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Open Innovation: a powerfull tool to remain competitive

Supervisor

Prof. Mario Volpe

Graduand

Lorenzo Marini

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Introduction

In the last decades it has been noticed that the life cycles of companies have been getting shorter and shorter, thus raising the question of how companies can remain competitive in the long run and extend their maturity phase as much as possible. This need can be satisfied through continuous innovation; this means always looking for better solutions, in step with the times and that will satisfy the needs of current consumers and attract new ones.

We have two ways to innovate: The first one, the so-called "closed innovation", consists in competing with the external environment relying solely and exclusively on one's own resources, autonomously controlling one's own processes and not having any exchange of information with competitors for fear of damaging the company itself and advantaging them; The second way to innovate, the one considered most effective, is the "open innovation", which focuses on the theme of sharing resources, ideas and methodologies between companies operating in the same sector and not, with the common goal of progressing especially from the point of view of technological skills and lengthen as much as possible the life cycle of the company.

In the following research we are going to develop the main themes of open innovation, explaining the differences between outbound and inbound open innovation, what the degrees of openness of a company refer to, the benefits of open innovation, the tools with which companies apply this type of innovation, the relationships that coexist between SMEs and large companies and finally the open innovation model.

1 Open Innovation

The conventional managerial theories and the best known business practices are going to describe with the term "innovation" that business process through which companies generate a new type of knowledge within the Company. This type of knowledge, however, is strictly confined within the corporate environment, defined as "black box" (Chesbrough, Vanhaverbeke, & West, New Frontiers in Openness and Innovation). West, New Frontiers in Open Innovation, 2014), and it is precisely the definition of a physical boundary that is necessary for the firm to protect the creation of this new cumulative store of knowledge that will allow the firm to differentiate itself from others and continue to have a substantial competitive advantage, generating more value along the value chain (or allow the firm to enter an industry where a high level of technology is required). It is precisely this ability to keep all the knowledge generated within its boundaries that ensures the company the possibility to continue to innovate, with the guarantee of being the only beneficiary of the benefits generated by the innovation process and that its efforts will be recognized by the final consumer, translating into a greater appeal compared to the competition when marketing its product or service.

The approach, so much reserved, described up to now has been a cornerstone until the beginning of the new millennium and has allowed the companies that have adopted it excellent returns on invested capital because the only focus was on products and they were protected, within the company boundaries, by know-how and intellectual properties (IPs). With the advent of the new millennium, however, we have witnessed a shift of business focus from product to service and this is mainly due

to the fact that the needs of consumers have changed: if before a single product was sufficient to fully satisfy the customer, now it is necessary a greater effort by the company, which has been forced to focus on services to maintain a differentiation from competitors; thus was born the term "user experience" in a new world where the consumer is constantly looking for a deeper connection with the product. For this reason, companies have felt the need to expand their value chain no longer only vertically but also horizontally, to move from a closed and linear system to a complex and above all open ecosystem (Chesbrough, Vanhaverbeke, & West, New Frontiers in Open Innovation, 2014). This marks the historic shift from a model defined as "Closed Innovation" to a totally new model defined as "Open Innovation". It is precisely Open Innovation that allows us to get out of the "black box", mentioned above, making us understand and appreciate the importance of shared knowledge and how this new model can bring benefits to the company through the creation of knowledge that comes from outside the classic company boundaries.

The key principles that differentiate the "closed" model from the "open" model could be summarized in the following table:

Principles of Closed Innovation	Principles of Open Innovation
Specialised people work for us	Not all specialist people work for us. It is necessary to work with people both inside and outside the company
To create profit from R&D we have to be the ones to discover, develop, take advantage of	External R&D can create significant value: internal research is needed to develop some portion of that value

If we discover it ourselves, we'll be the first to have it on the market	We don't have to create the idea profit
The company that enters the market first with innovation wins	Creating a better business model is better than entering the market first
If we create the majority and the best ideas in industry, we will win	If we make the best use of external and internal ideas, we will win
We should check our property so our competitors can't profit from our ideas.	We should take advantage of others' use can make of our intellectual property, and we should buy theirs whenever it can improve our business model

Table 1: main differences between Closed and Open Innovation

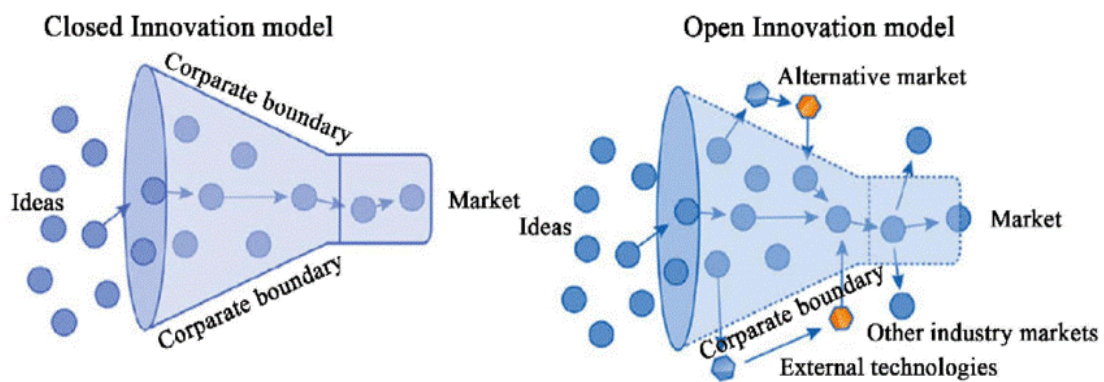


Figure 1 Closed vs. Open Innovation Model

In this new paradigm one assumes the corporate reality as an entity that has to place side by side with all those resources, which have been generated over time, internal those that come from as many external stakeholders as possible to try to maximize the ability to innovate. At the same time, it is relevant to highlight the fact that unused innovations within the company are marketed externally to also generate a profit from resources that would otherwise be discarded (Chesbrough, 2003). Chesbrough identifies three key determinants to the openness of corporate boundaries:

1. Increasing development costs of new technologies and reducing the life cycle of products (Chesbrough, 2006). The simultaneous combination of these two phenomena does not generate any kind of synergy, on the contrary, it is detrimental to the entire innovative process because on the one hand the increase in costs makes the R&D activity excessively burdensome if conducted internally, on the other hand the reduction of the life cycle reduces the possibility for the company to recover the investment due to the premature exit from the market of the product. By turning to third party sources, which integrate those developed internally, the company can lower the total development costs; moreover it can exploit external sources as customers to whom it can sell the internal innovations not used and therefore increase profits.
2. The second motivation highlights the fact that by increasing worker mobility (Chesbrough, 2003) the company finds more friction in controlling the ideas of the company. More specifically, when a worker ceases his relationship with the company and is hired elsewhere, we also have a transfer of ideas, know how and all the skills developed in the field and in previous workplaces passing from the "old" employer to the "new" one. The issue of mobility underlines the fact that the focus of the

entrepreneur is not to have the best workers already in the company but to be able to attract to himself the resources with the know-how that creates more synergies with the company.

3. The third and final motivation lies in the increasing availability of private capital that has financed the innovative projects that develop within a company even in the smallest realities where external sources of financing are fundamental (Chesbrough, 2003).

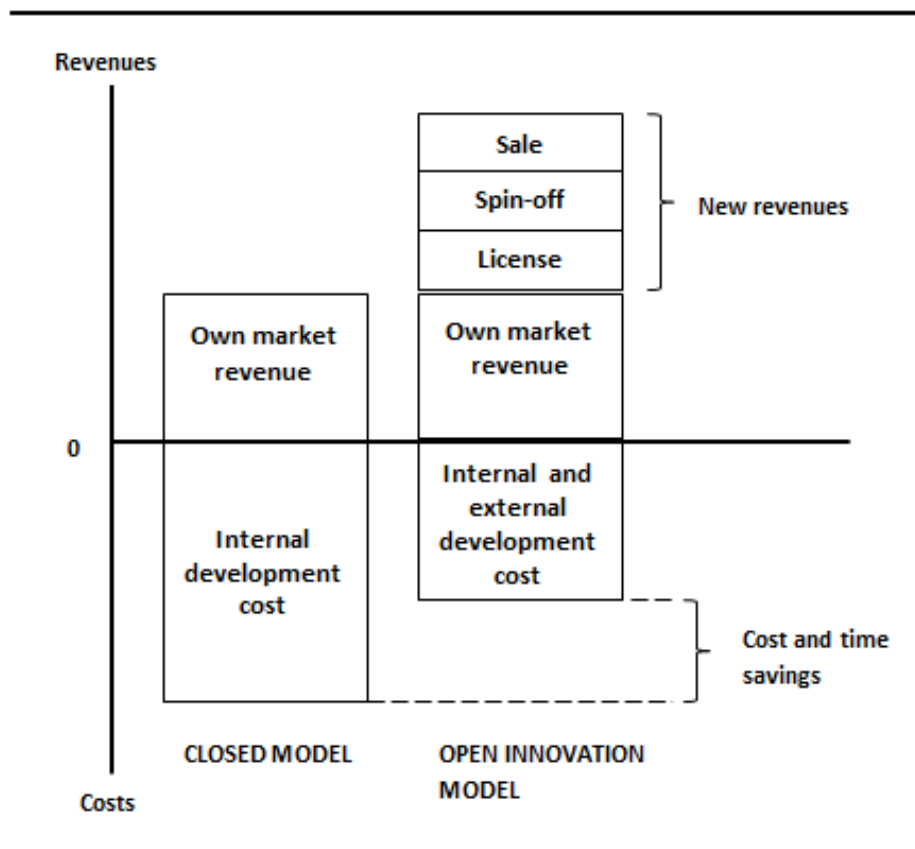


Figure 2: new business model related to OI

In addition, it seems appropriate to identify the factors that have stimulated the birth of this new type of innovation, emphasizing again the fact that with "open innovation" opens a market of knowledge where there is no longer something of the individual company but everything is shared and aimed at creating synergies in an environment between employees, suppliers, partners, universities, research centers etc.. Such factors are:

- The creation of flows of intangible resources that are mobilized between companies that also operate in different sectors and interacting with each other pass on the knowledge accumulated over the years;
- Increased focus on the roles that other companies in the value chain play in the innovation process, providing an increasing amount of resources (suppliers but also customers themselves).
- The growing mobility of skilled professionals; meaning staffs are no more attached to a single company in a long term relationship and the labor market is becoming much more dynamic with employees changing location and roles more often (Chesbrough, 2003; Gassman & Enkel, 2004). This makes it difficult for a firm to maintain its core-competencies, as the staffs leaving will take the knowledge with them. As a result, large amount of knowledge now exists outside the boundaries of the firm. This fact encourages firms to open to the outside, tapping into the pool of external resources to maintain competencies and acquire new ones;
- The rise of venture capital funding: it is incentivizing the creation and development of new firms and startups. It also triggers consequences like restructuration of industries, increases in competition, shifts in the market share, etc. (Chesbrough,

2003). Specifically, these new entrants play an important role in what comes to innovation, as they often enter the market using highly innovative, disruptive products (Christensen, 1997);

- Faster cycles of product development, as products themselves become obsolete much more quickly than earlier;
- Globalization of the markets, with the consequent hardening of the competition, as firms compete in a given industry at a global scale (Brondoni, 2012);
- Increase of specialization is more and more necessary (Gassman et al., 2010). As the complexity of technologies grows, firms need to focus in a narrow area to master their competencies. This implies that other competencies should be dropped if the firm wants to keep focus and efficiency;
- The increasing capability of external suppliers (Gassman & Enkel, 2004) and the threat of competition from them;
- The rise of the Internet (and the related rise of social media), which has brought the knowledge access and sharing capabilities of previously firm specific internal ICT networks to the World Wide Web (Chesbrough & Bogers, 2014).

Continuing with our overview of the situation, before explaining the differences between the two main types of open innovation (inbound and outbound), it is necessary to conclude this first part with a series of academic definitions that have emerged over the years on the concept of open innovation and how they appear different in some respects, but with some common elements.

Author	Source	Definition
Chesbrough, H.W., Vanhaverbek and, W. and West, J. (2006)	<i>Open Innovation: Reasearching a New Paradigm.</i> Oxford: Oxford University Press, p. 1	"Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology."
Chesbrough, H.W. (2003a)	<i>Open Innovation: The New Imperative for Creating and Profiting from Technology.</i> Boston: Harvard Business School Press, p. 43	"Open innovation means that valuable ideas can come from inside or outside the company and can go to market from inside or outside the company as well. This approach places

		<p>external ideas and external paths to market on the same level of importance as that reserved for internal ideas and paths to market during the Closed Innovation era."</p>
<p>Chesbrough, H.W. (2006b)</p>	<p><i>Open Business Models: How to Thrive in the New Innovation Landscape</i>. Boston: Harvard Business School Press, p. 2</p>	<p>"[...] companies will have to open up their business models. If they are able to do so, many more ideas will become available to them for consideration, and many more pathways for unused internal ideas will emerge to unlock latent economic potential as those ideas go to market. Companies that effectively build or change to open business models to exploit these</p>

		opportunities are likely to prosper."
Chesbrough, H.W. and Garman, A.R. (2009)	"How Open Innovation Can Help You To Cope In Lean Times." <i>Harvard Business Review</i> 87, 2, p. 68	"By breaking down traditional corporate boundaries, open innovation allows intellectual property, ideas, and people to flow freely both into and out of an organization."
Gassmann, O. (2006)	"Opening up the innovation process: towards an agenda". <i>R&D Management</i> 36, 3, p. 223	"Although a trend towards open innovation can be observed, open innovation is not an imperative for every company and every innovator."
West, J. and Gallagher, S. (2006)	"Challenges of open innovation: the paradox of firm investment in open source software". <i>R&D Management</i> 36, 3, p. 320	"[...] exploring a wide range of internal and external sources for innovation opportunities, consciously integrating that exploration with firm capabilities and resources, and broadly

		<p>exploiting those opportunities through multiple channels.</p> <p>Therefore, the open innovation paradigm goes beyond just utilizing external sources of innovation such as customers, rivals, and universities and is much a change in the use, management, and employment of IP as it is in the technical and research-driven generation of IP."</p>
<p>Enkel, E., Gassmann, O. e Chesbrough, H.W. (2009)</p>	<p>"Open R&D and open innovation: exploring the phenomenon". <i>R&D Management</i> 39, 4, p. 312</p>	<p>"Today's business reality is not based on pure open innovation but on companies that invest simultaneously in closed as well as open innovation activities. Too much openness can negatively impact companies' long-term innovation success, because it could lead</p>

		to loss of control and core competences. Moreover, a closed innovation approach does not serve the increasing demands of shorter innovation cycles and reduced time to market".
Innovation UK, (2009)	<i>Unilever - The power of more.</i> Innovation UK, Vol. 5-2, < http://www.innovationuk.org/news/innovation-uk-vol5-2/0211-unilever---the-power-ofmore.html >, (09/03/2012).	"Smart collaboration between ourselves and our partners allows us to leverage a greater mix of technologies, speeds up time to market and so delivers value that none of us could have achieved on our own" (Jonathan Hauge, Vice President of Open Innovation at Unilever).
General Mills (2012a)	<i>General Mills: Innovation,</i> < http://www.generalmills.com/Company/Innovation.aspx >, (06/03/2012).	"[...] innovation at General Mills is about connecting smart people inside the company and across the globe to imagine

		new possibilities and create solutions."
Berger, D. (2008)	"Interview with Steve Goers and Nanako Mura, open innovation at Kraft Foods". <i>The Innovators</i> electronic magazine, July 30 2008, < http://www.innovate1st.com/newsletter/july2008/Kraft.pdf >, (16/03/2012).	"We certainly have a strong internal innovation capability. However, we also realize there is a very large amount of innovation occurring outside Kraft. President Open Innovation and Strategy at Kraft Foods).

Table 2: Ten definitions compared

In all these definitions, with different nuances of the same concept, it is clear that the need to turn to sources outside the company boundaries to innovate is extremely important. It is necessary to underline the concept expressed by Chesbrough, Enkel and Gassmann (2009) that refers to the importance of being able to combine and balance the external sources of innovation with the internal research and development programs of the firm. The second common feature of the above definitions emerges as the "double face" of open innovation: inbound open innovation, i.e. seeking innovative solutions from the external environment with

those developed internally; outbound open innovation, i.e. looking for markets where all internal and unused innovations can be commercialized with the aim of profiting from such operations. In the following pages we will deal with both phenomena.

1.1 Inbound Open Innovation

Inbound Open Innovation (IOI) or technology exploration, is one of the two types of innovation that guarantees the company in which it is applied an improvement in technological developments by finding the necessary technological sources outside the company boundaries (Van de Vrande, De Jong, Vanhaverbeke, & De Rochemont, 2009). Thus, technology exploration is used to enable firms to acquire new knowledge and technologies from the external environment. This first type of innovation can in turn be divided into: revealing (non-pecuniary) and selling (pecuniary).

The first one refers to the way in which part of the resources that reside within the company are made public, going for collaborations, but without any effective guarantee of obtaining them (Henkel, 2006). A disadvantage that this model of Inbound Open Innovation could bring to the company is the fact that by revealing internal resources, it could be difficult to keep up with the pace of technological advancement; resulting in not being able to reap the benefits that come with it. (Helfat, 2006). For example, the company's competitors may be positioned more favourably to technological advancement and be able to leverage the company's innovation more effectively. Therefore, choosing which resources to keep hidden and which to reveal to the external environment becomes vital and is not an easy task. Many large companies protect themselves with patents, while smaller companies (SMEs) typically lack the structural resources for this process.

The second refers to the commercialization of own inventions developed in-house. The company grants a license for a certain period, or may sell it, to another company that obtains the right to exploit the R&D investment (Chesbrogh, 2003, 2006).

Evidence that licensing inventions and technologies is becoming increasingly common is also reported from what Gassmann & Enkel, 2006 wrote. However, even though this practice has developed in many business settings, there are barriers present that limit companies from profiting from their innovations; this is explained in Arrow's (1962) so-called "paradox of disclosure": when licensing, it is necessary to disclose some information to the potential customer; this implies that the licensee receives some additional information, external to the license, at no cost and could use this latter information opportunistically. Arrow claimed that these types of problems were the cause of market failures because they made inventors averse to disclosing their knowledge. In order to overcome this paradox, companies often require that inventors have formal intellectual property rights to the invention before they will sell it to third parties.

Continuing instead with some of the main Inbound Open Innovation practices, they are:

- Consumer Involvement
- External Networking
- External Participations
- R&D Outsourcing
- Inward Licensing of IP

Through the involvement of consumers, companies are able to obtain important feedback regarding the performance of their products or services and thanks to this they can improve the characteristics that can then lead to a significant competitive

advantage. Consumers, in this new perspective, are no longer seen as passive receptors of innovation but as active players in the process of product innovation.

External networking includes all those activities aimed at acquiring, maintaining and consolidating connections with all those external sources of social capital. Networking is a much debated topic with a fundamental relevance in Open Innovation, in fact it will be developed also in the next pages more specifically to understand how small and medium sized enterprises can leverage their knowledge to continue to innovate. Through good networking companies are able to raise capital, knowledge and other resources in a much more immediate and effective way. Sometimes networking can evolve into more formal collaborations, eventually leading to true R&D alliances that allow companies to remove the competitive element from their relationship and focus on more effective acquisition of technology expertise.

Thanks to external participations, companies are able to give the right value to all those deserving innovations that, being in an embryonic phase, would not be able to find the right place within the company; these innovations are developed through investment in start-ups or other companies and only later, if they prove to be valuable innovations, take place directly within the company.

Outsourcing of R&D is only being developed with the advent of this new way of doing business: companies have realized that not all the most valid sources of knowledge are present within the company boundaries, but that many times by opening up to the external environment better results can be obtained.

To conclude, the awareness that not all the sources of knowledge useful to the company are found within its borders leads back to the practice of Inward licensing of

IP. With the acquisitions through IP licensing the company manages to develop on two fronts: strengthening the current core business by exploiting the opportunities of innovations coming from outside; accelerating the process of internal innovation that will allow the company to develop in different businesses, thus expanding its portfolio of activities.

1.1.1 Conditions that favour Inbound Open Innovation activities

As explained by Gassmann (2006) regarding Inbound Open Innovation activity, he identifies five factors that foster it:

1. Globalization: i.e. the presence of a market in which there is great mobility of capital, low logistics and communication costs and a high efficiency of ICT (Information and Communications Technology) tools; thanks to this type of ecosystem, technologies can circulate more easily creating a more fertile ground for the development of Open Innovation;
2. Level of technological intensity that characterizes a market: this second factor echoes what was said before, namely that since both the level of technology and the complexity of technology is increasing a lot, using Open Innovation is the only plausible way to keep up with the times;
3. Technology fusion level: this third factor, which makes an open innovation process more suitable than a closed and integrated model, considers innovation as the fusion of technologies coming from different application fields. The higher this level is, the more obvious is the choice of having to rely on agents outside the company boundaries;
4. Possibility to create new businesses: it seems obvious how turning to an "open" type of innovation instead of a "closed" one stimulates the creation of new businesses, especially deriving from previous partnerships of different types;
5. Level of knowledge distribution: the last factor that favors the activity of Inbound Open Innovation takes into consideration the fact that the more the

markets are diversified and wide as far as knowledge is concerned, the more the exchange of this know-how between the parties will be favored and present.

1.2 Outbound Open Innovation

Outbound Open Innovation (OOI) or technology exploitation is used to improve the technological capabilities that are outside the boundaries of the company in order to create an ecosystem more conducive to the growth of its business. This second type of innovation can be divided into: sourcing (non-pecuniary) and acquiring (pecuniary).

The term "sourcing" identifies a type of openness that refers to how firms use external sources of innovation. Chesbrough et al. (2006) argue that companies scan the external environment before starting the internal R&D process. Through the R&D labs, ideas from outside are reworked and adapted according to the company's internal development needs. Following the logic of Laursen and Salter (2004) the larger the sample of external sources of innovation the broader the company's research strategy. This highlights the fact that at the basis of innovations we have the exploitation of others' discoveries. Moreover, again Laursen and Salter (2006) show that the broad and deep search for sources of innovation has a curvilinear relationship with innovative performance. In other words, while there may be a positive initial effect on openness, firms may search too much or come to rely too heavily on external sources of innovation.

The second term, "acquiring", indicates that appropriation of inputs to the innovation process by resorting to the market. In this sense, openness can be perceived as acquiring competences outside the company boundaries (Dahlander & Gann, 2010).

The ability to source external resources, which can be crucial to the innovation process, requires considerable effort and great professional skills. These skills are needed not so much to identify or discover external ideas, which can be internalised,

but rather to evaluate them and try to choose those that can create as many synergies as possible. However, incorporating knowledge bases that are too close to what the firm already knows can prevent the positive effect of assimilating external sources, and inputs that are too far away are more difficult to align with existing practices (Sapienza et al., 2004). In other words, the effectiveness of openness depends on the resource endowments of the partner organization.

Continuing, some of the most popular Outbound Open Innovation practices are:

- Venturing;
- Outward Licensing of IP.

Venturing refers to the creation of a total new organization that is directly supported in terms of: human capital, administrative services etc.

By licensing IP, the company commercializes unused innovations internally by licensing them to other organizations, thus obtaining a higher value than licensing without any licensing. In this case, the company is faced with a dilemma: by licensing its innovation, the company creates a cash inflow but on the other hand is subject to the "profit dissipation" effect, i.e. it gives the other company the opportunity to develop similar competencies to the licensor, thus creating competition and possibly decreasing market share.

1.2.1 Conditions that favour Outbound Open Innovation activities

Regarding the conditions that favour the development of Outbound Open Innovation strategies, Lichtenthaler (2009) identifies three so-called "environmental conditions":

1. Technological Turbulence: i.e., the speed at which technological changes occur in a given market; the greater the speed of change, the more difficult it is to capture the value of the innovation, making it more expedient to sell the innovation to a company operating in an industry where there is less turbulence.
2. Transaction rate: represented by the rate at which innovation is exchanged in a given market; in a market where exchanges are more frequent, transaction costs decrease a lot, thus facilitating the sale of technologies between firms.
3. Intensity of competition: technology markets characterized by high competition favor Outbound Open Innovation activities because it is easier for the company to identify potential buyers who will go to buy unused innovations as there is a greater demand for technology.

Open Innovation, therefore, is configured as a rather complex set of practices that relates to the direction of the knowledge flows that the company has to face, to which is added the further level of complexity that is constituted by the choice of opening up to the external environment through practices of a pecuniary or non-pecuniary nature. The careful analysis of these possible combinations is what must guide the company in choosing the best way to open up to the external environment in order to better benefit from this attitude. It is not possible to define a priori a series of situations in which it is preferable to adopt one form of openness rather than another;

it is up to the company to conscientiously assess and choose the one that best suits the scenario it has to face from time to time.

1.3 Openness Degree

In an Open Innovation context, the structure of the company network is more flexible than in a "closed" context and, moreover, knowledge flows are free to circulate inside and outside the company boundaries with almost no limits. Thanks to this model, discussed in the previous chapter, companies are able to really expand their knowledge base, in a very short time, sharing the knowledge acquired also in the other operating locations; according to Arrigo 2021, the network configuration of global companies promotes external knowledge from every periphery of the competitive scenario. Collaboration with external partners is at the heart of Open Innovation implementation and has been widely used with OI measurement since Larsen and Salter's publication in 2006, using mainly two dimensions: breadth and depth of interaction with partners. These two dimensions together can define the degree of openness of a company and both can greatly influence both the long-term business performance and the performance of the company's overall Open Innovation strategy. The performance of Open Innovation takes into account how the speed of internal innovation processes, their quality and the speed and quality of development processes are influenced by knowledge from outside the firm's boundaries (Van de Vrande et al., 2009). The dimensions of breadth and depth can be understood, when talking about the search for sources of knowledge from the outside as: the diversity of external sources and inputs and thus the multitude of external connections, as far as breadth is concerned; the frequency of interactions with certain external sources and partners, and thus, depth, shows the intensity or strength of external connections (Larsen & Salter, 2006). Another interesting analysis cue, regarding the topic of the

degree of openness of a firm, is the assessment of the strength of ties, and thus, the distinction between strong and weak ties (Granovetter, 1973; Hagedoorn et al., 2006; Rowley et al., 2000). Thus, if a firm relies on too many deep relationships with many external sources, it will exhibit inferior innovative performance. As mentioned earlier, the literature on networks employs the dimension of the strength of ties to assess the intensity of the relationship between a focal firm and its external partners (Granovetter, 1973). The strength of ties (weak and strong) increases as the frequency of interactions between partners increases. While weak ties are characterized by rather casual relationships with a shallow nature, strong ties, in contrast, describe relationships that are more frequent, intense and in which a higher degree of relationship trust is also placed (Hansen, 1999). The strength of ties, i.e. strong and weak ties, is related to several implications. While the possibility of achieving higher levels of global knowledge transfer is attributed to strong network ties (Reagans & McEvily, 2003), weak ties are said to offer pathways to different domains of knowledge, and thus are more likely to offer novel information (Granovetter, 1973). Nevertheless, the close and frequent interactions that take place in strong tie relationships facilitate the development of mutual trust that serves as a catalyst for the transfer of tacit knowledge. The latter has been particularly important for innovation performance (Hansen, 1999). Creating and maintaining such deep ties with external actors requires significant investments (Laursen & Salter, 2006; Reagan & McEvily, 2003). These investments include frequent and time-consuming face-to-face interactions, as well as increased coordination efforts, or the creation of mutual understanding and common knowledge (Hansen, 1999; Reagan & McEvily, 2003). Summarizing the studies discussed in this first part of chapter two, the ties defined as

strong include all those recurring interactions, therefore not occasional, with the same partners and often the same types of contracts are also discussed (Rowley et al, 2000). Weak ties, on the other hand, are defined as all those ties that occur rather infrequently and not with the same partners; this means that reciprocally the parties are less committed (Dittrich & Duysters, 2007). However, weak ties should not be given less importance a priori. While weak ties ensure that the firm can reach more inputs as partners change frequently, thus increasing the possibility of acquiring new information, strong ties leverage the mutual trust that is established over time between two parties that increase their frequency of interaction; this last aspect just discussed in strong ties means that the information exchanged has more specific knowledge and with more technical detail (Rowley et al., 2000). Creating strong ties (which often represent rather dense network interactions) and stable ties with some external partners requires considerable effort and commitment and also a long-term focus of the partners involved. In order to be able to maximise relationships with these partners, companies often focus only on a limited number of them as it is sometimes very costly to maintain long-lasting reactions with them (Hansen 1999). In contrast, maintaining weak, less economically intensive ties provide access to a wide diversity of contacts to non-redundant sources of innovation (Simard & West, 2006; Hagedoorn et al., 2006). Firms that manage to develop both types of ties (strong and weak) may have a higher level of innovation than those who prefer only one type of tie; having said that, however, two issues emerge: the availability of an adequate system that can manage meaningful information about potential and actual partners; investment in figures dedicated to the management of these networks who, rather than focusing only on finding ways to reduce costs, must be able to identify the

potential of the relationship to generate effectiveness and efficiency in the medium and long term, from a more entrepreneurial perspective, and who must be able to analyze and evaluate the evolution of the network over time (Corniani, 2013). Lee et al. (2010) highlighted how in multi-firm networks the role of innovation intermediary performs three activities of considerable importance: i) it deals with the collection of information about technologies, markets, potential partners and competitors; ii) it supports technology transfer and helps in network building; iii) it develops the culture of collaboration and facilitates collaboration. Although these types of openings allow companies to source ideas from external sources and thus the possibility of a future competitive advantage, it must be remembered that everything has a cost and processing time and that companies often need to be supported by external funding sources to support the burden of innovation.

1.4 The Good of Open Innovation

Through the use of Open Innovation companies are able to greatly reduce the costs of product development and process, greatly increasing the quality of services offered, working on the customer experience, accelerating time to market and improving relationships with customers and suppliers, also reduces the risk in the development of new products and services, going to improve the company's reputation and brand image (Wallin and Von Krogh, 2010). Many studies and researches have shown how, through the use of open innovation and then addressing a multitude of actors, we add many benefits (some just seen) compared to continue to adopt the classical model of Closed Innovation (Chesbrough 2003; Reichwald and Piller 2009). Other benefits are much clearer: reduced costs associated with moving innovations along the pipeline; reduced risk as others put their human capital to work on risky propositions; and accelerated time-to-market as innovation is freed from the shackles of the cumbersome large-company financial, planning, and pipeline process (Le Merle, Campbell, 2011). As mentioned above, Open Innovation succeeds in securing two very relevant advantages over the "closed" model: the exploitation of resources, knowledge, partnerships and risk diversification. External collaborations are aimed at learning important skills and acquiring assets, technologies and other resources. Through this reciprocal sharing of resources, the company improves its capabilities and flexibility for innovative projects. Meanwhile, this implies that various project costs and associated risks are reduced through a series of partnerships; it is in the next chapter that the importance that networking and partnerships play in practicing an "open" model of innovation will be discussed.

The open innovation model is a new, concrete and effective way to unleash the potential of innovation and to achieve competitive advantages that could not be achieved by acting individually. It could be defined as an open window on the outside world, from which to observe potential new developments in the world economy and interact with companies that may operate in different sectors, but from which it is possible to draw knowledge that is not yet present within the company. As Chief Digital Officer Alessandro Braga argues, open innovation can therefore be seen as a whole new ecosystem of value that, not only operates on the creation or monetization of value itself, but can encapsulate all these aspects together (Braga, 2018).

2 Open Innovation Tools

As seen in the previous chapter, Open Innovation can be an approach to doing business that in many cases is extraordinarily successful and can lead a company to a significant competitive advantage. We have seen how Open Innovation is divided between "Inbound" and "Outbound" and how these two different approaches are favoured by different conditions.

In this chapter the main tools with which Open Innovation is applied will be discussed and the different characteristics and advantages of each tool will be highlighted in order to underline their importance.

2.1 Network

In open innovation, firms rely on both internal and external resources for their new products/services, and internal resources can be deployed either inside or outside the market (Chesbrough, 2003). Resources from outside the market can have two ways in which they are used: through internal routes, or external routes to market (Chesbrough, 2003). Companies exploit the opportunity to use external knowledge to develop new products/services and increase the capacity of their product portfolio. The resources and capabilities of different organizations are brought together in an effort to deliver value to target customers and this is enabled through the creation of increasingly strong, structured and extended networks. In addition, companies, even the largest ones, cannot always develop internally the resources that the business model requires and therefore find themselves forced to collaborate with external partners to keep the level of innovation at a certain level; such collaborations allow for a constant and continuous flow of information that ensures both parties benefit. Such an increase in the permeability of company boundaries will improve the match between market opportunities and capabilities as well as a more efficient use of resources (Arora et al., 2001, 2010).

There are countless different definitions for the word "network", but they are usually seen as patterns of organization involving multiple connections. A network can be understood as a collection of nodes, consisting of individuals, groups or organizations, linked by a relationship and where such relationships between groups of firms are sometimes described as "innovation" (Freeman, 1991). The role of networks in innovation has been known for several hundred years when, during the

industrialisation of Britain in the late 1700s, there were innumerable links between groups of engineers in the generation of the first steam engines. Groups of professionals routinely met to share ideas about technology and markets of the time (Dodgson et al., 2008). Today, the development of network structures is a response to the challenges of globalization and this is allowed mainly due to the gradual thinning of the importance of geographical, administrative, political, currency, tax, legislative, language and other barriers; the network has allowed companies an increasing openness and the ability to access wider and more open markets, also going to affect with a greater number of end customers (Corniani, 2013). The Schumpeterian model of the individualistic entrepreneur single-handedly bringing innovations to markets has been replaced by an ecosystem composed of a multitude of different actors collaborating in iterative processes of trial and error to bring about the successful commercial exploitation of one of a new idea (von Hippel, 1988; Tidd & Trewhella, 1997). These models of innovation have been successful in highlighting the fact that the innovation process is very much about interactions with suppliers, lead users and a large number of institutions within the innovation system (von Hippel, 1988). This highlights the fact that innovators succeed in innovating only through a continuous flow of interactions with external agents and by coming together in groups in which coalitions are established based on "rapid trust".

Many studies have analyzed innovation networks and have been able to identify some of positive outcomes, including: increased access to new and different information (Burt, 1992; Burt, 1992), new and different information (Burt, 1992; Granovetter, 1985; Hansen, 1999), access to resources (Gnyawali & G. B., 1999), more efficient knowledge transfer (Reagans & McEvily 2003; Uzzi 1997), greater power and control,

greater legitimacy and understanding of products., greater innovation (Capaldo 2007), and increased performance (Lechner et al. 2010; Powell et al. 1996). But despite these positive aspects, scholars argue that networks have negative effects, such as: costs of maintaining additional ties, reduced information benefits, or information overload (Burt 1992, Uzzi 1997). The main reason why companies aggregate, forming networks, is due to the increase in the complexity of technology and therefore it is more convenient to combine and integrate knowledge, components and systems from many different domains. In order to succeed in integrating expertise from the external environment, firms need to develop: a high collaborative capacity (with external actors), develop the ability to capture and integrate ideas and technologies developed by others, and to learn especially from the ideas and insights of their customers and users (Cohen & Levinthal 1990; Chesbrough 2003, 2006). In addition, networks allow firms to take advantage of resources that do not belong internally to the firm without incurring the cost of acquisition because the whole point of a network is to share resources among the parties. The understanding of networks is therefore crucial for innovation, as they offer a rich network of channels, many of them informal, and have the advantage of having a high source credibility: experiences and ideas that arise within them are much more likely to be believed and implemented than those that emerge from outside (Powell et al. 1996). A further point in favour of a system in which a strong network is present is the fact of being able to find out what a company might really be able to do (with respect to what it is doing); this is achieved by sharing resources and information (e.g. collaborative R&D projects). In addition, networks create the possibility of self-help through experience sharing and learning. Cooperative networks

in Europe have enabled small-scale industry to compete successfully in global markets through collaborative involvement (Dodgson et al. 2008). Freeman (1991) argues that networks should not be explained primarily by reference to cost, but rather in terms of strategic behaviour, knowledge appropriation, technological complementarity and factors such as trust, ethics and confidence in the cooperativeness of others.

In addition to the positive aspects, networks can also cause negative consequences if they are not properly utilized. Networks can limit the commercial returns of the firms that participate in them, trapping firms in the low-value parts of the value chain, although to overcome this problem managers are trying to better configure the relationships between firms and external agents (Dodgson et al. 2008).

2.2 Crowdsourcing

Crowdsourcing can be a great tool to help companies and entrepreneurs in the process of Open Innovation as it focuses on sharing and the relationship between the company and the external environment. In order for Crowdsourcing activity to have a positive impact certain conditions must be present (Brabham D.C. , 2013):

- Crowdsourcer: the individual physical person who manages the innovation process;
- Crowd: composed of that group of people who are committed to doing the work;
- Crowdmatrix: the environment in which the crowdsourcing process takes place (often they are digital platforms or crowdsites). The crowdmatrix helps to manage the whole crowdsourcing process;
- The medium that the group of people (crowd) uses during the crowdsourcing process, which is usually the Internet.

In addition, the following eight conditions must also be present to facilitate the process (Estellés-Arolas, E., & González-Ladrón-de-Guevara, F. , 2012):

1. A well-defined crowd;
2. A task with a specific goal;
3. The reward for the crowd is unambiguous;
4. The crowdsourcer is identified;
5. The crowdsourcer must receive a clearly defined response;
6. The entire crowdsourcing process is developed online;
7. The process is enabled through the use of the Internet;

8. There is an open call because of participation.

2.2.1 Types of Crowdsourcing

According to many authors there are different types of crowdsourcing and they can be divided into (Brabham, 2008; Grier, D.A., 2013; Howe, J. , 2008; Kleemann, F., Voß, G. G., & Rieder, K. , 2008; Reichwald, R., & Piller, F. T. , 2006; Geerts, S. , 2009; Burger-Helmchen, T., Pénin, J. , 2010):

- Crowdcasting or Crowdcontests: is the simplest form of crowdsourcing in which a problem to be solved is proposed to a group of people who will be rewarded at the end of the contest (Estellés-Arolas, E., Navarro-Giner, R. ve González-Ladrón-de-Guevara, F. , 2015). Through this method it has been shown that the smartest ideas do not necessarily come from the brightest minds but from everyone's experience
- Crowdcollaboration: is similar to crowdcasting/crowdcontest but in this case the group collaborates in solving a problem without any final reward, but only out of an altruistic spirit (Sanchez, D.A., Gimilio, D.P., Altamirano, J.I., 2015). The following are the two subcategories present for crowdcollaboration: crowdstorming which consists of large online brainstorming sessions in which many ideas are collected and the best ones are voted (Estellés-Arolas, E., Navarro-Giner, R. ve González-Ladrón-de-Guevara, F. , 2015); crowdsupport, i.e., activity that allows the customer to

take care of a problem encountered by another customer without addressing the after-sales service (Sanchez, D.A., Gimilio, D.P., Altamirano, J.I. , 2015);

- Crowdcontent: the crowd exploits its work and knowledge, not competitively, to discover or create mainly new knowledge. There are three different subcategories of crowdcontent (Estellés-Arolas, E., Navarro-Giner, R. ve González-Ladrón-de-Guevara, F. , 2015; Sanchez, D.A., Gimilio, D.P., Altamirano, J.I. , 2015): crowdproduction, in which the crowd has to create a totally new content by collaborating with each other; crowdsearching, where the crowd searches online for resources for specific reasons; crowdanalysing, which is like crowdsearching but the search is done through archives, recordings, images and more and not with the use of the Internet ;
- Crowdfunding: is a tool through which a company or a project raises capital, through a platform made ad hoc, in which the crowd can invest or pour their own funds (Grier, D.A. , 2013). It is usually done to receive a final reward in return but there are cases where crowdfunding is non-profit (done for charity);
- Crowdo opinion: The purpose is to use a voting system, offer shares, make people comment or through a tag system to find out the preferences, opinions and feelings of customers about a specific product or service. If a voting system is used it is called crowdvoting.

2.2.2 Crowd Types

In order to avoid that the crowd does not have the same motivations or is not inclined towards a proactive attitude towards Open Innovation, the management of a company would do better to carefully select the crowd in order to have the best possible return on investment in terms of time and money that this tool requires (Grier, D.A. , 2013). Two different classes of crowd can be identified:

- Public crowds where invitations are made where, for example, the purpose of the project or the skills needed to participate are described. In this type of crowd the individuals are unknown to the company as they come from the external environment;
- Private crowds where only people known to the company such as customers, workers or other resources are present.

Both types of crowd can be subdivided, in turn, into:

- Open crowd: every participant is part of the crowd regardless of how well known they are to the person doing the crowdsourcing and their skills;
- Curated crowd: the crowd is carefully selected according to specific criteria (e.g. skills, knowledge).

2.2.3 Crowdsourcing Process

Crowdsourcing succeeds in making excellent use of individuals to continue to innovate the company and maintain a competitive advantage over competitors (Chesbrough, H.W. , 2003). The structure of this tool is divided into three parts (Thawrani, V. et.al. , 2014, May-Jun): crowd, crowdsourcing platform and crowdsourcer. The process starts when the individual who is looking for a solution to one's own problem (the crowdsourcer) uploads a task to a crowdsourcing platform; then, after responding positively to the car request, the crowd starts providing feedbacks to the crowdsourcer with the intention of solving the problem. The process ends when the crowdsourcer is satisfied with the result obtained.

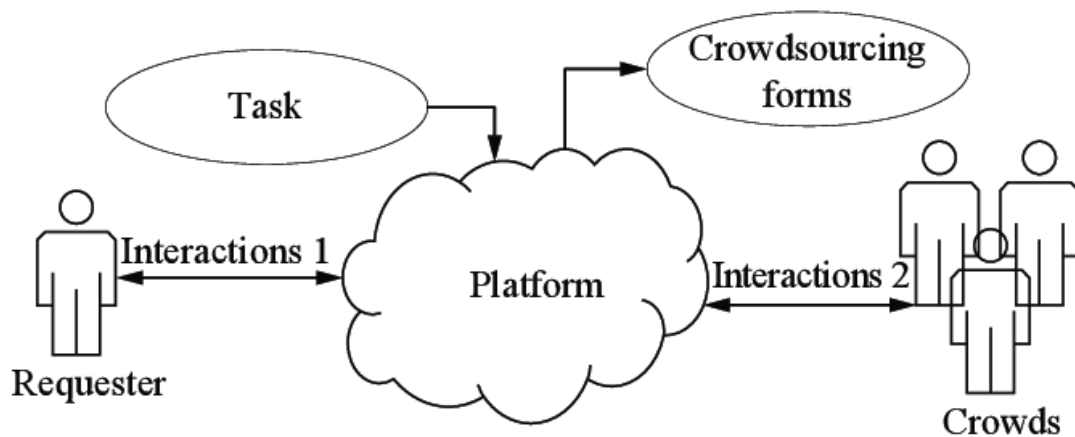


Figure 3: Crowdsourcing Process

2.2.4 Reasons to use Crowdsourcing

Among the various benefits that this tool can bring to a company, the main reasons why crowdsourcing is used a lot are (Grier, D.A. , 2013):

- Access to talent: through crowdsourcing companies are able to involve individuals with extraordinary skills in their projects and who are then offered a permanent position within the team;
- Being able to do more with less: crowdsourcing allows companies to achieve more ambitious goals with the same assets at their disposal, relying on a specialized crowd with specific technical skills specifically appointed for a given task; for example, if a company needs to develop its own multi-language website, it only needs to target an audience that knows the chosen languages and it will easily succeed, without having to hire a specialist who knows two languages
- Great flexibility: crowdsourcing allows the company to more easily follow market trends and not fall behind competitors. Grier in "Crowdsourcing for Dummies" (2013) summarizes this concept with a simple and good example: "Let's say you have an office that processes email. Rather than creating a large staff with fixed rules, you can give some of the work to the crowd and let individuals decide the best way to process the material and find the information you need."

2.2.5 Crowdsourcing Solutions for Entrepreneurship

Crowdsourcing helps entrepreneurs to innovate by having continuous access to different resources without necessarily having to acquire them; all through the use of the Internet (Smith, D., Manesh, M.M.G., Alshaikh, A. , 2013). This tool offers, especially to small business owners, a range of resources, including highly specialized ones, that would otherwise be too costly to acquire; for example, a new business can use crowdsourcing to remain small in terms of the number of full-time workers and require an outside crowd to perform a large number of tasks, thus greatly reducing the demand for the necessary capital. Nowadays, small businesses manage to compete easily with large companies precisely because of the openness they adopt towards these new tools (crowdsourcing) because large businesses are not structurally equipped with flexibility like that of small businesses (Saphiro, S. , 2011).

There are two necessary conditions, also with regard to the entrepreneurial world, that must coexist in order to make the most of the crowdsourcing tool: the Internet (Social Networks or Websites) and a crowd. When an entrepreneur is launching a new business they often don't immediately have the resources needed to quickly scale their business model and therefore using crowdsourcing is the best choice to innovate and develop faster.

2.2.5.1 Crowdcontests/Crowdcasting for Entrepreneurship

In the case where the entrepreneur needs an idea or a creative solution for his business the use of a crowdcontest/crowdcasting could be a cheaper and faster solution without having to acquire a specialized resource that may no longer be useful once the task is completed. Furthermore, by using this tool, since it is developed on the Internet, you can reach a much larger crowd than if you only search in your area.

2.2.5.2 Crowdfunding for Entrepreneurship

There are two ways in which entrepreneurs can use crowdfunding to raise capital: the first way is to sell a portion of equity through the sale of shares of the business; the second is to turn to a crowdfuding platform (e.g. CrowdFundMe, one of the main Italian platforms) for the capital needed to run the business.

2.2.5.3 Crowdopinion for Entrepreneurship

The entrepreneur can use this type of crowdsourcing as an effective marketing tool. The opinions or feedback from the crowd on to certain products can be sought after and be extremely necessary. Through this tool, market research will be much faster and less expensive (e.g. use social media platforms to conduct surveys). The

entrepreneur can use the opinions of the crowd on the design, content, packaging, form, price of a new product, etc. Additionally, the entrepreneur can promote their product or project by creating videos, photos, tweets, and stories. This type of crowdsourcing could be a strength an entrepreneur.

2.3 Living Labs

Living Labs are tools for structuring user involvement in innovation processes. They, according to many studies, are positioned among other Test and Experimentation Platforms (TEPs), among which we find (Ballon et al. , 2007): Prototyping, Field Trials, Testbeds, Societal Pilots, Market Pilots and Living Labs. These six types of TEPs are differentiated from each other by three relevant dimensions: technological readiness (low to high maturity), research focus (testing versus design) and openness (in-house activities to open platforms). Living Labs have a lower commercial maturity of the innovation in development than Societal Pilots and Market Pilots; moreover they have a lower focus on testing than Field Trials and Testbeds, but a higher focus on innovation design than the latter two TEPs. It can be said that Living Labs play a key role between prototypes and finished products, in fact they are defined by Ballon et al. (2007) as: "an experimentation environment where technology takes shape in real life contexts and where (end) users are considered as "co-producers".

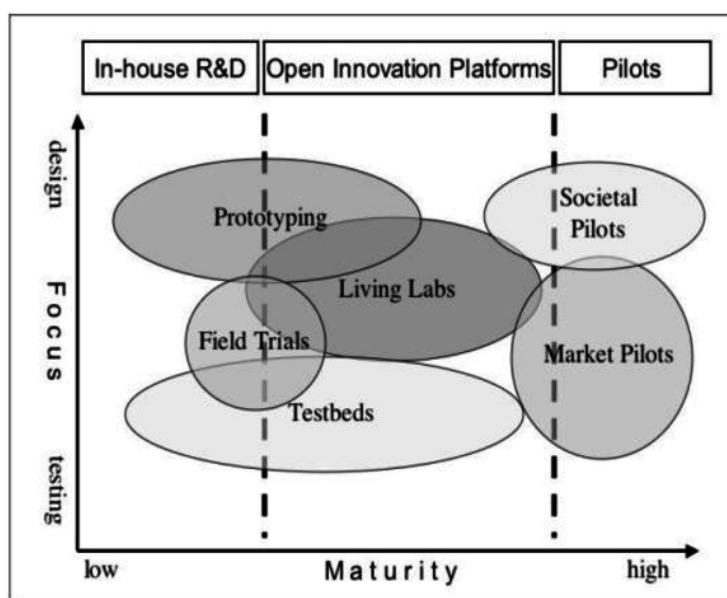


Figure 4: Classification of TEPs

2.3.1 Types of Living Labs

According to the studies of Leminen et al. (2012) Living Labs can be divided according to four different typologies based on which actors are driving their activities:

- Utilizer-driven Living Labs: Utilizers are companies that use Living Labs to better launch their business; the main focus is on the development and testing of new products or services. These Living Labs have a central role in the company's network and are used as a strategic tool to collect data from testing activities. Often the utilizer-driven living labs have a rather short life cycle because they are created for a specific project;
- Enabler-driven Living Labs: These Living Labs are generated by actors in the public sector, cities, non-governmental and financial organizations; their aim is to bring social improvement through socially effective innovations. Enabler-driven living labs have a longer life span than the previous category and are created for projects related to the public sector;
- Provider-driven Living Labs: Providers can be either public or private organizations that use Living Labs to collaborate in the development of new products, services, and solutions for their business needs. Provider-driven living labs have a particular focus on developing solutions that improve the daily lives of their users and bring substantial benefits to the network as a whole, and the main purpose of these living labs is to promote research and development theories, increase knowledge creation, and find solutions to specific problems. Some provider-driven living labs are born for single projects

and therefore with a fairly short life span, while others turn into innovation platforms with a long-term perspective;

- User-driven Living Labs: this last type is created by communities of users and focused on solving their daily problems; they are usually built around a specific problem or interest of the community. The value generated by the Living Lab is mainly created for the community but also for external companies that can benefit indirectly from the innovation generated within these tools. User-driven-living labs have a long-term perspective because they are built around a community of users.

2.4 Innovation Broker

An innovation intermediary is defined as "an organisation or body that acts as an agent or intermediary in any aspect of the innovation process between two or more parties" (Howells, 2006). Within an innovation system, these types of useful tools to better facilitate innovation (innovation intermediaries) are responsible for connecting actors from public, private and civic organizations, input suppliers, producers, transporters, traders and international agribusinesses (Klerkx and Leeuwis, 2009; Klerkx et al, 2009). In addition, innovation intermediaries include technology brokers and technology transfer organizations, but also venture capitalists. Educational institutions can play an important bridging role. These intermediaries can help accelerate Open Innovation by providing dedicated tools, methods and access to a community of solvers or participants.

Such intermediation, which consists mainly of bridge-building and brokering as a collateral activity, is less likely to actively promote learning processes or networking, and may pay more attention to and benefit particular actors in the value chain (Smits and Kuhlman, 2004), because it represents some interest.

A specialized type of innovation intermediary, called "innovation brokers" (Klerkx and Leeuwis, 2009), play an intermediary role on innovation as their main function, and do so from a more neutral and impartial position of "honest broker" (Klerkx et al., 2009). They play a crucial role as systemic intermediaries who facilitate information flows, connect partners, articulate demands, communicate needs and facilitate linkages (network composition) and other functions related to innovation processes (Klerkx and Leeuwis, 2009; Van Lente et al, 2003).

There are two different types of innovation intermediaries who: i) develop Open Innovation projects on behalf of their clients and provide them with solutions, establishing relationships with external partners; ii) help companies by training them in their Open Innovation skills to engage in direct collaboration with external partners.

An innovation broker does not have the role of maintaining a particular focus only on the organization or on implementing the innovations themselves, but is focused on enabling the organizations, with which they have a relationship, to innovate and maintain a competitive level of innovation (Winch and Courtney, 2007). They are also called "innovation facilitators", but they do not play a key role in the creation of substantial knowledge or technologies (such as research organizations), nor do they make a strong policy contribution (such as government), but they are able to provide an innovation contribution (such as government), and they are aimed at improving the interaction between the actors just mentioned.

The different roles of brokering innovation can be summarized in three processes:

- demand articulation: articulation of innovation needs and visions and the corresponding demands in terms of technology, knowledge, funding and policies, obtained through problem diagnosis and foresight exercises;
- Network composition: facilitation of linkages between relevant actors, i.e. scanning, scoping, filtering and matchmaking of possible cooperation partners (Howells, 2006);
- Managing the innovation process: improving alignment in heterogeneous networks consisting of actors with different institutional frames of reference

related to norms, values, incentives and reward systems. This requires continuous 'interface management' (Smits and Kuhlmann, 2004) in which there is 'translation' between different actor domains, described as 'boundary work' (Kristjanson et al., 2009). It also includes a range of facilitation tasks that ensure that networks are sustained and become productive, for example through building trust, establishing working procedures, promoting learning, managing conflict and managing intellectual property (Leeuwis, 2004).

3 Open Innovation, SMEs and Large Companies

This chapter has a particular focus on the different types of relationships between SMEs and large firms in innovation processes and the implications of these relationships. Next, other key issues regarding Open Innovation and SMEs and how small firms innovate will be discussed. Finally, different Open Innovation and Open Innovation practices in SMEs will be analyzed.

The success of innovation in SMEs and their continued growth is directly linked to the effectiveness of the relationships that can be established between small and large firms. As well as the effectiveness of the network in enabling SMEs to break down barriers to market entry, in recent times large firms have been focusing on the importance of certain types of relationships between SMEs and large firms in fostering innovation.

3.1 SME-Large Companies: types of interactions to innovate

In recent years we have seen a shift from much more traditional relationships (e.g. sub-contracting, research associations and government R&D programmes) to more complex and integrated types of relationships and/or collaborations that better reflect Open Innovation (Chesborough, 2006).

Even the largest firms are engaged in a complex web of relationships for the creation of new knowledge, its development into new products and services, and the marketing and distribution of those products and services. Accordingly, we start from Rothwell's observation that:

"... small and large firms do not exist in separate worlds but, on the contrary, are part of a 'network' of industrial production and industrial technological change characterized by complex flows of technological know-how and finite innovations. Within this network there exists a variety of inter-firm relationships of varying intensity and duration involving interchanges between large firm and large firm, between large firm and small firm, and between small firm and small firm" (Rothwell, 1989).

From a broader point of view, these relationships can be divided into: 1) supply chain or vertical relationships, which originate thanks to the flow of material goods, but which also manage to generate good opportunities for innovation; 2) knowledge creation and exchange or horizontal relationships, created ad hoc to have access to knowledge sources to produce innovation, or generated specifically for co-production. In this second type of relationship we can have a distinction between SF-LF relationships (small firms-large firms), aimed at internalizing the acquired

knowledge (e.g. collaborations, licenses and acquisitions) and those relationships that instead have as final aim the formalization of a division of the different innovation activities (e.g., contract research, corporate venturing, etc.). (e.g., contract research, corporate venturing, open innovation eco-systems).

The particular interest that is expressed in the relationships and interactions between small and large firms is due to the fact that they are, of course, unequal relationships, but in which a balance exists. In particular, some scholars have compared the material advantages of large firms to the behavioural advantages of small firms (6 Rothwell, R. and Dodgson, M. 1994).

Large firms have a significant advantage when it comes to innovation, since they have greater financial and technological resources, more specialised and larger teams, specialised equipment, better production facilities and more extensive distribution networks than small firms. Small enterprises, on the other hand, have on their side a less rigid structure that allows them a higher dynamism and an excellent reactivity to changes, as well as a remarkable entrepreneurial dynamism. When these different realities come into contact and start to collaborate with each other, it has been noticed how this stimulates the creation of innovation.

Rothwell himself observed how certain relationships between small firms and large firms (SF-LF) can more effectively combine the advantages of large and small firms in technological innovation (Rothwell, 1989). Through these "dynamic complementarities" small firms are able to carve out a space and a pivotal role for themselves in the innovation processes of large firms, especially in today's context where large firms are increasingly engaged in a range of "open innovation" practices

to maintain a competitive edge in their target market. At the same time, large firms can play an important role as a route to market for small firms' technological innovations (Rothwell, R. and Dodgson, M. 1994).

Countless research has shown how continuous interactions between small and large firms can expose the former to new sources of knowledge, improving access to inputs and enhancing knowledge transfer, thus stimulating innovation processes (Rogers, M. 2004).

In order to thrive, small businesses are often advised to develop relationships with external organizations that have the potential to aid business development and growth. The focus on small business external relationships emphasizes the vital importance of external resources in advancing a small business towards success and profitability (Street, C. T. and Cameron, A. F. 2007).

The next points provide an overview of the evidence on the effects of interactions between large and small firms on small firm innovation. Vertical (supply chain) and horizontal (business structuring and knowledge acquisition/exchange) relationships will be treated separately. The focus is on the implications for innovation of different forms of SF-LF relationships, with particular attention to the nature of the dyadic relationship.

3.1.1 Vertical SF-LF Relationships and Innovation

Supply chain relationships are vertical relationships that originate with the flow of tangible goods and where opportunities for learning and innovation can arise through the existing commitment of the two parties in the business relationship. Vertical relationships can include downstream links with customers and users and upstream links with suppliers. There are two main modes in this category:

- producer-customer relationships, in which smaller companies supply components and sub-assemblies to large companies. In this type of relationship, large companies often transfer technological, production and quality control know-how to their smaller suppliers. In this context, the development of stable and mutually beneficial relationships is not uncommon..;

- manufacturing subcontracting relationships, where small companies provide finished end products to large companies. Large firms, in turn, can transfer technological know-how and provide suggestions, aimed at improving the production of goods, to small suppliers based on user experience. This second mode may involve the collaborative development of new products for the large company in a much more dynamic and flexible environment (e.g. small software houses or design houses collaborating with large computer and car manufacturers respectively).

3.1.2 Horizontal Relationships

As we have seen, especially during the first chapter, innovation depends mainly on the ability of a firm to open its business boundaries, absorbing external knowledge and combining it with knowledge, already in the company's domain, with the aim of producing new goods and services (Chesbrough, H. 2003). Horizontal relationships for innovation are typically created to co-produce or access the knowledge needed for innovation; thus they can be as knowledge exchange and knowledge creation relationships. In this case, we can distinguish between: 1) horizontal "activity structuring" relationships, aimed at establishing or formalizing a division of innovative activity (e.g., contract research, corporate venturing, open innovation ecosystems; 2) horizontal relationships, to internalize knowledge (e.g., collaborations, licensing and acquisitions).

3.1.2.1 Activity Structuring Relationships

Horizontal "activity structuring" relationships are primarily the object of the study of large firms, but internal knowledge resources and less ability to invest in internal knowledge creation make the supply of knowledge from outside particularly important and attractive to small firms. Because small firms have a much lower initial level of resources and knowledge than large firms, it is plausible that increased external knowledge linkages have a greater effect on small-firm to large-firm relationships than on small-firm to other small-firm relationships. Ultimately, starting

from a very low level means that the marginal increase from adding a new knowledge link brings greater benefits than starting from an already relevant level of knowledge (Vahter, P., Love, J. H. and Roper, S. 2012).

For small businesses, seeking knowledge already created elsewhere is many times more advantageous and less costly than creating new knowledge in-house. This is because some connections, such as those with customers and suppliers, are likely to involve lower entry costs than R&D. Knowledge creation through internal R&D involves substantially higher fixed costs than knowledge acquisition from customers or suppliers. Smaller firms are on average less able to cover these fixed costs, simply because of their smaller scale and sometimes also their lower productivity, and therefore for this very reason it is cheaper to acquire knowledge that already exists.

A further advantage that SMEs have, in their ability to exploit external links, lies in their structural flexibility and dynamism compared to large enterprises (much more structured and less prone to flexibility). The speed of the decision-making process also benefits from less organizational and bureaucratic rigidity compared to large enterprises (Acs, Z. J. and Audretsch, D.B. 1987). For this reason and because of their ability to specialize in narrow market segments that are not attractive to larger firms, as they do not have a high level of profitability, SMEs may be better suited to quickly adopt the ideas and suggestions of key users in the product development phase (Chesbrough, H. W. 2010). Small firms can be attractive partners if they possess technological capabilities that make them unique and distinctive from others, but it is a commonplace to observe that they are often hampered by limited managerial experience and suffer a power imbalance when collaborating with large firms. The

relationships between large firms and SMEs are asymmetric not only because of their respective sizes, but also because power, management, capabilities and organizational cultures differ substantially.

3.1.2.2 Contract Research

A variety of contractual relationships can arise between small and large firms: as a result of expanding a supply chain relationship; as an alternative to acquisition or merger; or as a new collaborative alliance. A fundamental problem with any contractual approach to organizing joint innovation or R&D activity, however, is the uncertainty involved and the risk of cheating or moral hazard. This is exacerbated when technical, legal, and market resources are not evenly distributed among the parties, as they might be, of course, in the context of SF-LF relationships. In supply chains, incentives to cheat can be reduced by "intertwining" explicit contractual requirements and more implicit or informal agreements (Gilson, R. J., et al. 2009). This reflects evidence of the importance of staff trust and continuity in the wider success of managing SF-LF relationships within the supply chain (Jamieson, D., et al. 2012). Outside the supply chain, evidence suggests that at least some of these difficulties can be overcome when appropriation rights, e.g. patents, are granted to the R&D supplier (Kloyer, M. and Scholderer, J. 2012) and appropriate KPIs are adopted to measure R&D progress (Flipse, S. M., et al. 2013). Contracting for R&D and innovation can be difficult in dyadic relationships and can pose even greater challenges when partner networks are involved (Cafaggi, F. 2008).

3.1.2.3 Corporate Venturing

Corporate venture capital investments, i.e., equity investments in small entrepreneurial firms by large firms, are one means by which firms seek to leverage inter-organizational relationships to acquire, transfer, exploit, and explore the external knowledge of young technology-based firms (Weber, B. and Weber, C. 2007). The focus of this research has been primarily on the outcomes for the investor of the large firm rather than the consequences for the innovative performance of the small firm.

3.1.2.4 Open Innovation Ecosystems

Large firms pursuing an open innovation strategy require the effective engagement of external firms and organisations as a source of complementary knowledge and capabilities (Chesbrough, H. 2003). This effective engagement may require the creation and management of networks of external organisations and SMEs have the role of sources of technological innovation in these business ecosystems (Vanhaverbeke, W. 2006). The ecosystems in which open innovation takes place present SMEs with challenges: small firms have a reduced likelihood of being able to generate the internal knowledge on which innovation can be based through R&D and are therefore potentially more dependent on external sources of knowledge for innovation, whether university spin-outs or small firms specialising in mature sectors. In addition to lacking internal knowledge resources, small firms often lack the capacity

and resources to effectively protect their intellectual property, which puts them at quite significant risk when dealing with large firms (Chesbrough, H. W. 2010).

In addition, the lower absorptive capacity of smaller firms, as evidenced by their R&D expenditure or share of skilled labour, may hinder not only their ability to create external linkages, but also to take advantage of them. Open innovation therefore poses challenges for SMEs, partly because of their lack of capacity both to build organisational structures to identify useful external knowledge and to absorb ideas and technologies developed externally. In addition, the low level of knowledge resources in SMEs means that they may be unattractive collaborative partners to others, further reducing the chances of creating 'openness' (Chesbrough, H. W. 2010).

Absorptive capacity is defined as "the ability of a firm to recognize the value of new external information, assimilate it, and apply it for business purposes" (Cohen, W. M. and Levinthal, D. A. 1990). Absorptive capacity can be generated through R&D, as a by-product of a firm's manufacturing activities, or by sending staff to advanced technical training. Firm novelty can be a problem for the scale and scope of absorptive capacity, in the sense that new firms are likely to have lower absorptive capacity (Flatten, T. C., et al. 2011).

3.1.2.5 Knowledge Internalisation Relationships

Other forms of horizontal relationships are also characterized by the objectives of knowledge creation and exchange, but in this case the main objective is the internalization of knowledge, with three main modalities: purposive SF-LF collaborations; licensing agreements; knowledge-informed acquisitions.

3.1.2.5.1 Purposive SF-LF Collaborations

An effective method of internalising knowledge, making use of open innovation and thus harnessing external sources of innovation, is to adopt an innovation collaboration strategy. Collaboration usually requires a level of absorptive capacity in both small and large companies. From the perspective of small firms some times it is difficult to identify opportunities for collaboration with large firms because of limited managerial resources and most of the time, moreover, small firms have much more to lose than larger firms. If the SF-LF relationship makes customers perceive less risk in adopting innovation and if the small firm is confident that its autonomy will not be diminished, innovative small firms are willing to form strategic alliances. In addition, small and large firms are also likely to collaborate to assess the complementary resources needed to innovate, as well as to create new skills and knowledge by combining distinct sets of knowledge (e.g., large firms are more likely to have greater experience of regulatory systems, access to finance, and well-developed distribution channels).

Continuing with collaborations between small and large firms, it is noted how horizontal relationships with partners outside the supply chain are often differentiated into forward or backward linkages, and both can be positive for innovation. A recent study of Swedish IT firms, for example, examines the impact of horizontal and vertical technology collaboration along with the benefits of technology sourcing. Each of these activities is found to have a positive link to incremental or radical innovation (Parida, V., et al. 2012). Other studies have suggested that the benefits to different types of innovation from different types of targeted linkages may vary (Schmidt, T. 2010). Although evidence suggests that such linkages are potentially important for SMEs, there is less direct evidence on the contribution of LF-SF linkages. However, there is strong evidence of differences between the open innovation practices of small and large firms and their intellectual property protection strategies, which could create tensions in these linkages (Spithoven, A., et al. 2013).

3.1.2.5.2 Licensing Agreements

One of the most frequently used methods of technology appropriation is licensing (Anand, B. N. and Khanna, T. 2000). Licensing differs from collaboration in that it is a freer and more discrete method of exchange between two parties and also allows for rapid acquisition in new technical areas. It must be specified that technological knowledge can flow bilaterally both from large to small and vice versa; it is therefore not just a unidirectional exchange from large to small. Licensing can be a key element of the business model of an innovative small enterprise, or a necessity to operate in a

particular market area (e.g. in the case of defensive licensing). The implications for small business innovation vary depending on the industry, the maturity of the technology field, and the strategy of the large and small business.

Technology licensing allows SMEs to avoid technology uncertainties and speed up their growth process; however, it can also limit the way a company uses a particular technology. In terms of in-house technology licensing, the evidence for SMEs is positive, albeit relatively limited. A Korean study, for example, which compared various modes of internal R&D and external collaboration in service sector SMEs, found that both collaborative R&D and licensing contributed positively to SME technology development and that "technology acquisition may be one of the most efficient collaborative activities when this activity can simply be conducted to supplement insufficient resources" (Suh, Y. and Kim, M. S. 2012). For small firms, licensing outside may also lead to considerable efforts due to limited in-house resources. However, it has been suggested that out-licensing can be an important strategy for SMEs to increase the economic benefits from proprietary knowledge without having to develop downstream commercialization activities (Lee, S., et al. 2010). Research on out-licensing has had a majority focus on large firms and, in the cases where it has been conducted, suggests that returns from technology licensing are greater for larger firms (Andries, P. and Faems, D. 2013). Both the data on internal and external licensing in SMEs have little to say about the specific issues related to internal or external licensing in the context of SF-LF relationships. However, it is reasonable to suggest that such relationships may pose more significant problems than SME-SME relationships due to the different resource capacities of small and large

firms, differences in intellectual property management strategies¹¹³ and broader approaches to boundary spanning activities in innovation (Spithoven, A., et al. 2013).

3.1.2.5.3 Knowledge-informed Acquisitions

Firms often resort to mergers and acquisitions (M&A) in order to increase their market share, improve their capabilities or enter new and unexplored markets (Hagedoorn, J. and Duysters, G. 2002); this strategy is gaining much traction in corporate cultures as a method of acquiring the knowledge of a possibly smaller firm that could provide a huge competitive advantage (de Man, A. P. and Duysters, G. 2005). From an innovation perspective, mergers and acquisitions can be used to absorb the complementary external technological capabilities needed to compete successfully in radically changing industries (de Man, A. P. and Duysters, G. 2005) and often the motivation behind an acquisition is to quickly establish a position in a particular technical area (Tidd, J., et al. 1997). The activity discussed so far could be related to corporate venturing, mentioned earlier. There is ample evidence that many large multi-technology firms use their technological expertise to acquire small firms.

A survey of 38 UK and Japanese firms operating in different sectors found that about half of them acquired stakes in other firms as a means of gaining access to a new technology. The targets of these minority stakes or full acquisitions were mainly small entrepreneurial firms (Tidd, J. and Trehwella, M. J. 1997). The acquisition of small firms has also been used by large firms as a "catch-up" strategy in some emerging technology sectors (Hamilton, W. F. and Singh, H. 1992).

As for small firms, they can use mergers and acquisitions by large firms to overcome barriers to growth that would otherwise have been insurmountable (e.g., access to more resources, access to greater financial resources, manufacturing capabilities, and marketing channels of large firms). Similarly, acquisition can be a means for small business owners to realize value from their innovative activity. In fact, the business models of many new technology-based firms, especially those receiving venture capital funding, include an exit strategy based on the eventual sale of the firm to another larger firm that may be looking to expand, thereby realizing capital gain. The purpose of this type of transaction is the hope of being able to generate synergies between small and large firms and between the technological capacity of the SME and the complex infrastructure (e.g. corporate brands, marketing infrastructure, distribution networks) of the large firm. However, there is a large body of empirical evidence highlighting the challenges posed by the acquisition of a small firm by a large firm and the negative consequences this can have on the innovative capacity of the acquired small firm. Several studies have found that when the acquirer is large relative to the acquired, this can lead to a decline in innovation output after the acquisition (Ahuja, G. and Katila, R. 2001). This group of research points out that the acquisition of small high-technology firms presents special managerial challenges related to the organizational characteristics of such firms and their technology (Chakrabarti, A., et al. 1994). The success of R&D integration has been found to be related to the relative size of the acquirer and the acquired firm, with acquisitions of small firms by large firms being less successful (Chakrabarti, A., et al. 1994). It has been shown that active M&A markets can induce innovation in small firms and that although innovative activity increases with demand, competition and industry across all firms, this effect

is stronger for small firms (Gordon, M. P. and Zhdanov, A. 2013). This research is concerned with the innovative activity of the small firm before and to encourage acquisition by a larger firm. Once acquired, the data on innovative performance is mixed and not specific to the new subsidiary.

4 Open Business Model

In today's landscape, where more and more companies are competing for a small market share, innovation plays a key role in ensuring organizations have a long-term competitive advantage.

Innovation is always more expensive if done totally in-house, as traditional business models predict; so how do companies stay competitive in a scenario where consumers demand more and more innovation at an affordable price? This is where we start talking about Open Innovation applied to business models: open business models, where collaboration is at the core of value creation and commercialization of technologies and ideas.

This is followed by a chapter where different business models will be explored, how internal and external innovations connect and the overlaps between Open Innovation, business models and open business models.

4.1 Overview of different types of Business Models

Today's situation sees a market in which the development costs of new products are getting higher and higher, while their life cycle is getting shorter and shorter; in a context like this, if companies base their foundations for innovation only on their own strengths, it is quite complicated to get good results from innovative activity. It is therefore obvious that companies must evolve more complex systems, in which their business model is opened to allow external actors to flow new ideas and knowledge inside the company, in order to innovate their products; on the contrary, companies must let internally produced innovations flow outwards, but which are not bringing any internal benefit and which, however, could help some external actor to innovate. This paradigm is known as the "open innovation model" and underlines the tendency of companies to search for business models capable of researching, developing and commercializing new technologies realized as a product of multiple sources of knowledge.

Unlike technologies, in fact, a good business model appears difficult to imitate by competitors and therefore able to guarantee the company, if well designed and managed, lasting advantages even in the long term.

A business model, in general, fulfils two main functions: it allows to define the series of activities that will guarantee the commercialization of the final product, allowing the company to create value for itself and for the final user; it defines the way in which these activities should be articulated and the role played by the company within them, allowing to capture the value previously generated (Chesbrough, 2006).

A business model, as it represents the way in which a company manages to transform, through a series of activities, inputs into a final output available to the consumer, is a tool that all companies, even unconsciously, are equipped with because it allows them to organize the company's activities and ultimately generate a profit for the company.

The difference between the various business models lies in the amount of value created and Chesbrough (2006) proposes a classification, starting from the "undifferentiated business model" (the most basic) up to the "integrated business model" (capable of generating a greater competitive advantage for the company).

Type 1	Business Model Undifferentiated	This type of business model is based on the sale of a service or a product, not with particularly singular characteristics, in an undifferentiated market (with general and not specific needs). The main drive of the business model is the price.
Type 2	Business Model Slightly Differentiated	Compared to the previous model, the company offers its customers a premium version of the product developed in "Type 1", thus seeking a minimum degree of differentiation

		from the offerings of competitors.
Type 3	Business Model Segmented	The firm, in this business model, seeks to satisfy the needs of multiple consumer segments through the sale of customized products for each type of segment. Like the previous two models, however, this one also relies solely on product development from internal resources, thus limiting the potential for new business growth.
Type 4	Business Model Open	In this type of business model, the production process is supported by external partners, thus favouring innovation and the sharing of technologies and ideas; it turns out to be a much faster process, with a high level of risk sharing and also more convenient economically.
Type 5	Business Model Integrated	Companies share their development strategies with their suppliers and

		consumers; in this model we see a real collaboration at the value chain level in order to build a more integrated business model (e.g. collaborating actors further upstream than suppliers and further downstream than customers).
Type 6	Business Model Adaptive	This last type of business model is the one with the highest degree of openness compared to "Type 5". Companies show a full willingness to undertake experiments to find the combination of resources that generates the most value.

Table 3: Types of business models according to Chesbrough (2006)

The different business model that a company decides to adopt represents a determining factor in establishing the value that a given innovation is able to generate; in fact, it happens that a new technology not yet used may not be able to release its potential and therefore result not very successful if it is developed and marketed within a company that adopts a business model not suitable for that

particular technology (but extremely successful if it is developed and marketed within a business model capable of enhancing the technology). In this context, a business model could be compared to a camera used by a company to take a picture of a particular technology: if the lens used by the company is not suitable, the picture will be blurred and consequently it will not be possible to see all the details that the technology offers; otherwise, if the company decides to change lens and use a more suitable one, then in that case no details will be lost in the picture and the technology will be able to release all its potential.

When Xerox decided to launch its new product, the first office printer (the 914 model), the business model at that time was to sell it at a mark-up price (Chesbrough and Rosenbloom, 2002). However, it was noted that, due to high production costs, the final price was too high and no consumer was willing to buy it. It was concluded that there was no market potential for this type of product.

product. However, Xerox changed its business model and instead of selling the printer, it decided to lease it to its consumers at the price of \$95 per month, committing to pay 4 cents for each print made after the first two thousand (Chesbrough and Rosenbloom, 2002). This new business model, which foresaw a totally different revenue stream, appeared much more attractive from the consumer's point of view, and thanks to the strong interest shown towards this new product, the number of copies produced was well in excess of two thousand units per day (Chesbrough and Rosenbloom, 2002).

The example above shows that it is much more important to find the right business model that will be able to exploit the full potential of a new technology, rather than

looking for new products that will fit into the company's existing business model; you can have even the most revolutionary of technologies, but if the business model is not sufficiently suitable, the result will be poor (Chesbrough and Rosenbloom, 2002).

Despite the focal importance of a business model, Chesbrough (2007) identifies how most companies struggle to adapt and modify it according to the specific need; he observes that the problem of this lack of flexibility within companies is due to the fact that there is no figure with the skills and responsibilities to modify a business model and adapt it to the specific technology to be developed and marketed. In addition to the figure of the CEO who is responsible for the whole company's performance, all the other figures belonging to the so-called top management are the managers of the single areas (e.g. marketing, finance, sales, product development) and they are only responsible for the performance of their business unit; instead, a well built business model should guarantee a good overall performance. In addition, a further element of resistance comes from the reassurance offered by a known business model, whereas a new model would bring new challenges and uncertainties. However, as Chesbrough (2007) states, no business model has a perpetual life and sooner or later the time comes for the company when it becomes necessary to change it. In some cases the spark comes from a shock as happened, for example, for IBM and Procter & Gamble.

In the first case, the company found itself facing a financial crisis in 1992 that led to the dismissal of many employees due to a loss of over five billion dollars. Under the leadership of Lou Gerstenr, the new CEO, they tried to revive the company by changing the business model that had always been adopted and thus trying to identify

new revenue streams (Chesbrough, 2007): other companies were allowed to use their production lines for the creation of semiconductors in exchange for a fee; many patents were offered under license; the new business of computer services was opened.

In a similar way, Procter & Gamble, towards the end of the last century, had to face a crisis due to the collapse of its share price on the stock market (loss of more than 50%) (Huston and Sakkab, 2006); a totally different business model was then sought, a new business model that focused on external research of new technologies and oriented to the commercialization of those developed internally, in order to optimize both costs and revenues. In this way the company was able to overcome the period of crisis, recover and resume growth.

These examples draw attention to another case that happened about a decade ago at the Japanese electronics giant Sony. In 2011 the company had a loss of about five billion euros and because of this huge negative result it planned the dismissal of more than ten thousand jobs. The causes are attributed among other things to a delay compared to competitors in the production of TVs, mobile phones and tablets (Milano Finanza, 2012). In the article we read how the new CEO, Kazuo Hirai foresaw a policy of cuts and focus of the business in which the company operated: mobile phones, video games and digital cameras will be the new strengths of Sony, while as far as the television sector was planned a sharp reduction in production costs of LCD screens also through possible collaborations with Japanese competitors (Milano Finanza, 2012). Furthermore, Hirai was planning to diversify his business by entering the medical sector (Milano Finanza, 2012). Without pretending to attribute this crisis to a

bad model of innovation management, since other factors, including the flooding at some production sites in Thailand and the loss of shares in some important markets (Romano, 2012) have contributed to designate this negative scenario, there appears, however, great potential to adopt a business model more open to external actors.

What is recommended, however, is to be able to adopt a different, more open business model as soon as possible and therefore in a preventive way, without waiting for a period of crisis and deciding to change the business model adopted for decades only as a last alternative; the advice to adopt the new and more dynamic business model as soon as possible also comes from the fact that such a particular type of business model, which involves the continuous exchange of information and contacts with external actors, requires a long period of experimentation and testing (therefore a considerable amount of time). It is advisable, in fact, to embrace the new business model gradually, starting to study its potentialities on a small portion of the company's activities through trial and error processes, in order to avoid the perception that it is a project aimed at wasting resources. This was the case at Air Products, for example, when the industrial chemicals company decided to engage in a licensing deal with British Oxygen to get the innovative new solutions it needed to compete. However, John Tao, the person in charge of this task, realised that it was necessary to allow himself a trial period during which to analyse the licensing programmes developed by other companies (Chesbrough, 2007). "Tao had a reason to start small. 'I didn't ask for large amounts of money on purpose', he explained. 'I thought that if I requested a lot of money before we knew what we were doing, I would be [making] the program ... an easy target for some future cost - cutting meeting'" (Chesbrough, 2007).

Once the true potential of the new business model has been demonstrated, through numerous experiments, it can be introduced and implemented in the company with almost no risk; in the initial period, however, it must be remembered that the two business models (the old and the new) will coexist and therefore there will certainly be adjustments to be made in areas that present conflicts. Also in this we identify a phenomenon of resistance to change as many companies are afraid of launching experiments that could damage the brands developed over many years of work and therefore are hostile in the adoption of a business model that deviates too much from that usually used (Chesbrough, 2007). It is not certain that the new business model adopted by the company is immediately better than the previous one and it is precisely for this reason that it is necessary to conduct experiments, process the collected data, identify the direction to take and conduct new tests (Chesbrough, 2007).

4.2 The Business Model: Connecting Internal and External Innovation

As it can be observed in the literature, companies are more and more pushed to adopt open innovation models because of the huge costs to innovate and also because of the increasing reduction of product life cycles. In this new scenario the role of the business model has a fundamental position.

Previously, it has been seen how a business model is a vital tool for companies and how it links ideas and technologies to valuable economic outcomes; the business model mainly implements two functions (Teece, 2010): it deals with the generation of value through a series of activities; it captures the value generated by the activities by generating a product or service to be offered to a group of customers (referred to as "target" customers) (Vanhaverbeke & Chesbrough 2014).

Organizations also capture value by establishing a unique resource, asset or position within that set of activities in which the firm enjoys a competitive advantage. Specifically, business models can also refer to the ties that exist between organizational units involved in the performance of fulcrum activities and with external stakeholders in the firm's attempt to create, deliver and capture this value (Zott et al., 2011).

Business models enjoy an intrinsic dynamism that pushes them to change depending on some exogenous factors such as: the evolution of the legal structures in which they are embedded; the continuous change of markets; the development of technology (Teece, 2010). In addition, there are also endogenous factors such as the adoption of Open Innovation that leads companies to change their business model and adapt it to a completely new structure. With the adoption of this new model it is easy to involve

actors from outside the company reality that will be, then, involved in the links of the value chain and in the monetization dimension or in the revenue model and, in particular, in the involvement of customers. Although the definition of Open Innovation and the business model concept do not seem to be directly related, Chesbrough (2003) argues that: "Open Innovation combines internal and external ideas into architectures and systems whose requirements are defined by a business model. The business model uses both external and internal ideas to create value while defining internal mechanisms to claim some of that value."

There is no way to conceive open innovation without business models: the value that can be attributed to an idea or a technology would be equal to zero if the company was not able to build around it a business model capable of enhancing this innovation; there is no intrinsic value in a technology if it is not able to reach the market effectively. This is where the business model plays its role and enables the commercialisation of a new technology or innovative idea. As Chesbrough (2003) notes, a mediocre technology pursued within an excellent business model may be more valuable than a great technology in a mediocre business model. To improve or revamp the existing business model, a company must go through extensive business model experimentation (Chesbrough, 2010; West & Gallagher, 2006). What is more, a non-negligible organizational leadership capability is required when trying to innovate a business model; a capability needed to overcome the barriers (e.g., organizational) that a company faces throughout the business model experimentation process (Chesbrough, 2007; Chesbrough, 2010; Amit & Zott, 2012).

Researchers from different fields (e-business and information technology, strategy, innovation and technology management), have used and developed the concept independently (Zott et al., 2011). Some researchers in the field explicitly consider boundary-spanning activities (Shafer et al., 2005; Zott & Amit, 2007, 2010; Zott et al., 2011) or collaboration with partners (Osterwalder et al, 2005; Teece, 2010) to be an integral part of business models. A strand of literature (Chesbrough & Schwartz, 2007; Chesbrough, 2006; Davey

et al., 2011; Smith et al., 2010) places the open business model in a strong relationship with the process of open research and development (R&D) (Chesbrough & Schwartz, 2007; Chesbrough, 2003). Open innovation includes phenomena such as intellectual property commercialization, user and customer integration, and collaborative R&D processes (Gassmann et al., 2010). Chesbrough (2007) argues that "to make the most of this new system of innovation, firms need to open up their business models, actively seeking out and exploiting external ideas and allowing untapped internal technologies to flow outward where other firms can unleash their latent economic potential". According to this view of the concept, which focuses more on technology, innovation and ideas, the link between research and development (R&D) and open business model is extremely important, and through this current allows companies to create a greater amount of value that will allow the company to gain advantages over competitors.

New flexible organizational forms emerge in global markets, postulating a global division of structures in terms of space, time and functions performed (Brondoni, 2014). In particular, to explain open business models, Chesbrough (2006) starts from

the current trend of "division of labour in innovation". In order to increase the productivity of the research and development division and to stimulate innovation, the division of labor turns out to be an efficient and powerful way. In the context of an open business model, division of labor is a way to be able to create more value within the organization; it is based on leveraging more external ideas by utilizing key assets, resources, or positions not only in the company's own operations, but also in those of other companies. Moreover, thanks to open business models, better financial performance can be achieved by going (Vanhaverbeke & Chesbrough, 2014): reducing costs; decreasing the time of innovation; monetizing technologies through licensing agreements and spin-off activities (when it is not possible to adopt the technology in the market where the company operates); generating additional revenues. In this way, open business models are still closely linked to the innovation activities of a firm or its external innovation partners, improving internal and external knowledge flows and enabling organizations to be more effective in creating and capturing value (Chesbrough, 2007).

4.3 Open Business Model Patterns

According to the study of Frankenberger et al. (2014), an additional factor that could stimulate companies to adopt an open business model is represented by the history of successful business models that can be found; this could incentivize companies to adopt this type of business model since it has proven successful in other realities (even if in different sectors).

In the case of Procter&Gamble, for example, the transfer of the open company business model (Osterwalder & Pigneur, 2010) came from the pharmaceutical and IT industries, where Eli Lilly and IBM had been pioneers in opening up their R&D activities (Frankenberger et al., 2014).

Several scholars have pointed out that it is also possible to replicate or imitate the open business model of a firm that previously achieved success with its open model (Baden-Fuller & Morgan, 2010; Casadesus-Masanell & Zhu, 2013; Teece, 2010; Zott & Amit, 2013). Teece (2010), for example, argues that successful business models can be transferred from one context to another and trigger a successful business model. Baden-Fuller and Morgan (2010) argue that business models can also serve as recipes, which in themselves are open to variation and innovation. Finally, Casadesus-Masanell and Zhu (2013) show that incumbents have to decide whether to maintain their business model or imitate the business model of new entrants in order to stay in the market. Thus, business models and, in particular, open business models seem to be an important factor for further business model openness.

4.4 Overlaps of the Open Business Model

As seen above, open innovation encompasses openness on the part of firms in research and development activities in an effort to innovate and keep up with ongoing market developments. Business models describe a firm's sustained value creation and capture, regardless of openness; in particular, business models defined as "open" are part of a subclass of business models in which the focus is on the ability of a firm to collaborate with external actors in order to capture the greatest value. Since the concept of Open Innovation, the general business model definition and the subclass of open business models overlap, Figure 5 will illustrate the areas of overlap.

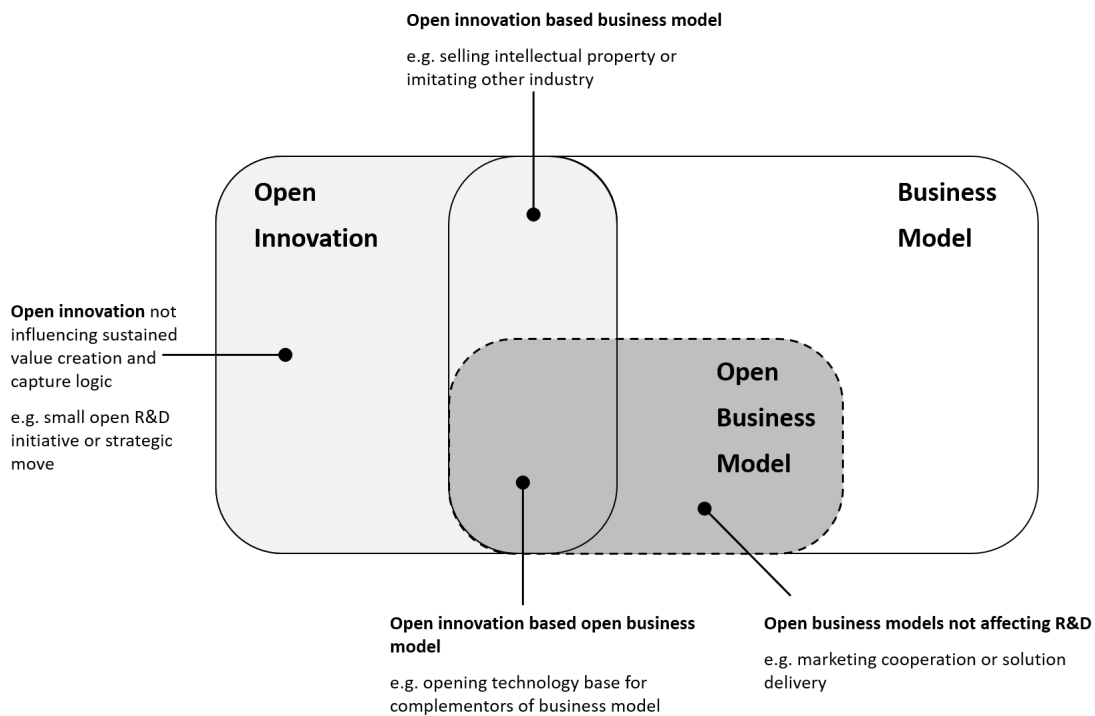


Figure 5: Conceptual framework of separation and overlap between the concepts of open innovation, business model and open business model

The concept of Open Innovation: it agrees with the concept of business model only if through it it is possible to generate additional value for the company and if this value can be captured; it is part of the concept of open business model only if it has as its central focus the continuous collaboration with actors outside the company boundaries that lead to the transfer of technology and ideas. An open business model, therefore aimed at generating value through collaborations with external agents, describes the design or architecture that the enterprise must adopt if it is to succeed in capturing the desired additional value.

Conclusion

In the research we investigated how a specific way to innovate (open innovation) can be used as a winning tool to find resources and technologies from outside, which allow the company to remain competitive in the long run compared to competitors in the sector, to lengthen its maturity phase and therefore to prolong the life cycle of the company. Through open innovation we have seen how an approach towards the external environment can lead to the creation of a new cumulative baggage of knowledge without damaging the resources already existing within the company but, on the contrary, give the company the possibility to market with the outside world the resources not used in production processes (or present in surplus). Subsequently, analyzing the different tools available to companies to implement open innovation, it was noted how the network and the creation of a strong external network is of substantial importance in order to access the resources needed to innovate, in advance, compared to competitors and how new tools, such as crowdsourcing, are winning to find technologies and resources not present, at the time, within the boundaries of the company.

In the second part of this analysis special attention was given to small and medium sized enterprises, since they constitute the majority of the Italian entrepreneurial fabric, and in particular the two types of relationships (vertical and horizontal) that small and medium sized enterprises have with large companies were studied. Large enterprises have a significant advantage as far as innovation is concerned, since they have more financial and technological resources than small enterprises. Small enterprises, on the other hand, have on their side a less rigid structure that allows

them a higher dynamism and an excellent reactivity to changes, as well as a remarkable entrepreneurial dynamism. When these different realities come into contact and begin to collaborate with each other, it has been noted that this stimulates the creation of innovation.

Continuing, through practical examples, we analyzed the different types of business model and how each technology must be commercialized using the most appropriate model, because otherwise it is not possible to release the value that a given innovation is able to generate. Finally, it has been seen how the focal point of a business model defined as "open" is the ability of the company to collaborate with external actors, in order to generate synergies that create a greater overall value; with respect to this last point, however, the overlaps between the concept of Open Innovation, the general definition of business model and the subclass of open business models have been highlighted.

Bibliography

- Acs and Audretsch, *Innovation, Market Structure, and Firm Size*, 1987
- Arora et al., *Ideas for Rent: An Overview of Markets for Technology*, 2010
- Arora et al., *Markets for Technology: The Economics of Innovation and Corporate Strategy*, 2001
- Arrigo, *Open Model: Integrated Open Access Materials Modelling Innovation Platform for Europe*, 2021
- Arrow and Kenneth, *Economic Welfare and the Allocation of Resources for Invention*, 1962
- Baden-Fuller and Morgan, *Business Models as Models*, 2010
- Ballon et al., *Classification of TEPs*, 2007
- Brabham, *Crowdsourcing*, 2013
- Brondoni, *The Adoption of Open Innovation Practices in Global Firms*, 2012
- Burger-Helmch and Pénin, *Crowdsourcing of inventive activities: Definition and limits*, 2010
- Burt, *Structural Holes*, 1992
- Capaldo, *Network Structure and Innovation: The Leveraging of a Dual Network As a Distinctive Relational Capability*, 2007
- Casadesus-Masanell and Zhu, *Business model innovation and competitive imitation: The case of sponsor-based business models*, 2013

Chesbrough and Bogers, *Explicating Open Innovation: Clarifying an Emerging Paradigm for Understanding Innovation*, 2014

Chesbrough and Garman, *How Open Innovation Can Help You To Cope in Lean Times*, 2009

Chesbrough and Rosenbloom, *The Role of the Business Model in Capturing Value from Innovation: Evidence from Xerox Corporation's Technology Spin-Off Companies*, 2002

Chesbrough, *Business model innovation: it's not just about technology anymore*, 2007

Chesbrough, *Business Model Innovation: Opportunities and Barriers*, 2010

Chesbrough, *Open Business Models: How to Thrive in the New Innovation Landscape*, 2006

Chesbrough, *Open Innovation: Researching a New Paradigm*, 2008

Chesbrough, *Open Innovation: The New Imperative for Creating and Profiting from Technology*, 2003

Chesbrough, Vanhaverbek and West, *Open Innovation: Reasearching a New Paradigm*, 2006

Chesbrough, Vanhaverbeke and West, *New Frontiers in Open Innovation*, 2014

Christensen, *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*, 1997

Cohen and Levinthal, *Absorptive Capacity: A New Perspective on Learning and Innovation*, 1990

Corniani, *Business Networks and Local Partners in Global Competition*, 2013

Dahlander and Gann, *How Open is Innovation?* , 2010

De Man and Duysters, *Shaping the alliance management agenda: A capability approach*, 2005.

Dittrich and Duysters, *Networking as a Means to Strategy Change: The Case of Open Innovation in Mobile Telephony*, 2007

Dodgson et al, *The Management of Technological Innovation: Strategy and Practice*, 2008

Enkel, Gassmann and Chesbrough, *Open R&D and open innovation: exploring the phenomenon*, 2009

Estellés-Arolas and González-Ladrón-de-Guevara, *Towards an Integrated Crowdsourcing Definition*, 2012

Flatten et al., *A Measure of Absorptive Capacity: Scale Development and Validation*, 2011

Flipse et al, *Identifying key performance indicators in food technology contract R&D*, 2013

Frankenberger et al, *The antecedents of open business models: An exploratory study of incumbent firms*, 2014

Freeman, *Networks of Innovators: A Synthesis of Research Issues*, 1991

Gassman and Enkel, *Towards a Theory of Open Innovation: Three Core Process Archetypes*, 2004

Gassmann, Kausch and Enkel, *Negative Side Effect of Customer Integration*, 2010

Gassmann, *Opening up the innovation process: towards an agenda*, 2006

Gilson et al., *Contracting for Innovation: Vertical Disintegration and Interfirm Collaboration*, 2009

Gnyawali and Park, *Co-opetition between giants: Collaboration with competitors for technological innovation*, 1999

Gordon and Zhdanov, *R&D and the Incentives from Merger and Acquisition Activity*, 2013

Granovetter, *The Strength of Weak Ties*, 1973

Grier, *Crowdsourcing For Dummies*, 2013

Hagedoorn and Duysters, *The Effect of Mergers and Acquisitions on the Technological Performance of Companies in a High-Tech Environment*, 2002

Hagedoorn et al., *Understanding the Cross-Level Embeddedness of Interfirm Partnership Formation*, 2006.

Henkel, *Selective Revealing in Open Innovation Processes*, 2006

Howe, *Crowdsourcing: How the Power of the Crowd is Driving the Future of Business*, 2008

Howells, *Intermediation and the Role of Intermediaries in Innovation*, 2006

Huston and Sakkab, *Connect and Develop: Inside Procter & Gamble's New Model for Innovation*, 2006

Jamieson et al., *Large Businesses and SMEs: Exploring how SMEs interact with large businesses*, 2012

Kleemann, Voß and Rieder, *Un(der)Paid Innovators: The Commercial Utilization of Consumer Work through Crowdsourcing*, 2008

Klerkx and Leeuwis, *Strengthening Agricultural Innovation Capacity: Are Innovation Brokers the Answer?*, 2009

Kloyer and Scholderer, *Effective Control Rights in Vertical R&D Collaboration*, 2012

Laursen and Salter, *Open for Innovation: The Role of Openness in Explaining Innovation Performance Among U.K. Manufacturing Firms*, 2006

Laursen and Salter, *The paradox of openness: Appropriability, external search and collaboration*, 2004

Le Merle and Campbell, *Building an external innovation capability*, 2011

Lechner et al, *The Estimation of Causal Effects by Difference-in-Difference Methods*, 2010

Lee et al, *Heterogeneity, Brokerage, and Innovative Performance: Endogenous Formation of Collaborative Inventor Networks*, 2010

Leminen et al., *Living Labs as Open-Innovation Networks*, 2012

Lichtenthaler, *A Capability-Based Framework for Open Innovation: Complementing Absorptive Capacity*, 2009

Parida et al., *Inbound Open Innovation Activities in High-Tech SMEs: The Impact on Innovation Performance*, 2012

Powell et al., *Interorganizational Collaboration and the Locus of Innovation: Networks of Learning in Biotechnology*, 1996

Reagans and McEvily, *Network Structure and Knowledge Transfer: The Effects of Cohesion and Range*, 2003

Reichwald and Piller, *Crowdsourcing and the participation process for problem solving: the case of BP*, 2006

Reichwald and Piller, *Interactive value creation - open innovation, individualization and new forms of division of labor*, 2009

Rogers, *Networks, Firm Size and Innovation*, 2004

Rothwell and Dodgson, *The Handbook of Industrial Innovation*, 1994

Rothwell, *The strategic management of re-innovation*, 1989

Rowley et al, *Redundant governance structures: An analysis of structural and relational embeddedness in the steel and semiconductor industries*, 2000

Sanchez, Gimilio and Altamirano, *Crowdsourcing as an Open Innovation Tool for Entrepreneurship*, 2015

Sapienza et al., *A Capabilities Perspective on the Effects of Early Internationalization on Firm Survival and Growth*, 2004

Simard and West, *Knowledge networks and the geographic locus of innovation*, 2006

Smith, Manesh and Alshaikh, *Overcoming Barriers to Collaboration in an Open Source Ecosystem*, 2013

Smits and Kuhlman, *The rise of systemic instruments in innovation policy*, 2004

Spithovenet et al., *Open innovation practices in SMEs and large enterprises*, 2013

Street and Cameron, *External Relationships and the Small Business: A Review of Small Business Alliance and Network Research*, 2007

Teece, *Business Models, Business Strategy and Innovation*, 2010

Tidd and Trewhella, *Organizational and Technological Antecedents for Knowledge Creation and Learning*, 1997

Uzzi, *Social Structure and Competition in Interfirm Networks: The Paradox of Embeddedness*, 1997

Vahter, Love and Roper, *Externalities of Openness in Innovation*, 2012

Van de Vrande, De Jong, Vanhaverbeke and De Rochemont, *Open Innovation in SMEs: Trends, Motives and Management Challenges*, 2009

Van Lente et al., *Roles of Systemic Intermediaries in Transition Processes*, 2003

Von Hippel, *Sources of Innovation*, 1988

Wallin and Von Krogh, *Organizing for Open Innovation: Focus on the Integration of Knowledge*, 2010

Weber and Weber, *Corporate venture capital as a means of radical innovation: Relational fit, social capital, and knowledge transfer*, 2007

West and Gallagher, *Challenges of open innovation: the paradox of firm investment in open source software*, 2006

Winch and Courtney, *The Organization of Innovation Brokers: An International Review*, 2007

Zott and Amit, *The Business Model: A Theoretically Anchored Robust Construct for Strategic Analysis*, 2013

Zott et al, *The Business Model: Recent Developments and Future Research*, 2011