has a positive influence on the number of research spin-offs.

Notwithstanding the positive influence noted, Italy with a total population of nearly 60 million inhabitants subdivided in 20 Regions, still suffers from several structural problems that hamper its innovation potential and the hope for improved economic performance. Bureaucracy, political instability and a marked delay in fostering and supporting the new information and communication technologies (Colombo, Delmastro, 2001, 2002; Bassanetti *et al.*, 2004; Finlombarda, 2006; Bianchi *et al.*, 2010), are affecting the Italian situation “*A major change is now expected with the launch of the E-government 2012 plan that, starting from an intervention for ICT diffusion in public administration, should act as a major instrument to stimulate economic recovery*”, (Inno-Policy TrendChart: 2009: 9). Special factors such as low-skilled workers entering the labor market, weak investment in R&D, firms continuing to specialize in traditional sectors, and the prevalence of small family businesses which are less likely to innovate (Bianchi *et al.*, 2010; Balderi *et al.*, 2007), and insufficient product market competition, can have contributed to depress measured productivity growth. Since the 1990s, Italy’s performance substantially lagged behind that of other main European Union economies (Inno-Policy TrendChart, 2008). Italian structural problems reduce the ability to take advantage of the innovative technologies spread throughout the world in recent years (Fondazione Rosselli, 2007; 2008; Bassanetti *et al.*, 2004). In spite of a widespread entrepreneurship oriented towards traditional/mature sectors, Italy is behind in promoting the creation of new technology-based firms (Colombo, Delmastro, 2001, 2002; Finlombarda, 2006). Furthermore, the worsening of the international macroeconomic scenario is also nudging the development to the downside. Italy is in the group of “moderate innovators”, with a performance below EU average but above the group of “catching up” countries (Inno-Policy TrendChart, 2008, 2009), while according to Fondazione Rosselli (2007; 2008) Italy is in the group of “scarcely innovative countries”. The analysis developed by Fondazione Rosselli (2007; 2008) to measure and compare the innovation potential of 19 major industrialized countries, highlighted that technology transfer is one of the fields where an improvement is observable in Italy, in particular in terms of spin-off firms. The number of spin-offs of high-tech business ideas is gradually increasing as a new strategic orientation of Italian universities. A pivotal role has been played by Italian universities since 2001 in initiating research spin-off firms. Their vast increase in numbers over the past few years has prompted many Italian universities to establish rules to control the spin-off process and address related issues systematically. The inspiring spurt for the issuing of spin-off regulations was the Legislative Decree No 297/1999, which is concerned with the ‘reorganization of the discipline and streamlining of the procedures for the support of scientific and technological research, for the diffusion of technologies, for researchers’ mobility’. The Ministerial Decree of 8 August 2000, No 593, sets out ‘procedures for giving support according to Legislative Decree n. 297/1999’ (Salvador, 2009).

Given this general context, it is important to stress also the main changes in the regional governance system that occurred in recent years. Since 2005, the contribution of Italian regions to the innovation policy formulation process and the management of measures favoring R&D and innovation increased due to the reform of Title V of the Constitution in 2001 and its implementation through the Law 131/2003. Thanks to the new power acquired by the Regions in the field of scientific research and technological innovation policy, regional R&D and innovation policy initiatives have been developed. Several regions provided specific instruments whose application has been launched at local level. Nevertheless, the duality between the central government and the regional actors’ intervention is still

affecting the Italian system and more coordination between the two levels would be useful in order to better define industrial policy objectives, devise territorial balancing, and establish responsibilities and areas of intervention (Inno-Policy TrendChart, 2008, 2009). According to Bianchi *et al.* (2010), globalization has made necessary the modernization of Italy and the elimination of many structural delays. Main challenges for the Italian system are given as: the improvement of technology transfer mechanisms to reduce the existing time delay gap between research and the market, acquisition of innovation financing, in particular venture capital, and the need to counteract mobility (and hence loss) of talents, especially to slow down the brain drain.

Several policy interventions had indeed been introduced in order to address these challenges. And science parks and incubators can be considered as an important tool in order to address these challenges.

## **SCIENCE PARKS, INCUBATORS AND RESEARCH SPIN-OFFS: A QUESTIONNAIRE INVESTIGATION IN ITALY**

Questionnaire investigation was conducted on the universe of Italian research spin-offs between January and June 2008. Descriptive statistics of the main results obtained from the questionnaires received are computed in Salvador and Rolfo (2011) and the case-study of Turin is discussed in Salvador (2011).

The number of research spin-off firms I identified in Italy was 419. I was able to contact 394 firms: 25 research spin-offs had the positive approval of the university at the time of the survey, but they had not yet been established. The response rate was 39.5%: 155 spin-offs consented to answer the questionnaire. Given the response rate and the geographical distribution of the universe and of the sample<sup>6</sup>, we can consider this sample as reasonably representative. The questionnaire was divided into several sections:

- a) general characteristics of the spin-off firm;
- b) funding sources;
- c) university and spin-off firm relationship;
- d) incubator/science park and spin-off firm relationship;
- e) patents;
- f) industrial partnership;

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<sup>6</sup> The distribution by Regions of the 155 questionnaires revealed that 58% was from the north, 23% from the centre and 19% from the south and islands, while the Italian distribution of the 419 spin-offs showed 54% from the north, 25% from the centre and 21% from the south and islands.

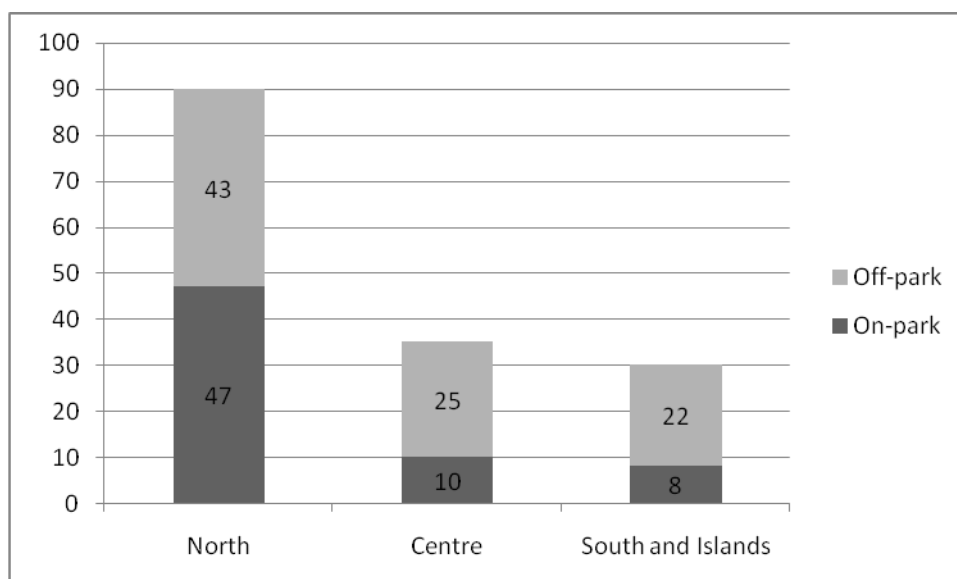
g) geographical location of the spin-off firm.

Section d “incubator/science park and spin-off firm relationship” is important in terms of the aim of this analysis. 65 research spin-offs out of 155 were tenant firms of an incubator/science park, while 90 were off-park companies. The comparison between these 65 research on-park spin-offs and 90 research off-park spin-offs revealed few conclusive differences with the significant exceptions that on-park companies were on average more internationally oriented and more closely linked to their parent institute. The international propensity of on-park spin-offs has also been confirmed by the probit analysis undertaken by Mariotti and Salvador (2011). Furthermore, the questionnaire investigation confirmed that distance matters, because the proximity of the science park/incubator to the parent institute was considered to be a key factor by most of the on-park sample.

Therefore, I now provide a description of the main significant results of the questionnaire analysis by dividing the overall sample in the two groups in order to compare on-park and off-park companies. First of all, I look specifically at the location of the particular instance, the reasons for the setting up the company and the solutions found and applied to offset the lack of managerial competencies. Secondly, I provide some reflections on the industry sectors and the market of activity. Thirdly, I analyze in more depth section ‘d’ of the questionnaire: this includes some consideration of the history of hospitality in a science park-incubator, the advantages arising from the hospitality, the main services made use of, the verdict on the hospitality, and the proximity to the university or other higher education institutions.

The location of the spin-off sample revealed a similar distribution of on-park and off-park companies in the north of the country, and a higher percentage of off-park spin-offs both in the centre and in the south and islands (Figure 1).

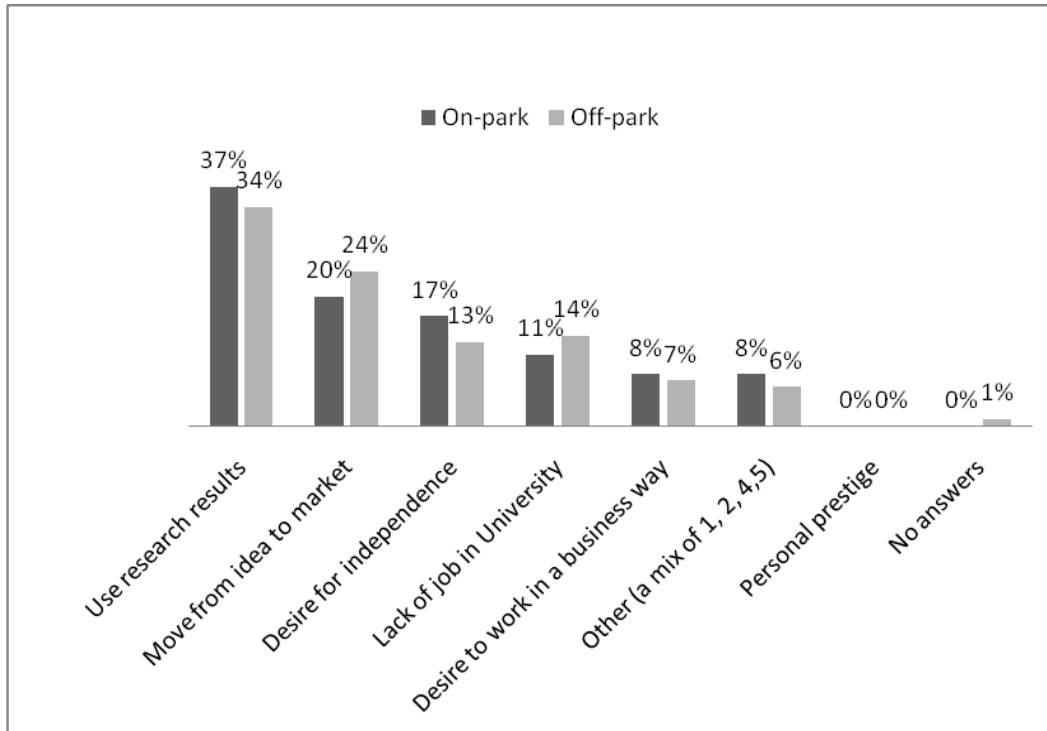
Figure 1: Distribution of on-park and off-park research spin-offs





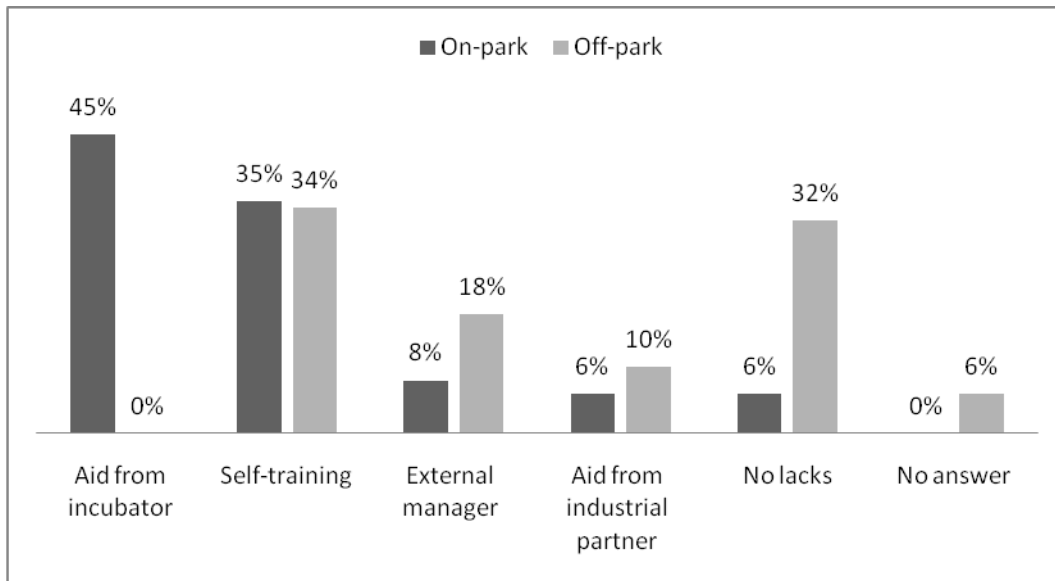
If we look at the reasons for creation of the firm, the questionnaire answers revealed the prevalence of the willingness and eagerness to use research results, and the wish to commercialize ideas in both the samples of research spin-offs (Figure 2).

Figure 2: First reasons for setting up the firm



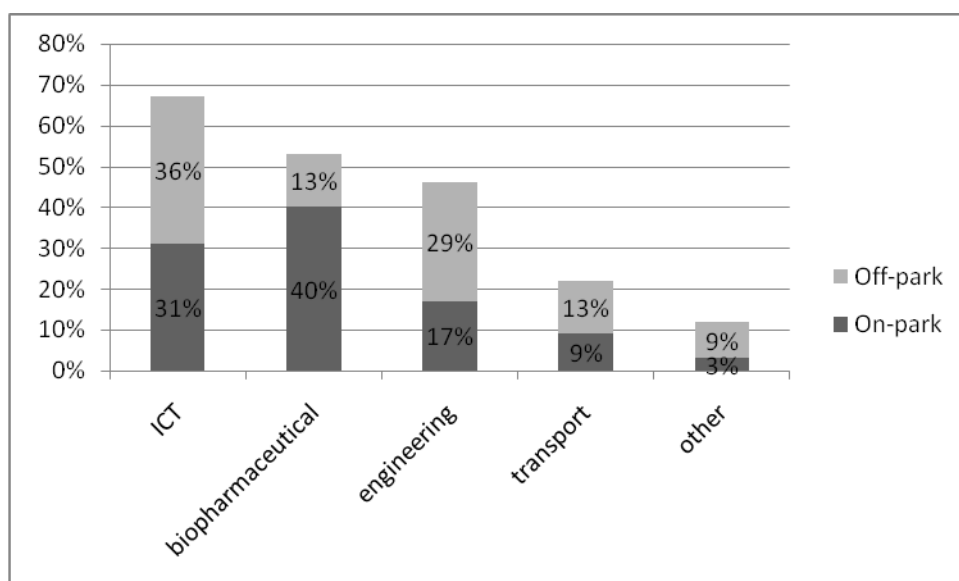
Interesting answers were also provided to the question about the solution to lack of managerial competence: a high prevalence of positive comments about the aid provided by the science park-incubator by on-park spin-offs, turned up as expected, followed by similar comment about a self-training solution. The sample of off-park spin-offs favored self-training solutions as well as lauding the absence of any difficulties (Figure 3). The lack of managerial and business competencies and the lack of credibility of a particular kind of firm like the research spin-off are well known in the literature (Shane, Stuart, 2002; Lockett et al., 2003; Heirman, Clarysse, 2004; Wright et al., 2004; Shane, 2004). Aid by a structure like an incubator or a science park may serve a function of “certification” for spin-offs (Akerlof, 1970) and may help develop management competence.

Figure 3: Solution to lack of managerial competence



The comparison of industry sectors revealed a higher percentage of on-park spin-offs in the biopharmaceutical sector and a slight difference between on-park and off-park spin-offs in the ICT sector (Figure 4). According to Shane (2004) and Zhang (2009) a possible explanation for the parks being fertile quarters for the creation of biopharmaceutical research spin-offs are linked to the long product development horizons and to the expertise of universities in the creation of biomedical inventions. Young firms in the biopharmaceutical industry usually spend many years on R&D activities before putting the first product on the market. Therefore, being tenant companies of a science park-incubator may be an important advantage since it enjoys the opportunity of using resources and laboratories.

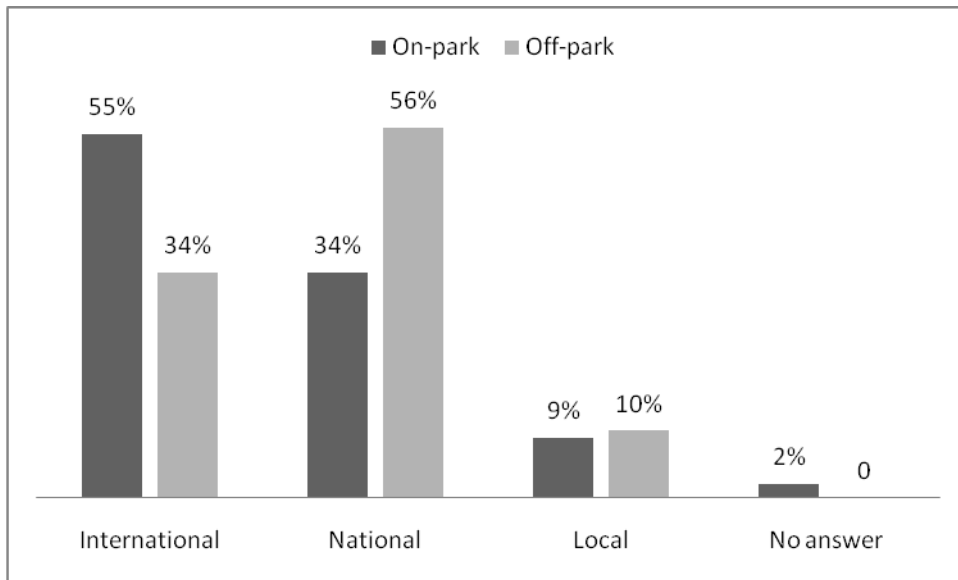
Figure 4: Industry sectors of the 65 on-park and the 90 off-park research spin-offs



A specific question investigated the market of research spin-offs. The international attitude of on-park spin-offs is clearly illustrated in Figure 5: 55% of on-park spin-offs deal on the international

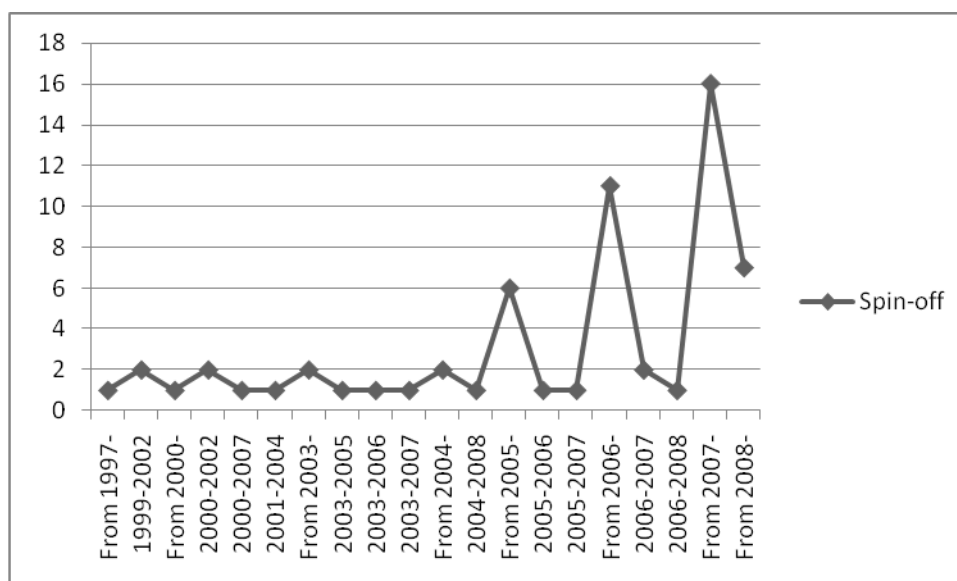
market compared to only 34% of off-park spin-offs. The international attitude of research spin-offs has already been highlighted in the literature (McDougall, Oviatt, 1996; Chiesa, Piccaluga, 2000; Harrison, Leitch, 2007). The greater internationalization of on-park spin-offs may also be explained by the kind of aid available from the incubator-science park.

Figure 5: Market of research spin-offs



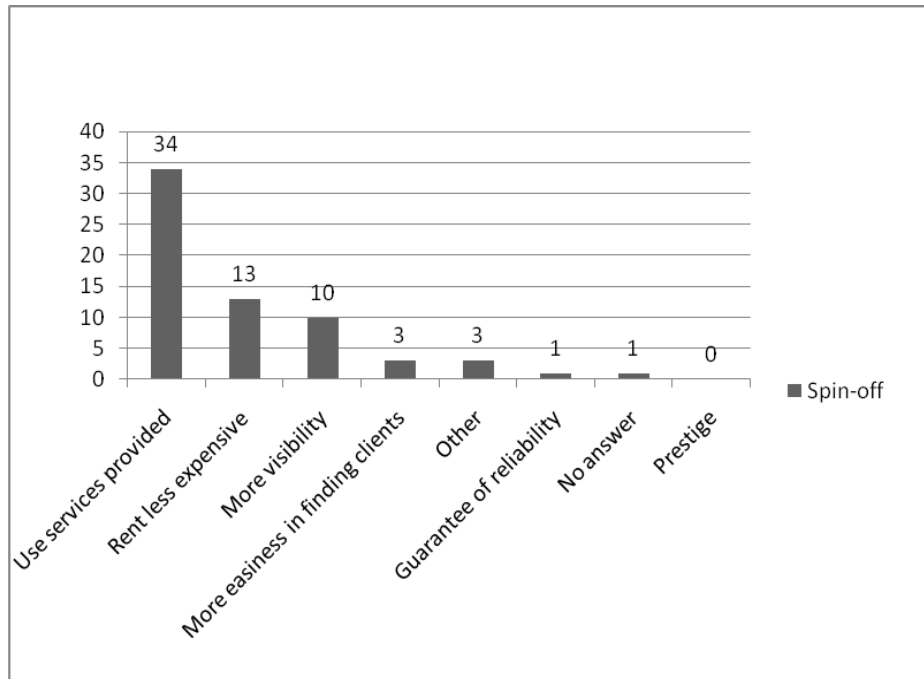
If we look at the time period of incubation, most on-park spin-offs were still in a science park-incubator at the time of the questionnaire investigation. An increase in the number of tenant companies is observable since the year 2005. This increase is due to the great attention devoted to the research spin-off phenomenon by Italian universities in recent years as well as to the high number of research spin-offs created in the last years. A summary of the hosting period is provided in figure 6.

Figure 6: Time period of incubation



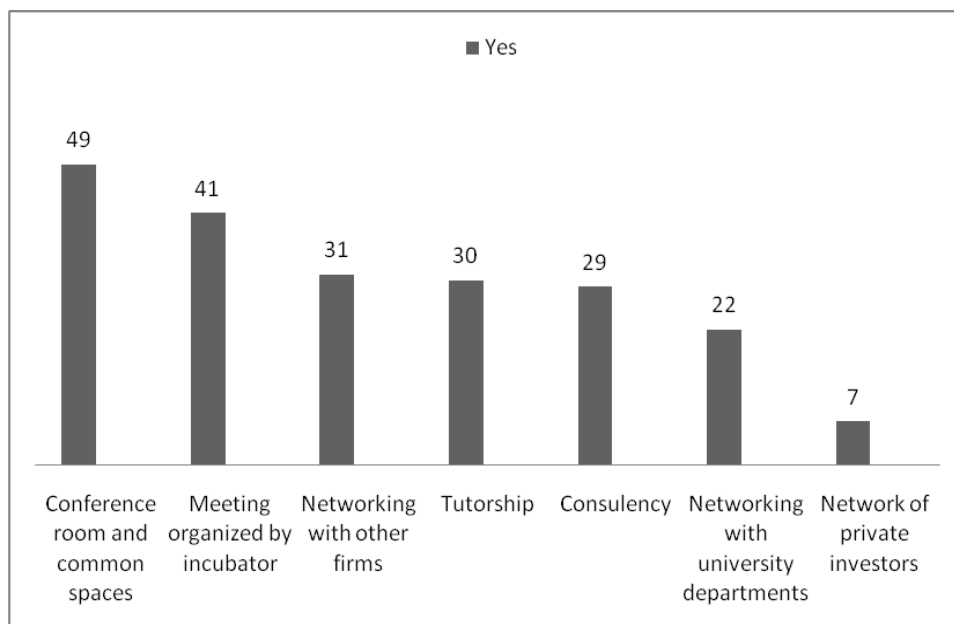
The questionnaire investigated the perceptions of tenant firms about the main advantages derived and the services utilized. According to the questionnaire results, the most important advantages coming from the hospitality in an incubator-science park were: the possibility of using the services provided by the park, the rent being less than the market rate, and the greater visibility (Figure 7).

Figure 7: First advantage of hospitality



Among the services most utilized by tenant companies, the questionnaire results showed that “meetings organized by the incubator-science park with business personalities” and “conference room and common spaces for meetings” were the most appreciated, followed by “networking with other firms”, “tutorship” and “consultancy” services (Figure 8).

Figure 8: Science park-incubator services utilized



If we look at the verdict on hospitality in an incubator/science park, most of the respondents provided a positive answer (Figure 9) and they argued that the geographical proximity of this structure to the university is a pivotal factor (Figure 10). This result confirms the literature evidence that distance matters (Link, Scott, 2003, 2005, 2006, 2007).

Figure 9: Verdict on hospitality

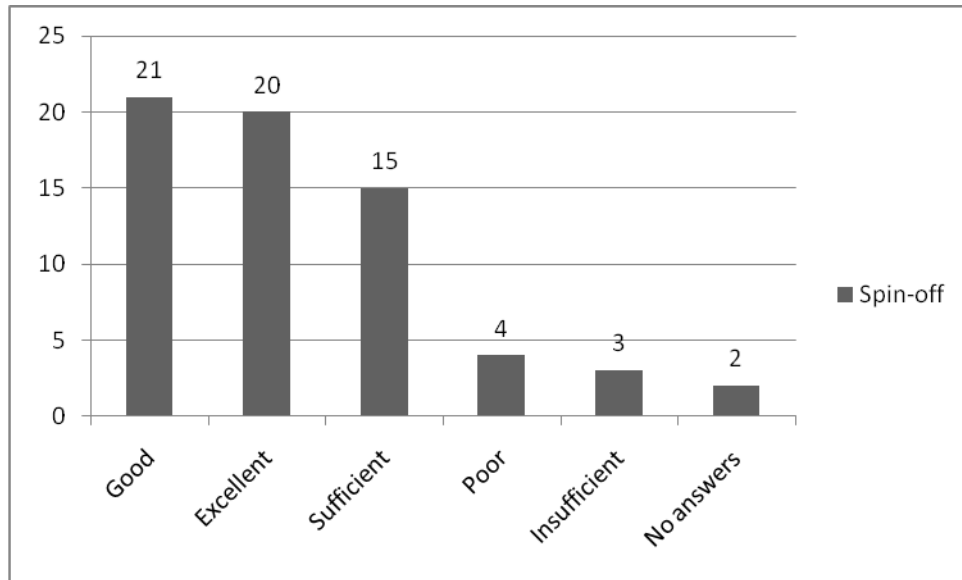
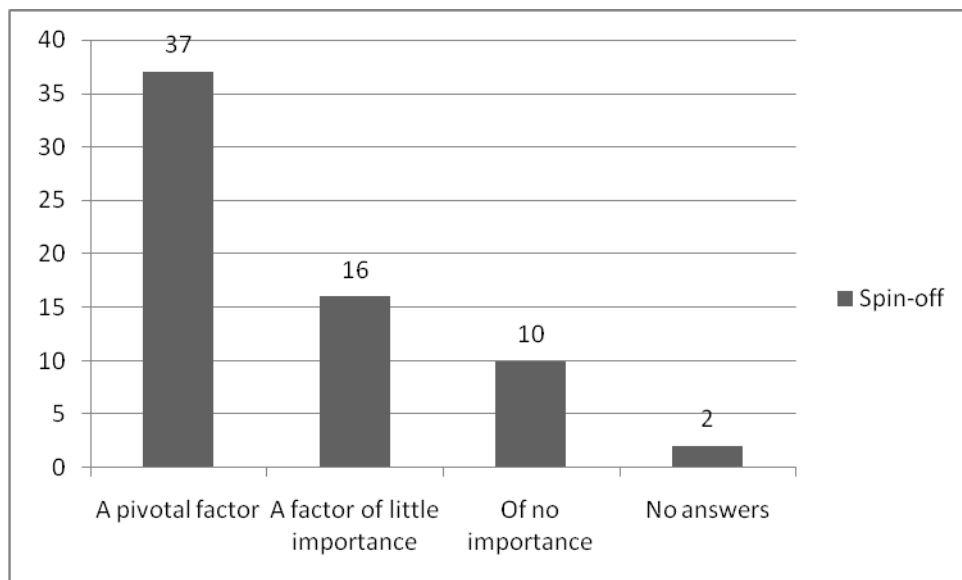


Figure 10: Geographical proximity to university



In general, the questionnaire results did not highlight significant differences between the perceptions of on-park spin-offs and the off-park ones. This could suggest that science parks and incubators are not as effective as they could be for research spin-offs. Nevertheless, the positive verdict on the hospitality and the key importance of the geographical proximity to the parent institute as well as the international attitude of on-park spin-offs supply important confirmation of the soundness of the

current policy. Furthermore, the questionnaire answers highlighted the recurrent use of the aid provided by science park and incubator structures. Nevertheless, the results in terms of growth and performance seemed to be poor (Salvador, 2011, 2011a). More specifically, the aid provided by a structure like an incubator or a science park is important, because not only does it provide tutorial services and facilities but it is also a guarantee of reliability in the eyes of potential clients and banks that are more inclined to give loans to firms positively evaluated by a university incubator. Nonetheless, the result of the comparison between Turin spin-offs and a matched sample of start-ups confirmed a lower performance by the spin-offs. In general this outcome was also found during a comparison between a sample of Italian research spin-offs and a matched sample of start-ups. As a consequence, the need to improve the role of science parks and incubators as “brand name” was suggested, as well as the creation of a “synergy” among the main actors involved in the research spin-off phenomenon, namely universities, incubators, science parks, TTOs and ILOs with the goal of increasing the effectiveness of the assistance received from these actors by research spin-offs at country level.

The questionnaire was completed only by research spin-offs: it would be interesting to send a similar questionnaire to all the firms hosted in an incubator-science park. Therefore, it would be useful also to have a sample of start-ups as respondents to a questionnaire. Start-ups are independent which means they are firms not created by university personnel and therefore not linked to the academic world. In this way we could have a more comprehensive overview of the perceptions of the universe of SMEs hosted in (and outside) these structures. Notwithstanding, we can say that the results of the questionnaire investigation on research spin-offs confirmed that the debate on the effectiveness of science parks-incubators is still open, but it also highlighted interesting aspects about the activities and the services provided. The positive evaluation of the hospitality in these structures enhances the idea that there is simply a need for improvement rather than an overall change of policy, as suggested in Salvador and Rolfo (2011).

More specifically, the questionnaire answers emphasized that communication channels and network activities (Hackett and Dilts, 2004b) are really important. Furthermore, an international attitude and proximity to the university are pivotal factors. In fact, science parks are important “networking” actors (Antonelli, 2004). They provide hospitality and services to potential start-ups and spin-offs. Inside a science park it is possible to find several group-structures that cooperate to foster commercialization of new products and services. Research centers, incubators and financing societies are common examples (Antonelli, 2004).

The following section illustrates the history and the context of the Bioindustry Park Silvano Fumero. This park has been chosen as a case-study because it is one of the most important in the Italian context, it introduced the life science sector in a territory mainly based on other sectors, it hosts research spin-offs as well as start-ups, but it is quite far from the higher education institutions. This characteristic makes the Bioindustry park an interesting case-study, given the general importance of the proximity to the parent institute. It seems that the set of activities implemented by the park is able to fill the distance gap. To accomplish this aim, it would be useful to send a specific questionnaire to the universe of the firms hosted, focused on the location and the linked advantages or disadvantages and the capacity for building network relationships at the international level notwithstanding the geographical location.

## A CASE-STUDY: THE BIOINDUSTRY PARK SILVANO FUMERO<sup>7</sup>

The Bioindustry Park Silvano Fumero<sup>8</sup> (BIPCa SpA – Collettero Giacosa, TO, Italy), previously known as Bioindustry Park of Canavese<sup>9</sup>, is located 40 km far from Turin (Piedmont region – North West of Italy) and it has been set up 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 2009). It has been conceived as a territorial strategic tool to support 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 m<sup>2</sup>. equipped for production activities and 16,000 m<sup>2</sup> 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 was established in 1998 and it has as shareholders public institutions and private companies. The project of the Park was adopted by Piedmont Regional Authority as a priority in the regional industrial policy. The Bioindustry Park has been established in the context of European Union Structural Funds, with contributions from the European Fund for Regional Development, and it is jointly financed by the State and the Regional Authority, who granted a total investment of €52 million. The Park promotes and develops research in biotechnologies and life sciences. It offers research facilities, scientific and support services, such as technology transfer, patent support, tutoring/mentoring of start-ups and spin-offs. More specifically, it hosts national and foreign companies, small and medium enterprises that are willing to undertake research activities and experimental production in the chemical, pharmaceutical, diagnostic, veterinary, agro-food, cosmetics, bioengineering and information technology sectors (Conicella, 2010; Conicella, 2011; Conicella, Bassi, 2011). It gives priority to small entrepreneurs and researchers wishing to undertake innovative projects. Start-ups and spin-offs are assisted in the pre-startup phase, in the start-up one, along the development path, and finally on their way out — to an independent existence. Since the beginning, the science park has had the goal to develop a dedicated value network that allows the start-up and growth of successful companies. Attracting companies, creating start-ups, realizing 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 brings into play synergies between public and private initiatives (Conicella, 2011). Piedmont region does not provide any yearly transfer of funds for the management of the Park. Only specific and evaluated projects, such as the bioPmed project are supported by regional authorities and only in the form of co-financing (Buchi *et al.*, 2010). The financial situation, as presented in the 2010 balance sheet is positive and the accounts show that public financing only represent around 10% of turnover.

*“The science park developed a quite interesting governance model based on a triple helix, private public partnership approach”* (Conicella, Baldi, 2011: 9): this quotation describes a vision of fostering entrepreneurship development and transfer of research results. The Park is a private

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<sup>7</sup> This section has been read and commented on by Fabrizio Conicella, General Manager of Bioindustry Park, who provided interesting and useful comments and suggestions.

<sup>8</sup> [www.bioindustrypark.eu](http://www.bioindustrypark.eu)

<sup>9</sup> In 2009 the Park changed name in honor of its founder, Silvano Fumero, manager and scientist who died in 2008.

company with public majority and the presence of two major pharma companies (Merck-Serono and Bracco), with local public administrations and regional financing institutions as shareholders. It hosts more than 35 different organizations (July 2011) and it is in contact with more than 250 companies<sup>10</sup>, many of them are formally committed to boost the cluster bioPmed. At the same time Bioindustry Park directly manages an R&D lab focused on providing scientific services and setting internal R&D activities in motion. Results of these activities are available for licensing and collaborative research agreement.

Another pillar of the structure is supporting the creation of innovative and focused start-ups: the park in the last 5 years has created more than 15 start-ups that have been able to raise more than 30 million Euros of private risk capital (Conicella, 2010, 2011). 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 established in the context of Piedmont region 2000 - 2006 DOCUP (programming single document of the Region). The Bioincubator offers 9 prepared spaces, for as many companies operating in the life science field, besides offering shared areas and equipment.

Following the above considerations, we can say that the Bioindustry Park hosts not only private enterprises, but also proprietary shared labs, based on the concept of a technological platform, managed in close collaboration with the University of Turin and one of the CNR's research centers specialized in proteomics (Conicella, Bassi, 2011). Support services and a series of advanced services relative to the search of financing for research activities and to the search of business angels, to technology transfer, to patents, etc. are also provided. The international dimension seems particularly important. Biotech sector is global in its nature. Critical mass, systemic approach and internationalization are key factors (Conicella, 2011).

According to Conicella (2010: 48), to Conicella (2011: 12-13) and to Conicella, Bassi (2011: 10) *“Results of the first 10 years of life of the Bioindustry Park confirm that it is possible to develop a high tech sector through a science park approach: around 23 different companies, three research centers / universities and different association, with a total of around 500 workers are in fact located in the Park area. Another four companies with around 300 workers are located 10 kilometers distant from the Park. All those organizations except two have located in the area after the creation of the Science Park”*. Furthermore, *“after more than 10 years of activity Bioindustry Park has a 95% occupation rate, hosts around 30 different organizations, employing more than 500 employees, and is well positioned at local, national and international level”* (Conicella, Baldi, 2011: 10). According to Buchi et al. (2010: 85) *“During the latest 10 years the Bioindustry Park has helped more than 30 companies to raise and to grow, accumulating more or less 30 million Euros of equity, and this is a great result if compared to the youth of the Ivrea biotech reality”*.

In this context, the Bioindustry Park is embedded in two interesting initiatives: Discovery and bioPmed. It is also important to mention the PartnerPorts service platforms that are an initiative in progress in the context of the ABC Europe project.

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<sup>10</sup> The list of companies part of the enlarged network of the Bioindustry Park is on-line at the following address: [www.biopmed.eu](http://www.biopmed.eu)



## **THE DISCOVERY INITIATIVE**

The Discovery initiative<sup>11</sup> is managed by Bioindustry Park in strong partnership with Eporgen Venture<sup>12</sup> and with support of the Piedmont regional authorities. Discovery is a project focused on start-up creation. It was based on the development of a local seed capital company set up by a group of informal investors, called Eporgen. With a self-sustaining approach, it has involved more than 40 local small investors and it has been coupled with the Bioindustry Park incubator. Therefore, Eporgen Venture has been created with the support of Bioindustry Park involving local investors and business angels. Regional funds for incubation have been used to develop a positive environment, while private money has been used to create innovative companies (Conicella, 2011; Conicella, Baldi, 2011; Conicella, 2010).

Discovery is a selection promoted by the Bioindustry Park in order to find innovative ideas in the life science and biotechnology sectors with high technological contents. The Discovery project consists of three core phases: selection of deserving scientific projects, location of the company in the park Biocubator that also provides equipment, general services, tutoring services, shared facilities and access to Bioindustry Park Lab and instrumentations and investment in seed capital by non-institutional bodies that the park has been able to involve in the scheme. This last one is something completely new in the Italian context (Conicella, 2011; Conicella, 2010). From June 2004 to November 2009 through road shows and promotional activities around 20 start-ups have been created and more than 7 million Euros of seed capital/business angels capital has been raised in this initiative. A part of capital has been provided by Eporgen Venture. The goal is to assure financial resources for the first 24 - 36 months of development of start-ups providing also managerial assistance. Discovery is one of the few examples of integrated approach to the start-up of innovative companies in biotech linking physical facilities, tutoring support, access to scientific know-how and instrumentation and seed capital funds (Conicella, 2011, 2010).

## **THE BIOPMED INITIATIVE**

The Bioindustry Park developed the bioPmed initiative<sup>13</sup>(insert note format) as a focused and sectoral life science cluster project. bioPmed is the Innovation Cluster for 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 organizations — operating in a particular sector and region and designed to stimulate innovative activity by promoting intensive interactions, sharing of facilities and exchange of*

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<sup>11</sup> For further information, see the website [www.bioindustrypark.eu](http://www.bioindustrypark.eu) ; <http://discovery.bipcaweb.it/>

<sup>12</sup> Eporgen Venture “is the first Italian company, entirely funded by private, non-institutional investors, dedicated to seed capital investments in the area of life sciences. It was established in June 2004 with the aim of establishing and supporting the development of new enterprises operating in the life sciences field and born of highly innovative projects of international scientific importance”, (Buchi et al., 2010: 82).

<sup>13</sup> For further information, see the websites [www.biopmed.eu](http://www.biopmed.eu) ; [www.piemontebiosciences.org](http://www.piemontebiosciences.org)

*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).

As of July 2011, bioPmed - leaded by the Bioindustry Park - consisted of 70 organizations, including large companies, SMEs, Universities and research centers working in the Life Sciences sector, signatories of a formal agreement on its creation and development (Conicella, Baldi, 2011; Conicella, Bassi, 2011). Why this initiative? After ten years of successful initiatives in the life science sector, the Bioindustry Park recognized that two main gaps limited the further development of the park. These two gaps have been identified in the geographical concentration and a focus on physical infrastructures. In order to fill these gaps an innovative cluster<sup>14</sup> policy scheme has been developed by Piedmont region (Conicella, Baldi, 2011). More specifically, within the POR-ERDF 2007-2013<sup>15</sup> program, Piedmont Regional Authority promoted the establishment of twelve innovation clusters in twelve different technological areas, and appointed a managing body for each cluster, chosen from bids received in a dedicated call for tenders (bioPmed report 2009/2010). The Bioindustry Park suggested to be the managing company of one of these clusters with a focus on life sciences for healthcare, because 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).

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). As the managing body, the Bioindustry Park 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.

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<sup>14</sup> “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).

<sup>15</sup> “The Regional Operating Program (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).

## **THE QUESTIONNAIRE RESULTS FOR RESEARCH SPIN-OFFS HOSTED IN THE BIOINDUSTRY PARK—AND A SWOT ANALYSIS**

Among the 65 questionnaires received from on-park research spin-offs, 5 respondents were companies hosted by the Bioindustry Park Silvano Fumero. These five research spin-offs were established between 2005 and 2006, therefore they are very young, they were all limited liability companies and all but one were service companies. This is a confirmation of the usual characteristics of Italian research spin-offs.

The questionnaire answers for this small sample of respondents confirmed the general evidence described in the preceding section: on-park companies were international oriented, they underlined the usefulness of using the services provided by the park and they highlighted a general good opinion on the hospitality provided. As expected from this specific and particular case-study, different opinions emerged on the geographical location: this confirms the importance of the initiatives in progress implemented by the Bioindustry Park in recent years in order to fill this gap (cf. supra).

Looking more specifically at the questionnaire results, the main reasons for creation of the company revealed the prevalence of the “desire to work in a business way” as well as to “use research results” and “be independent”. All these five research spin-offs deal on the international market.

According to the results of the overall survey, the possibility to “use the services provided by the structure”, the “greater visibility” and the “rent less expensive than on the market” were indicated as the most important advantages coming from the hospitality in the park. Furthermore, among the services most utilized by these tenant companies, the questionnaire results showed that “meetings organized by the incubator-science park with business personalities”, “conference room and common spaces for meetings” and “networking with other firms” were the most appreciated. About the verdict on hospitality in the park, the five respondents provided a “good” answer. On the contrary, there emerged a mix of opinions about the geographical proximity of this structure to the university: some indicated the proximity as “a pivotal factor” while others argued that it is “a factor of little importance”. In other words, some companies underlined the distance from universities and research centers as a gap, while others highlighted the possibility to fill this gap through the use of the motorway.

From these considerations and the overall description of the history and the characteristics of the Bioindustry Park, we can try to analyze the main strengths, weaknesses, opportunities and threats (SWOT analysis) for the future of the Park (Table 1). Main strengths of the Park are identifiable in the focus on a new and growing sector, “life sciences”, a full range of services and facilities provided to incubatees in a wide territorial area, an attitude to networking and clustering activities linked to an international propensity. Main weaknesses are linked to the geographical location far from the universities, the polytechnic and other higher education institutions, a geographical concentration and a focus on physical infrastructures. Another weakness is linked to financing: the process of growth in the life science sector is based also on the presence of venture capital financing. This presence is really scarce at local level and probably the Park will have to define a clear strategy to try to attract the interest of venture capitalists. Nevertheless, some initiatives have been undertaken in order to try to fill these gaps: research laboratories are located inside the Park and the recent bioPmed initiative has the goal to foster the further development of the Park. It emerges also that there are many opportunities and a few threats: the former highlight the potentialities offered by the Internet

technologies, that enable to build strong networking activities at the international level and to find partners for participating in European projects, while the latter underline the potential threats coming from the widespread international crisis, that undermines the survival of new and young firms, as well as the absence of diversification in the market sectors, that could be an advantage but also a threat for future perspectives. Last but not least, important opportunities are given by the recent Discovery initiative and the bioPmed innovation cluster, that is a key challenge implemented since 2009 by the Bioindustry Park.

*Table 1: SWOT analysis*

Strengths	Weaknesses
Focus on a new and emerging sector: life sciences and biotechnology	Location: far from universities
Wide range of facilities and services	Geographical concentration
International orientation	Focus on physical infrastructures
Clustering and networking activities	Few specialized financial actors
Opportunities	Threats
Discovery initiative	International crisis: failure of young but promising firms
bioPmed innovation cluster	Market concentration
International synergies	
Participation in European projects	
Potentialities offered by the ICT revolution	

## CONCLUSIONS

Starting from a questionnaire investigation in the universe of research spin-offs, this paper provides some considerations on the role of science parks and incubators in Italy. Italy has given considerable attention in recent years both to the research spin-off phenomenon and to science park and incubator structures. They are useful and important tools of technology transfer. More specifically, the questionnaire results highlighted the international attitude of research spin-offs hosted in a science park-incubator as well as the importance of a geographical proximity to the parent institute. The services provided by the structure, the rent less expensive than on the market, the greater visibility and networking activities proved to be of key importance. Notwithstanding, the questionnaire analysis did not highlight significant better results for on-park spin-offs compared to off-park ones: science parks

and incubators seemed not to be as effective as they could be for research spin-offs. Nevertheless, the positive verdict on the hospitality and the key importance of the geographical proximity of the hosting structures to the university as well as the international attitude of on-park spin-offs are pivotal proofs of the soundness of the policy in progress. McMahan (2009) highlighted the importance of a policy environment that is patient, adaptable and focused on commercialization. Specific attention provided to the needs of every single firm could be useful instead of general policy prescriptions. Furthermore, a similar questionnaire investigation in the universe of the firms hosted in these structures, meaning not only research spin-offs but also start-ups, could enable to confirm or not these results and to improve knowledge on the perception of the science park location benefits that hosted firms are receiving as well as on the perceived advantages and disadvantages. To this goal, the activities carried out by the Bioindustry Park Silvano Fumero, chosen as case-study, seem to go into this direction. More specifically, the recent Discovery and bioPmed initiatives are interesting challenges. And a specific questionnaire sent to the participating firms could provide information of key importance for policy improvement and future park strategy. An empirical investigation based on self-evaluation by the respondents is one of the best solutions in this case, because it provides primary data sources that capture data directly from the respondents. In other words, subjective data based on perceptions and judgments of a questionnaire's respondents enable one to obtain information that are not available from secondary data sources like databanks. For example, in measuring success Manchester Science Park tenant companies are asked to fill out a questionnaire annually (Davies, 2009). Therefore, I suggest Italian science parks and incubators to increase and/or improve the use of specific questionnaires at least on an annual basis, aimed at understanding in depth the situation of every firm hosted.

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bioPmed report 2009/2010, Piemonte innovation cluster, life sciences cluster

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