



## TOWARDS A THEORY REGARDING OPEN INNOVATION AND ENTREPRENEURSHIP: A META-SYNTHESIS FROM QUALITATIVE STUDIES IN SMALL AND MEDIUM ENTERPRISES AND START-UPS

Eduardo Gomes Carvalho<sup>1</sup>, Joel Yutaka Sugano<sup>2</sup>

<sup>1</sup> Federal Center for Technological Education of Minas Gerais; Lavras Federal University

<sup>2</sup> Federal University of Lavras

### ABSTRACT

Open innovation is still after a decade an emergent topic in literature and, because of this, there are few gaps to be explored. Two of these gaps are the relationship between open innovation and entrepreneurship and open innovation in small and medium enterprises (SMEs), because most studies focus on large enterprises. Our research question in this study is: what do case studies report in terms of open innovation in start-ups or SMEs that would be related to entrepreneurial orientation? Our study is a meta-synthesis of qualitative case studies following the stages presented by Hoon (2013). A theory was developed and presented considering the entrepreneurial orientation dimensions and open innovation activities. In the concluding section, limitations and suggestions in terms of future works were presented.

**Keywords:** Open Innovation; Entrepreneurship; Entrepreneurial Orientation; Start-Ups, Small and Medium Enterprises.

### 1. INTRODUCTION

Chesbrough (2003) coined the term open innovation, presenting not only new possibilities for innovation managers, but opening a new field for studies and researches. On the other hand, according to West *et al.* (2014), while open innovation research is highly cited and has influenced the direction of innovation studies, it has had a limited impact upon the broader disciplines of management and economics. One of the management subjects is entrepreneurship, as pointed by Hossain (2013). This topic becomes more significant because, according to Soriano *et al.* (2013), over the last few years, the interrelationships between innovation, entrepreneurship and new business creation have become apparent within a vibrant research trend that fuses insights from different academic approaches.

Several authors (Bianchi *et al.*, 2011; Hossain, 2013; van de Vrande *et al.*, 2009) also point open innovation in small and medium enterprises as a gap. According to these authors, research on open innovation emphasizes the large and multinational companies. small and medium enterpri-

ses (SMEs) are important to almost all economies in the world, because SMEs contribute to the creation of jobs; they play an important role in terms of the technology development, and they are major economic growth drivers, especially in developing countries.

Joining the entrepreneurship gap and open innovation in small and medium enterprises' gaps, start-ups may be considered a promising research object. The academic literature defines a high-tech start-up as a young firm (less than 8 years) launched by individuals for developing and exploiting innovation in various forms (Freeman, 1982; Shan, 1990). According to the Brazilian Association of Start-ups, start-ups are early stage companies that develop innovative products or services, with potential for fast growth. By these definitions it is clear that the entrepreneurship element is present. Most start-ups are SMEs. Thus, start-ups are a little explored rich research field, according to the open innovation literature. Therefore, our research question is: what do case studies report in terms of open



innovation in start-ups or SMEs that would be related to entrepreneurial orientation?

Entrepreneurial orientation was chosen because, according to Rauch *et al.* (2009) it has emerged as a major construct in the strategic management and entrepreneurship literature over the years. To answer these questions, a meta-synthesis of empirical studies, following the stages presented by Hoon (2013), will be performed. Although Lumpkin *et al.* (1996) identify five dimensions of entrepreneurial orientation (autonomy, competitive aggressiveness, innovativeness, proactiveness and risk taking), Mello *et al.* (2005) identified a sixth dimension in high-tech enterprises in Brazil called networks. There is the fact that innovativeness and open innovation are redundant and, because of this, innovativeness was excluded. Thus, the disagreements should be related to following dimensions: autonomy, competitive aggressiveness, networks, proactiveness and risk taking.

This study is a meta-synthesis of qualitative case studies following the stages presented by Hoon (2013). According to Hoon (2013) a meta-synthesis is defined as an exploratory, inductive research design to synthesize primary qualitative case studies for the purpose of making contributions beyond those achieved in the original studies. Meta-synthesis constitutes an understanding in terms of synthesis that is interpretive, aiming at synthesizing primary qualitative case studies that have not been intended as part of a unified multisite effect (Hoon, 2013).

After this section, the theoretical background, the methodology, the theory and discussions are presented, followed by the concluding section.

## 2. THEORETICAL BACKGROUND

The purpose of this section is to provide the reader with the broad theoretical framework used for interpreting the research. First, the open innovation paradigm will be presented, followed by the entrepreneurship concept and the entrepreneurial orientation framework. Studies that approach the relationship between open innovation and entrepreneurship also will be presented.

### 2.1. Open Innovation

Defining open innovation is not easy. The definition of open innovation is yet to be made clear-cut, and what open innovation is and what it is not, is still being debated (Hossain, 2013). The definition of open innovation has evolved along the time, as pointed by West *et al.* (2014). The first and most used definition of open innovation was provided by Chesbrough (2003):

open innovation means that valuable ideas can come from inside or outside the company and can reach the market from inside or outside the company as well. Figure 1 illustrates the open innovation definition. However, posteriorly, Chesbrough (2006) emphasizes the intentionality of the knowledge flows into and out of the firm. Thus, Chesbrough (2006) affirms that open innovation is the use of purposive inflows and outflows of knowledge aimed to accelerate internal innovation and expand the markets for external use of innovation, respectively. However, in a new effort to define open innovation, West *et al.* (2014) presented the most actual definition of open innovation provided by Chesbrough *et al.* (2014), which considers the increasing interest in terms of non-pecuniary knowledge flows; and open innovation is defined as a distributed innovation process based on purposively managed knowledge flows across organisational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model.

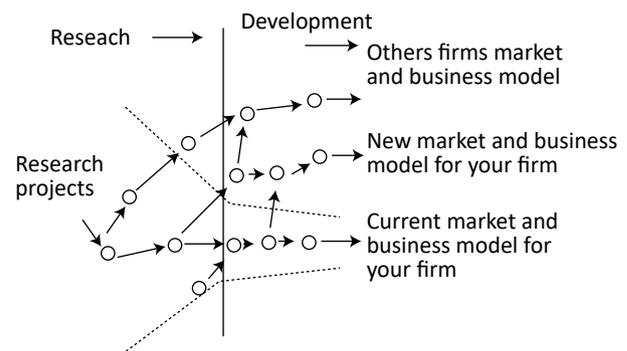


Figure 1: Open innovation model

Source: Chesbrough (2003)

In order to understand the concept of open innovation its activities should be known. Huizingh (2011) affirms that open innovation became the umbrella that encompasses, connects, and integrates a range of already existing activities. Hossain (2013) affirms that open innovation overlaps other concepts such as user generation, crowdsourcing, and distributed innovation. Thus, open innovation is not a novelty, but a range of existing concepts and activities. Gassmann *et al.* (2004) divided open innovation in three macroprocesses or archetypes, as follows:

- The outside-in process: Enriching the company's own knowledge base through the integration of suppliers, customers and external knowledge sourcing can increase a company's innovativeness. Conboy *et al.* (2011) draw attention to the fact that this process is also referred to as inbound. Bianchi *et al.* (2011) cite as organisational modes for outside-in open innovation: in-licensing, minority equity investments, acquisitions, joint ventures, R&D contracts and research funding, purchase of technical and scientific services and non-equity alliances.



- The inside-out process: earning profits by bringing ideas to market, selling intellectual property and multiplying technology by transferring ideas to the outside environment. Conboy *et Morgan* (2011) draw attention to the fact that this process is also referred to as outbound. Bianchi *et al.* (2011) cite as organisational modes for inside-out open innovation: licensing out, spinning out of new ventures, sale of innovation projects, joint venture for technology commercialization, supply of technical and scientific services, corporate venturing investments and non-equity alliances.
- The coupled process: coupling the outside-in and inside-out processes by working in alliances with complementary partners in which giving and taking are crucial for success. According to Conboy *et Morgan* (2011) this open innovation approach combines the outside-in (gaining external knowledge) with the inside-out process (to bring ideas to market), and because of this is not always approached by some authors. In order to accomplish both, these companies collaborate and cooperate with other stakeholders such as partner companies (e.g. strategic alliances, joint ventures), suppliers and customers, as well as universities and research institutes.

As affirmed previously, the coupled process is a combination of the inside-out and the outside-in processes in strategic R&D alliance, justifying the fact that authors such as Chesbrough *et Crowther* (2006) and Wang *et Zhou* (2012) adopt only inside-out and outside-in processes in their works. Furthermore, authors such as van de Vrande *et al* (2009) adopt the terms technology exploration and technology exploitation to define respectively inbound and outbound open innovation. In our work, we will use the processes adopted by van de Vrande *et al* (2009), because they are among the few to explore open innovation in SMEs. Van de Vrande *et al* (2009) cite as example of outbound open innovation: venturing, outward IP licensing and employee involvement. Moreover, van de Vrande *et al* (2009) cite as example of inbound open innovation: customer involvement, external networking, external participation, outsourcing R&D and inward IP licensing.

Lazzarotti *et al.* (2011) distinguish four different open innovation models with respect to two variables, representing the degree of openness: the number and type of partners with whom the company collaborates (partner variety) and the number and type of phases of the innovation process currently open to external collaborations (innovation phase variety). Figure 2 illustrates the differences between these open innovation models. The open innovation models are:

- Open Innovators: companies that are really able to manage a wide set of technological relationships,

that impact the whole innovation funnel and involve a broad set of different partners;

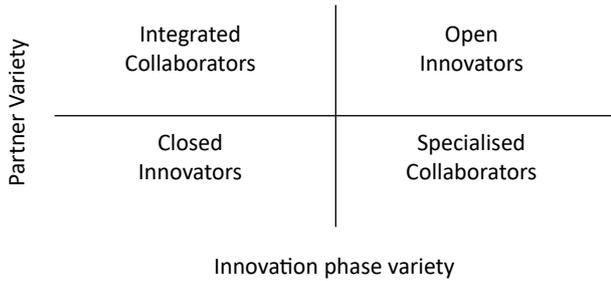
- Closed Innovators: companies that access external sources of knowledge only for a specific, single phase of the innovation funnel and typically in dyadic collaborations;
- Integrated Collaborators: companies that open their whole innovation funnel, but only to contributions coming from a few types of partners and;
- Specialised Collaborators: companies that are able to work with many different partners, but concentrate their collaborations at a single stage of the innovation funnel.

According still to Lazzarotti *et al.* (2011), the integrated and specialised collaborators have got a lower degree of openness (the integrated lower than the specialized) and probably a lower complexity in terms of the collaborations.

According to West *et al.* (2014), open innovation has also had a considerable impact on practice. Daily industry press releases all the latest “open innovation” initiative of an industrial or consulting firm (West *et al.* 2014). West *et al.* (2014) affirm that middle managers have adopted “open innovation” in their job title, and conferences regularly promise to reveal open innovation secrets for their industry participants. Yet Huizingh (2011) adverts that, since there is no panacea in medicine, that is, a remedy for healing all diseases, it is unlikely that a management concept has positive effects in any situation, implying that the effectiveness of open innovation must be context dependent. The context is affected by management and economics issues. However, West *et al.* (2014) affirm that, while open innovation research is highly cited and has influenced the direction of innovation studies, it has had a limited impact upon the broader disciplines of management and economics. One example is that the role of managers and entrepreneurs to implement open innovation is still unexplored and studies that bring connection between entrepreneurship literature and open innovation may help to strengthen our understanding (Hossain, 2013).

## 2.2. Entrepreneurship

Entrepreneurship is a wide concept, having several sides and promoting many discourses. For some, entrepreneurship is perceived as crucial activity that fuels the economic development of regions. One example is Soriano *et Huang* (2013), who affirm that entrepreneurship is a milestone on the road towards economic progress, and makes a huge contribution towards the quality and future hopes of a sector, economy or even a country.



**Figure 2:** Open innovation models  
 Source: The authors

For us the relationship between entrepreneurship and innovation is interesting. Although relationship between open innovation and entrepreneurship is still little explored, the relationship between innovation and entrepreneurship is obvious in literature. Schumpeter (1934) defines entrepreneurship as an endeavour that is centrally characterized by innovation. Other authors such as Ndubisi *et al.* (2012), Swami *et al.* (2005), Zhao (2005) and Galindo *et al.* (2013) explored the relationship between innovation and entrepreneurship. According to Soriano *et al.* (2013), over the last few years, the interrelationships between innovation, entrepreneurship or new business creation have become apparent within a vibrant research trend that fuses insights from different academic approaches.

However, there are many initiatives that focus the relationship between open innovation and entrepreneurship. In the April 2013 issue of the Technology Innovation Management Review, entitled Open Innovation and Entrepreneurship, authors from Belgium *et al.* Norway had the opportunity to share their academic insights and experiences in terms of open innovation or entrepreneurship, or where these two topics intersected. This issue includes five works:

- The first work is the article of Vanhaverbeke (2013) that argued that open innovation can be applied in situations where companies do not develop new products or services, and argued that open-innovation scholars have insufficiently differentiated open-innovation initiatives in terms of their impact on companies' growth. According to Vanhaverbeke (2013) some open-innovation initiatives lead to incremental innovations in an existing business while, in other cases, open-innovation initiatives are used to establish completely new businesses.
- The second work is the article of Solesvik *et al.* (2013) that considered open innovation from the perspectives of causation and effectuation, and social networking. They examined the challenge of selecting partners for open innovation.

- The article of Iakovleva (2013), the third work of that issue of the Technology Innovation Management Review, aimed to extend the discussion in terms of entrepreneurial strategies of SMEs by including the concept of open innovation. The article shows how the innovative action of an SME may depend on the combined influence of entrepreneurial orientation within the firm and knowledge-providing cooperative links with knowledge providers.
- In the fourth article, Segers (2013) examined the impact of strategic partnerships and open innovation on the success of new biotechnology firms in Belgium by developing multiple case studies of firms in regional biotechnology clusters.
- At the end, De Cleyn *et al.* (2013) presented a case study of iMinds, a network organisation in Flanders, Belgium. They described how iMinds' incubation and entrepreneurship programs act as a catalyst for open business ecosystems.

Another initiative was the work of Chaston *et al.* (2012) that presents evidence in terms of the impact of entrepreneurial orientation and open innovation in firm performance, but how the work of Iakovleva (2013) did not link the dimensions of entrepreneurial orientation and open innovation.

Even in these works a multiplicity of approaches is perceived. One of the main concepts in terms of entrepreneurship studies for the last decades is entrepreneurial orientation. According to Campos *et al.* (2012) entrepreneurial orientation has received substantial conceptual and empirical attention, representing one of the few areas in entrepreneurship research in which a cumulative body of knowledge is developing.

### 2.2.1. Entrepreneurial Orientation

Entrepreneurial orientation allows understanding the entrepreneurship process. According to Lumpkin *et al.* (1996), entrepreneurial orientation refers to the processes, practices, and decision-making activities used by entrepreneurs that lead to the initiation of an entrepreneurial firm.

Several works use the entrepreneurial orientation construct. Chaston *et al.* (2012) used the construct to evaluate whether entrepreneurial behaviour sustains business growth in emerging economies. Fernández-Mesa *et al.* (2012) used structural equations modelling in a sample of 182 ceramic tile industry firms, and explored the relationship between entrepreneurial orientation and innovation performance that take organisational learning capability as a mediating variable. Iakovleva (2013) shows how the innovative action of an SME may depend on the combined in-



fluence of entrepreneurial orientation within the firm and knowledge-providing cooperative links with knowledge providers. Mello *et Leão* (2005), using the long interview method, applied the entrepreneurial orientation to study the entrepreneur behaviour of high-tech SMEs in Brazil.

Lumpkin *et Dess* (1996) identify five dimensions of entrepreneurial orientation, as follows:

- **Autonomy:** is defined by Lumpkin *et Dess* (2001) as an independent action by an individual or team aimed at bringing forth a business concept or vision and carrying it through to completion.
- **Competitive aggressiveness:** is said to reflect the intensity of a firm's effort to outperform industry rivals, characterized by a strong offensive posture and a forceful response to competitor's actions (Lumpkin *et Dess*, 2001);
- **Innovativeness:** according to Lumpkin *et Dess* (1996) innovativeness reflects a firm's Schumpeterian tendency to engage in and support new ideas, novelty, experimentation, and creative processes that may result in new products, services, or technological processes. Innovativeness represents a basic willingness to depart from existing technologies or practices and venture beyond the current state of art. (Lumpkin *et Dess*, 1996);
- **Proactiveness:** is defined as acting opportunistically to shape the environment by influencing trends, creating demand, and becoming a first mover in a competitive market (Lumpkin *et Dess*, 1996);
- **Risk taking:** involves the determination and courage to make resources available for projects that have uncertain outcomes, in other words those which involve risk (Villiers-Scheepers, 2012). According to Lumpkin *et Dess* (2001), risk taking refers to a tendency to take bold actions such as venturing into unknown new markets, committing a large portion of resources to ventures with uncertain outcomes.

However, Mello *et Leão* (2005) identified a sixth dimension called networks. According to them, this dimension was inserted because the entrepreneur must build relationships with partners to make the venture viable. According to Mello *et Leão* (2005), the key concept to this dimension is network identity. Mello *et Leão* (2005) concluded that the emergence of this dimension justifies the absence of the competitive aggressiveness dimension.

The term networks refer to two or more organisations involved in a long-term relationship (Thorelli, 1986). Probably the most salient part of the environment of any firm are other firms (Thorelli, 1986). Interfirm relations have been given surprisingly short shrift in marketing, industrial organisation economics and organisation theory (Thorelli, 1986). Strategic network identity consists of a firm's calculated and consolidated assessment of its set of existing and past relationships across partners over time (Bonner *et al.*, 2005). Strategic network identity also embraces the value of a firm's alliance network (Bonner *et al.*, 2005). Therefore, it seems reasonable to argue that a firm that perceives its strong strategic network identity has both the impetus to seek competitive advantage through its identity and has the ability to attract profitable partners and be favourably compensated, which, in turn, should enhance its marketplace performance (Bonner *et al.*, 2005). Bonner *et al.* (2005) considered three factors to analyse strategic network identity: reputation of the organization as a "partner of choice", competitive strength of alliance network and strength of relationships with key alliance partners.

Despite the absence of the competitive aggressiveness dimension, envisaged by Mello *et Leão* (2005), this dimension will be considered in our work. But, the innovativeness dimension will not be considered, because a firm that practices open innovation is naturally an innovative firm.

### 3. METHODOLOGY

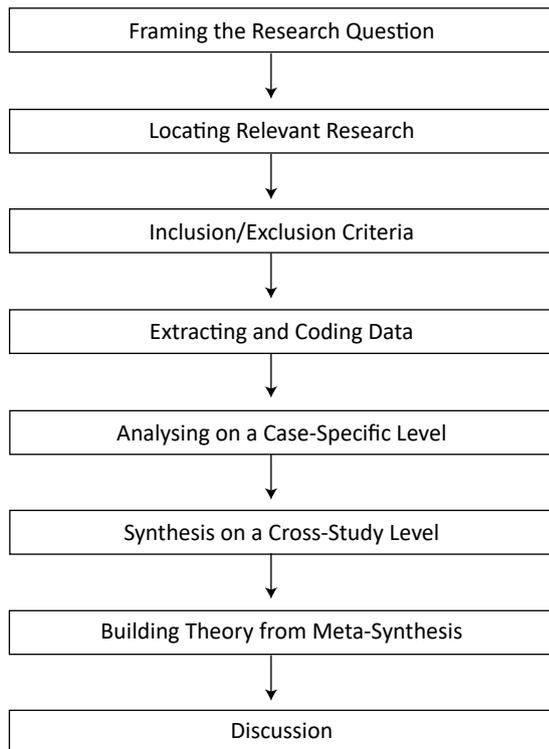
Our study is a meta-synthesis of qualitative case studies. Meta-synthesis seeks to synthesize the key variables and underlying relationships across a set of published qualitative case studies in order to reach a refined, extended, or even new theory (Hoon, 2013). The research interests of our meta-synthesis study focus on open innovation in start-ups or SMEs. The steps followed are presented in figure 3.

The first step, in other words, the research question was presented before: what do case studies report in terms of open innovation in start-ups or SMEs that would be related to entrepreneurial orientation?

In the next step, we choose the research database. The search was performed in SCOPUS using the following string: (TITLE-ABS-KEY ("open innovation") AND (TITLE-ABS-KEY (start-up) OR TITLE-ABS-KEY (high-technology) OR TITLE-ABS-KEY ("new venture") OR TITLE-ABS-KEY(SMEs))) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English") OR LIMIT-TO (LANGUAGE, "Portuguese")) AND (LIMIT-TO (SRCTYPE, "j")). The



aim was articles in English or Portuguese and published in journals. The term “open innovation” and least one of the following terms must be in the title, abstract or keywords of the articles: start-up, high-technology, new venture or SMEs. The search returned 70 results. However, the institutional access provided by CAPES (government agency linked to the Brazilian Ministry of Education that is responsible for promoting high standards for post-graduate courses in Brazil) allowed access to only 45 articles.



**Figure 3:** Meta-synthesis steps

Source: Hoon (2013)

The third step is the appropriate inclusion of relevant qualitative case studies. The exclusion criteria are: quantitative studies; conceptual works, no focus in open innovation; no focus in start-ups, SMEs or high-tech firms. One work was excluded because it was duplicated (printing mistake of the journal). At the end, 14 articles are available. The abstracts of articles were read to verify whether they met the criteria.

The fourth step, extracting and coding data, is the development of a coding form. The coding form has the following fields: Author(s), Title, Journal, Year, Literature Gap, Broader aim(s) of study, Research Question, Intended Contribution, Country, Sector, Longitude, Research Method, Multimethods, Unit of Analysis, Number of Cases Included, Sampling Strategy, Timing and Sequencing of Data Collection, Data Collection Techniques Used

by the Original Researcher, Data Sources, Key Findings as Summarized by the Original Researcher in Abstract/ Introduction/Conclusion Section, Inbound Open Innovation Activities, Outbound Open Innovation Activities, Environmental Conditions, Visualization of Conceptual Model or Framework as Provided by the Original Author(s), Discussion of Key Finding(s), Contribution(s) as Stated by the Original Researcher(s), Contribution to the Field of Open Innovation, Contribution to Other Fields, Limitations as Discussed by the Authors, Other Limitations, Study Relevance, Study Reliability, Missing Information, and Further Comments.

As the interest was in the intersection between open innovation activities and entrepreneurial orientation, a case dynamics matrix was chosen to analyse it on a case-specific level. According to Miles *et* Huberman (1994) a case dynamics matrix displays a set of forces for change and traces the consequential processes and outcomes. The entrepreneurial orientation dimensions were considered the set of forces for change, and open innovation activities were considered consequential processes.

Later, the cross-case analysis was performed. Why is the cross-case analysis used? According to Miles *et* Huberman (1994) one reason is to enhance generalisability. They affirm that, although it is argued that this goal is inappropriate for qualitative studies, multiple case studies, adequately sampled and analysed carefully, can help answering the reasonable question. A partially ordered meta-matrix was adopted. According to Miles *et* Huberman (1994) *meta-matrices* are master charts assembling descriptive data from each of several cases in a standard format. According to them the simplest form is juxtaposition – a stacking-up – of all of the single-case displays on one very large sheet or wall chart. The simplest form of a meta-matrix was chosen in this case.

The next section presents the theory from meta-synthesis and discussions.

#### 4. THE THEORY AND DISCUSSIONS

The outbound open innovation is neglected in SMEs. Van de Vrande *et al.* (2009) presented three ways to do outbound open innovation: venturing, outward intellectual property licensing, and employee involvement. The selected articles do not show examples of venturing performed by SMEs. It corroborates the affirmation of van de Vrande *et al.* (2009) that SMEs that are successfully engaged in venture activities tend to be the exception.

As to the outward intellectual property licensing, Bianchi *et al.* (2010) affirms that a critical success factor



in terms of the practice of open innovation is the timely identification of opportunities for out-licensing a firm's technologies outside its core business. Bianchi *et al.* (2010) affirms that this can be particularly challenging for SMEs because of their focused business portfolio, specialized knowledge basis, and limited financial resources that can be devoted to innovation activities. They presented a methodology for the identification of viable opportunities for out-licensing a firm's technologies outside its core business, developed in collaboration with an Italian SME. However, entrepreneurial orientation dimensions were not identified. Only one observation was presented: patent attorneys intentionally use cryptic terms to describe inventions in order to hide them from competitors. This may be considered an example of competitive aggressiveness, but it is not a specific characteristic of that Italian SME or that case study. Furthermore, one case cannot be generalized.

The same occurs with employee involvement. Only one article explored this activity and presented evidences of the relationship with entrepreneurial orientation dimension. According to Hutter *et al.* (2013), in the investigated SMEs, internal sources such as employees are still considered important sources of innovation, and they have autonomy to work. Furthermore, the employees and the firms are proactive; they look for getting ahead the competitors at introducing a new idea or product.

Unlike the outbound open innovation, inbound open innovation is very used, specifically customer involvement and external networking. There are evidences regarding outsourcing R&D, but none relationship with entrepreneurial orientation was found. Considering that there are multiple case studies, and they are adequately sampled, a theory may be built.

Customer involvement is strongly related with network dimension, despite evidences in terms of the relationship with risk-taking and proactiveness dimensions. Chesbrough (2003) stressed the importance of value networks in the seminal work about open innovation. According to him, creating and appropriating value also involves third parties outside the immediate value chain and, taken together, these outside parties form a value network. Chesbrough (2003) still affirms that the value network created around a given business shapes the role that suppliers, customers, and third parties play in influencing the value captured from the commercialization of an innovation. Customer involvement was also mentioned by Chesbrough (2003). According to him, the networked world essentially allows to bring customers into the lab as co-producers, allowing tapping not only the customers' explicit knowledge, but also their tacit knowledge made. Chesbrough (2003) still affirms that

prototypes used by real customers, who are dealing with their own problems, afford a kind of reflection in terms of the practice that helps to flush out serious flaws, misleading instructions, and missing functionality before the product is brought to market. About this, Ståhlbröst (2012) affirms that the risk of opening up their processes decreases if they are opened up as early as possible, since it is possible to get to know the users' needs early on; and also, according to Ståhlbröst (2012) the Living Labs approach presents proactiveness at the anticipated future opportunities of a product. According to the European Network of Living Labs (ENoLL), a Living Lab is a real-life test and experimentation environment where users and producers co-create innovations.

For instance, the Living Lab approach created business values for the involved SME and value for the intended customers through improved design of the innovation (Ståhlbröst, 2012). Brunswicker *et Ehrenmann* (2013) also cited an example of a German software company that builds up downstream partnerships to increase sales potential. Increasing sales potential is the result of better understanding customers' needs.

Thus, when should customers be involved? Lazzarotti *et al.* (2011) distinguish four different open innovation models with respect to two variables, representing the degree of openness: the number and type of partners with whom the company collaborates and the number and types of phases of the innovation process currently open to external collaborations. They are: open innovators, closed innovators, integrated collaborators and specialised collaborators. Grimaldi *et al.* (2013) used this open innovation models approach and presented the case of a specialized innovator company, whose relationship between the company and one association enables the firm to develop a better understanding in terms of the *coeliac disease* and, as a consequence, to successfully develop a line of products that would fully meet the needs of individuals with the *coeliac disease*. Still considering the affirmation of Ståhlbröst (2012), in which the risk of opening up their processes decreases if they are opened up as early as possible, since it is possible to get to know the users' needs early on, the customer must take part in the generation of ideas and concept defining phases. Grimaldi *et al.* (2013) presented an example that, in an integrated company of a collaborator, the impulse towards innovation came from an idea of a client who had expressed a specific need to the company.

The company studied by Brunswicker *et Ehrenmann* (2013) defines itself as a networked enterprise and as an open innovator according to the above specified open innovation paradigm. In this case, the company is aware of its customers, suppliers, complementors, competitors,



intermediaries and uses its network both for the commercialization of products (i.e. operations) and for the innovation management. This company uses both customer involvement and external networking as inbound open innovation.

The participation of suppliers is very important, but they do not play a fundamental role in terms of developing innovations. In the company studied by Grimaldi *et al.* (2013), the strong links with the suppliers enabled to finalize a product with a high electronic content in the integrated collaborator's firm. In this case, the network resources did not play a fundamental role in implementing this innovation, although the partnership link, previously activated by the company, represented an asset for the realization of a successful product. The flexibility of the personnel to rapidly adjust to the new production process, the capacity to coordinate an in-depth study of the different packaging methods of the new product (working in close contact with the suppliers), the ability to finalize the new product in 12 months and the realization of new commercial and marketing policies guaranteed the success of one innovation on open innovation firm (Grimaldi *et al.*, 2013).

However, intermediaries are very important. The Living Labs approached by Ståhlbröst (2012) promotes the interactions between SMEs and customers. The company studied by Brunswicker *et Ehrenmann* (2013) implemented a relationship promoter (i.e. in addition to champions and power promoter) to facilitate cross-company innovation within networks.

Networking with public research bodies are a good innovation source for SMEs. Grimaldi *et al.* (2013) presented an example of innovation developed by a specialized innovator company. The innovation is the production line of pasta made from raw material of certified origin, that was the result of a process of research and development that, in a few years, led to the release of a new product. The relationship set between the enterprise and public research bodies, in particular the universities, proved to be a determining factor.

Hutter *et al.* (2013) show that within the small and micro firms surveyed, other external sources for ideas, inventions and inspiration are mainly other corporations and partner firms. Even within the venture capital (VC) companies (a kind of inbound open innovation activity) the interaction and collaboration between VC firms and large corporations is not only common, but has become a critical component to VC activity in the United Kingdom, as demonstrated by Watkins (2010). This collaboration provides VC firms with an important mechanism for accessing external or extra-regional knowledge, particu-

larly changing industry dynamics and corporate product innovation needs, with the value of this collaboration particularly felt at the very early stage (i.e., investment selection) and the very late stage of the investment cycle (i.e., investment exit).

Lastly, it is important to highlight that there are two kinds of knowledge networks: global and local. The outcomes from the study of van Geenhuizen *et Nijkamp* (2012) suggest coexistent use of both mainly local and mainly global knowledge networks in city-regions, and losing local connectedness by some of the globalized companies, particularly those involved in the co-creation of products with global customers and those acting as learning partners of global multinational corporations.

## 5. CONCLUSION

Two preliminary considerations are important before presenting the conclusions in terms of the results from the meta-synthesis. The first consideration is: the relationship between open innovation and entrepreneurial orientation are still little explored. Despite the specificity of our research, the theoretical background shows few case studies related to open innovation and entrepreneurship. Open innovation as a young research area is a weak excuse, since the relationship between innovation and entrepreneurship has been known for a long time. Several gaps were found in meta-matrix: the risk-taking dimension with other open innovation activities (only customer involvement was present); the proactiveness dimension is only related with two activities of open innovation (employee involvement and customer involvement); the autonomy dimension is only related with employee involvement and; the competitive aggressiveness dimension has no relationships. The only dimension of the entrepreneurial dimension with more than two relationships is networks. Despite this fact, there is no relationship between networks and outbound open innovation activities, and some inbound open innovation activities (external participation, outsourcing R&D and inward IP licensing). Exploratory studies are very important to fill these gaps.

The second consideration is: the outbound open innovation is neglected in both multinationals and SMEs. Despite the low infrastructure of SMEs and start-ups, it is a good opportunity for revenues and a strategic position is established. It is understandable that venturing is very difficult to this kind of firm, but through employees the firm can develop technologies to sell. The literature presents a gap about the use of outbound open innovation in SMEs. It is an opportunity to future case studies, which may contribute with academics and practitioners.



The most prominent entrepreneurial orientation dimension was networks. Despite the fact that Lumpkin *et* Dess (1996) did not present this dimension, empirical evidences were pointed by Mello *et* Leão (2005) about the presence of this dimension and the absence of competitive aggressiveness in high-tech enterprises in Brazil. Our work corroborates these findings of Mello *et* Leão (2005), even due to the absence of approaches related to the competitive aggressiveness dimension. The networks dimension is strongly related with customer involvement and external networking. The customer involvement apparently is very important in the first phases of development, because the risk of opening up their processes decreases if they are opened up as early as possible since it is possible to get to know the users' needs early on. It is expected that customers' involvement increases sales potential. Despite the literature evidences in terms of customer's involvement, it is important to understand how this involvement occurs. Thus, there is another opportunity for future studies.

External networking was very important. The Living Labs approach in the early phases of development is useful to SMEs because of the low infrastructure of this kind of firm. Unlike customer involvement, the suppliers and other partners are important in later phases, such as production, distribution and commercialization.

One important observation: there are many success cases in the literature. Successes are attractive; however, to understand a new area, it is important to know what does not work in order avoid mistakes. It is almost impossible for all the open innovation cases to be successful. Researchers must look for unsuccessful cases, and even these cases must be analysed through secondary data. Probably the organisations are not open to report their failures.

Ultimately, our work has limitations. Not all articles were analysed because of our limited access provided by CAPES. Furthermore, other terms can be applied in the research, such as smart companies and young companies. However, a theory is presented and must be authenticated. Future studies, such as surveys, are desirable to confirm the presented theory and contribute to the body of knowledge of open innovation.

## REFERENCES

- ABSTARTUPS (2014). "Associação Brasileira de Startups." Accessed December 01. <http://www.abstartups.com.br>.
- Brunswicker, S. et Ehrenmann, F. (2013) "Managing Open Innovation in SMEs: A Good Practice Example of a German Software Firm", *International Journal of Industrial Engineering and Management*, vol. 4, no.1, pp. 33-41.
- Bianchi, M.; Campodall'orto, S.; Frattini, F.; Vercesi, P. (2010) "Enabling open innovation in small-and medium-sized enterprises: how to find alternative applications for your technologies", *R&D Management*, vol. 40, no. 4, pp. 414-431.
- Bianchi, M.; Cavaliere, A.; Chiarone, D.; Frattini, F.; Chiesa, V. (2011) "Organisational modes for Open Innovation in the bio-pharmaceutical industry: An exploratory analysis", *Technovation*, vol. 31, pp. 22-33.
- Bonner, J. M.; Kim, D.; Cavusgil, S. T. (2005) "Self-perceived strategic network identity and its effects on market performance in alliance relationships", *Journal of Business Research*, vol. 58, pp. 1371-1380.
- Campos, H. M.; de la Parra, J. P. N.; Parellada, F. S. (2012) "The Entrepreneurial Orientation-Dominant Logic-Performance Relationship in New Ventures: an Exploratory Quantitative Study", *Brazilian Administration Review*, vol. 9, special issue, pp. 60-77.
- Chaston, I. et Scott, G. J. (2012), "Entrepreneurship and open innovation in an emerging economy", *Management Decision*, vol. 50, no. 7, pp. 1161-1177.
- Chesbrough, H. W. (2003), *Open Innovation: The New Imperative for Creating and Profiting from Technology*, 1 ed., Harvard Business School Press, Boston, MA.
- Chesbrough, H.W. (2006), *Open Innovation: Researching a New Paradigm*, 1 ed., Oxford University Press, Oxford.
- Chesbrough, H. et Crowther, A.K. (2006), "Beyond high-tech: early adopters of open innovation in other industries", *R&D Management*, vol. 36, no. 3, pp. 229-36.
- Conboy, K. et Morgan, L. (2011), "Beyond the customer: Opening the agile systems development process", *Information and Software Technology*, vol. 53, pp. 535-542.
- de Cleyn, S.H.; Gielen, F.; Coppens, J. (2013), "Incubation Programs from Public Research Organizations as Catalysts for Open Business Ecosystems", *Technology Innovation Management Review*, April 2013, pp. 29-34.
- ENoLL (2014). "European Network of Living Labs." Accessed December 01. <http://www.openlivinglabs.eu/aboutus>.
- Fernández-Mesa, A.; Alegre-Vidal, J.; Chiva-Gómez, R. (2012) "Orientación Emprendedora, Capacidad de Aprendizaje Organizativo y Desempeño Innovador", *Journal of Technology Management & Innovation*, vol. 7, no. 2, pp. 157-170.
- Freeman, C. (1982) *The Economics of Industrial Innovation*. Frances Pinter.
- Galindo, M. et Mendez-Picazo, M. (2013) "Innovation, entrepreneurship and economic growth", *Management*



- Decision, vol. 51, no. 3, pp. 501-514.
- Gassmann, O. et Enkel, E. (2004), "Towards a theory of open innovation: three core process archetypes", article presented in R&D Management Conference, Lisbon, Portugal, 2004.
- Grimaldi, M.; Quinto, I.; Rippa, P. (2013) "Enabling Open Innovation in Small and Medium Enterprises: A Dynamic Capabilities Approach", *Knowledge and Process Management*, vol. 20, no. 4, pp. 199-210.
- Hoon, C. (2013) "Meta-Synthesis of Qualitative Case Studies: An Approach to Theory Building". *Organizational Research Methods*, vol. 16, no. 4, pp. 522-556.
- Hossain, M (2013) "Open innovation: so far and a way forward". *World Journal of Science, Technology and Sustainable Development*, vol. 10, no. 1, pp.30-41.
- Huizingh, E. K. R. E. (2011) "Open innovation: State of the art and future perspectives", *Technovation*, vol. 31, pp. 2-9.
- Hutter, K.; Hautz, J.; Repke, K.; Matzler, K. (2013) "Open innovation in small and micro enterprises", *Problems and Perspectives in Management*, vol. 11, no. 1, pp. 12-22.
- Iakovleva, T. (2013), "Open Innovation at the Root of Entrepreneurial Strategy: A Case from the Norwegian Oil Industry", *Technology Innovation Management Review*, April 2013, pp. 17-22.
- Lazzarotti, V.; Manzini, R.; Pellegrini, L. (2011) "Firm-specific factors and the openness degree: a survey of Italian firms", *European Journal of Innovation Management*, vol. 14, no. 4, pp.412-434.
- Lumpkin, G. et Dess, G. (1996) "Clarifying the Entrepreneurial Orientation Construct and linking it to Performance", *Academy of Management Review*, vol. 21, no. 1, pp. 135 – 172.
- Lumpkin, G. et Dess, G. (2001) "Linking two dimensions of entrepreneurial orientation to firm performance: the moderating role environment and industry life cycle", *Journal of Business Venturing*, vol.16, pp. 429–451.
- Mello, S. C. B. et Leão, A. L. M. S. (2005) "Compreendendo a orientação empreendedora de empresas de alta tecnologia" in SOUZA, E. C. L. et GUIMARÃES, T. A. (Ed.) *Empreendedorismo Além do Plano de Negócios*, Editora Atlas, São Paulo, SP, pp. 162-178.
- Miles, M. B. et Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*, 2 ed., Sage, Thousand Oaks, CA.
- Ndubisi, N. O. et Iftikhar, K. (2012) "Relationship between entrepreneurship, innovation and performance: Comparing small and medium-size enterprises", *Journal of Research in Marketing and Entrepreneurship*, vol. 14, no. 2, pp. 214-236.
- Rauch, A.; Wiklund, J.; Lumpkin, G. T.; Frese, M. (2009) "Entrepreneurial orientation and business performance: an assessment of past research and suggestions for the future", *Entrepreneurship Theory and Practice*, vol. 33, no. 3, pp. 761-787.
- Schumpeter, J. (1934). *The Theory of Economic Development*, 1 ed., Harvard University Press, Boston, MA.
- Segers, J. P. (2013), "Strategic Partnerships and Open Innovation in the Biotechnology Industry in Belgium", *Technology Innovation Management Review*, April 2013, pp. 23-28.
- Shan, W. (1990) "An empirical analysis of organizational strategies by entrepreneurial high-technology firms", *Strategic Management Journal*, vol. 11, pp. 129-139.
- Solesvik, M. Z. et Gulbrandsen, M. (2013), "Partner Selection for Open Innovation", *Technology Innovation Management Review*, April 2013, pp. 11-16.
- Soriano, D. R. et Huang, K. (2013) "Innovation and entrepreneurship in knowledge industries". *Journal of Business Research*, vol. 66, pp.1964-1969.
- Ståhlbröst, A. (2012) "A Set of Key Principles to Assess the Impact of Living Labs". *International Journal of Product Development*, vol. 17, pp. 60-75.
- Swami, S. et Porwall, R. (2005) "Entrepreneurship, innovation and marketing: conceptualization of critical linkages", *Journal of advances in management research*, vol. 2, no. 2, pp. 54-69.
- Thorelli, H. B. (1986), "Networks: between markets and hierarchies", *Strategic Management Journal*, vol. 7, no. 1, pp.37-51.
- van de Vrande, V.; Jong, J. P. J.; Vanhaverbeke, W.; Rochemont, M. (2009), "Open innovation in SMEs: Trends, motives and management challenges", *Technovation*, vol. 29, pp.423-437.
- van Geenhuizen, M. et Nijkamp, P. (2012), "Knowledge virtualization and local connectedness among young globalized high-tech companies", *Technological Forecasting & Social Change*, vol. 79, pp.1179-1191.
- Vanhaverbeke, W. (2013), "Rethinking Open Innovation Beyond the Innovation Funnel", *Technology Innovation Management Review*, April 2013, pp. 6-10.
- Villiers-Scheepers, M. J. (2012) "Antecedents of strategic corporate entrepreneurship", *European Business Review*, vol. 24, no. 5, pp. 400-424.
- Wang, Y. et Zhou, Z. "Can open innovation approach be applied by latecomer firms in emerging countries?", *Journal of Knowledge-based Innovation in China*, vol. 4, no. 3, pp. 163-173.



Watkins, A. (2010), "The Venture Capital Perspective on Collaboration with Large Corporations/MNEs in London and the South East: Pursuing Extra-Regional Knowledge and the Shaping of Regional Venture Capital Networks?", *Review of Policy Research*, vol. 27, no. 4, pp. 491-507.

West, J.; Salter, A.; Vanhaverbeke, W.; Chesbrough, H. (2014), "Open innovation: The next decade", *Research Policy*, vol. 43, no. 5, pp. 805-811.

Zhao, F. (2005) "Exploring the synergy between entrepreneurship and innovation", *International Journal of Entrepreneurial Behaviour & Research*, vol. 11, no. 1, pp. 25-41.