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Open Innovation in the small and medium-sized enterprises in North-Eastern Italy: challenges and opportunities for growth

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OPEN INNOVATION IN THE SMALL AND MEDIUM-SIZED ENTERPRISES IN NORTH-EASTERN ITALY: CHALLENGES AND OPPORTUNITIES FOR GROWTH

Abstract

As far as industrial organisation is concerned, the current and traditional economic situation of the Italian North-East denotes a strong prevalence of small and medium-sized enterprises (hereinafter, and in accordance with the literature, referred to as SMEs) which often belong to industrial districts. Such districts have been widely studied in terms of how the companies in the district could manage to attain superior performance levels thanks to a process of clusterization allowing them to efficiently exploit a multitude of linkages along and across different value chains. Recently, while still retaining a strong traditional character, several companies have distinguished themselves both nationally and internationally thanks to their innovativeness. Due to their size and the inherent constraints, it is generally not expected of SMEs to use Open Innovation practices because of an array of alleged problems, however that does not necessarily imply they would not be able to reap the benefits Open Innovation can bring, provided the process is carefully organised and managed. The purpose of this study is that of presenting the current state of Open Innovation practices among manufacturing SMEs in the Italian North-East and draft a set of recommendations for the implementation of such practices on a larger basis.

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1. Introduction

The notion of Open Innovation, according to which companies can source and exploit information and knowledge coming from outside their boundaries in order to fuel their innovation process and grant access to new commercialisation channels, is relatively new since it was coined only in 2003 by Henry W. Chesbrough. It has lately been discussed very frequently and is rapidly gaining popularity with larger and innovative organisations and the entire business model of which often revolves around this paradigm.

In many companies, innovation is one of the driving forces behind their profitability, hence, if the boundaries of the firm become porous, innovating by intentionally letting information and knowledge seep through, is a sure way to help the company broaden and deepen in scope its learning experience, which could in turn be a factor that guarantees a competitive advantage given that the firm becomes more aware of, and, potentially, responsive to, what happens in the external environment.

Smaller companies are generally not considered as the ideal kind of organisation for the implementation of Open Innovation (mostly because they are burdened by structural problems), but they can however derive great advantages from Open Innovations and at the international level, many have adopted this approach already.

SMEs represent the backbone of the Italian economy and are extremely important at local level not only due to their economic relevance, but also because they contribute to shape the social dimension as well. These firms have strong ties to their local context and with other firms in their surroundings; they are embedded in a socio-economic system that, given the extreme networking potential, is arguably the most fertile ground for Open Innovation.

In particular, the North-East of Italy, characterised by a high productivity driven for the most part by SMEs in the manufacturing sector, has been chosen in order to analyse the behaviour

of its smaller firms with respect to Open Innovation.

The aim of this study is that of finding out if the SMEs in the region have, at any rate, ever adopted any Open Innovation practices, what the difficulties they face are and what could be done to improve the outlook of Open Innovation in the region.

The tool chosen to pursue this aim is an online anonymous questionnaire and the surveyed firms are all manufacturing SMEs located in the North-East of Italy, that is to say in the two administrative Regions of Friuli Venezia Giuli and Veneto, and in the two Autonomous Provinces of Trentino and Südtirol.

Section 2 of this work features a brief review of the literature and explains the main theoretical concepts that are relevant for this study and constitute its reference theoretical background.

Section 3 is centred around the Italian SMEs and outlines their main characteristics, as well as the state of art of innovation and Open Innovation in the specific context.

Section 4 provides an account of two projects that have been set up to support the implementation of Open Innovation practices in the reference region of the Italian North-East.

In Section 5, the results of the questionnaire are discussed.

Section 6 is for the concluding remarks, to provide recommendations for policymakers and possible directions for future research.

2. Theoretical background

2.1. Innovation: the underlying theory

2.1.1. Defining innovation

Generally, when trying to define Innovation, one might encounter some difficulties or pitfalls, but the literature however does provide some good examples that are not biased towards one's interest or professional field.

Damanpour and Schneider (2006) asserted "*innovation is studied in many disciplines and has been defined from different perspectives*", in fact, the concept of innovation spans different fields: Economics, Management, technical and scientific disciplines; it has political and policy implications on various levels as well on our everyday lives. For the purpose of this study however, the main concern is with the managerial and economic aspects of innovation within networked business organisations.

The only constants that can be traced in the several definitions of innovation available and that will be mentioned later, are the ideas of change and newness.

A starting point in defining innovation could be Schumpeter's considerations (1912). He stated that the following are all instances of innovation:

a) development of a new product;
b) development of a new production process;
c) creation of a new market;
d) exploitation of a new source of raw materials of intermediate goods;
e) adoption of a new organisational form.

It is clear how change and newness are deeply embedded in all the elements in the list above, however, a more formal definition is needed in order to make sure to include such elements and possible other relevant ones.

Again, Schumpeter (1942), defined innovation as the commercialization of invention but while his view is widely accepted, it does not quite consider the more complex interplay of forces lying beneath the surface, nor how innovation is to be achieved. It focuses merely on one of the many possible ends.

Interestingly, Damanpour (1991) refers to innovation as a tool firms use to implement change, or to respond to it, in their specific internal and external environment. The same author provided a well-known, yet broad, definition that makes for a good starting point: "*Innovation is conceived as a means of changing an organization, either as a response to changes in the external environment or as a pre-emptive action to influence the environment. Hence, innovation is here broadly defined to encompass a range of types, including new product or service, new process technology, new organization structure or administrative systems, or new plans or program pertaining to organization members.*" (Damanpour, 1996).

Two possible perspectives are those of knowledge management and technology management. What seems to be essential in defining innovation are knowledge and ideas and while to some extent they are, defining innovations strictly in those terms, as du Plessis (2007) did, fails again in capturing the wider picture. Technology-related definitions instead concentrate around the technological development leading to the creation of new products (Nord and Tucker, 1987).

I personally believe that innovation needs to be defined independently of its final purpose or the preconditions upon which it is achieved. Hence, innovation can be operatively defined as a process so as to make clear that it is not a discrete act (Baregheh, Rowley and Sambrook, 2009).

Baregheh et al. (2009), after thoroughly reviewing the literature on innovation through a comprehensive content analysis, went as far as devising their own definition, which is

possibly the most pertinent to this study: "*Innovation is the multi-stage process whereby organizations transform ideas into new/improved products, service or processes, in order to advance compete and differentiate themselves successfully in their marketplace.*".

2.1.2. Innovation models and the sources of innovation

Choosing to define innovation as a process has several implications on the way it is managed. Early innovation models, which were in many cases informal, or even just mental schemes, would only be constituted by activities in a linear sequence, this is why they are called "linear models of innovation".

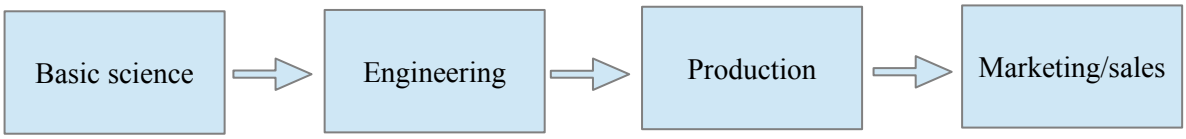

Figure 2.1: "Linear model of innovation". Source: Rothwell, 1994.

Examples of linear models of innovation are the "technology push" and the "market (or need, demand) pull" models. Discussing these two basic models also allows to briefly outline what the traditional sources of innovation are.

In the technology push model, the innovation process is initiated by research, be it internal or external. The objective is that of exploiting commercial opportunities that might arise from the actual practical use of technical capabilities, competencies and know-how. No positive feedback from the market is granted since demand or unmet needs are not considered at the beginning of the innovation process and therefore the innovation might only eventually find its way to the marketplace.

In the market/need/demand pull model instead, consumers' unmet needs and the demand for

problem-solving are the source of innovation. This model seems to be a safer alternative to the technology push model, however, despite innovation stemming, in this case, directly from market demand, commercial success cannot be guaranteed.

Both models have relevant drawbacks. In the case of technology push models, there is a tendency for Research and Development (R&D) to become inefficient and unresponsive to changes in the environment due to being completely decoupled from the market, its trends and, in some cases, the rest of the organisation. Common related phenomena, as cited in Brem and Voigt (2009) are that of the "lab in the woods" effect, and the "reinvention of the wheel". Furthermore, there is a risk of having R&D lacking direction and start from what is more easily researched, creating something that only caters to the needs of few atypical users and excessive focus or reliance on only one kind of technology. Market/demand/need pull models, on the other hand, are characterised by a tendency to lose the scouting capability research should normally which in turn translates into missed opportunities for learning. This is because R&D often evaluates and pursues opportunities only concerning those needs that are easily identified and barely scratches the surface of more complex problems. The main risks lie in the possibility of not understanding the signals from the market, or coming up with biased or wrong interpretations. Another potential risk is that of continuously proposing refinements of an innovation in order to better serve the needs expressed by the market, only to have the competition quickly catch up and become a real threat to competitiveness.

Tidd (2006) asserts that successful innovation stems from a combination of these two approaches. This combination gave then rise to several more recent innovation models in which coupled processes, parallel development, networking and alliances are emphasized (Tidd, Bessant and Pavitt., 2005). These are the "interactive models of innovation" and share several common features. According to Johansson, Karlsson and Stough (2006), these

common characteristics, or essential:

a) involvement of a wide variety of actors;

b) interactive (collaborative) dynamics;

c) feedback across different stages;

d) R&D is not necessarily where innovation starts;

e) innovation can emerge at all stages.

Such models emerged after the criticism and decline of the linear models and can better deal with the complexities of innovation which is not a linear process and usually involves conflicts between its technical and commercial aspects that need to be solved by taking a holistic view of the whole process and managing different sources of innovation across stages.

2.1.3. Learning as a variable in innovation strategies

Innovation is widely recognised as vital for the growth and long-term survival of organizations. In this light, organisations should devise and implement an innovation strategy that considers not only their mission and vision, but also strategic concerns that address the questions of how to stay competitive.

For a firm, the renewal of the products or services offered and know-how is not only a matter of sales, but also of increasing its knowledge stock and thus organisational learning comes into play.

Following the seminal article by March (1991), two very important concepts broke into the existing landscape of studies on innovation and learning: exploration and exploitation.

According to March (1991) exploration entails learning through research and experimentation, and it requires flexibility, facing change and undertaking risk. Exploitation,

instead, is a form of learning that stems from execution, experience, and the selection and refinement of routines and competencies (Baum, Li and Usher, 2000; March, 1991).

Holmqvist (2004) stated that "*exploitation is about creating reliability in experience, and thrives on productivity and refinement. Exploration is concerned with creating variety in experience, and thrives on experimentation and free association*".

It is important to stress that from the point of view of the firm, exploration is about learning by venturing into the unknown and testing novel approaches, or learning from the experience of others, and it is commonly associated with radical innovation, while, with exploitation instead, the focus is on learning from the firm's own practices and competencies, and this approach is associated with incremental innovation. According to March (1991), both are essential in granting organizations a competitive advantage, however he states that these two approaches, are in competition for the scarce resources a firm has available. March points out how firms that choose one over the other are bound to take extremely important decisions over strategy, investments and the organisational structure that frequently do not lead to securing a competitive advantage, but might instead bring about specific problems. According to the author, a trade-off is to be sought since it represents an essential factor for long-term survival and growth.

Despite formally agreeing with the theory by March that has been briefly presented above, Gupta, Smith and Shalley (2006) challenge one of its notions, that of the two seemingly conflicting strategies clashing over the firm's pool of scarce resources, in a way that is highly relevant for the comprehension of concepts that will be explained in the next paragraphs and chapters. In fact, they remark that the stock for certain resources, such as information and technologies, could be endless while other resources could be accessible even though located outside the boundaries of the organisation.

It should thus be possible, to some extent, or in particular circumstances, to access this stock of resources and then combine exploration and exploitation, or rather find a trade-off between the two. Considering information and knowledge as infinite resources (Shapiro and Varian, 1998) and the chance of accessing, through alliances or other agreements, resources owned by other organisations, the total stock of resources a firm would have available is larger and could offer more opportunities to make exploration and exploitation coexist and thrive.

The possibility to combine the two approaches has been considered many times in the literature and the concept has been referred to as "ambidexterity", and among all the numerous other studies, it is worth mentioning those by Andriopoulos and Lewis (2009), Kim, Song and Nerkar (2012), and Raisch and Birkinshaw (2008).

Ambidexterity resides in the capability to balance the tensions toward exploration and exploitation, or, more practically, "*ambidexterity is the ability to both use and refine existing domain knowledge (exploitation) while also creating new knowledge to overcome knowledge deficiencies or absences identified within the execution of the work (exploration)*" (Turner, Maylor and Swart, 2011).

2.1.4. The New Product Development process

Embracing the view of innovation as a (multi-stage) process naturally leads to identify and label each phase.

The notion of innovation, for the purpose of this study, is mostly related to new product development (NPD) activities, so it is worth presenting two main ways to manage the NPD process: the sequential process and the partly parallel process.

There are broadly-defined phases in the product development cycle, which, for the purpose of this study, coincides with the aforementioned multi-stage innovation process. In

chronological order, the phases (that are groups of interrelated activities) are:

a) opportunity identification;

b) concept development;

c) product design;

d) process design;

e) commercial production.

In the sequential process, the five phases, or stages, follow one another with a "gate" between every two stages: that is where a the process can be declared ready to proceed to the next stage, reverted back to the previous phase or "killed" completely. The main disadvantage of this process that was widely used in the USA until the mid-90s, is the fact that the cycle time can lengthen considerably due to the lack of early warning system that halts a product concept not suited to be manufactured from being discovered before it is handed to those in charge of manufacturing it (Schilling, 2009).

Thus, given the need for a solution to the overly long development times associated with a sequential NPD process, the partly parallel process was introduced. Slightly overlapping each phase (except for the last one) with the previous one allowed for increased cooperation and exchange of information across the stages so the chances to have product concepts not suited to be manufactured would be much lowered and the development cycle time would shorten. However though, partially overlapping stages might cause problems since variations or

changes in a phase can have large, undesired, impacts on the following phase that has started already, as would be likely to happen between the product design and process design stages in uncertain and rapidly changing markets (Schilling, 2009).

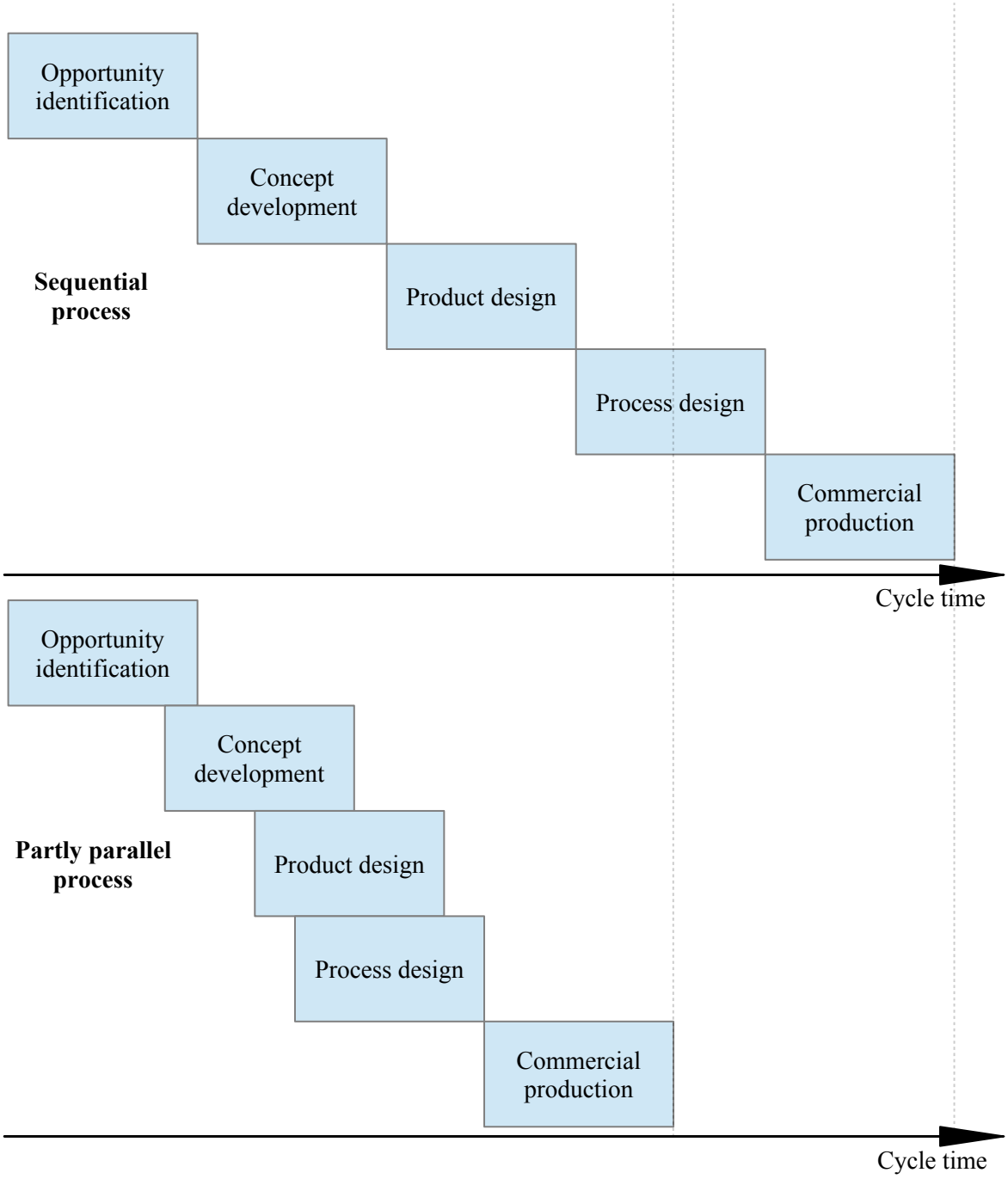

Figure 2.2.: "Comparison between the sequential and partly parallel processes". Adapted from Schilling, 2009.

Cooper (1990) proposed a conceptual model called "Stage-Gate System", a management approach and tool used to improve sequential processes.

According to the Stage-Gate System, a gate is set before each stage: that is the node where a set of inputs or deliverables are supposed to be verified (the "go/kill" decision) for compliance with certain criteria (dependent on the stage, and peculiar to every single firm). The output of this verification, if positive, is the token of entry to the next stage; otherwise, if negative, the process is "killed" (Cooper, 1990).

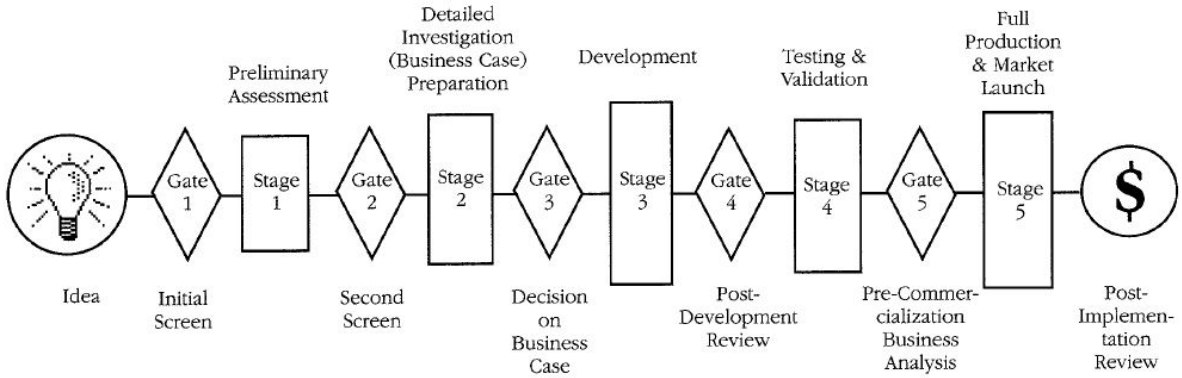

Figure 2.3: "Example of a Stage-Gate System". Source: Cooper, 1990.

2.2. Closed Innovation

Traditionally, innovation was mainly achieved through (internal) R&D: in order to innovate, firms exploited only their resources, knowledge and assets.

Firms, especially the largest ones, meticulously carried out in-house R&D activities and that was considered the sole source of innovation.

R&D was aimed at creating new and unique products to be patented and brought to market as quickly as possible: it was crucial for companies to be the first to bring their novelties to market. Firms focused on profiting from R&D activities by inventing, developing and crafting new products in-house.

Intellectual property (IP) had to be protected with patents so as to prevent other companies from appropriating and profiting from it (Bloem, van Door and van Ommeren, 2007).

The main implications of the Closed Innovation model are:

1. there is no way to skip phases, or considerably speeding them up, as the innovation process can only start from the first stage (longer time-to-market);
2. innovation can only be commercialised through a firm's own channels to market (fewer opportunities for internationalization and licensing out).

Being (internal) R&D the norm between the end of the Second World War and the mid-80s, this way of innovating did not require a specific classification until 2003, when Chesbrough (2003) categorised a different approach to innovation: Open Innovation, a form of collaborative innovation which had already been observed starting from the 60s, mainly as instances of inter-firm R&D. By contrast, the old standard paradigm was labeled Closed Innovation.

2.3. R&D as a process crossing the boundaries of the firm

R&D and learning are strictly related, in fact, according to Rosenberg (1982), R&D is, together with learning-by-doing and learning-by-using, one of the types of learning that directly affects productivity.

Bellandi (1992) says that learning doesn't necessarily have a creative character, but recognises the creative importance of R&D, and, in particular, he mentions the case when the practice is supported by the knowledge shared among producers of goods. In the same article, he refers to the phenomenon as "*Decentralized Creativity*" and "*Decentralized Industrial Creativity*" (excluding the contributions made by craftsmen).

It has been observed before that companies sourced R&D from other organisations in several

different instances. Pisano (1990) asserts this happens mainly in presence of "*creative destruction*" Schumpeter (1942), when firms have to face major rapid disruptive technological changes that leave them unable to compete with new entrants. Then, already-established firms have to make R&D procurement decisions.

Pisano (1990) identified the main factors that drive a firm's choice between in-house (governed by hierarchical mechanisms) and contractual (dependent on contracts and market transactions) approaches to organising R&D. Such factors are:

a) appropriability issues: when a R&D project is carried out internally, know-how can be prevented from spilling over, but when external partners are involved, at any stage, it becomes necessary to define a set of contractual obligations in order to safeguard IP rights;
b) historical factors: there is a potential path dependence on the part of the firms in making R&D procurement decisions as they are more likely to follow already-established patterns regardless of changes in the environment or technologies, and if they had never had any experience in R&D contracting, they might overestimate the risks and organisational costs involved;
c) previous R&D experience in the specific technology: the level of accumulated skills and knowledge in specific R&D fields and technologies determines the need to enter R&D contracts with partner, or a preference towards the full internalisation of R&D projects;
d) focus: processes, R&D-related tasks and projects that a company deems to be of strategic importance are most often internalised;
e) size of the firm: larger firms usually have more resources to invest in R&D, and more chances to generate scale advantages, however, as firm size increases, complexity in

the organisational processes increases as well and this might have a negative effect on R&D;

f) national/geographic origin: dependently on the location of the companies and pools of specialised competencies, certain companies might find it harder or more costly to take a contractual approach to R&D.

2.4 Open Innovation

Since 2003, when the term "Open Innovation" was first introduced by Chesbrough, the abundant literature on the topic has focused mainly on how external sources of knowledge are searched for and exploited by larger companies and multinationals (Chesbrough, 2003; Dodgson, Gann and Salter, 2006).

Despite the theory being somewhat recent, the approach itself is not and, as mentioned earlier, it had been observed before Chesbrough .

The term "Open Innovation" refers to the concept that companies can, through a process entailing both inflows and outflows of knowledge, rely on externally-generated ideas and insights that can be exploited to increment the degree of internal innovativeness and increase the possibilities of profiting from operations in the marketplace.

Since according to Chesbrough, Vanhaverbeke and West (2006) Open Innovation is defined as "*the use of purposive inflows and outflows of knowledge to accelerate internal innovation and to expand the markets for external use of innovation, respectively*", Open Innovation and its related activities can be either of an inbound or outbound character; so, then, while at the organisation level, the concept of inbound Open Innovation refers to the inflow of new ideas and the acquisition of external knowledge (Spithoven, Clarysse and Knockaert, 2011), outbound Open Innovation is the process by which knowledge, ideas and technologies that

are developed internally are revealed, then acquired and exploited by external subjects and other companies (Ahn, Minshall and Mortara, 2015; Chesbrough et al., 2006).

According to Ahn et al. (2015), examples of inbound Open Innovation are joint R&D, in-sourcing (licensing-in), merger and and acquisition (M&A), strategic alliances and user involvement. The same authors identified licensing-out, open-sourcing and spin-off as examples of outbound Open Innovation.

What sounds striking about this approach is the fact that it is "open", hence in stark contrast with the previous paradigm of Closed Innovation in which the protection and secrecy of the firm's hard-earned IP was of paramount importance. However, as Chesbrough (2003) himself pointed out, "*innovation initiatives must gain access to and leverage from the insights, and support of other companies without compromising legitimate corporate secrets*". It is thus necessary to stress once again that while "open" may stand for "collaborative", or rather "receptive" of external stimuli, it doesn't mean that all the IP is shared, or easily and directly accessible to any stakeholder in the innovation process.

The pillars upon which Chesbrough (2003) built his model can be summarised as follows:

a) not all the brightest people work for a certain firm, hence it is important to tap into external pools of knowledge and expertise;
b) external R&D can greatly contribute in generating added value, internal R&D is only responsible for a share of the total added value that can be created;
c) R&D does not have to be internal in order to profit from it;
d) being the first to market is less important than having a good business model;
e) in order to score a top-level performance in the marketplace, the firm should make the best use of internal and external knowledge;
f) the firm must be able to exploit and profit from both its own and other subjects' IP.

While traditionally, companies limited themselves to what has been referred to as Closed Innovation, the exploitation of internally-generated knowledge through internal Research and Development (R&D), which was then, and in many cases still is, considered the sole source of innovation, lately, after a strenuous conceptualization work, Open Innovation practices have been understood and widely implemented across different industries.

Choosing to open up, or outsource, the innovation processes doesn't imply internal R&D becomes useless, on the contrary, while not being the only source of innovation, it is necessary in order to harmonise and fully exploit all the contributions coming from the external partners in the innovation process. For optimal performance, internal and external innovation have to be combined, they need to be considered as complements (Cassiman and Veugelers, 2002, 2006; Vanhaverbeke, van de Vrande and Cloodt, 2007; Veugelers, 1997).

The notion of Open Innovation, as it is currently used, is a catch-all term for a plethora of innovation practices contrasting the Closed Innovation paradigm and emphasizing a more or less open innovation process and collaboration with various different kinds of subjects outside the boundaries of the firm.

Such subjects could be briefly categorised as: users/consumers, other companies, technology transfer centers, universities and public or private research institutions. As it will be made explicit later, though, for analytical purposes, and in order to implement a certain degree of compliance with previous research, these categories will be further broken down to more precise sub-categories as Laursen and Salter (2006) proposed in their study on Open Innovation within British SMEs.

It must be noticed that generally Open Innovation has been commonly and most notoriously associated to New Product Development (NPD), but its scope spans well beyond this set of activities and the definition of the phenomenon should not be limited to enhancing, either

radically or incrementally, the innovativeness of the product offering.

Furthermore, as noted earlier, not only externally generated knowledge is used for NPD activities, but it is also essential in improving internal processes, or, more generally, the innovativeness of the organisation, and in order to exploit new commercialisation channels (Chesbrough, 2003).

The general motives behind the adoption of Open Innovation are fostering growth and increasing revenues (Chesbrough and Crowther, 2006; van de Vrande, de Jong, Vanhaverbeke, de Rochemont, 2009), reduction of the time-to-market and better exploitation of knowledge, acquiring new knowledge and resources, spreading risks and reducing costs (Hoffmann and Schlosser, 2001; Mohr and Spekman, 1994).

These general motives apply to firms of every size, however, as it will be more evident in the next chapters, and anticipating in part the results of the survey, for SMEs, the rationale for choosing the path of Open Innovation transcends these motives and is far more specific and related to their needs and problems.

The innovation process, in the domain of Open Innovation, is much more swift and agile if compared to the traditional sequential or partly parallel innovation processes commonly adopted under the Closed Innovation model, in fact, all the phases can be greatly sped up since the knowledge involved and activities making up such stages can be partly, or entirely, sourced from outside the boundaries of the firm.

Hence, while a Closed Innovation process is rigid and less responsive to changes in the specific industry or market, under Open Innovation, companies can benefit from R&D carried out by others or inputs in the innovation process that would not otherwise be available. This makes it possible for firms to skip certain stages in the innovation process, forgoing or sharing onerous investments in several research fields and to “listen to the markets” more

accurately.

2.5 SMEs

2.5.1 General characteristics of SMEs

SMEs are generally defined as independent companies with a limited number of employees (OECD, Organisation for Economic Co-operation and Development, 2000), however, the term has no universal meaning since the threshold widely differs across countries.

Being Italy part of the European Union (EU) and fully integrated in its economic system, the definition of SMEs used in the analytical part of this paper (or whenever reference is being made to companies located within the EU), will be that provided by the European Commission (2003) which dictates that companies can be classified as SMEs only if they meet the following requirements (see Table 2.1) expressed in terms of:

1. staff headcount;
2. either turnover or balance sheet total.

Company category	**Staff headcount**	**Turnover *OR* Balance sheet total**	
		Turnover	***Balance sheet total***
Medium-sized	< 250	≤ € 50 million	≤ € 43 million
Small	< 50	≤ € 10 million	≤ € 10 million
Micro	< 10	≤ € 2 million	≤ € 2 million

Table 2.1: "Definition of SMEs in the European Union". Adapted from: European Commission, 2003.

By contrast, it is interesting to show how these requirements are strikingly different in a larger economy such as China. As reported by Zeng, Xie, and Tam (2010), n the Asian country in fact, firms fall into the SMEs category if their total staff is less than 2000, and:

1. their annual turnover does not exceed RMB Yuan 30 million or

2. their total assets amount to no more than RMB Yuan 40 million.

SMEs play a central role in fueling economic growth, creating employment and implementing social cohesion worldwide (Ocloo, Akaba and Worwui-Brown, 2014; OECD, 2000), and it is estimated that more than 95% of the companies in those countries that are members of the Organisation for Economic Co-operation and Development (OECD) belong to this category and they account for a share of total employment which is between 60% and 70% in most countries (OECD, 2000). For instance, in the United States of America, small businesses were responsible for 64% of the new jobs created between 1993 and 2008 (Sargeant, 2011).

Most jobs in the SMEs in the OECD area are in the service sector, moreover, SMEs are also responsible for about half of the total manufacturing employment in said area (OECD, 2000).

What has been just said gives a very bright picture of the socio-economic outlook SMEs contributed to create, some less bright comments are however due in order to grasp the bigger picture.

Hallberg (2000) denotes that despite higher job creation rates being rightfully attributed to SMEs, it is also to be taken into consideration that the gross rate of destruction of such jobs is high as well, especially due to SMEs, unlike large firms, exhibiting high death rates or failing to grow. Thus, job security is generally lower in SMEs than in large firms, although the author points out that during recessions, possibly due to wages being more flexible, job destruction rates are lower in SMEs than in large enterprises.

As shown by Little, Mazumdar and Page (1987), SMEs are not necessarily more labor-intensive than large firms, in general, but only within certain industries.

The activity of SMEs is most often characterised by a strong local component and while they succeed to compete in the local/national market, they still struggle to make an impact in the

international one, where they are exposed to harsher competition and rapid changes. Competitiveness, seen as the potential of organisations to successfully engage with markets and appropriate revenues and resources (Greenwald and Kahn, 2005), is crucial for survival in a globalised world and so is, for new and small business, to develop competitive advantage (Bressler, 2012).

It is not yet clear what effect globalisation, trade liberalisation and the increasing international competition have had on SMEs (Asiedu and Freeman, 2007; Colantone, Coucke and Sleuwaegen, 2010). Findings from an empirical study by Álvarez and Vergara (2013) suggests that the impact of trade liberalisation on SMEs has not been dramatically negative. They are, indeed, between 16% to 8% (depending on the size) less likely to survive than larger firms but, on the other hand, their growth rate for employment and sales is higher Álvarez and Vergara (2013). Technically then, SMEs might be well-suited to sustain international competition, especially since they are more adaptable to repentine changes in demand conditions than large companies and their high degree of specialisation leads them to profit from niches of the market that are shielded from mainstream competition (Colantone et al., 2010). In this regard, Box and Miller (2011) observed that most small business compete in the market on the basis of differentiation.

Large companies, on the other hand, as observed by Bressler (2012), often seem to compete on the basis of cost. He clearly adds though, that it could be a viable option for small businesses too, provided they could successfully adjust their cost structure.

Analysing the value proposition of small businesses, Valadez (2011) highlighted an important trait that differentiates them from larger businesses, that is a tension towards creativity, innovation, novel solutions and ideas which is instead precluded to their counterpart (larger firms) due to a more formalized hierarchy, company culture and and the fact that they seek

efficiency at any cost. That may be because, as the author points out, the management approach within small businesses is more instinctive and less based on careful research.

2.5.2. The peculiarities of innovation in the SMEs

Schumpeter (Mk1, 1912) in his early works, attributed great importance to creative individuals whom he referred to as "entrepreneurs" and their ability to innovate. Over the years, however, the author changed his mind and while he originally stated that innovation was not a prerogative of large firms and that it was plausible that small and medium-sized enterprises were the source of most innovations Schumpeter (Mk1, 1912), during his time in the United States, analysing the financial side of R&D in such smaller organisations, he found out that due to the high costs involved, such firms were not likely to undertake many innovative projects (Schumpeter, Mk2, 1942). The Austrian economist then added that as innovation was being turned into a routine, so it was not dependent on the spontaneous creativity of some individuals, more formalised systems of managing it were required in order to pursue consistent technological progress as a corporate goal (Schumpeter, Mk2, 1942).

From a strategic point of view, traditionally, the exploitation of resources necessary to conduct R&D under the Closed Innovation model implied larger firms were able to set up high barriers to entry and outperform smaller firms (Teece, 1986).

While they can count on flexibility, quick decision-making and a low degree of formalization (Vossen 1998); the main disadvantages of SMEs are scarce financial resources, difficulty in spreading the risk over a large innovation portfolio and few opportunities to hire specialised workers (van de Vrande et al., 2009).

Wynarczyk (2013) adds that, nowadays "*SMEs, particularly new small firms are*

increasingly vulnerable and exposed to structural handicaps such as size, time, culture, managerial capacity, skills, access to information and finance".

Given this picture of the landscape of innovation for SMEs, Open Innovation practices are essential for many of these companies in order to overcome their liabilities and increase profitability (Gassmann, Enkel and Chesbrough, 2010).

2.5.3 Open Innovation practices in the SMEs

In recent years, a growing interest in Open Innovation practices in the SMEs has been observed in the literature and studies have focused mainly on external knowledge sourcing (Brunswicker and Vanhaverbeke, 2011; Brunswicker and Vanhaverbeke, 2015; Laursen and Salter, 2014; Spithoven et al., 2013) and firm performance (Ahn et al.,2015, Laursen and Salter, 2006).

SMEs have often been at the forefront of innovation as they are, at least in principle, capable of radical innovation (Acs and Audretsch 1987), but, of course, it is not always the case.

Several studies have tried to pinpoint the main advantages and disadvantages SMEs have as far as their own peculiar way of organising and managing the innovation process is concerned.

The main problem of a substantial lack of resources, is exactly what, according to Lee et al. (2010), constitutes a paramount incentive for SMEs to open up and leverage on their network. The authors also point out that companies might incur potential unwanted effects arising from cooperation with external partners, chiefly the cost for monitoring them and the loss of core knowledge and competencies.

The alleged benefits of Open Innovation have been summarised by Vanhaverbeke et al. (2008) as "*improved access to other organizations' technological capabilities or higher*

R&D productivity through the combination of internal and external channels to market". This definition surely catches all that is positive and convenient about Open Innovation, but the literature has however identified other inherent risks to the Open Innovation approach, most notably, the excessive dependence on external partners (Vanhaverbeke et al., 2002), the risks of involuntarily strengthening the competition (Fosfuri, 2006), loss of control over products and processes (Becker and Zirpoli, 2011), loss of core competencies and missing learning opportunities connected to learning-by-doing (Zirpoli and Becker, 2011; 2011).

Less relevant in the particular context, given the often emergent nature of strategy and innovation within SMEs, but still worth mentioning, is the case of business venturing. Broadly speaking, four main advantages associated with Open Innovation and new business venturing have been identified by Vanhaverbeke, van de Vrande and Chesbrough (2008) in a groundbreaking study connecting Open Innovation practices and the notion of real options:

a) benefits from early involvement in new technologies and business ventures;
b) possibility to exploit a combination of internal and external paths to market, thus granting the opportunity to postpone entry or financial commitment;
c) possibility of an early exit by accessing venture capital funds (through the spin-off of ventures, selling technologies or out-licensing agreements);
d) flexibility as far as the exit decision is concerned since it can be postponed (depending on the strategic fit and commercial success).

Usually the phenomenon of Open Innovation is not analysed according to the real options perspective which, doesn't generally apply to all SMEs. Lately however, with the emergence of startups, which are often sought after as important technology providers by other companies, increasingly frequently including large market players, venturing could be regarded as an important outbound Open Innovation strategy. Many startups in fact benefit

from Open Innovation practices at all stages and are intentionally more exposed to practices such as selling technologies and licensing agreements, or even strategic acquisitions on the part of larger and more established organisations that increasingly frequently look at them as core technological partners to be integrated.

Escoffier, La Vopa, Loccisano, Puccini and Speser (2012), added, on the topic of real options, that they are particularly useful in the early stages of technologies, when their net present value is close to 0 and provide several examples of real options used in connection with licensing agreements.

2.5.4 Empirical relevance of this study

While this study necessarily builds upon the theoretical framework provided by the respected scholars that have been previously mentioned, due to its very specific aim, a more localised and practical contribution to the literature on the topic is called for (and still missing) since, as of now, it is not known of any published article or research paper by any scholar who ever analysed the SMEs in the Italian North-East or, more generally, the Italian industrial districts, according to the different notions and operational aspects that concern the phenomenon of Open Innovation; nor any of the several projects implemented to foster the adoption of Open Innovation practices at a national and regional or local level in Italy has ever been considered. However, meaningful contributions in this regard have been made by Ceci and Iubatti (2012) who analysed the relevant issue of personal relationships as a driver of innovation diffusion in a consortium of networked SMEs, hence operating as a cluster, in the automotive industry. Such companies are located in Abruzzo, Central Italy.

Unrelated to the Italian context, but still extremely relevant to explain the inner functioning of the networks of SMEs are the articles by Tambunan (2009) and Zeng et al. (2010). The

former, which stresses the importance of technology transfer, is about a metalworking cluster in Indonesia, the latter analyses the interplay of cooperation and innovation in Chinese networked SMEs.

Lazzarotti, Manzini, and Pellegrini (2010), instead, focused on the Open Innovation models adopted in Italy by analysing a sample of 99 manufacturing companies in Lombardia, North-Western Italy, which had applied for funding with the local Chamber of Commerce in order to improve their innovativeness. While no indication of the size of such companies is given, considering the propensity to innovate of the firms in the region and the rather unique makeup of the Italian economic landscape (where SMEs prevail at a national level), it is wise to assume a fair share of them were SMEs.

Given the substantial lack of literature specific to the Italian regional context, only few important previous similar studies carried out elsewhere in Europe could be identified and used for reference. Great attention has been placed on the methodology used and on the resulting findings.

In particular, Rahman and Ramos (2013) conducted an explorative study with a comparable aim and methodology in Portugal. Similarly to that of this study, the main aim of theirs was that of mapping and understanding the challenges, limitations and constraints faced by Portuguese SMEs in adopting Open Innovation strategies.

Other relevant studies that could shed light on the challenges faced by SMEs in adopting Open Innovation practices are those conducted by Wynarczyk (2013) in the United Kingdom, and van de Vrande et al, (2009) in the Netherlands; although the latter used a different definition of SMEs, thus effectively including large companies.

Wynarczyk (2013) analysed a sample of 64 British SMEs operating in science- and technology-related sectors. Based on the claim that internal factors such as formal

management structures, diverse managerial skills and expertise, and internal R&D capacity are essential in successfully exploiting the full potential of Open Innovation practices, the analysis concluded that firms which implemented such practices are more likely to have a higher number of dedicated (internal) R&D teams and a higher number of employees only concerned with R&D. In addition to this, the exploratory study clearly points out that SMEs of any size (from micro- to medium-sized businesses) have, in the particular setting analysed, used Open Innovation practices.

Elaborating more on the importance of social and personal ties as a driver of innovation, we find a confirmation of that in the articles by Baum et al. (2000) and Edwards, Delbridge and Munday (2005): findings suggest in fact that, for SMEs, innovation is inherently externally-focused and facilitated by such aforementioned social and personal relationships that customarily take place at a local level.

3. Open Innovation in the Italian SMEs

3.1. General traits of the Italian SMEs and industrial districts

3.1.1. The Italian SMEs

According to estimates for 2014 by DIW Econ (as published in the EC's 2015 Small Business Act Fact Sheet - Italy, 2015), SMEs account for 99.9% of the total firms in Italy, with a large percentage (94.9%) of firms belonging to the Micro business category. SMEs also account for 79.6% of the total employment and 67.3% of the added-value produced in the country. These figures are many percentage points higher than the average in the EU. The situation depicted is that of an economic system which is strongly dependent, or reliant, on the SMEs.

	Number of enterprises			Number of persons employed			Value added		
	Italy		*EU-28*	Italy		*EU-28*	Italy		*EU-28*
	Number	Share	*Share*	Number	Share	*Share*	Billion €	Share	*Share*
Micro	3 503 624	94.9 %	*92.7 %*	6 592 785	46.1 %	*29.2 %*	186	29.2 %	*21.1 %*
Small	167 248	4.5 %	*6.1 %*	2 985 874	20.9 %	*20.4 %*	137	21.5 %	*18.2 %*
Medium-sized	18 669	0.5 %	*1.0 %*	1 810 373	12.7 %	*17.3 %*	106	16.6 %	*18.5 %*
SMEs	**3 689 541**	**99.9 %**	***99.8 %***	**11 389 032**	**79.6 %**	***66.9 %***	**429**	**67.3 %**	***57.8 %***
Large	3 056	0.1 %	*0.2 %*	2 910 068	20.4 %	*33.1 %*	208	32.7 %	*42.2 %*
Total	**3 692 597**	**100.0 %**	***100.0 %***	**14 299 100**	**100.0 %**	***100.0 %***	**638**	**100.0 %**	***100.0 %***

These are estimates for 2014 produced by DIW Econ, based on 2008-2012 figures from the Structural Business Statistics Database (Eurostat). The data cover the 'non-financial business economy', which includes industry, construction, trade and services (NACE Rev. 2 sections B to J, L, M and N), but not enterprises in agriculture, forestry and fisheries and the largely non-market service sectors such as education and health. The advantage of using Eurostat data is that the statistics are harmonised and comparable across countries. The disadvantage is that for some countries the data may be different from those published by national authorities.

Table 3.1: "Data about the Italian SMEs landscape (2014 estimates)". Source: EC's 2015 SBA Fact Sheet - Italy, 2015.

The Italian SMEs landscape is characterised by a great variety of industry, organisational forms, incorporation and ownership types; size however, does not vary as much given that 94.9% of the firms fall under the Micro business category, hence in the vast majority of the companies the total staff is less than 10, and their annual turnover and balance sheet total never exceed 2 million Euro. These micro businesses employ 46.1% of the Italian workforce, a figure more than two times higher than that for the Small enterprises and almost four times

higher than that for Medium-sized companies.

Large companies represent, in Italy, only 0.1% of the total businesses, however, the employ 20.4% of the workforce, an amount very close to the figure for the Small businesses, which however outnumber the large companies by 4.4%.

After the Second World War, the Italian economy was characterised by uneven development and stark contrasts, especially between North-Western and Southern Italy. In the former there were already large enterprises that could attain high levels of productivity and mass produce goods to serve the entire Italian market; the latter was instead still very underdeveloped, with a prevalence of agricultural and craft activities.

The industrial system of North-Western Italy found itself lagging behind other similar production systems when, with the 70s, a decline of Fordism loomed over the developed industrial economies and then, subsequently, Italian companies lost, at least initially, the challenge of globalisation. It is exactly in those years that a previously neglected player emerged in the Italian economy as a champion: it is the Italian North-East, with its SMEs.

The SMEs in Italy's North-Eastern regions have deep roots in the territory and were, and in many cases still are, strongly related to the traditional production systems that have a long history of excellence in the reference geographical setting. These smaller companies would later function as the driving force for the growth of the Italian economy as a whole, its productivity, employment and for the development of a pool of specialised know-how that to this day is hard or impossible to find elsewhere.

Together with Emilia Romangna, Marche, Toscana and Umbria (all located in Central Italy), the North-Eastern Regions, i.e.Friuli Venezia Giulia, Veneto and the two Autonomous Provinces of Trentino and Südtirol, make up what Bagnasco labelled as “Terza Italia” (“Third

Italy", as the third main economic macro-area in Italy after the North-West and South) in 1977. The regions grouped under the Terza Italia heading are all characterised by a very high number of SMEs with a strong local identity and sound linkages within their territory that allowed them to exploit the full potential of networking well before the Internet era.

Two consecutive harsh recessions hit Italy in recent years, starting from 2008 and the domestic demand has begun to shrunk in 2011. The smaller businesses have been hit much harder than the other firms. In particular, a decline in export between 2008 and 2009 determined a reduction of the total number of SMEs by 5% between 2008 and 2013, and, in the same period, added-value also decreased by 15%.

The reason why SMEs were hit so badly by the recessions and decline in export is because Italy, starting from the post-war times, witnessed an emergence of export-oriented SMEs (Beccattini, 1979). These export-oriented SMEs developed due to an increase in the international demand for the goods these firms produced, hence, their growth does not only depend on the internal market in Italy, but on the premises under which Italy approaches foreign markets and on the conditions of the demand. According to the aforementioned author, such firms are very specialised and often located within industrial districts.

For what concerns the factors that mainly affected the demand for Italian products and the business of Italian companies and SMEs in particular, are the switch from Lira to Euro and the rise of developing economies such as China.

Italy officially adopted the Euro, a much stronger currency than Lira, in 2002. Demand started dwindling right away as the Italian products were then more expensive in the international markets. Another effect of this switch is that Italy could not devalue Euro (since everything is decided at EU level), which is what has often been done with Lira, as a mean of sustaining export in rough times.

When China rose, or better started opening up, progressively, in the 90s, it became able to provide products that, despite often being of a lower quality than those produced in the West, were much more affordable and took over some markets entirely.

Another factor worth mentioning, but of a lesser importance for the purpose of depicting the situation of export, is the ICT revolution that followed with year 2000. Many firms were slow in implementing ICT and were still stuck in old-fashioned and less effective management practices.

Italian SMEs found themselves caught in between all these fast changes and could react only partly, due to their higher degree of flexibility, but often failed to keep prices low in order to try and stay competitive in the international markets.

3.1.2. The Italian industrial districts

Beccattini (1989) defines industrial districts as socio-territorial entities characterised by the active co-presence of a community of people and a differentiated population of firms the relationships among which are deeply intertwined in the own structure of the district. The degree of differentiation in the districts is such that firms specialise in one or few phases of the production process (Beccattini, 1987), however, observation suggests that this is not always the case, at least in North-Eastern Italy where many firms, including SMEs, operating in the same district can actually perform the whole process of transforming raw materials into finished products. In certain districts however, likely due to inherent complexities or requirements for higher levels of investment, the production process is more fragmented though and the different phases of production in which the firms specialise might include processes that come from different industries (Beccattini, 1989), hence the stock of

knowledge in a district is not limited to one industry, but covers widely different notions, abilities and technologies that contribute, through a mechanism based both on market transactions and personal relationships, to the creation of a set of products.

Beccattini (1989) attributes particular importance to industrial districts due to them being extremely important entities where creativity thrives. The definition of creativity that the author provided is that of the actual ability of a subject endowed with a stock of knowledge to come up with new ideas in a given specific setting. Industrial districts are, in fact, possibly the paramount example of a full-fledged system for the practical application of creativity due to the particular endowment of their members. They satisfy the criteria that Beccattini (1989) outlined to define the ideal locus of creative processes: they simultaneously host differentiated knowledge and competencies, and provide opportunities to create (and exploit) linkages between competencies and transferable approaches to overcoming peculiar challenges. This mutual exchange of information is made possible thanks to formal and semi-formal institutions and an environment where networking possibilities are highly increased. Institutions and shared values are what, according to Beccattini (1989), holds the district together and favour the creation of opportunities for exchanging knowledge between all the subjects involved.

It would be wrong to think of industrial districts as autonomous production entities completely detached from the wider external environment. The internal environment of the district is dependent on the conditions of the external one and sensitive to its changes. The growth and survival of all the actors in a districts is directly linked to the extent to which they can adapt to a rapidly-changing external environment which is in turn at least in part dependent on innovation which could also be seen as the force allowing for new combinations of already existing competencies (Beccattini, 1989).

Chiarvesio, Di Maria and Micelli (2010) highlighted a switch from the traditional model in which the supply chain of firms in the industrial districts in Italy was almost entirely internal to the district, with the exception of suppliers of raw materials and distributors of the finished products. They observed two strategies adopted by the SMEs that are changing the industrial districts landscape in Italy: they are commercial internationalisation and manufacturing internationalisation. Commercial internationalisation is a step beyond exporting goods: rather than directly selling their products to customers located in other countries, these SMEs are now creating their own sales network abroad. Manufacturing internationalisation indicates a further process of opening the company up towards the international markets with the aim of exploiting suppliers and networks abroad.

3.2. Innovation in the Italian SMEs

Analysing the specialisation of Italian firms in certain sectors, Onida found out in 1984 that this specialisation is correlated to the characteristic of light industry, chiefly a predominance of small and medium-sized specialised firms, product diversification (rather than standardisation) as the focal point and technological innovation carried out outside the traditional R&D lab. In the same year, Momigliano (1984) stated that it was impossible to find a significant degree of correlation between firm size and innovation in Italy due to the SMEs operating in the high-tech industries coexisting with other SMEs in the traditional (low-tech) ones. Certainly the situation has changed since 1984, however, as highlighted before, SMEs operating in the traditional industries still play a very important role for the Italian economy. Despite the supposed impossibility to summarise the relationship between firm size and innovation, observation suggest that many Italian firms intentionally and

actively pursue innovation.

It is believed that a less formal, or informal, R&D can be beneficial to SMEs. In this regard, Malerba (1985) pointed out formal R&D is not a prerequisite for innovation, and Mistri (1989) added that the presence of formal R&D is not a significant driver of innovation for the Italian SMEs since instead than on radical technological innovation, they would rather focus on incremental innovation and finding new ways to engage the markets.

In the wake of what happened with the crisis of the export-oriented SMEs in the first decade of the 21th century, it is wise to consider what Cozzi said in 1989: restrictive policies and weak or absent growth damage SMEs more than the larger companies. In particular, for what regards innovation, he made the following points:

a) the difficulties SMEs have to face in accessing capital translate into feasibility problems in pursuing innovative projects;
b) SMEs need less uncertainty because it is more difficult for them to evaluate the stream of revenues arising from innovative projects and they cannot simply rely on probability to determine the success of such projects.

Cozzi added that these reasons are also the explanation as to why Italian SMEs focus on incremental innovation rather than on radical innovation: while groundbreaking innovation could potentially lead to higher profits, it is also more risky and its outcome and success are harder to predict; incremental innovation instead is about the refinement or upgrading of products/services/process that have already been tested, it usually requires lower monetary investments and is more predictable.

In 2015, del Bufalo, based on data from a survey carried out in 2013 by MET (Monitoraggio Economia e Territorio S.r.l.), a private company, found out that innovation is positively related to firm size. The percentage of innovating SMEs is as follows:

Total staff	Percentage of innovating firms - industrial sector	Percentage of innovating firms - services sector
1-9	15.1%	13.2%
10-49	31.1%	20.5%
50-249	43.6%	32.1%

Table 3.2: "Innovating firm per size category and sector". Adapted from del Bufalo, 2015.

The highest percentage of innovating SMEs is in North-Eastern Italy, where 17.9% of the SMEs are actively investing in innovation. The Italian North-West and Centre follow with a percentage of 15.8% each. The macro-area of Southern Italy and the Islands is the one where the least SMEs have invested in innovation, the percentage is 13.5%.

Investment in innovation, for the Italian firms, is mainly directed at improving the current technologies of the firms. The investment in machinery is the most common one and in the industrial sector it has been undertaken by more than 80% of the firms in each category. Investment in ICT follows, but there is a considerable gap, especially if Micro firms are considered.

	Micro enterprises (1 to 9)	Small enterprises (10 to 49)	Medium enterprises (50 to 249)	Large enterprises (≥ 250)
Industry				
Land and buildings	5.7 %	9.4 %	14.3 %	11.8 %
Machinery	82.4 %	84.9%	85.8 %	87.9 %
ICT technologies	10.9 %	18.9 %	24.9 %	25.1 %
Patents	0.6 %	1.5 %	2.6 %	4.6 %
Employee education	2.5 %	10.0 %	10.8 %	23.1 %
Energy saving investments	2.9 %	9.7 %	7.4 %	17.1 %
Marketing and advertising	2.2 %	5.7 %	7.0 %	14.2 %
Production services				
Land and buildings	5.8 %	5.3 %	9.5 %	8.0 %
Machinery	54.3 %	63.1 %	62.4 %	66.3 %
ICT technologies	45.0 %	32.1 %	32.8 %	46.0 %
Patents	0.9 %	1.3 %	1.0 %	4.9 %
Employee education	3.1 %	10.6 %	13.1 %	21.6 %
Energy saving investments	0.9 %	3.3 %	3.8 %	7.1 %
Marketing and advertising	3.4 %	2.4 %	3.1 %	3.4 %

Note: Data show the shares of enterprises undertaking each specific type of investment broken down by size class. The types of investment are not mutually exclusive. For example: among medium-sized enterprises which invested in 2013 within the industry sector, 24.9 % invested in ICT technologies.

Source: MET Survey 2013.

Table 3.3: "Investment in innovation in Italy by size category and sector". Source: del Bufalo, 2015.

In the study by del Bufalo (2015), it is clearly shown how product innovation is the most common instance of innovation across all size categories in the industrial sector. Organisational innovation is prevalent in the services sector .

	Micro enterprises (1 to 9)	Small enterprises (10 to 49)	Medium enterprises (50 to 249)	Large enterprises (≥ 250)
Share of firms introducing product innovation				
Total	8.7%	18.9%	27.5%	34.0%
Industry	10.6%	21.5%	31.2%	37.1%
Production services	7.2%	10.6%	16.8%	25.8%
Share of firms introducing process innovation				
Total	5.4%	13.8%	21.5%	31.0%
Industry	6.1%	15.9%	23.9%	34.5%
Production services	4.9%	7.2%	14.3%	21.9%
Share of firms introducing organisational innovation				
Total	6.1%	13.1%	21.9%	32.5%
Industry	5.1%	13.1%	21.8%	29.5%
Production services	6.9%	13.2%	22.4%	40.2%

Note: The same firm may have introduced more than one type of innovation. The reference group also includes non-innovating firms.

Source: MET Survey 2013.

Table 3.4: "Type of innovation introduced in Italy by size category and sector". Source: del Bufalo, 2015.

In particular, del Bufalo (2015) identifies R&D as a critical area for Italian SMEs, with the percentage of firms investing in R&D being very low. Once again however, North-Eastern Italy ranks first, with 9.1% of its SMEs undertaking R&D investments. It must be noticed however, that, especially in the case of SMEs, as mentioned before, formal R&D is not a prerequisite for innovation and hence carries no significance in determining the innovativeness of the firms in the specific area.

The author also found out there is a possible positive correlation between R&D investment and the tendency towards internationalisation since in 2013 the amount of SMEs with operations abroad that also invested in R&D was five times higher than the number of firms

investing in R&D but having operations in Italy only. This is likely to be due to the different nature of the foreign markets and competition, in fact it is plausible that R&D is one of the drivers contributing to making these Italian SMEs competitive in foreign markets where investment in innovation is higher and represent a prerequisite for successful penetration, establishment and generation of profits.

Escoffier et al. (2012) presented a very detailed study on knowledge and technology transfer in Italy and carried out an analysis of the innovation scenario faced by the SMEs. They proposed a less bright perspective than what is usually accepted and argued that the same issues that hamper the adoption of a consistent innovative culture in the Italian SMEs are those that also represent obstacles to the internationalisation of such firm. These issues are:

a) lack of resources (both economic and human);
b) lack of innovative managing skills;
c) no access to basic research;
d) limited access to funds or financing.

All these factors contribute to the creation of a wide gap in growth, competitiveness and innovation capabilities compared to other countries. Escoffier et al. (2012) also confirm the supposition made above that implementing innovation more consistently is necessary for Italian SMEs facing the international marketplace. In fact, they say that sustaining competitiveness in markets other than Italy is frequently dependent on the degree of innovativeness and the technologies adopted.

The authors also add that the Italian SMEs don't know the state of the art in their industry and they would greatly benefit from technology transfer. Technology transfer, which represents a form of Open Innovation itself, is an important constituent of this study and its practical importance for Italian SMEs will be briefly outlined in the following chapter by means of two

examples of technology transfer projects aimed at fostering the adoption of Open Innovation practices in North-Eastern Italy.

3.3. Open Innovation in the Italian SMEs

Revealing in part the results from the survey, it is necessary to make it clear that given the situation of innovation in Italy, where despite the emergence of some SMEs as champions in the innovation scenario, others, arguably the most traditional ones, are completely unfamiliar with innovation practices, let alone knowing what the Open Innovation paradigm is. Open Innovation is however often implemented without even realising, through a set of choices or strategies that, in the most simple cases, allow the firm to create strong relationships, or even interdependencies, with other companies. If there is an exchange of information, there is potential for innovation, provided the firm has the right skills and capabilities to exploit this extra knowledge that was previously unavailable.

This is greatly aided by the structure of the Italian economic system where a sizeable amont the SMEs are networked and operate in close proximity to each other.

In 2012, Ceci and Iubatti published a study based on a questionnaire about innovation diffusion among the members of a network of 15 SMEs in Abruzzo, Central Italy. These firms are manufacturers of mechanical parts for the automotive industry and are clustered in an area called Val di Sangro. The authors found out that personal relationships drive the diffusion of innovation among the members of the network. Even more specifically, they investigated the relationship between companies effectively operating as partners and came to the conclusion that personal relationships, in addition to the business relationship present between the partners, make the diffusion of innovation much easier and greatly stimulate and enhance competitiveness of both partners.

The whole situation of the adoption of Open Innovation practices in Italy has never been analysed in detail, nor has been the adoption of such paradigm in the SMEs.

Lazzarotti et al. 2010 run a cluster analysis on a sample of 99 respondents to their questionnaire. These firms had applied for funding in 2008 with a local chamber of Commerce in Lombardia (North-Western Italy) It is reasonable to believe that almost all of them are SMEs due to the fact that small and medium-sized businesses almost make up the interity of the firms in Italy and because usually funding programs developed by a local Chamber of Commerce are directed at SMEs. The authors devised a framework for classification of the firms that is very helpful in understanding the differences, or asymmetries in the adoption of Open Innovation practices. They used two main dimensions: partner variety (the number of partners in the Open Innovation activities) and phase variety (the number of different phases of the innovation process that are "opened up"). The clusters are:

a) "*open innovators*": high partner variety and high phase variety, these companies have many partners involved in many phases of the innovation process;
b) "*specialised collaborators*": high partner variety and low phase variety, firms in this category are characterised by a few open phases and the involvement of several partners
c) "*integrated collaborators*": low partner variety and high phase variety, they choose to open up several, or all, the phases of the innovation process, but only to a few selected partners;
d) "*closed innovators*": low partner variety and low phase variety, these companies are either completely "closed", or involve few partners in only one or a few phases of the innovation process.

Unsurprisingly, *open innovators (43)* and *closed innovators (36)* outnumber the other two categories. This reflects the fact that most firms, when they consciously open up their innovation process, they do so by trying to reap all the benefits that arise from a number of different collaborations and in order to increase their chances for success, they choose to be fully open and possibly to build their whole business model around the paradigm of Open Innovation. Closed innovators are instead the firms that deem collaboration too risky, or that suffer from severe constraints (either economic, geographical, technical or others) that do not allow them to pursue an Open Innovation strategy. The two intermediate categories arguably represent companies for which Open Innovation is an emergent phenomenon, rather than the outcome of a strategic decision.

Given the peculiar landscape of innovation in Italy, it is my opinion that SMEs are better suited than larger companies to team up with external partners in order to reach higher levels of innovativeness and that the advantages they could derive from this would be of a greater magnitude than what could be for larger firms. The structure of the Italian economy appears to be the perfect locus for the implementation of Open Innovation on a large basis and this could lead to a solution to both the competitiveness and innovativeness problems the Italian SMEs currently face.

4. Regional projects fostering the adoption of Open Innovation practices

4.1. Foreword

The Italian government, either at a national or local level, and the EU have always been proactive in devising a number of programs and projects meant at addressing the liabilities SMEs are plagued by.

The four most common areas of intervention have been:

a) financing;

b) international promotion and trade;

c) information and communication technology (ICT);

d) innovation.

There have been in many Member countries, and at the EU-level, several programs focused on innovation enacted in order to specifically increase the rate of adoption of Open Innovation. Some of these can directly be associated to the concept of Open Innovation because of their name, in other cases, Open Innovation is mentioned in their description. Other programs instead, while not bearing any direct reference to the phenomenon of Open Innovation, focus on interorganisational cooperation as a way to solve specific innovation problems, address particular innovation needs or generally improve the innovativeness of firms by enriching their know-how.

Such programs have involved SMEs in the Italian North-East as well. Information and findings from two of these projects will be presented in the following paragraphs.

Gathering information to document such programs entailed contacting and meeting three executives from two technology transfer centers and an applied research organisation located in the Veneto region and Südtirol province (also known as Autonome Provinz Bozen - Südtirol, the Autonomous Province of Bolzano/Bozen) of North-Eastern Italy. These

organisations have been among the various partners, both public bodies and private organisations, in the projects that will be presented below and the three executives have been kind enough to share details and aggregate data that are not readily available to the public, and for which I am extremely grateful. No full datasets, names of participating companies or market implications could be provided, mainly due to the existence of non-disclosure agreements between the technology transfer centres and the SMEs involved.

Briefly covering the activities carried out in the two projects below, besides making it clear that both public and private bodies are moving to further promote, foster and implement innovation, Open Innovation and an innovation culture among SMEs, allows for a better understanding of the importance of technology transfer, especially in the Italian context.

4.2. Rapid Open Innovation - speeding time to market (Open Alps platform)

Rapid Open Innovation - speeding time to market (Rapid Open Innovation) is a transnational project with a very precise tagline embedded in its name. The project, which run from the end of 2013 to 2014, was aimed at enhancing the competitiveness and innovativeness of Italian and Austrian SMEs in the area along the border between the Austria and Italy. As far as Italy is concerned, the SMEs involved were located in the border areas of Veneto (provinces of Vicenza, Belluno and Treviso) and and Südtirol.

It must be noticed that the firms involved, being for the vast majority located in mountain areas, and possibly even in remote place, they suffer from structural problems that no government has had the ability to tackle yet. In particular, specifically due to their location, many services are precluded to them, or they are more expensive. Among the many limitations it is relevant to name a few: harsher natural conditions, a less skilled workforce (or a general shortage of workers), logistics issue, reduced access to lines of credit, and

distance from the government, economic, research and education institutions.

Two executives from t²i - trasferimento tecnologico e innovazione (t²i, a private technology transfer center located in Veneto) and Fraunhofer Italia Research s.c.a.r.l. (Fraunhofer Italia, a private not-for-profit applied research organisation located in Südtirol and affiliated to the German Fraunhofer-Gesellschaft), contributed useful information on the program.

t²i, which was then, when the program started, called Treviso Tecnologia and was affiliated to Camera di Commercio, Industria, Artigianato e Agricoltura (CCIAA) di Treviso (the Chamber of Commerce of the Treviso province, which set it up in 1989), has been given the current name and incorporated in January 2014, when two other stakeholders entered the venture, Camera di Commercio di Venezia (the Chamber of Commerce of the Venice province) and Camera di Commercio di Rovigo (the Chamber of Commerce of the Rovigo province). These last two organisations then merged in July 2015, thus giving birth to Camera di Commercio Venezia Rovigo Delta Lagunare, which is still a stakeholder in the business.

t²i, under its previous denomination, was the Lead Partner in the project and Fraunhofer Italia, together with Regione del Veneto's Unità di Progetto Ricerca ed Innovazione (Italy), Certottica s.c.a.r.l. – Istituto Italiano per la certificazione dei prodotti ottici s.c.a.r.l. (Italy), Transidee Tranferzentrum Universität Innsbruck GmbH (Austria), Innovations- und Technologietransfer Salzburg GmbH (Austria, now ITG - Innovationsservice für Salzburg) and Wirtschaftskammer Tirol (Austria), was a Partner.

The project was funded by the EU through the European Regional Development Fund (ERDF) and was part of the Interreg IV Italy-Austria program of the wider EU Alpine Space 2007-2013 program.

Rapid Open Innovation was part of the OpenAlps Open Innovation platform, also funded by the EU (EU Alpine Space program), the aim of which is that of creating a link between SMEs

and R&D centers in the whole European alpine geographic region. In total, the countries involved have been seven: Austria, France, Germany, Italy, Liechtenstein, Slovenia and Switzerland. In order to promote equal access to all the qualified organisations, the website is available in English, French, German, Italian and Slovene.

For what concerns Rapid Open Innovation, a call for applications was issued (in English, German and Italian, the languages used throughout the operations of the project), a quota of 10 participating firms from Veneto and 8 from Südtirol was set, and three industries were chosen: mechanics, green construction, and wood and furniture

About 100 companies applied, their total staff never exceeding 100 employees.

The process entailed:

a) gathering data and insights on the innovation needs of the companies through a questionnaire-based survey;
b) organising collective workshops attended by personnel from multiple participating firms;
c) further technology transfer activities with the single firms;
d) in some cases, business matching.

The initial survey revealed two major problems affecting the innovation process of the participating firms. The gathered data could not be disclosed and is unfortunately unavailable, however, the executives clearly explained the trends and findings. Considering the whole innovation process, from idea generation to product launch, the most critical phase has been found to be that of idea generation: firms were either short of ideas, or, if they had any, they were unable to move beyond the purely conceptual stage and left with ideas that were not developed or refined enough to be able to create a product concept out of them. This is connected to a lack of knowledgeable human resources. The second problem is that of

financial support to R&D since SMEs seemed to be averse to investing in R&D and innovation given the long development times and high uncertainty previously encountered all along the innovation process, including at the launch of a new product on the market.

The aforementioned findings show considerable consistency with the results of the questionnaire supporting this study.

Providing financing services to the SMEs was beyond the scope of Rapid Open Innovation and, instead, the focus was on knowledge and technology brokerage.

The Partners in the project successfully organised workshops tackling central issues in creativity management, agile management, lean manufacturing and ergonomics.

Ad-hoc technology transfer and consulting activities followed, addressing the specific needs of each single company and, in some cases, business arrangements were made.

Interestingly, one of the executives stated that there is no difference in the way Austrian and Italian SMEs involved in Rapid Open Innovation organise and manage the innovation process, be it open or closed, and that they both suffer from exactly the same liabilities and have to face identical challenges.

4.3. Open AUDITECH and related projects and activities

Open AUDITECH was a program and an Open Innovation model and platform (through the OpenInn website, now offline) that run from 2011 to 2013 with the aim of creating a link between the SMEs in the Province of Padova and both public and private research bodies. The now-defunct program was supported by two partners: Parco Scientifico e Tecnologico Galileo (PST Galileo, a private consortium and technology transfer center located in Padova) and Camera di Commercio di Padova (Chamber of Commerce of the Padova province).

PST Galileo was founded in 1997 under a different name, TecnoPadova and was then

affiliated to the local Chamber of Commerce in the Province of Padova. In 2000, TecnoPadova merged with Scuola Italiana Design (SID, founded in 1991, it is a highly innovative research and education centre for industrial design which cooperates with many well-established large companies form various industries), also located in Padova and PST Galileo came into being.

In 2001, MaTech - materiali innovativi (MaTech), a branch of PST Galileo specialised in research and technology transfer in the field of innovative materials. Examples of materials developed thanks to MaTech are injection moulding ceramic, green materials, 3D braided fabrics and iridescent coatings. Applications span a very wide array of industries and range from the automotive sector to healthcare and from construction to aerospace.

Other branchess of PST Galileo are SIL (Sistema Laboratori), BAN Veneto (Business Angels Network Veneto) and AUDITECH.

SIL is a network of laboratories for testing innovations and certifying their compliance with the most recognised standards. It is also the only UNI (Ente Nazionale Italiano di Unificazione, a private not-for-profit organisation devising standards and norms recognised by both the Italian Government and the EU) facility for the Province of Padova.

BAN Veneto is the point of contact between innovators or startups and investors.

AUDITECH is a branch of PST Galileo that actively fosters innovation and the adoption of new technologies, and connects the business world with that of universities and research institutions. Auditing activities in the companies are performed so that innovation needs can be assessed and then discussed with possible partners. It is the division that was responsible for the Open AUDITECH project.

Open AUDITECH has been defined by the PST Galileo as an Open Innovation model. It is so in the measure that the company, as a technology transfer centre implemented a new system

for matching SMEs and their innovation needs with research organisations.

SMEs from the following industries participated in the project: wood and furniture, mechanics, green construction, leather, footwear and textiles.

Ideally, SMEs would send in well-specified requests for assistance with R&D issues, that would then be published on the website where local research institutions and the divisions of PST Galileo could see them and get in touch with firm.

193 of these requests have been received. PST Galileo operated as an intermediary in the following business matching activities, but, in certain cases, it has proposed solutions to the firms through its SID (idea generation and product design), SIL (testing) and MaTech (innovative materials R&D) branches.

Besides SID and MaTech, other bodies have answered the firms' call, chiefly the University of Padova and the R&D and innovation department of Confindustria Padova, the business association of companies located in the Province of Padova.

The main challenges that the SMEs participating in the project seemed to have concerned the idea-generation phase: again, they displayed a lack of skills, specific technical knowledge and both economic and human resources that would have helped in refining their ideas beyond the embryonic stage.

Again, the situation briefly depicted here is consistent with the results from the survey.

Open AUDITECH has surely granted the participating SMEs great advantages, but it was an imperfect model. This is because the service was not free of charge (although the costs involved would be extremely lower than what it would have costed to firms to provide for their own internal R&D arrangements) and often PST Galileo would publish the firms' requests only after catering to their innovation needs through its branches, so as to secure a stream of earnings from these collaborations that would have otherwise be appropriated by

others.

All in all, considering the whole innovation system involved in the project, it must be observed then that there was no full openness, transparency and cooperation as could be expected from a network. On the other hand though, the Open Innovation paradigm does not prescribe the related activities to be effectively open to anyone, nor free.

Interestingly, when the University of Padova has cooperated with the participating SMEs, it has often done so through the inTesi awards, which were financed by the Chamber of Commerce of the Province of Padova and meant to let students perform R&D activities together with the staff from the firms, or on their behalf, and then write a Master's thesis documenting the process.

Open AUDITECH has been formally abandoned, however PST Galileo still continues offering technology transfer services and thus operates as one of the central intermediaries in Open Innovation.

5. Survey and analysis of the results

5.1. Methods

Surveying companies to assess the state of the art of innovation across different industries is not a new practice and such surveys are often carried out internationally both at a local and national level.

In the EU, in the Member countries, countries of the European Free Trade Association (EFTA) and EU candidate countries, data is gathered through the Community Innovation Survey (CIS). The Partners involved in the Business Model for Open Innovation (BMOI) EU project used the data from the 2008 edition of the CIS to derive a regional report focusing on three regions: Eindhoven in the Netherlands, Navarre in Spain and Stuttgart in Germany.

In all three regions, more than half of the firms considered in the report were in the manufacturing sector, the lowest share being that of Stuttgart, with 53.99% of the firms falling under the manufacturing category. A percentage between 87.57% (Stuttgart) and 93.39% (Navarre) were SMEs (Cruz-Cázares et al., 2012). The aim of the report was that of measuring the extent to which companies in those regions implemented Open Innovation practices. Among other interesting facts, findings suggest that firms in the manufacturing sector are more open than firms in the service sector although the latter category spends twice as much on external R&D (Cruz-Cázares et al., 2012).

In order to find out exactly what is the stance of firms towards Open Innovation, rather than doing an amount of in-person interviews that would not have been sufficient to explain the extent to which Open Innovation practices are applied (if at all) among SMEs in North-Eastern Italy, an online survey was chosen as the most effective methodology.

The questionnaire was created and sent (as an e-mail invitation to participate in the survey) to the firms using Google's Google Forms feature.

It has been chosen to survey only firms in the manufacturing sector in North-Eastern Italy. This choice was made because of three main reasons:

a) small businesses in the manufacturing sector are traditionally rooted in the region, generate the most employment and account for most of the Gross Domestic Product;
b) the adoption of Open Innovation practices is considered to be more likely in this sector (Cruz-Cázares et al., 2012);
c) more consistent answers were expected since it is easier for entrepreneurs and employees alike to relate innovation to the activities that are generally performed in this sector, where the focus is often on bringing new products to market.

The questionnaire had a dynamic structure, in the sense the set of questions respondents would encounter was based on the previous answers. However, it was compulsory for the firms to answer to all the questions they would encounter, with the possibility of selecting "no opinion" as an answer to certain questions in the "Personal opinions" section.

The structure of the questionnaire thus explains why for some of the questions the number of respondents is different (lower) than the total number of respondents. It is anticipated that such segmentation of respondents was based on the adoption, or lack thereof, of Open Innovation practices, and the presence, or lack thereof, of employees performing innovation-related activities.

The anonymous questionnaire was sent via e-mail directly from the Google Drive platform to 300 randomly selected SMEs in the manufacturing sector in North-Eastern Italy. Answers are automatically stored on Google's servers with no need for the respondents to log in, or reveal their identity or e-mail address in any way. Of course, this was clearly pointed out in the e-mail that was sent them.

Out of 300 firms contacted, 62 submitted the questionnaire, the response rate thus being

20.67%. The total number of respondents is similar to that obtained in the study by Wynarczyk (2013) in the United Kingdom, where the respondents were 64.

Given the small number of companies surveyed, the results of this questionnaire are not claimed to bear any statistical significance, however, a qualitative analysis deserves being carried out nonetheless and descriptive statistics can be derived.

An important point to be made here is that, as it has been said before, the definition of SMEs this study uses is that provided by the European Commission in with the 2003 EU Directive; however, being it impractical, and in many cases impossible, to obtain the balance sheet and turnover figures for the companies surveyed, it has been chosen to rely solely on one parameter as the only approximate indication of the SME status: total staff (which needs to be lower than 250). It has been deemed wiser not to ask to indicate any turnover or balance sheet threshold in the questionnaire due to a perceived risk of firms refusing to answer and submit the questionnaire.

5.2. Results and analysis

5.2.1, First section: general information about the companies

The first question in the questionnaire asked to to state the industry the firm belongs to.

For the purpose of this survey, it has been deemed appropriate to merge together some of the industries, thus creating multi-industry categories, such as in “Textile/footwear/leather” this is because these industries share many similarities as far as production and innovation processes and commercial channels are concerned. This choice also allowed to have a less fragmented sample.

It was however possible, for those companies willing to do so, to indicate a different industry by simply entering a new category.

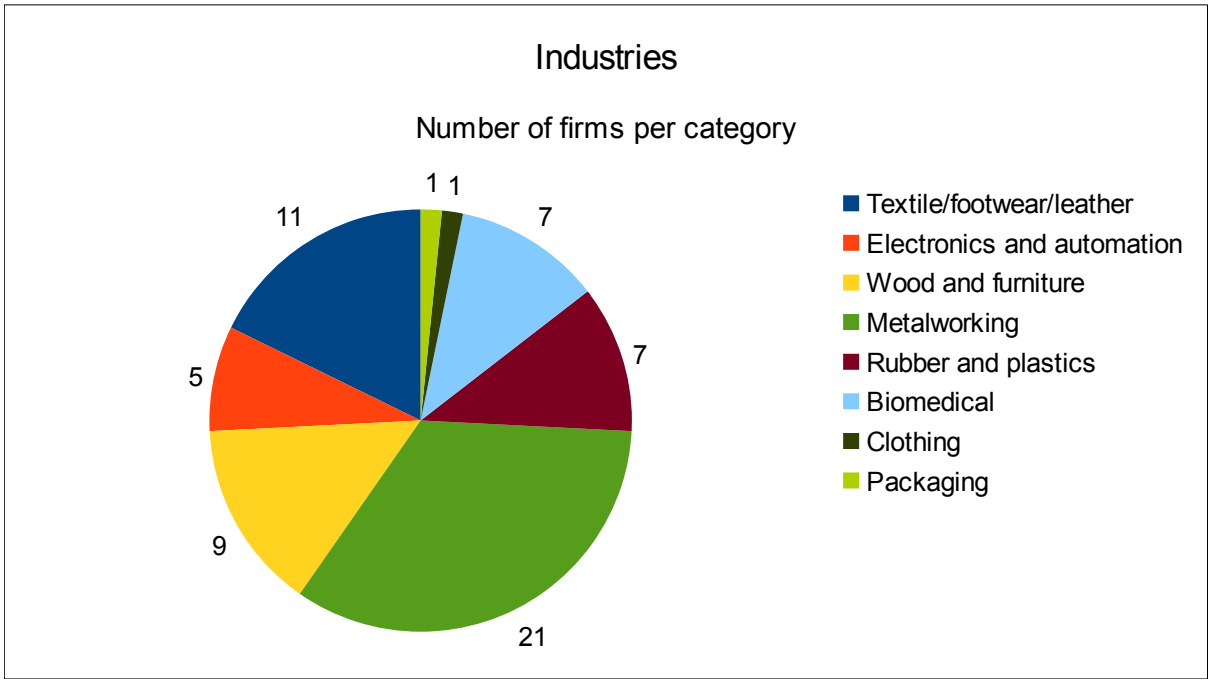

Figure 5.1: "Industries - Number of firms per category". Own elaboration.

Besides the seven provided categories of "Textile/footwear/leather", "Electronics and automation", "Wood and furniture", "Metalworking", "Rubber and plastics" and "Biomedical", two respondents added a category each: "Clothing" and "Packaging".

It is clear how the Metalworking industry dominates the sample. This is due to an effective prevalence of this kind of firms in the region surveyed.

The next question serves two purposes. Its main purpose is that of segmenting the respondents based on the total staff within their companies The second purpose is that of making sure all the respondents were SMEs according to the EU classification, since for some of the companies, which are legitimately believed to be SMEs, no indication of the total staff could be found, or the available figures might have been outdated. Thus, ">249" was added as a possible answer. No respondents however fell under the ">249" category, hence the sample the is entirely made up of SMEs (according to the definition used in this study).

Total staff	Number of companies
1-9	20
10-19	12
20-49	23
50-99	4
100-149	0
150-199	2
200-249	1
>249	0

Table 5.1: "Sample segmentation according to total staff". Own elaboration.

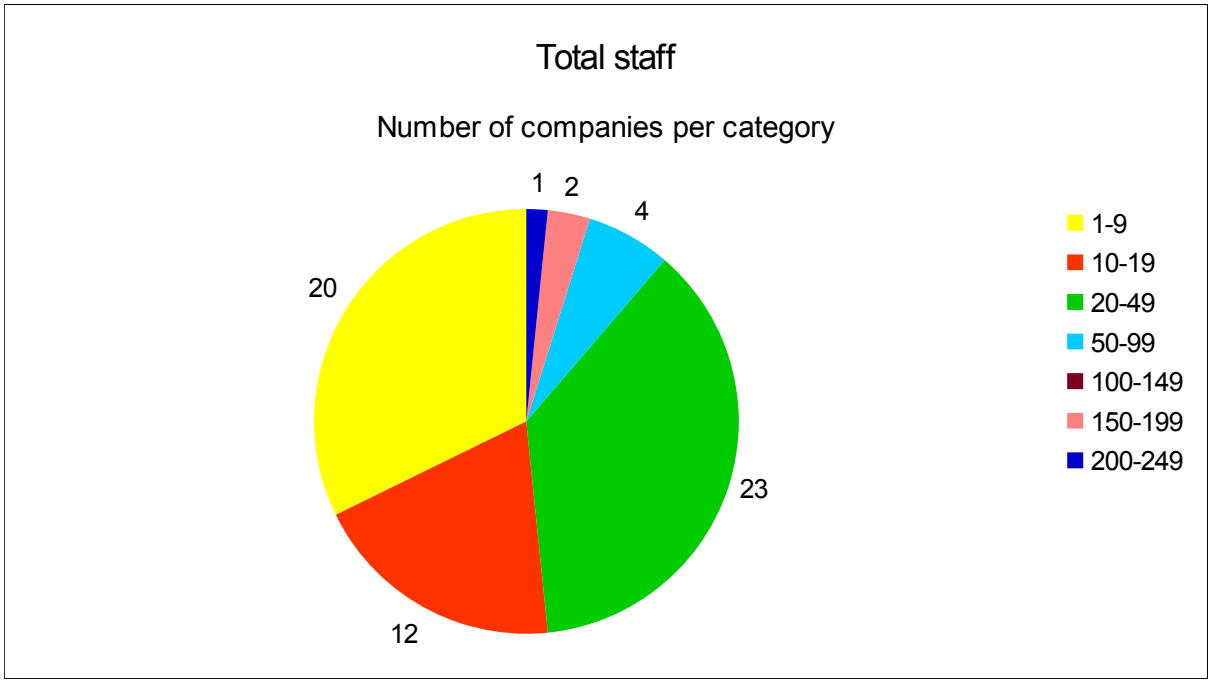

Figure 5.2: "Sample segmentation according to total staff". Own elaboration.

The previous segmentation of the sample also allows to derive the following chart showing the classification according to the categories outlined by the European Commission in 2003. Companies in the 20-49 total staff category outnumber by three units those in the 1-9 category. No company among the respondents fall in the 100-149 category.

At an aggregate level, Small firms, i.e. those whose total staff is between 10 and 50

outnumber by far both the Micro and Medium-sized ones.

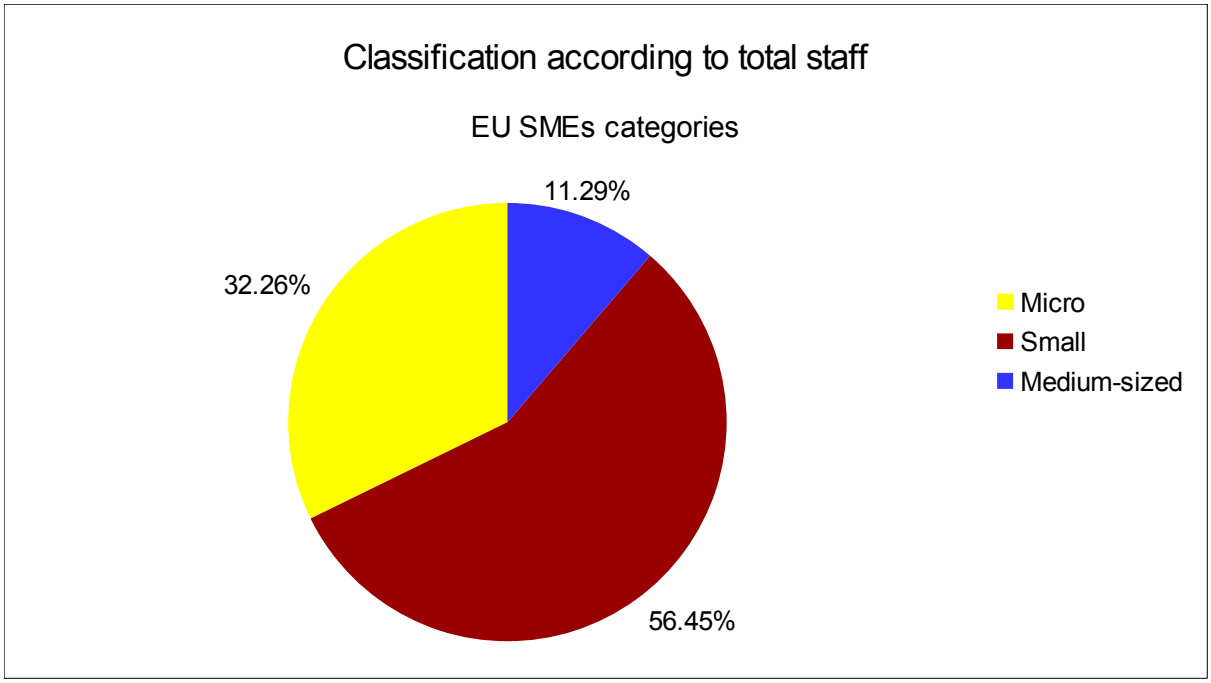

Figure 5.3: "Sample segmentation according EU SMEs staff categories". Own elaboration.

When asked to evaluate the innovativeness of the firms on a 1 to 4 scale, where 1 equals "not innovative at all" and 4 "very innovative", 72.58% of the respondents chose either 3 or 4, with an overall 50.00% choosing a level of innovativeness corresponding to 3. 27.42% of firms are in the two least innovative categories (1 and 2).

In order to see how this would correlate to how important they perceived innovation to be with respect to competitiveness in the sector, it was asked to evaluate this on a similar 1 to 4 scale, where 1 equals "not important at all" and 4 "very important". 50.00% of the respondents rated innovation to be "very important" (4) for competitiveness in their industry.

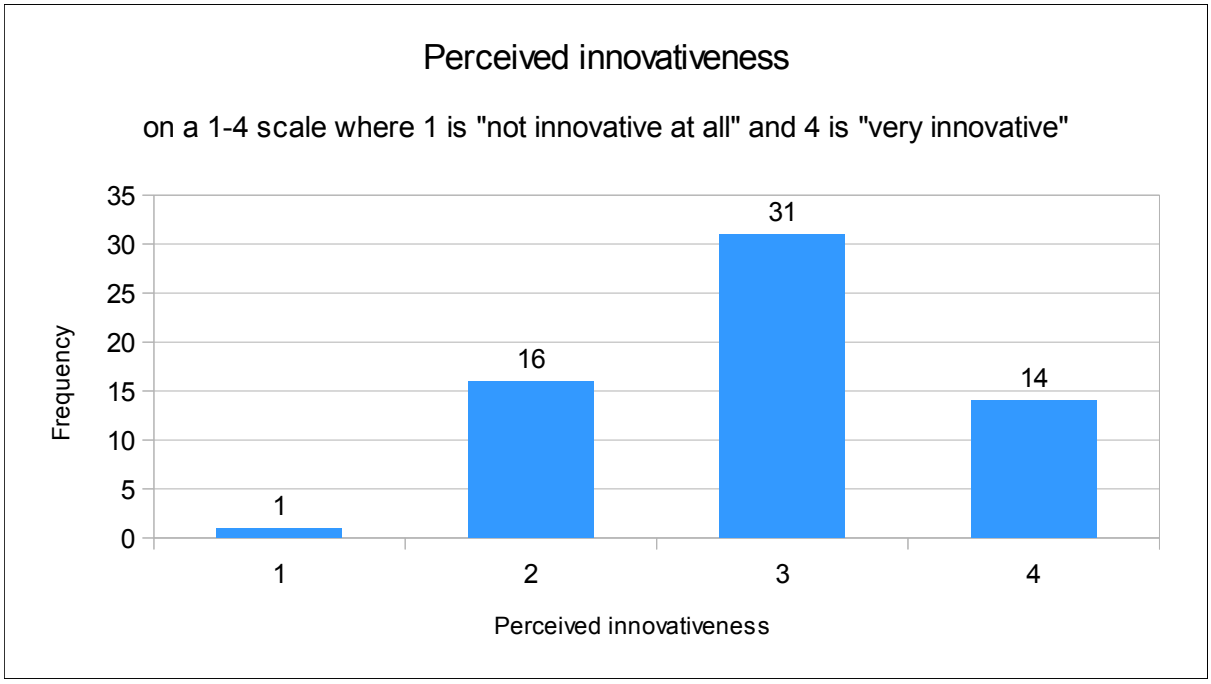

Figure 5.4: "Perceived innovativeness". Own elaboration.

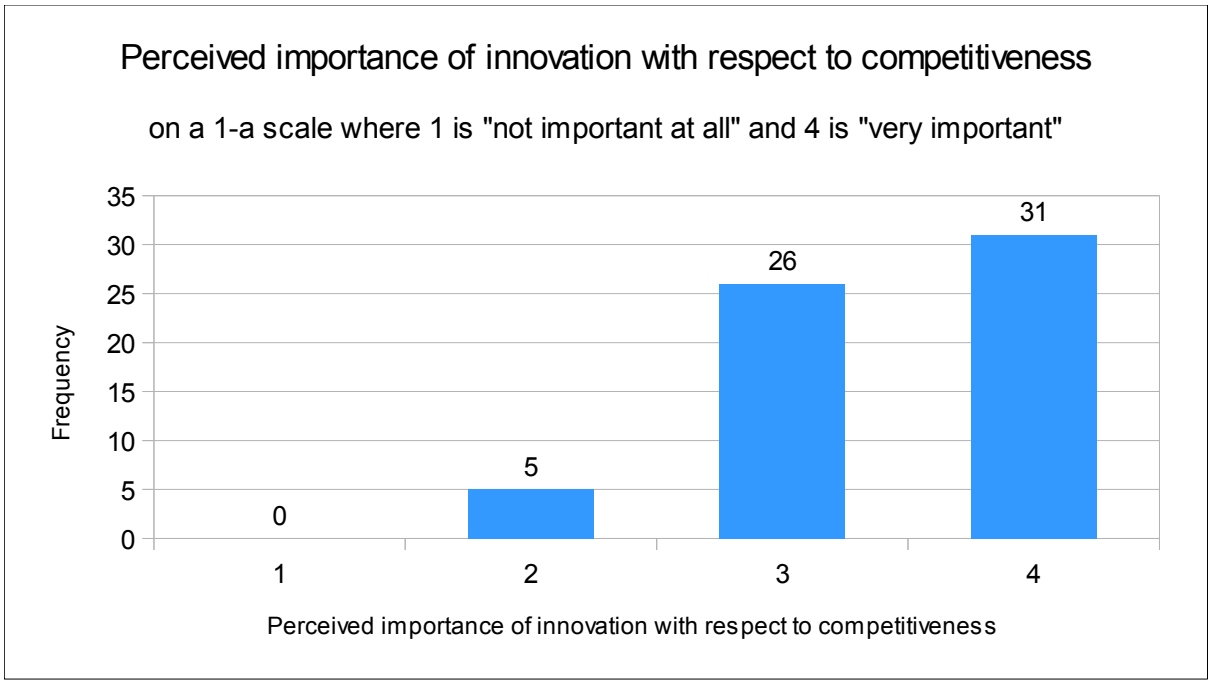

Figure 5.5: "Perceived importance of innovation with respect to competitiveness". Own elaboration.

Running a Pearson correlation test on the two 1-4 variables yields a degree of association measured by a Person coefficient of 0.40, thus indicating a medium degree of positive association. The extent to which the variables are positively correlated, or rather associated, was initially expected to be higher. The data leads to infer that while most companies recognise the high importance of innovation for competitiveness in their industry, they might not be innovative enough to keep up.

An important prerequisite to innovation, even though under the Open Innovation paradigm certain stages of the process can be sourced from outside the firm, is the possibility to count on an internal R&D team, be it formal or informal, with the function of coordinating and combining all the innovation efforts.

In this regard, the first question concerning internal R&D was aimed at finding out if any of the employees in the surveyed companies is performing, among all the others, innovation-related activities. 47 respondents out of 62 stated that there are, in their companies, employees that are concerned with innovation-related activities, but almost a quarter (24.19%) of the firms in the sample lack this important resource.

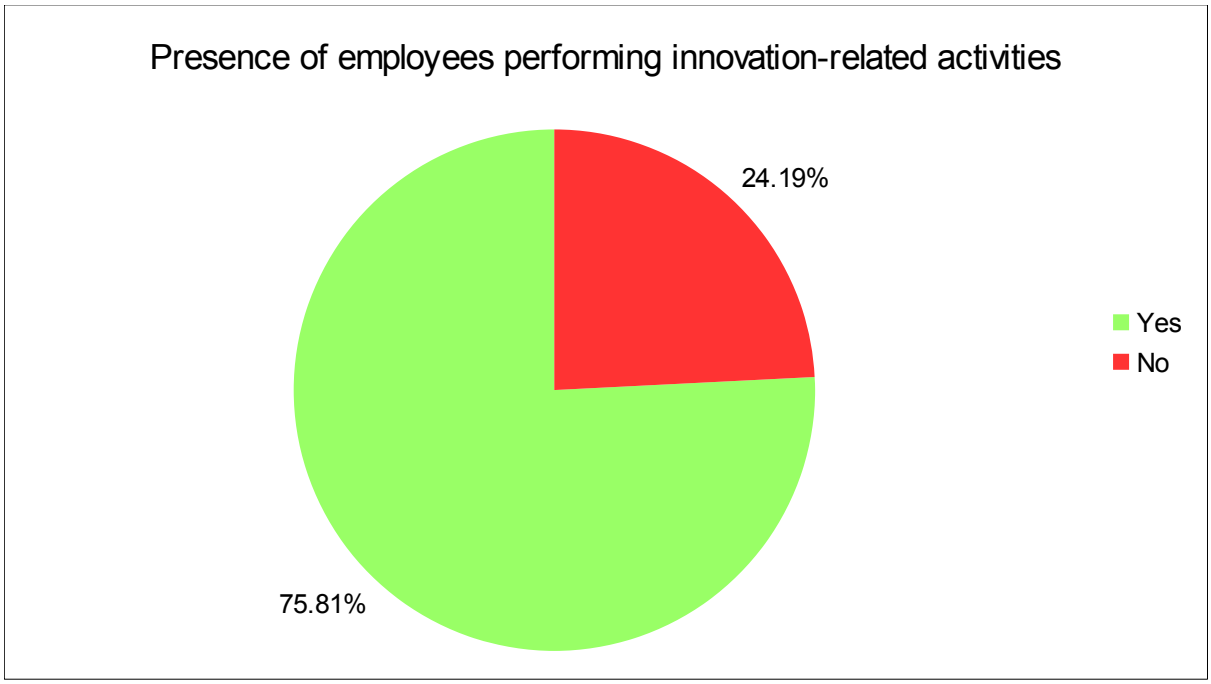

Figure 5.6: "Presence of employees performing innovation-related activities". Own elaboration.

The 47 firms that answered positively to the question mentioned above where then directed to a set of two questions with the purpose of finding out how many had a dedicated innovation (possibly R&D) team and, more in general, the amount of employees performing exclusively innovation-related activities per firm. For these two questions then, the number of respondents is not 62, but 47, i.e. the number of companies in the sub-sample of those who actually had the possibility of pursuing innovation in-house, through their own employees. In only 5 of the firms surveyed, corresponding to 8.06% of the total sample of 62 SMEs, those employees performing innovation-related tasks can do so without focusing on other business areas. In the other 42 firms that have employees involved in innovation activities, they also have to carry out different tasks.

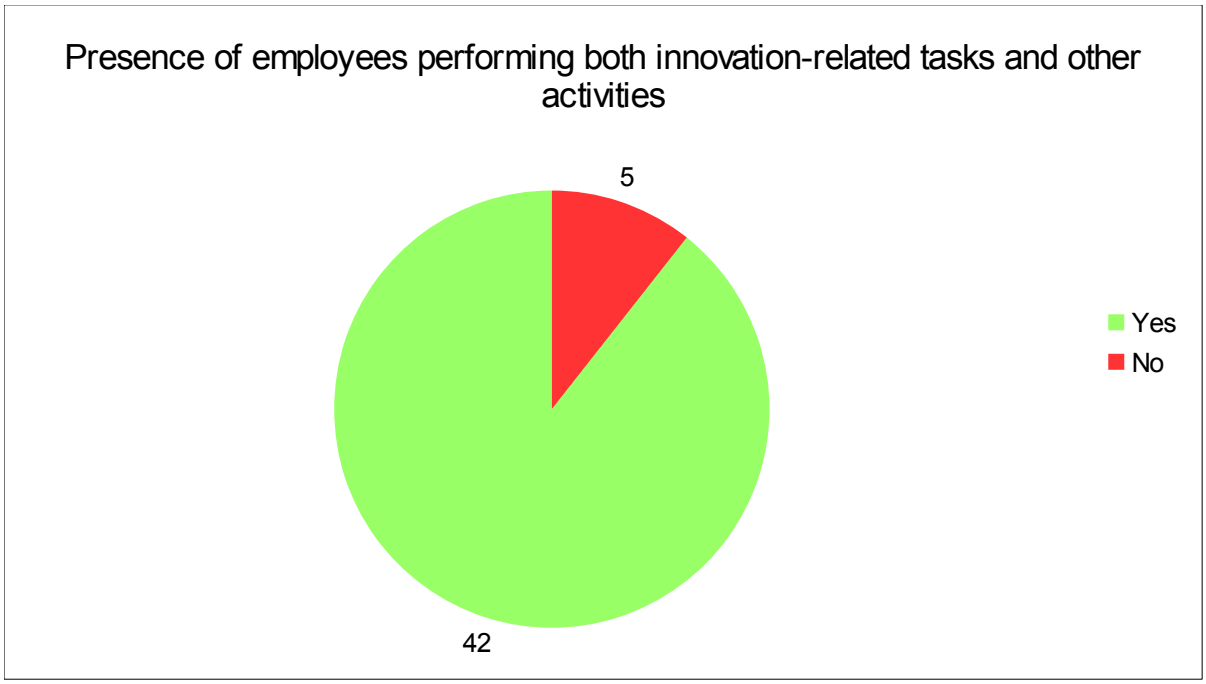

Figure 5.7: "Presence of employees performing both innovation-related tasks and other activties". Own elaboration.

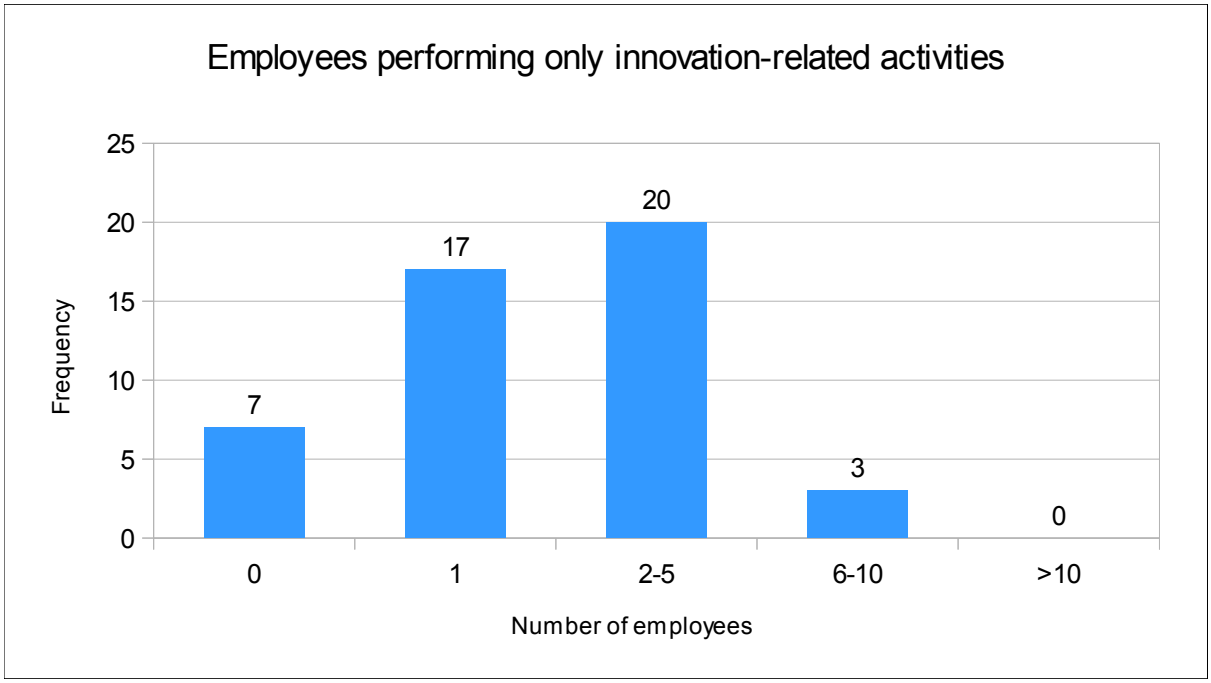

Figure 5.8: "Number of employees exclusively involved in innovation-related activities per company". Own elaboration.

In only five of the SMEs in the sample there are employees who are only focused on innovation-related activities. General data about these five companies is presented below.

No.	Industry	Size	Perceived innovativeness (1-4 scale)	Perceived importance of innovation w.r.t. competitiveness (1-4 scale)	Size of the innovation team
1	Metalworking	20-49	3	4	2-5
2	Biomedical	1-9	3	4	1
3	Metalworking	20-49	3	4	1
4	Rubber and plastics	20-49	4	4	2-5
5	Biomedical	10-19	3	4	2-5

Table 5.2: "General data about firms with a dedicated innovation team". Own elaboration.

It is interesting to notice how the two firms in the biomedical industry, despite their smaller size (with one being classified as a micro enterprise according to the guidelines on total staff provided in 2003 by the European Commission), still have at least one employee that can focus solely on increasing the innovativeness of the firm and its products.

5.2.2 Second section: Open Innovation practices

It has been speculated that many organisation are not aware of the phenomenon of Open Innovation and that often Open Innovation practices are implemented without even knowing, and considering it standard practice.

Italian SMEs are often networked, especially those located in the industrial districts (Ceci and Iubatti, 2012), it was hence expected that at least a share of the interviewees could have unknowingly adopted Open Innovation practices in at least one occasion.

35.48% of the firms, slightly more than one third of the respondents, claimed to be aware of

the phenomenon of Open Innovation.

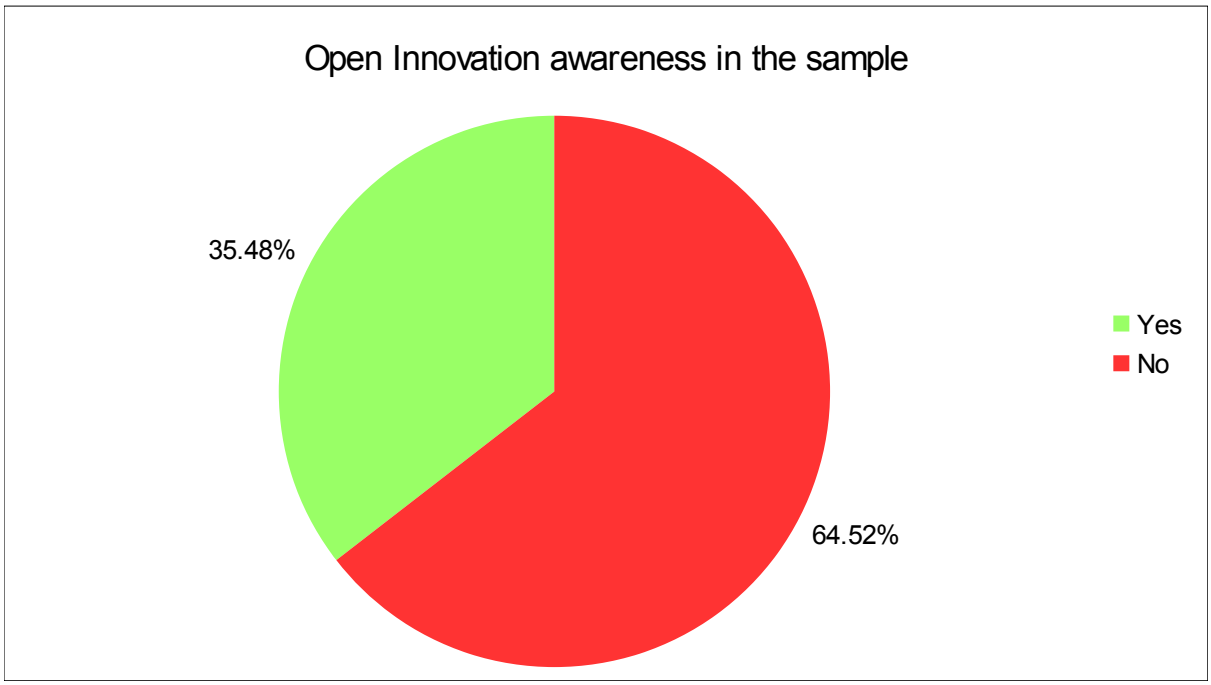

Figure 5.9: "Open Innovation awareness in the sample". Own elaboration.

Of the 22 companies that already knew the phenomenon of Open Innovation, only 11 have actually put Open Innovation into practice.

Together with these 11 firms, other 14 SMEs (25 in total, 40.32% of the sample) have stated they have implemented Open Innovation practices after a simple definition of Open Innovation was provided. This confirms what has been said before about firms often unknowingly implementing Open Innovation practices.

It has been interesting to learn what kind of Open Innovation practices have been used and, it could be stated that the Open Innovation paths the respondents have said to to have been involved in are rather traditional: as it can be seen from the chart below, there is a high prevalence of consulting and strategic alliances, cooperations and co-development agreements.

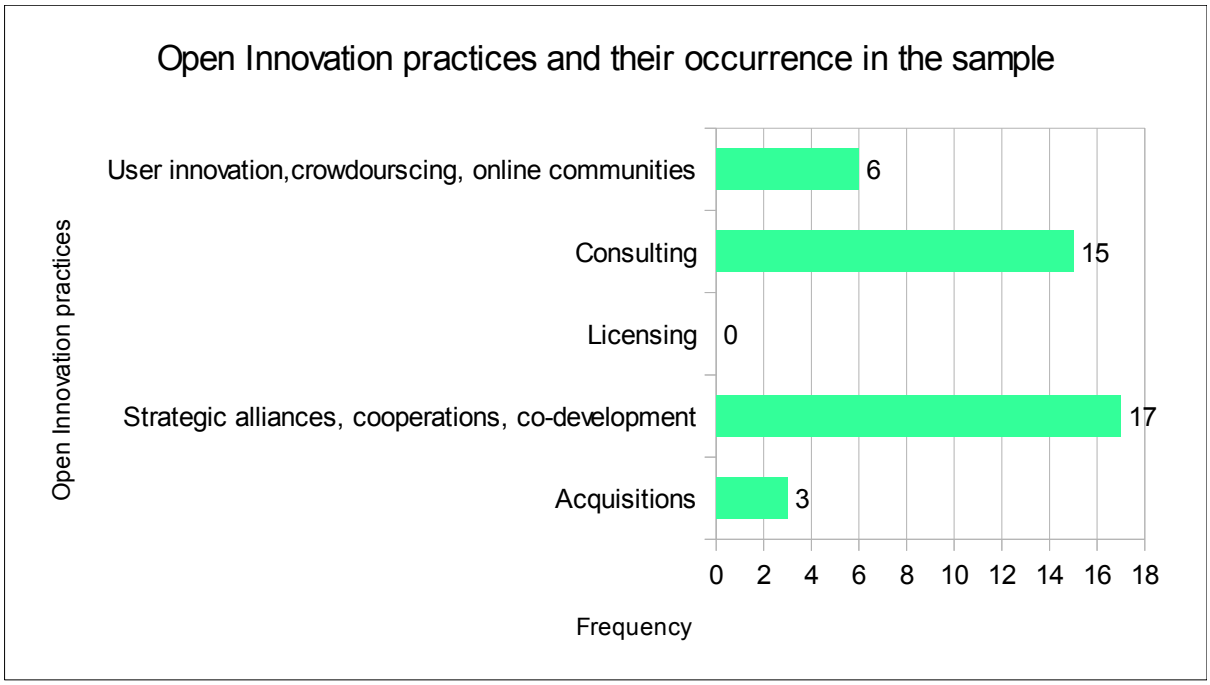

Figure 5.10 "Open Innovation practices and their occurrence in the sample". Own elaboration.

Each respondent could choose more than one answer. In several cases the surveyed SMEs have used at least two different practices but it must be noticed that the results of this question only serve as a way to perform an initial mapping of the extent to which companies applied the principles of Open Innovation, but in no way constitute a measure of Open Innovation breadth and depth as proposed by Laursen and Salter (2006; 2014) since no precise indication of who the different partners are is given, nor a clear account of the frequency of such practices being implemented is provided. This will be explained later in this chapter and a simple, yet effective, mathematical model for the evaluation of the two specific aforementioned parameters will be provided and discussed.

What is striking, and to some degree, uncommon, is the fact that no companies have been involved in licensing agreements (either licensing-in or -out). This leads to draw a few

possible conclusions. First of all, it is possible that the often emergent nature of strategy and innovation in the SMEs does not allow to plan a for licensing practices to be carried out. Secondly, it could be that the laws and rules on IP and licenses are not developed enough, or simple enough, for the SMEs which might lack the knowledge, tools or funds to access them. It could also be argued that the degree of innovativeness of the surveyed firms is not high enough to generate the interest of other companies in their IP, products or processes (in the case of licensing-out), and that such SMEs could not manage to find the favourable conditions for licensing-in agreements to be made.

The concept of Open Innovation can have a very broad scope as it is possible to innovate across a multitude of functions and processes that can normally be found in most organisations. The most relevant ones for the purposes of innovation (which can itself be pursued in a wide array of fields) were singled out, or, in some cases grouped together under the same heading in order to produce a more relevant outlook and the respondents were asked to select the most important ones according to them.

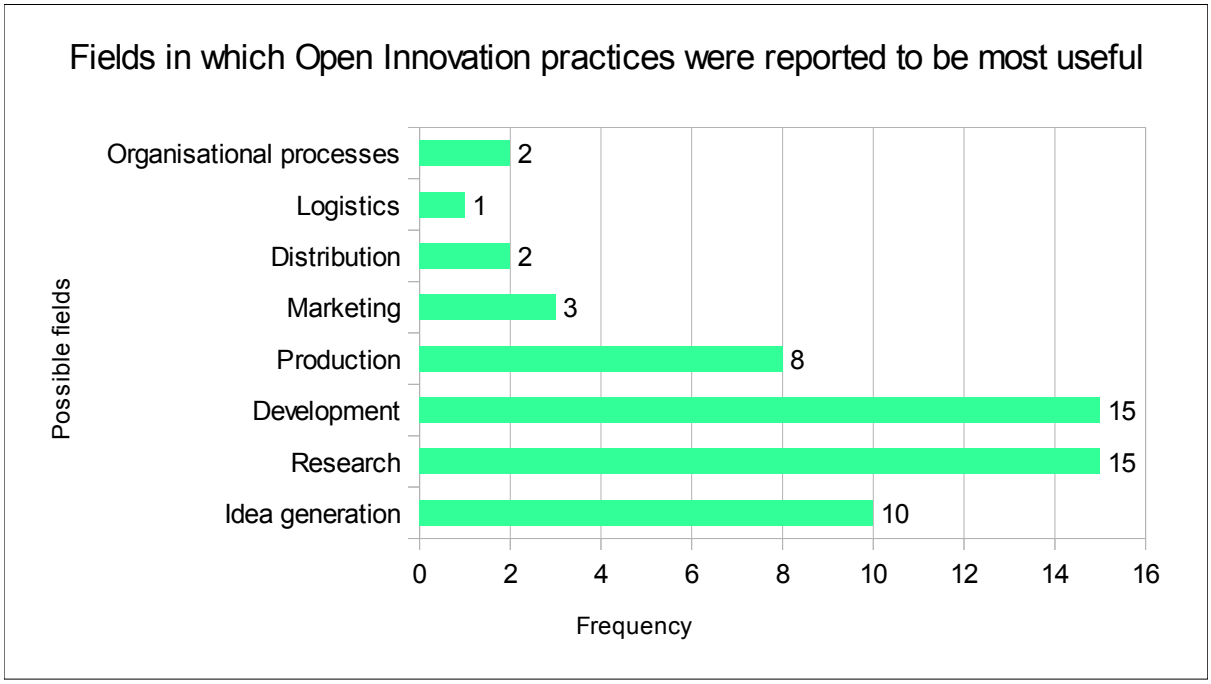

Figure 5.11: "Fields in which Open Innovation practices were reported to be most useful". Own elaboration.

Development and Research have been, in this question, decoupled as it is recognised that despite being usually merged and considered as a single process, they do not serve the same purpose, require the same skills and knowledge nor pursue the same aim.

As predicted, the three fields in which an Open Innovation approach proved to be most useful are Research, Development and Idea generation. This is in accordance with that emerged from the interviews with the executives from the technology transfer centres in the region and highlights a clear knowledge and creativity mismatch on the part of the firms with what is required to achieve innovation. This is also supported by the data from the following questions, asking what were the main reasons for opening up the innovation process.

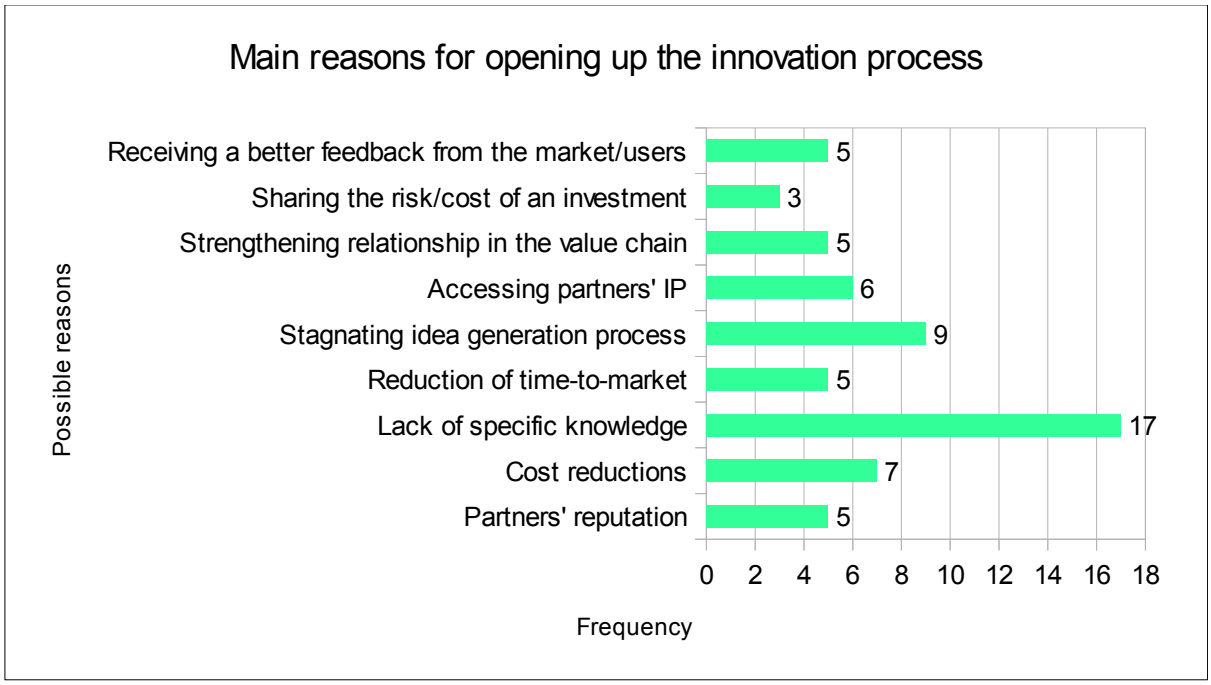

Figure 5.12: "Main reasons for opening up the innovation process". Own elaboration.

Given what has been said before and the insights provided by the aforementioned professionals in this specific field, it was expected to have a strong prevalence of firms citing a lack of specific knowledge to be one of the main reasons that made the surveyed SMEs choose an Open Innovation approach. In fact, "Lack of specific knowledge" was chosen as one of the reasons by 17 out of 25 firms that have been involved in Open Innovation practices. This is followed by a "Stagnating idea generation process", chosen by 9 firms.

It is, in my modest opinion, interesting to notice how only 5 out 25 firms did this in order to strengthen the relationships with other members of the value chain. The explanation behind this is two-fold: it could be argued that these companies, due to their particular innovation needs, are forced to exploit sources across different value chains (other than the one they are in) or do not feel the need to integrate further in their own value chain.

Despite much has been said about the importance of regional networks and industrial districts for the impact on the value chains of SMEs, their survival and supposed higher levels of performance, the dimension of Open Innovation is, in the majority of cases, national, i.e. relative to other areas in Italy, outside North-Eastern Italy. This might be dependent on an impossibility to find the right partners or knowledge in the region considered the object of this study.

However, most of the firms, 72.58% f the total 62 SMEs surveyed assigned a high rating, either 3 or 4, on a 1-4 scale where 1 is "not important at all" and 4 is "very important", to the importance of the local dimension of the industry they're in. Arguably, this shows how these companies trust both the local market and the networking possibilities associated with close proximity of suppliers, similar companies and clients; so while Open Innovation does not seem to have found a favourable ground in North-Eastern Italy in terms of what has been already achieved, the potential, and a much needed amount of mutual trust and desire to

collaborate, to exploit the local pool of interconnected competencies is definitely there.

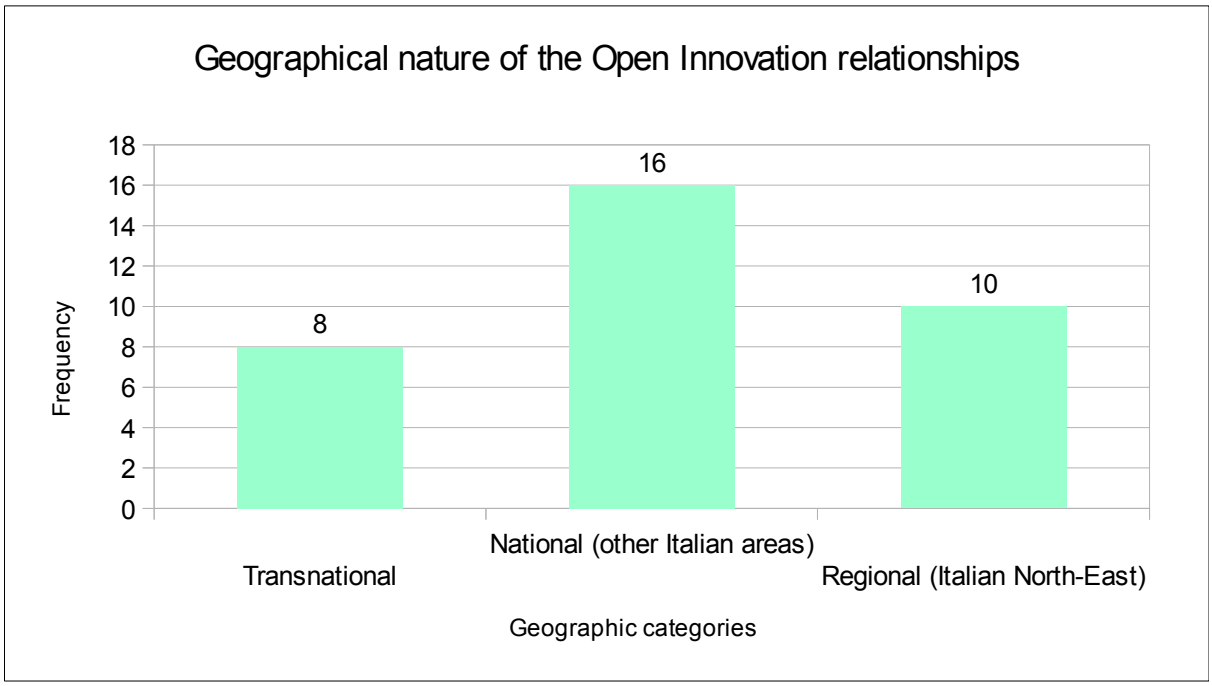

Figure 5.13: "Geographical nature of Open Innovation relationships". Own elaboration.

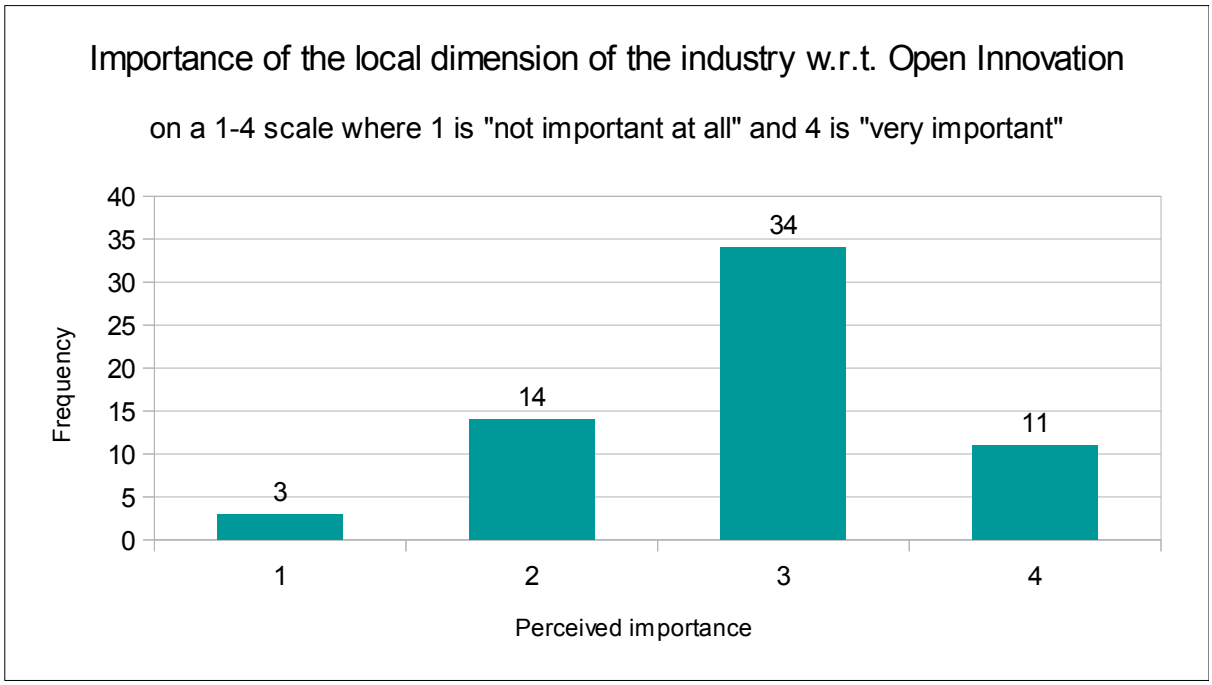

Figure 5.14: "Importance of the local dimension of the industry with respect to Open Innovation". Own elaboration.

An essential part of this study is played by the evaluation of openness following the model proposed by Laursen and Salter (2006). The two authors proposed to measure the degree of openness of firms along two different, yet complementary, dimension: Open Innovation breadth and depth. These two measures can be associated to the external search process only, or the whole Open Innovation approach.

Open Innovation breadth (hereinafter referred to as breadth only) is a measure of the amount of different external knowledge sources, or partners, an organisation relies on in its innovation process.

Open Innovation depth (hereinafter referred to as depth only) is a measure of the intensity of such collaborative innovation effort, or the extent to which an organisation draws from certain external sources of knowledge or partners in the innovation process.

The categories of knowledge sources that Laursen and Salter considered in their study (2006), and that have been used for this study are:

a) suppliers of equipment, materials, components or software;

b) clients or customers;

c) competitors;

d) consultants;

e) commercial laboratories/R&D enterprises;

f) universities or other higher education institutes;

g) government research organisations;

h) other public sector, e.g., business links, government offices;

i) private research institutes;

j) professional conferences, meetings;

k) trade associations;

l) technical/trade press, computer databases;

m) fairs, exhibitions;

n) technical standards;

o) health and safety standards and regulations;

p) environmental standards and regulations.

In the survey, firms had to indicate how many times they had included one of these categories in their innovation process. The possible answers were integers ranging from "0" to "5 or more". Of course, this question was only available to those firms that had previously stated they had been involved in Open Innovation practices.

Differently from Laursen and Salter (2006), who evaluated breadth and depth based only on the categories entailing actual collaboration, I chose to consider all categories as Open Innovation does not necessarily imply collaboration to take place as long as an organisation sources ideas and knowledge from outside its boundaries.

A breadth score was calculated for each firm by counting the number of knowledge sources that have been used at least once. This score then is in the 1-20 range. An industry average breadth score was then calculated.

Measuring depth required the creation of three bands:

a) Low depth: 1-2 times;

b) Medium depth: 3-4 times;

c) High depth: 5 or more times.

Average depth scores were calculated for each band by computing the average between the frequency of the two different answers chosen, except for the "High depth" category where the frequency would represent the High depth score for that specific company with no need to calculate an average.

An average total depth score was then calculated as the average between the Low depth, Medium depth and High depth scores for each company, and then an industry average was derived for each industry.

Aggregate results are as follows:

Industry	**No. of firms**	**Industry average breadth**	**Industry average depth**	**Industry median breadth**	**Industry median depth**
Textile/footwear/leather	5	8.40	1.63	7.00	1.50
Electronics and automation	3	7.33	1.50	8.00	1.50
Wood and furniture	3	10.33	2.50	11.00	2.50
Metalworking	10	8.50	1.93	9.00	1.92
Biomedical	2	7.50	2.25	7.50	2.25
Rubber and plastics	2	4.50	0.75	4.50	0.75

Table 5.3: "Industry Open Innovation breadth and depth scores". Own elaboration.

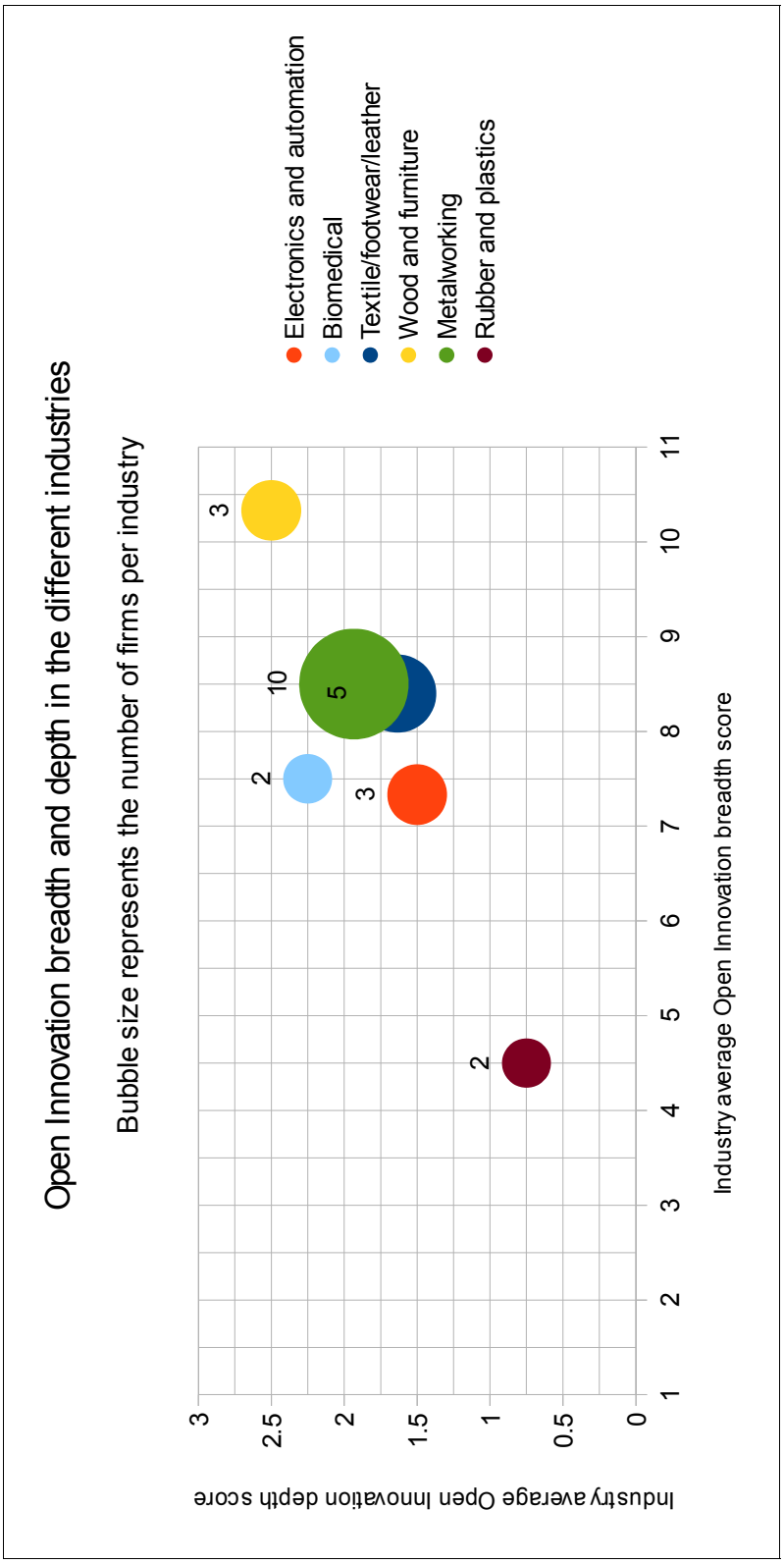

Figure 5.15: "Open Innovation breadth and depth in the different industries". Own elaboration.

With openness being defined by two dimensions, and thus increasing with increases in the two measures used in the chart, due to the low number of firms per industry, it would not be wise to make assumptions about a whole industry, however, it is clearly noticeable how, in the sample, firms in the Rubber and plastics industry seem to be the least open, while those in the Wood and furniture industry appear to be the most open. This could be partially explained by the existence of more than one industrial district in the Wood and furniture industry, and the lack of a specific industrial districts for the Rubber and plastics SMEs (which are anyway often integrated into multi-industry districts).

This model I proposed is a simplified version of that proposed by Laursen and Salter (2006) who could develop a proper econometric model given the substantially higher amount of data. It is a simple model yet it effectively accounts for differences in the measures of breadth and depth across different bands and industries. Future studies could possibly follow the same simple model and apply it to a much larger sample if an econometric analysis is not necessary.

It has been chosen to re-arrange the knowledge sources categories identified by Laursen and Salter (2006) by aggregating some of them and considering only those that could actually be considered as "partners" in the innovation process, i.e. those that can be involved in actual relationships or networks. "Internal staff" was added as the only non-external partner in order to understand the weight placed by firms on their personnel for the purpose of innovation. All the SMEs in the sample were then asked to rate their perceived importance of the categories created in the innovation process. These categories are: "Internal staff", "Universities and research institutes", "Competitors", "Customers/consumers", "Entrepreneurs and startups", "Business/technology incubators", "Suppliers" and"Firms in other industries".

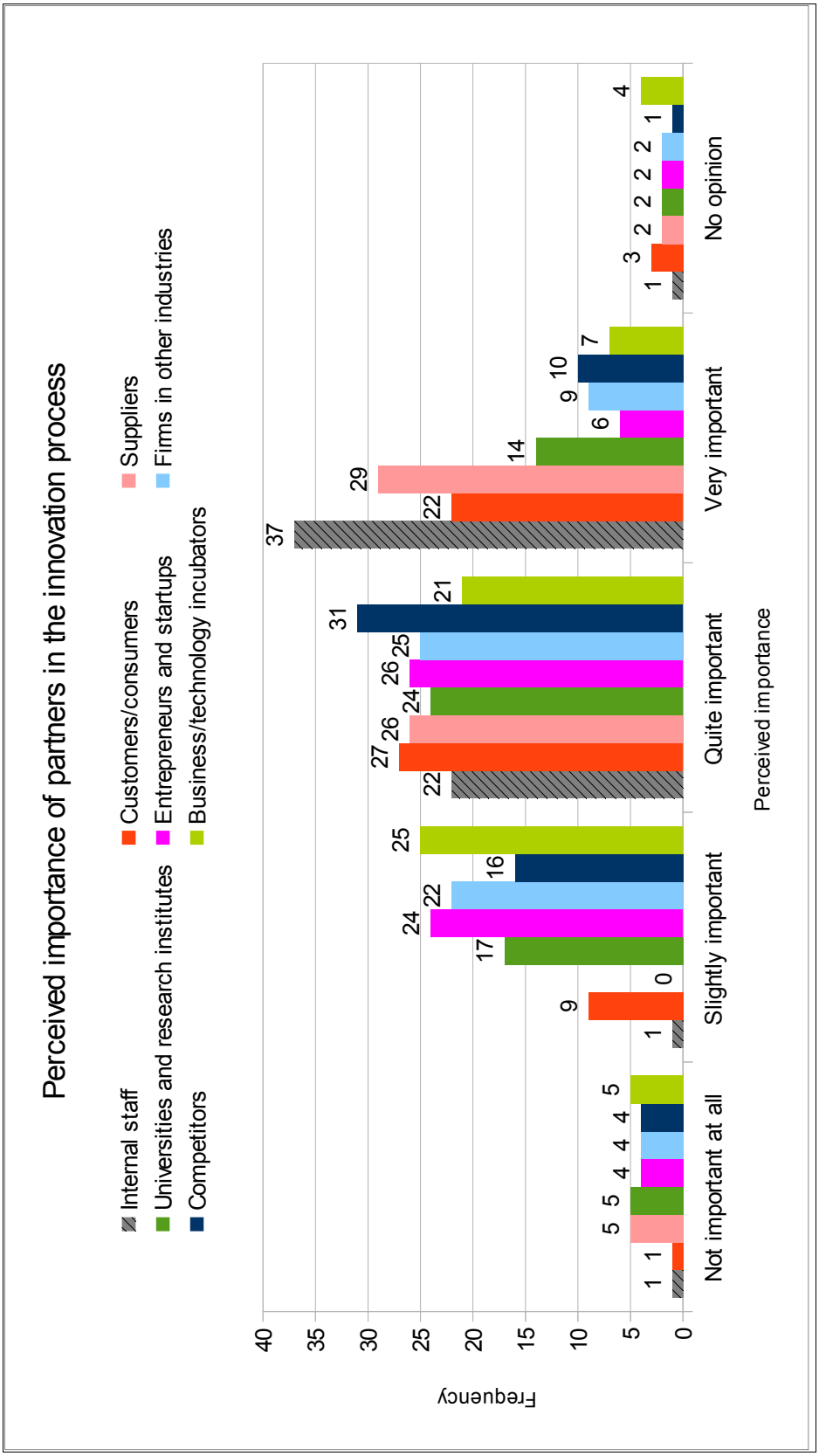

Figure 5.16: "Perceived importance of partners in the innovation process". Own elaboration.

The two most important partners appear to be “Internal staff” and “Suppliers” with respectively 95.16% and 88.71% of the total 62 SMEs rating them as being either “Quite important” or “Very important”.

It is not surprising to see “Internal staff” rank first since it is widely recognised that the success of innovation-related activities is dependent on the ability of a firm's own personnel to direct and integrate all the innovation efforts, be they either of an open or closed type.

The two categories receiving the lowest rating are “Business/technology incubators” and “Entrepreneurs and startups”, which have been rated as being either “Not important at all “ or “Slightly important” by 48.39% and 45.16% of the firms respectively.

“Business/technology incubators” and “Entrepreneurs and startups” are, nowadays, the two categories that are pursuing the most disruptive innovation strategies, yet it seems they are not relevant to the innovation needs of the SMEs in North-Eastern Italy. They are often sought-after partners abroad, but in Italy they could not establish a solid foothold and since they are very often small organisations, they are plagued by many of the same issues that affect SMEs in the manufacturing sector and that limit the scope of their activities, and, to some extent, their innovativeness.

With the same methodology, all 62 SMEs have been asked to rate how useful Open Innovation practices could be, according to them, in different phases of the innovation process leading to the roll out of a new product or service.

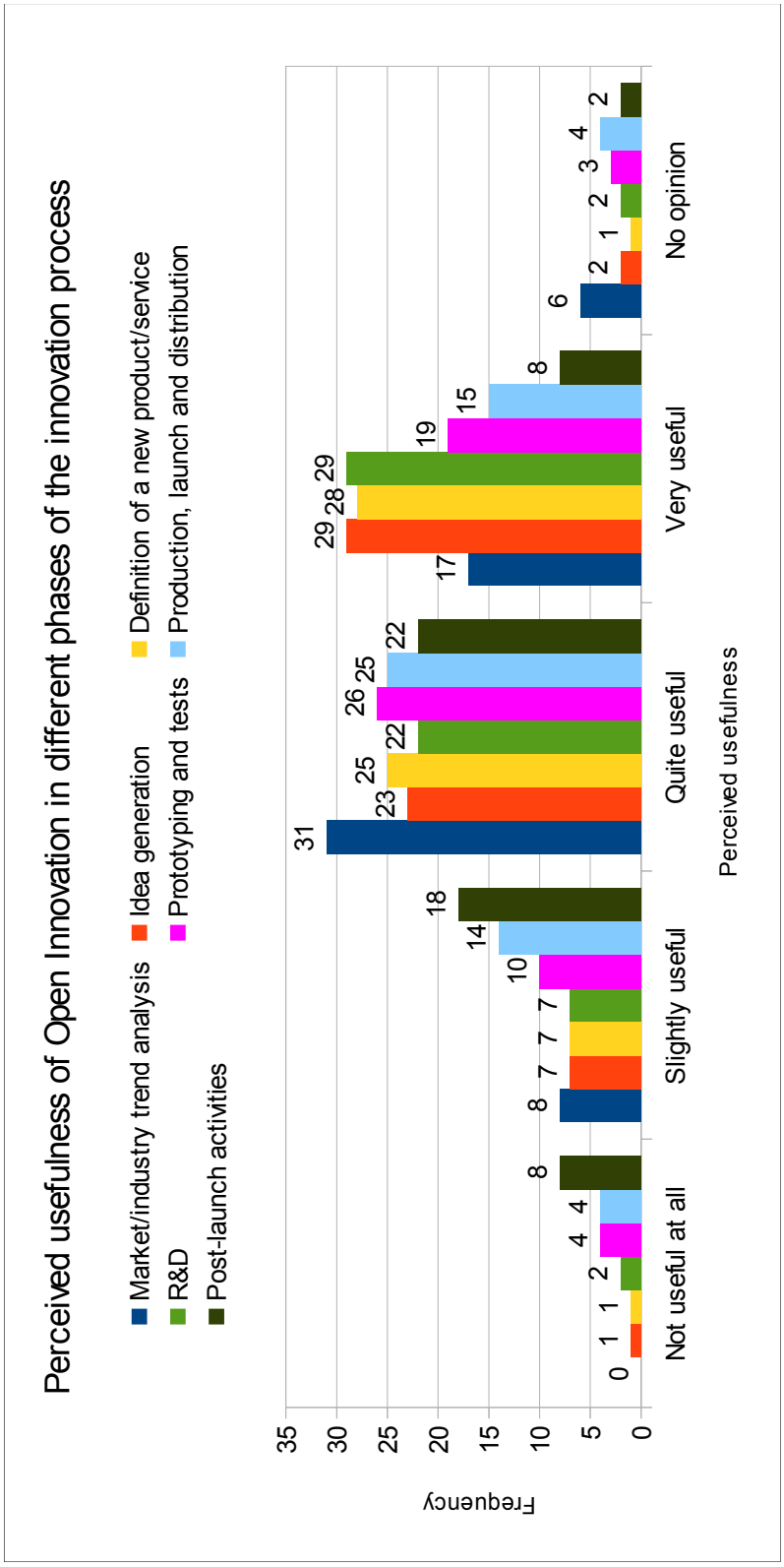

Figure 5.17: "Perceived usefulness of Open Innovation in different phases of the innovation process". Own elaboration.

Open Innovation has been rated to be either "Quite useful" or "Very useful" by 85.48% and 83.87% of the total 62 SMEs in the two closely linked phases of "Definition of a new product/service" and "Idea geneation" respectively.

Once again we have a confirmation of how the surveyed SMEs think of these two phases as critical for their innovativeness and recognise the need to potentially open up their innovation process to bring in fresh perspectives and new ideas, or to benefit from the guidance of some more experienced subjects in the conceptual stages.

Open Innovation practices have been considered to be the least useful, hence rated either "Not useful at all" or "Slightly useful" by 41.94% and 29.03% of the SMEs, in the last two stages of the innovation process, respectively "Post-launch activities" and "Production, launch and distribution".

A possible explanation is that the surveyed companies are less interested in exploiting new paths to market and that they feel less of a need to innovate their processes compared to product/services.

5.2.3. Third section: challenges and opportunities

The purpose of the third and last section of the questionnaire was to understand if the surveyed SMEs could be interested in adopting Open Innovation and what factors could contribute to ease or speed up the adoption of this paradigm.

First of all, in order to identify the main challenges companies have to face with regard to Open Innovation, the 37 SMEs that have never been involved in any Open Innovation practice were asked what made them forgo this opportunity.

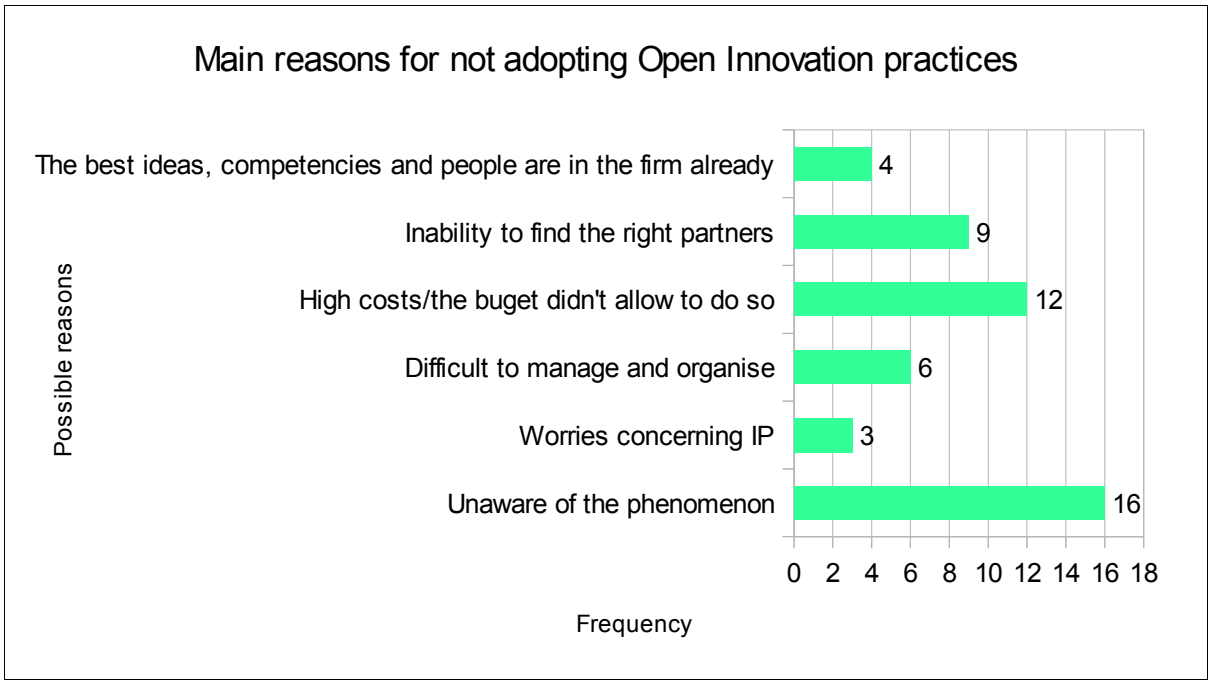

Figure 5.18: "Main reasons for not adopting Open Innovation practices". Own elaboration.

Multiple answers were possible and the most common answer chosen by the 16 companies out of 37 (43.24% of the respondents to this question) was “Unaware of the phenomenon”. While it was necessary to include such answer, it cannot be considered to be a valid reason for not opening up a firm's innovation process since other companies recognised having adopted Open Innovation without knowing about the paradigm. It must however be acknowledged that if local government bodies governing business matters had briefed the SMEs, which are considered the backbone of the regional production system, on the advantages of tackling the problem of innovativeness (and, in turn, competitiveness) with an Open Innovation strategy, the innovation landscape could possibly be different and maybe the purpose of networking between firms and entrepreneurs could be more geared towards innovation, rather than on preferential agreements.

Concerns over the (supposedly) high costs of implementing Open Innovation, or budget constraints, were found to be one of the main reasons for 12 SMEs (32.43% of the respondents). This is a valid reason in the sense that due to the need to manage a collaborative, potentially distributed, innovation process, coordination costs might arise, but they could be offset by earnings deriving from more efficient production processes, shortened time-to-market, or the premium price customers could be willing to pay for a product that better meets their needs and tastes. Thus, this should be evaluated on a case-by-case basis. Considering again the perspective of policymakers, they could contribute in offsetting such costs by granting tax credits or exemptions.

"Inability to find the right partners" was chose by a sizeable amount of companies too (9 out 37): these firms have probably tried looking for the right kind of partners, but could not find them. This leads to questions both the possibilities for external search and the necessary skills of the searching company. It could be argued that if a partner was essential in carrying out specific innovation-related tasks, the company would extensively scan the external environment for the right kind of knowledge needed, however, some companies might lack the instruments (and time) to do so, especially if the search has to be enlarged to other countries. At the same time, it could be that the innovativeness of the potential partners is not up to par.

The propensity to use Open Innovation in the future seems however to be quite high for most companies since more than half of them are either "Quite interested" or "Very interested" in implementing Open Innovation practices across the four main areas of "Product or service innovatin", "Process Innovation", "Business model" and "Organisation" in the future.

In particular, 85.48% of the 62 respondents stated they are "Quite interested" or "Very interested" in adopting Open Innovation to innovate their products or services.

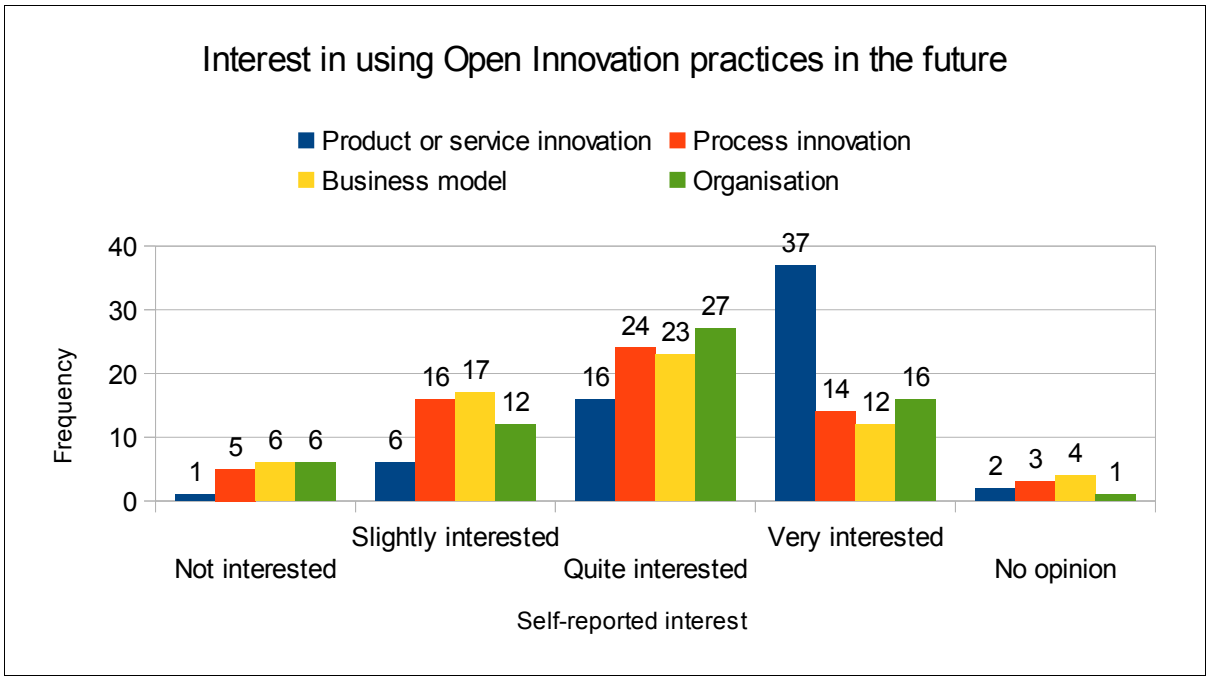

Figure 5.19: "Interest in using Open Innovation practices in the future". Own elaboration.

Given this high propensity to adopt the Open Innovation paradigm, and the supposed problems, or rather the fears, associated with it, it comes natural to wonder what could be done from the institutional side to make this happen.

Four possible measures were proposed to the firms in the sample: “Creation of intermediaries”, “Tax credits”, “Improving IP rules” and “More information provided by local institutions”.

85.48% of the 62 respondents think it would be either “Quite useful” or “Very useful” to be granted tax credits. This could be done if, at a local level, policymakers could devise programs aimed at supporting the investments of SMEs in Open Innovation projects. It is believed that, since for many companies Open Innovation is not a viable path due to budget constraints or the fear of incurring higher costs, a lower tax rate would greatly improve their willingness to undertake investments in innovative activities.

Another critical factor, with the opinions of 83.87% of the firms falling under the two

categories mentioned above, is the need for more information on the Open Innovation paradigm that local institutions could provide. Since currently institutions such as the local Chambers of Commerce, technology parks and universities offer courses on several technical aspects of business and innovation, conferences and workshops should be added so as to foster the implementation of open, collaborative, innovation strategies that would strengthen the networks the regional economy of the Italian North-East is renowned for.

With 30.65% of the respondents stating that "Improving IP rules" would be either "Not useful at all" or only "Slightly useful", we find another confirmation of the fact that these SMEs do not generally pursue innovation strategies aimed at licensing-in or -out IP. It is however to be considered that both licensing-in and -out agreements could lead to higher profitability, but, as pointed out before, the smaller businesses do not have the knowledge nor the tools to efficiently access these opportunities. If a real interest in these possibilities was found though, local institutions should tackle the problem by offering their full support, by providing both information and funds to the entrepreneurs.

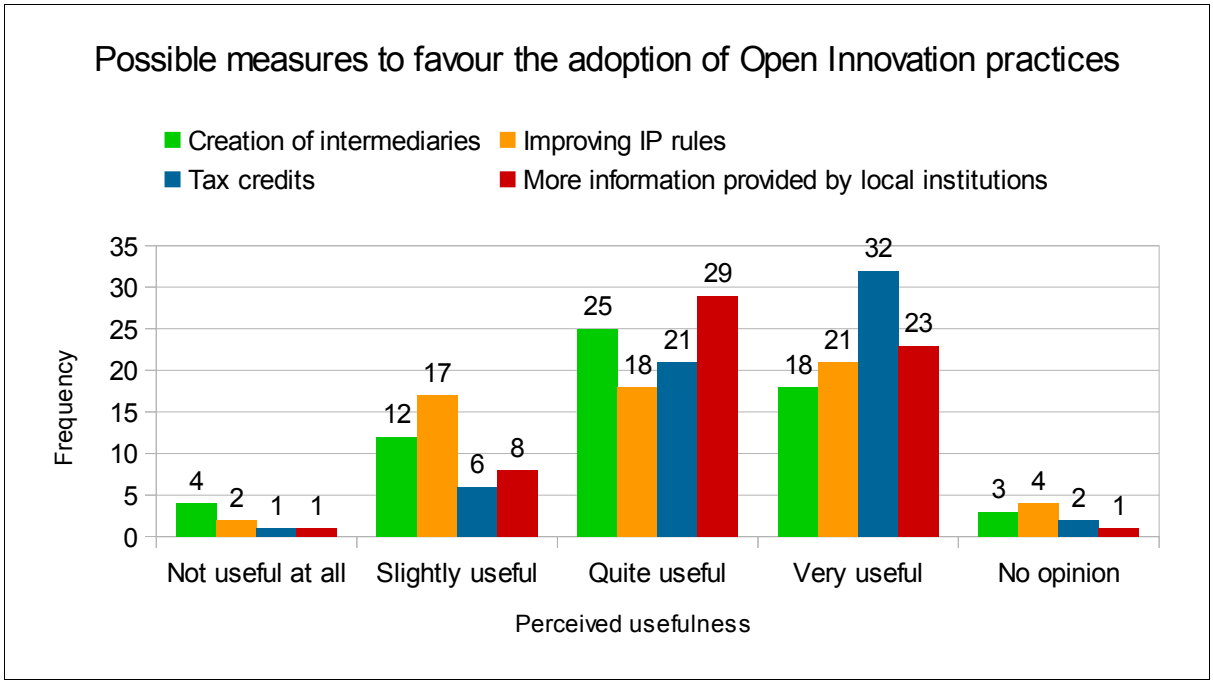

Figure 5.20: "Possible measures to favour the adoption of Open Innovation practices in North-Eastern Italy". Own elaboration.

6. Concluding remarks

Open Innovation comprises a set of practices that allow an organisation to source new knowledge and information from outside their boundaries. This can greatly increase their innovative and learning potential, which will in turn increase the competitiveness of the firm. Certainly managing an open, potentially distributed innovation process is not easy and brings about peculiar challenges.

It has been chosen to analyse the implementation of Open Innovation practices in SMEs for two main reasons: because they represent an important a very important, often overlooked actor in the global economy, and due to a need to understand better how they innovate.

The SMEs, mostly due to their smallness, which is not intrinsically a problem but has several negative implication, seem to be a category of firms that would greatly benefit from the adoption of Open Innovation practices. This is because sourcing knowledge about the market and innovative activities could make up for some of the resources they lack, both economic and human.

The focus on this study was on the SMEs of North-Eastern Italy, an area that is renowned for its small business culture and productivity, where such companies have been thriving for a long time. The context would be, in my perspective, the best ground for practical application of the Open Innovation paradigm. In fact, in this part of Italy, the SMEs are in close proximity to each other, sometimes located in industrial districts, linked by personal/social ties between members of a large community of entrepreneurs and professionals and they have (a need for) specific competencies or knowledge that could sparkle the implementation of Open Innovation practices (either as an outside-in, or inside-out process).

What has been found by surveying a small sample of companies is that in general most companies are not aware of what Open Innovation is. However, once the definition was

provided, more than 40% of the respondents reported having been involved in Open Innovation practices before. This gives a clear insight on the often emergent nature of innovation in the SMEs of the region where, due to a lack of skills, information and knowledge can make planning and organising for innovation too complicated, or seemingly unnecessary. Open Innovation however, thanks to the structure of the economic and social systems, finds its way toward practical application in many instances, frequently without managers intentionally and consciously choosing this path.

It is necessary to point out that findings from the survey suggest however that most of the collaborations have not taken place between firms of the same region (the Italian North-East), instead, firms from this region had to look for partners in the rest of Italy. Hence, regardless of the abundant stock of knowledge stored within the region, many of the respondents could not find the right partners there.

A lack of knowledge and a difficulty in conceiving new ideas represent the two most frequent reasons, for the surveyed SMEs, to open up their innovation process. This is in part justified by the fact that few of these firms have formal R&D teams which could consistently drive up their innovative potential. R&D is not however seen as a substitute for Open Innovation (and vice-versa), the two are rather considered complements. The lack of specific knowledge and the stagnating idea generation process are possibly the two most concerning points that policymakers should address in order to foster the competitiveness and innovativeness of the SMEs.

What makes firms steer away from the opportunity of opening up their innovation process is the fact that, according to them, Open Innovation is a black box. Firms are not aware of the phenomenon, or fear it might imply sustaining higher costs. Again, since there seems to be an interest in pursuing Open Innovation in the future, policymakers could effectively devise

plans and program to support the SMEs in this regard: they should provide free information to all companies, and funding, or tax credits, to selected companies that apply to training programs. This would ultimately all go to the advantage of the networking dynamics in the area that are very often praised, but rarely supported.

So, in short, the recommendations for the policymakers could be:

a) providing information about Open Innovation to all companies (not just SMEs) in the area;
b) intensify the technology transfer activity through branches of the local Chambers of Commerce or government offices;
c) devise programs in which training and funds (or lower tax rates, tax credits) are granted to the participating companies who consistently adopt an Open Innovation approach.

This study surely has many limitations given that the sample is relatively small and doesn't have any statistical relevance, however, it is, to my knowledge, up to now the only study of this kind tackling the issue of Open Innovation in North-Eastern Italy. Hopefully future research could succeed in gathering a larger amount of data and give a more precise picture of the state of the art of Open Innovation in the region.

7. Bibliography

Acs, Z. J., Audretsch, D. B. 1987. Innovation, Market Structure, and Firm Size. **The Review of Economics and Statistics**, 69(4): 567-574

Ahn, J. M., Minshall, T., & Mortara, L. 2015. Open innovation: a new classification and its impact on firm performance in innovative SMEs. **Journal of Innovation Management JIM**, 3(2): 33-54.

Álvarez, R., & Vergara, S., 2013. Trade exposure, survival and growth of small and medium-size firms. **International Review of Economics & Finance**, 25(C): 185-201.

Andriopoulos, C., & Lewis, M. W. 2009. Exploitation-Exploration Tensions and Organizational Ambidexterity: Managing Paradoxes of Innovation. **Organization Science**, 20(4): 696-717.

Asiedu, E., & Freeman, J. A. 2007. The Effect of Globalization on the Performance of Small- and Medium-Sized Enterprises in the United States: Does Owners' Race/Ethnicity Matter? **American Economic Review**, 97(2): 368-372.

Bagnasco, A. 1977. **Tre Italie: la problematica territoriale dello sviluppo italiano**. Bologna: Il Mulino.

Baregheh, A., Jennifer Rowley, J., Sambrook, S. 2009. Towards a multidisciplinary definition of innovation. **Management Decision**, 47(8): 1323-1339.

Baum, J. A. C., Li, S. X., & Usher, J. M. 2000. Making the Next Move: How Experimental and Vicarious Learning Shape the Locations of Chains'Acquisitions. **Administrative Science Quarterly**, 45: 766-801.

Becattini G. 1979. Dal "settore" industriale al "distretto" industriale. Alcune considerazioni sull'unità d'indagine dell'economia industriale. **Rivista di economia e politica industriale**, V(1): 7-21.

Becattini G. 1987. **Mercato e forze locali - Il distretto industriale**. Bologna: Il Mulino.

Becattini G. 1989. Il distretto industriale come ambiente creativo. In Benedetti E. **Mutazioni tecnologiche e condizionamenti internazionali**: 19-33. Milano: Franco Angeli.

Becker, M. C., & Zirpoli, F. 2011. **Beyond product architecture: Division of labour and competence accumulation in complex product development**. Working paper.

Bellandi, M. 1992. The incentives to decentralized industrial creativity in local systems of small firms. **Revue d'Économie Industrielle**, Programme National Persée, 59(1): 99-110.

Bloem, J., van Door, M., & van Ommeren, E. 2007. **Open for Business: Open Source Inspired Innovation**. Amsterdam: Research Institute for the Analysis of New Technology VINT.

Box, T., & Miller, W. 2011. Small Firm Competitive Strategy. **Academy of Strategic Management Journal**, 10(2): 55-59.

Brem, A., & Voigt, K. 2009. Integration of market pull and technology push in the corporatefront end and innovation management - Insights from the German software industry. **Technovation**, 29: 351–367.

Bressler, M. S. 2012. How small businesses master the art of competition through superior competitive advantage. **Journal of Management & Marketing Research**, 11: 1-12.

Brunswicker, S., & Vanhaverbeke, W. 2011. **Beyond open innovation in large enterprises: How do small and medium-sized enterprises (SMEs) open up to external innovation sources?** To be submitted to Research Policy..

Brunswicker, S., & Vanhaverbeke, W. 2015. Open Innovation in Small and Medium-Sized Enterprises (SMEs): External Knowledge Sourcing Strategies and Internal Organizational Facilitators. **Journal of Small Business Management**, 53(4): 1241-1263.

Cassiman, B., & Veugelers, R. 2002. Complementarity in the Innovation Strategy: Internal R&D, External Technology Acquisition and Cooperation. **C.E.P.R. Discussion Papers** 3284, C.E.P.R. Discussion Papers.

Cassiman, B., & Veugelers, R. 2006. In Search of Complementarity in Innovation Strategy: Internal R& D and External Knowledge Acquisition. **Management Science**, INFORMS,

52(1): 68-82.

Ceci, F., & Iubatti, D., 2012. Personal relationships and innovation diffusion in SME networks: A content analysis approach. **Research Policy**, 41: 565-579.

Chesbrough, H. W. 2003. **Open Innovation: The New Imperative for Creating and Profiting from Technology**. Boston: Harvard Business School Press.

Chesbrough, H., & Crowther, A. K. 2006. Beyond high tech: early adopters of open innovation in other industries. **R&D Management**, 36: 229-236.

Chesbrough, H. W., Vanhaverbeke, W., & West, J. 2006. **Open Innovation: Researching a New Paradigm**. Oxford: Oxford University Press.

Chiarvesio, M., Di Maria, E., & Micelli, S. 2010. Global Value Chains and Open Networks: The Case of Italian Industrial Districts. **European Planning Studies**, 18(3).

Colantone, I., Coucke, K., & Sleuwaegen, L. 2010. **Globalization and Firm Exit: Differences Between Small and Large Firms**. Working Papers 2010/19, Hogeschool-Universiteit Brussel, Faculteit Economie en Management.

Cooper, R. G. 1990. Stage-gate systems: A new tool for managing new products. **Business Horizons**, 33 (3): 44-54.

Cozzi, T. 1989. Problematiche dell'innovazione nella piccola e media industria. In Benedetti E. **Mutazioni tecnologiche e condizionamenti internazionali**: 137-147. Milano: Franco Angeli.

Cruz-Cázares, C., Smits, A., Berends, H., Reymen, I., Anzola, P., Bayona-Sáez, C., García-Marco, T., Schubert, M., & Flavius Sturm, F. 2012. **BMOI Report: A regional comparison of open innovation practices.** BMOI Euris Programme. The Netherlans.

Damanpour, F. 1991. Organizational Innovation: A Meta-Analysis of Effects of Determinants and Moderators. **The Academy of Management Journal,** 34(3): 555-590.

Damanpour, F. 1996. Organizational complexity and innovation: developing and testing multiple contingency models. **Management Science**, 42(5): 693-716.

Damanpour, F., & Schneider, M. 2006. Phases of the Adoption of in Organizations: Effects of Environment, Organization and Top Managers. **British Journal of Management**, 17: 215-236.

del Bufalo, G. 2015. Italy (country report). In Abel-Koch, J., del Bufalo, G. Fernandez, M., Gerstenberger, J., Lo, V., Navarro, B., & Thornary, B. **SME Investment and Innovation: France, Germany, Italy and Spain**. Rome: Cassa depositi e prestiti SpA.

Dodgson, M., Gann, D., & Salter, A. 2006. The role of technology in the shift towards open innovation: the case of Procter & Gamble. **R&D Management**, 36(3): 333-346.

du Plessis, M. 2007. The role of knowledge management in innovation. **Journal of Knowledge Management**, 11(4): 20-29.

Edwards, T., Delbridge, R., & Munday, M. 2005. Understanding Innovation in Small and Medium-Sized Enterprises: A Process Manifest. **Technovation**, 25(10): 1119-1127

Escoffier, L., La Vopa, A., Loccisano, S., Puccini, M., & Speser, P. 2012. Technology transfer and knowledge transfer activities in Italy: a detailed analysis. **The Quarterly Review of Corporation Law and Society**, 14. Tokyo: Waseda Institute for Corporation Law and Society.

European Commission, 2003. **Commission recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises**. (notified under document number C(2003) 1422) (2003/361/EC). Official Journal of the European Union, 20.5.2003.

European Commission, 2015. **2015 Small Business Act Fact Sheet – Italy**. Available at: http://ec.europa.eu/growth/smes/business-friendly-environment/performance-review/files/countries-sheets/2015/italy_en.pdf Last accessed on February 9, 2016.

Fosfuri, A. 2006. The Licensing Dilemma: Understanding the Determinants of the Rate of Technology Licensing. **Strategic Management Journal** 27(12): 1141-1158.

Greenwald, B. Kahn, J. 2005. **Competition demystified**. New York: Penguin Group.

Gassmann, O., Enkel, E. & Chesbrough, H. W. 2010. The future of open innovation. **R&D Management**, 40(3): 213–221.

Gupta, A. K., Smith, K. G., & Shalley, C. E. 2006. The interplay between exploration and exploitation. **Academy of Management Journal**, 49(4): 693-706.

Hallberg, K. 2000. **A Market-Oriented Strategy for Small and Medium Scale Enterprises**. IFC International Finance Corporation, Discussion Paper 40, IFD40, April 2000.

Hoffman, W. H., & Schlosser, R. 2001. Success Factors of Strategic Alliances in Small and Medium-sized Enterprises - An Empirical Survey. **Long Range Planning**, 34: 357-381.

Holmqvist, M. 2004. Experiential Learning Processes of Exploitation and Exploration within and between Organizations: An Empirical Study of Product Development. **Organization Science**, 15(1): 70-81.

Johansson, B., Karlsson, C., & Stough, R. 2006. **The Emerging Digital Economy: Entrepreneurship, Clusters, and Policy**. Berlin: Springer.

Kim, C., Song, J., & Nerkar, A. 2012. Learning and innovation: Exploitation and exploration tradeoffs. **Journal of Business Research**, 65 (8): 1189-1194.

Laursen, K., & Salter, A. 2006. Open for innovation: the role of openness in explaining innovation performance among U.K. manufacturing firms. **Strategic Management Journal**, 27: 131-150.

Laursen, K., & Salter, A. 2014. The paradox of openness: Appropriability, external search and collaboration. **Research Policy**, 43(5): 867-878.

Lee, S., Park, G., Yoon, B., & Park, J. 2010. Open Innovation in SMEs an intermediated network model. Research Policy, 39: 290-300.

Lazzarotti, V., Manzini, R., & Pellegrini, R. 2010. Open innovation models adopted in practice: an extensive study in Italy. Measuring Business Excellence, 14(4): 11-23.

Little, I. M. D., Mazumdar, D., & Page, J. M. Jr. (1987). **Small Manufacturing Enterprises: A Comparative Analysis of India and Other Economies.** Oxford: Oxford University Press.

Malerba, F. 1985. Mutamento tecnologico, impresa e mercato. In Onida, F. **Innovazione, competitività e vincolo energetico**. Bologna: Il Mulino.

March, J. G. 1991. Exploration and exploitation in organizational learning. **Organization Science**, 2(1): 71-87.

Mistri, M. 1989. Specializzazione internazionale della piccola e media industria italiana e

ruolo dell'innovazione tecnologica: riflessioni sui dati del Mediocredito centrale. In Benedetti E. **Mutazioni tecnologiche e condizionamenti internazionali**: 201-219. Milano: Franco Angeli.

Mohr, J., & Spekman, R. 1994. Characteristics of partneship success: Partnership attributes, communication behaviour, and conflict resolution techniques. **Strategic Management Journal**, 15: 135-152.

Momigliano, F. 1984. L'innovazione industriale e la condizione dell'Italia: problemi di analisi delle determinanti ed effetti dell'innovazione e risultanze di ricerche empiriche. In Antonelli, G. **Innovazioni Tecnologiche e struttura riproduttiva**. Bologna: Il Mulino.

Nord, W.R., & Tucker, S. 1987. **Implementing routine and radical innovations**. Lexington, MA: Lexington Books.

Ocloo, C. E., Akaba, S., & Worwui-Brown, D. K. 2014. Globalization and competitiveness: Challenges of Small and Medium Enterpriss (SMEs) in Accra, Ghana. **International Journal of Business and Social Science**, 5(4): 287-296.

Onida, F. 1984. Innovazione e competitività: l'Italia nei mercati internazionali. In Antonelli, G. **Innovazioni Tecnologiche e struttura riproduttiva**. Bologna: Il Mulino.

Organisation for Economic Co-operation and Development, 2000. **Small and Medium-sized Enterprises: Local Strength, Global Reach**. OECD Policy Brief, June 2000.

Pisano, G. P. 1990. The R&D Boundaries of the Firm: An Empirical Analysis. **Administrative Science Quarterly**, 35(1): 153-176.

Rahman, H., & Ramos, I. 2013. Challenges in Adopting Open Innovation Strategies in SMEs: An Exploratory Study in Portugal. **Issues in Informing Science and Information Technology**, 10.

Raisch, S. & Birkinshaw, J. 2008. Organizational ambidexterity: Antecedents, outcomes, and moderators. J**ournal of Management**, 34: 375-409.

Rosenberg, N. 1982. **Inside the Black Box: Technology and Economics**. New York: Cambridge University Press.

Rothwell, R. 1994. Towards the Fifth-generation Innovation Process. **International Marketing Review**, 11(1): 7-31.

Sargeant, W. 2011. **The Small Business Economy: A report to the President 2010**. Washington, D.C.: United States Government Printing Office.

Schilling, M. A. 2009. **Strategic Management of Technological Innovation** (3rd edition). New York: McGraw-Hill/Irwin.

Schumpeter, J.A. 1912. **Theorie der wirtschaftlichen Entwicklung**. Leipzig: Duncker &

Humblot. English translation published in 1934 as The Theory of Economic Development.

Schumpeter, J. A. 1942 [1961]. **Capitalism, Socialism and Democracy**. London: Allen & Unwin, London.

Shapiro, C., & Varian, H. R. 1998. **Information Rules: A Strategic Guide to the Network Economy**. Boston: Harvard Business Review Press.

Spithoven, A, Clarysse, B, & Knockaert, M. 2011. Building absorptive capacity to organise inbound open innovation in traditional industries. **Technovation**, 31: 10–21.

Spithoven, A., Vanhaverbeke, W. & Roijakkers, N. 2013. Open innovation practices in SMEs and large enterprises. Small Business Economics. 41(3): 537-562.

Tambunan, T. 2009. Promoting innovation in SMEs through transfer of technology: Lessons from a metalworking industry cluster in Indonesia. **Asia Pacific Tech Monitor**, 26(4).

Teece, D. J. 1986. Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy. **Research Policy**, 15(6):285-305.

Tidd, J. 2006. **A review of innovation models**. London: Imperial College London.

Tidd, J., Bessant, J. & Pavitt, K. 2005. **Managing innovation: Integrating technological, market and organizational change** (3rd edition). John Wiley & Sons.

Turner, N., Maylor, H., & Swart, J. 2011. **Ambidexterity-as-Practice: Understanding the Role of the Manager in IT-Services Projects**. Hull, UK: Hull University Business School. Organisational Learning, Knowledge and Capabilities Conference 2011.

Valadez, R. M. 2011. The Value Proposition of Small Businesses: Economic engines for job creation. **Journal of Management & Marketing Research**, 9:1-11.

van de Vrande, V., de Jong, J. P. J., Vanhaverbeke, W., & de Rochemont, M. 2009. Open innovation in SMEs: Trends, motives and management challenges. Technovation, 29: 423-437.

Vanhaverbeke, W., Duysters, G., & Beerkens, B. 2002. **Technology capability building through networking strategies within high-tech industries**, Academy of Management Best Paper Proceedings.

Vanhaverbeke, W., van de Vrande, V., & Chesbrough, H. W. 2008. Understanding the advantages of open innovation practices in corporate venturing in terms of real options. **Creativity and Innovation Management**, 17(4): 251-258.

Vanhaverbeke, W., Van de Vrande, V., & Cloodt, M. 2007. **Connecting Absorptive Capacity and Open Innovation**. Proceedings of the CAS Workshop on Innovation in Firms, Oslo, Norway.

Veugelers, Reinhilde, 1997. Internal R & D expenditures and external technology sourcing. **Research Policy**, 26(3): 303-315.

Vossen, R. W. 1998. Relative strengths and weaknesses of small firms in innovation. **International Small Business Journal**, 3: 88 – 94.

Wynarczyk, P. 2013. Open innovation in SMEs: A dynamic approach to modern entrepreneurship in the twenty-first century. **Journal of Small Business and Enterprise Development**, 20(2): 258-278.

Zeng, S. X., Xie, X. M., & Tam, C. M. 2010. Relationship between cooperation networks and innovation performance of SMEs. **Technovation**, 30: 181-194.

Zirpoli, F., & Becker, M. C. 2011. **The limits of design and engineering outsourcing: performance integration and the unfulfilled promises of modularity**. R&D Management, 41(1): 21-43.

Zirpoli, F., & Becker, M. C. 2011. **What happens when you outsource too much?** MIT Sloan Management Review, 52(2): 58-64.

Appendix 1: Full questionnaire (in Italian)

Prima sezione: informazioni generali sull'Azienda

1) A quale settore appartiene la Sua Azienda?
- ○ metalmeccanica
- ○ elettronica e automazione
- ○ legno/arredo
- ○ plastiche e gomma
- ○ biomedico
- ○ tessile/calzaturiero/pellami
- ○ altro (specificare)

2) Da quante persone è composta l'Azienda?
- ○ 1-9
- ○ 10-19
- ○ 20-49
- ○ 50-99
- ○ 100-149
- ○ 150-199
- ○ 200-249
- ○ >249

3) Come reputa la Sua Azienda?
Su una scala da 1 a 4 dove 1 significa "per nulla innovativa" e 4 "molto innovativa".

per nulla innovativa 1	2	3	molto innovativa 4
○	○	○	○

4) Quanto percepisce che l'innovazione sia determinante per la competività nel Suo settore?
Su una scala da 1 a 4 dove 1 significa "per niente utile" e 4 "molto utile".

per niente utile 1	2	3	molto utile 4
○	○	○	○

5) Vi sono nella Sua Azienda impiegati coinvolti in attività volte ad accrescere il carattere innovativo dell'Azienda e/o dei Suoi prodotti?
- ○ sì
- ○ no

6) Questi impiegati svolgono anche altre attività all'interno dell'Azienda, oltre a quanto concerne l'innovazione?

- ○ sì
- ○ no

7) Quanti sono gli impiegati esclusivamente coinvolti in attività a carattere innovativo?

- ○ 1
- ○ 2-5
- ○ 6-10
- ○ più di 10

Seconda sezione: pratiche di Open Innovation

8) Ha mai sentito parlare di Open Innovation?

- ○ sì
- ○ no

9) Definendo l'Open Innovation come l'uso di idee e conoscenze esterne all'azienda stessa per accellerare il processo di innovazione, migliorare l'offerta di prodotti, i processi interni e/o l'accesso a nuovi canali di commercializzazione, l'Azienda è mai stata coinvolta in pratiche di Open Innovation?

- ○ sì
- ○ no

10) Quali di questi strumenti ha usato?
Qualora necessario, è possibile selezionare più opzioni.

- ○ acquisizioni
- ○ alleanze strategiche, cooperazioni e co-sviluppo
- ○ accordi di produzione su licenza
- ○ user innovation (coinvolgimento dei clienti/consumatori), crowdsourcing e comunità online
- ○ consulenza

11) Quante volte è stato fatto ricorso ad una stessa fonte di conoscenza esterna?
Le colonne indicano il numero di volte un'azienda ha fatto ricorso ad una specifica categoria (se non è mai stata usata, scegliere "0").

	0	1	2	3	4	5 o più
fornitori (di strumentazioni, materiali, componenti o software	○	○	○	○	○	○
clienti/consumatori	○	○	○	○	○	○
aziende della competizione	○	○	○	○	○	○
consulenti	○	○	○	○	○	○
aziende di Ricerca e Sviluppo, laboratori	○	○	○	○	○	○
università e altri istituti di formazione	○	○	○	○	○	○
istituzioni di ricerca governative	○	○	○	○	○	○
altre istituzioni pubbliche	○	○	○	○	○	○
istituti di ricerca privati	○	○	○	○	○	○
conferenze professionali e meeting	○	○	○	○	○	○
associazioni professionali	○	○	○	○	○	○
stampa tecnico-commerciale, database	○	○	○	○	○	○
fiere ed esposizioni	○	○	○	○	○	○
standard tecnici	○	○	○	○	○	○
standard e regolamenti di salute e sicurezza	○	○	○	○	○	○
standard e regolamenti ambientali	○	○	○	○	○	○

12) In quali aree il l'apporto di queste fonti di conoscenza esterne è stato più determinante?
Qualora necessario, è possibile selezionare più opzioni.

- ○ ideazione
- ○ ricerca
- ○ sviluppo
- ○ produzione
- ○ marketing
- ○ distribuzione
- ○ logistica
- ○ processi organizzativi

13) Quali sono le principali ragioni che hanno portato ad avvalersi di conoscenze/idee provenienti dall'esterno?
Qualora necessario, è possibile selezionare più opzioni.

- ○ reputazione dei partner
- ○ previste riduzioni nei costi
- ○ mancanza di conoscenze specifiche in Azienda
- ○ riduzione del time-to-market
- ○ stagnante processo di ideazione
- ○ per avere accesso alla proprietà intellettuale dei partner
- ○ rafforzare le relazioni con altri componenti della catena del valore
- ○ condividere il rischio di un investimento oneroso
- ○ per avere un migliore feedback dal mercato

14) Di che natura sono state le collaborazioni?
Qualora necessario, è possibile selezionare più opzioni.

- ○ transnazionali
- ○ nazionali (altre aree in Italia)
- ○ regionali (Nord-Est)

15) quanto pensa che la dimensione locale del Suo settore sia importante per (o possa favorire) l'adozione di pratiche di Open Innovation? *
Esprimere una valutazione su una scala da 1 a 4, dove 1 corrisponde a "per nulla importante" e 4 a "molto importante".

per nulla importante 1	2	3	molto importante 4
○	○	○	○

16) Per quale ragione non sono mai state adottate pratiche di Open Innovation? *
Qualora necessario, è possibile selezionare più opzioni.

- ○ non conoscevo il fenomeno dell'Open Innovation
- ○ preoccupazioni riguardo la proprietà intellettuale
- ○ difficile da gestire, può causare problematiche gestionali
- ○ temevo i costi potessero essere elevati e/o il budget non lo consentiva
- ○ impossibilità di reperire i giusti partner
- ○ non è mai stato necessario in quanto le migliori persone e conoscenze sono già nell'Azienda

Terza sezione: sfide e opportunità

17) Quanto pensa che adottare pratiche di Open Innovation sia stato (o potrebbe essere) utile per la Sua Azienda e in quale stadio del processo di innovazione?

	per niente utile	poco utile	abbastanza utile	molto utile	nessuna opinione
analisi dei trend nel mercato/industria	○	○	○	○	○
generazione di idee	○	○	○	○	○
definizione di un nuovo prodotto o servizio	○	○	○	○	○
ricerca e sviluppo di un nuovo prodotto	○	○	○	○	○
prototipazione e test	○	○	○	○	○
lancio sul mercato, produzione e distribuzione	○	○	○	○	○
attività post-lancio	○	○	○	○	○

18) A quali tipologie di partner attribuirebbe maggiore importanza nel processo di innovazione?

	per niente utile	poco utile	abbastanza utile	molto utile	nessuna opinione
personale interno	○	○	○	○	○
clienti	○	○	○	○	○
clienti/consumatori	○	○	○	○	○
fornitori	○	○	○	○	○
università e istituti di ricerca	○	○	○	○	○
imprenditori e start-up	○	○	○	○	○
aziende di altri settori	○	○	○	○	○
aziende della competizione	○	○	○	○	○
incubatori tecnologici/aziendali	○	○	○	○	○

19) In quali aree sarebbe più interessato ad innovare tramite l'Open Innovation in futuro?

	per nulla	poco	abbastanza	molto	nessuna opinione
innovazione di prodotto/servizio	○	○	○	○	○
innovazione di processo	○	○	○	○	○
business model	○	○	○	○	○
organizzazione	○	○	○	○	○

20) Secondo Lei, quali misure potrebbero favorire l'adozione di pratiche di Open Innovation nel Nord-Est?

	molto inutile	abbastanza inutile	abbastanza utile	molto utile	nessuna opinione
creazione di appositi organismi che fungano da intermediari	○	○	○	○	○
adeguare la normativa sulla proprietà intellettuale	○	○	○	○	○
sussidi e sgravi fiscali	○	○	○	○	○
maggiore informazione da parte degli organismi locali	○	○	○	○	○