Entrepreneurial orientation and open innovation in brazilian startups: a multicase study

Orientação empreendedora e inovação aberta em startups brasileiras: um estudo multicaso

Orientation entrepreneuriale et innovation ouverte dans des startups brésiliennes: une étude cas multiples

Orientación emprendedora e innovación abierta en startups brasileñas: un estudio multicaso

Eduardo Gomes Carvalho*
(eduardo@varginha.cefetmg.br)
Joel Yutaka Sugano**
(joel.sugano@dae.ufla.br)

Recebido em 02/12/2015; revisado e aprovado 15/04/2016; aceito em 27/04/2016
DOI: http://dx.doi.org/10.20435/1984-042X-2016-v.17-n.3(08)

Abstract: Entrepreneurship and innovation are the basis to regional and national development. Therefore, entrepreneurs and startups are protagonists in this scenario. However, a new paradigm emerges in innovation studies: Open Innovation. But the relationship between Open Innovation and entrepreneurship is few explored. Thus, our work aims to fill this gap. Using case studies we check the hypotheses presented by Carvalho and Sugano (2016). At end, a framework and new hypotheses were presented to future studies.

Key words: entrepreneurship; entrepreneurial orientation; open innovation.

Resumo: Empreendedorismo e inovação são bases para o desenvolvimento regional e nacional. Portanto, empreendedores e startups passam a ser protagonistas neste cenário. No entanto, um novo paradigma surge em estudos de inovação: Open Innovation. Mas a relação entre inovação aberta e empreendedorismo é pouco explorada. Assim, nosso trabalho visa preencher esta lacuna. Usando estudos de caso vamos verificar as hipóteses apresentadas por Carvalho e Sugano (2016). Ao final, um *framework* e novas hipóteses foram apresentados para estudos futuros.

Palavras-chave: empreendedorismo; orientação empreendedora; inovação aberta.

Résumé: Entrepreneuriat et innovation sont la base du développement régional et national. Par conséquent, les entrepreneurs et les startups sont les protagonistes de ce scénario. Toutefois, un nouveau paradigme émerge dans les études d'innovation: l'innovation ouverte. Mais la relation entre l'innovation ouverte et de l'entrepreneuriat est peu exploré. Ainsi, notre travail vise à combler cette lacune. En utilisant des études de cas, nous vérifions les hypothèses présentées par Carvalho et Sugano (2016). Enfin, un framework et de nouvelles hypothèses pour de futures études ont été présentés.

Mots-clés: entrepreneuriat; orientation entrepreneuriale; innovation ouverte.

Resumen: El espíritu emprendedor y la innovación son la base para el desarrollo regional y nacional. Por eso, los emprendedores y startups convierten en protagonistas en este escenario. No obstante, un nuevo paradigma emerge en los estudios de innovación: la innovación abierta. Pero la relación entre la innovación abierta y el espíritu emprendedor es poco explorada. Así, nuestro trabajo tiene como objetivo llenar este vacío. Utilizando estudios de caso, comprobamos las hipótesis presentadas por Carvalho y Sugano (2016). Al final, fueron presentados un framework y nuevas hipótesis para futuros estudios.

Palabras clave: espíritu emprendedor; orientación emprendedora; innovación abierta.

* Centro Federal de Educação Tecnológica de Minas Gerais, Varginha, Minas Gerais, Brasil.
** Universidade Federal de Lavras, Lavras, Minas Gerais, Brasil.

1 INTRODUCTION

Open innovation is between the hottest topics in innovation studies. However the relationship between open innovation and the broader disciplines of management is unexplored, as pointed by West et al. (2014). An important discipline of management (and highly linked with innovation) is entrepreneurship. Even before West et al. (2014), Hossain (2013) identified the gap of studies about open innovation and entrepreneurship.

As affirmed, the relationship between innovation and entrepreneurship is relevant in the literature. A pioneer in the studies about entrepreneurship and innovation is Schumpeter (1934). Schumpeter (1934) viewed the entrepreneur as innovator. Schumpeter (1934) maintained that innovation contributes to the growth of the economy because entrepreneurs produce innovations. After Schumpeter (1934), other important author that touched on the conceptual relationship between innovation and entrepreneurship is Drucker (1994). Other several works (NDUBISI; IFTIKHAR, 2012; SWAMI; PORWAL, 2005; Zhao, 2005; Galindo; Mendez-Picazo, 2013) explored the relationship between innovation and entrepreneurship. But, why the relationship between open innovation and entrepreneurship is still unexplored?

First, open innovation is still under scrutiny, and it is rooted in technology. Therefore, the relationship between open innovation and the disciplines of economics and management is the next step to understand the phenomenon of open innovation. Second, this relationship is not entire unexplored. For example, Chaston and Scott (2012), through a survey, presented evidences about the impact of entrepreneurial orientation and open innovation in firm performance, but they did not link the dimensions of entrepreneurial orientation and open innovation. After, the issue of April 2013 of the Technology Innovation Management Review, entitled Open Innovation and Entrepreneurship, works of authors from Belgium and Norway that explore this relationship were presented (DE CLEYN et al., 2013; IAKOVLEVA, 2013; SEGERS, 2013; SOLESVIK; GULBRANDSEN, 2013; VANHAVERBEKE, 2013). Recently, Eftekhari and Bogers (2015), using case study, explored how an open approach to new venture creation can be beneficial for start-up entrepreneurs. Cheng and Huizingh (2014) addressed how three types of strategic orientations, between them Entrepreneurial Orientation, moderate the relationship between Open Innovation and innovation performance. But, no one explored Entrepreneurial Orientation as driver for Open Innovation.

Notwithstanding, Carvalho and Sugano (2016), using systematic review, presented some hypotheses that explore the relationship between open innovation and entrepreneurial orientation, defending the hypothesis of Entrepreneurial Orientation as driver for Open Innovation. Thus, our work aims to check the hypotheses presented by Carvalho and Sugano (2016). At check those hypothesis we are trying to answering the following question: What is the relationship between Open Innovation and Entrepreneurial Orientation? Our proposition is that Entrepreneurial Orientation dimensions are correlated with Open Innovation, and both impact the firm performance. The research method adopted is case study. In contrast to Cheng and Huizingh (2014), we aim to focus on firm performance, not in innovation performance.

Next we present a theoretical background about open innovation and entrepreneurial orientation, followed by methodological section. Posteriorly, the discussion is presented. At end, we present the final considerations.

2 THEORETICAL BACKGROUND

2.1 Open Innovation

Chesbrough is the pioneer in the studies of Open Innovation. The book of Chesbrough (2003) not just compiled reflections from a former Silicon Valley manager's, but presented a first definition of Open Innovation. According to Chesbrough (2003) 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. However, posteriorly, Chesbrough (2006) emphasize 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 to accelerate internal innovation, and expand the markets for external use of innovation, respectively. But, in a new effort to define open innovation West et al. (2014) presented the most actual definition of open innovation provided by Chesbrough and Bogers (2014), that considerate the increasing interest in non-pecuniary knowledge flows, being open innovation defined as a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model.

Saebi and Foss (2015) analyzed the definitions provided by Chesbrough and others and pointed three points. First, open innovation studies are congruent with regard to their understanding of open innovation as a set of practices that facilitate both purposive inflows and outflows of knowledge; thus open innovation generally encompasses both inbound and outbound dimensions of innovation processes. Second, studies seem to agree that pursuing open innovation requires a certain degree of permeability of organizational and innovation process boundaries to guarantee successful innovation. Third, extant definitions of open innovation are kept broad, arguably to reflect what Huizingh (2011) calls the "appeal" of open innovation, namely that it provides the "umbrella that encompasses, connects and integrates a range of already existing activities".

The first observation of Saebi and Foss (2015) reflects what is known as macroprocess or archetypes of Open Innovation. Gassmann and Enkel (2004) present three macroprocess of Open Innovation: outside-in, inside-out and coupled. The outside-in process is related to enriching the company's own knowledge base through the integration of suppliers, customers and external knowledge sourcing can increase a company's innovativeness. The inside-out process refers to profits by bringing ideas to market, selling intellectual property and multiplying technology by transferring ideas to the outside environment. The coupled process involves coupling the outside-in and inside-out processes by working in alliances with complementary partners in which give and take is crucial for success. 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.

Usually, most works refers only to outside-in and inside-out dimensions. Furthermore, Conboy and Morgan (2011) use the terms inbound and outbound to define respectively outside-in and inside--out. The other case is van de Vrande et al. (2009), which adopt the terms technology exploration and technology exploitation to define respectively inbound and outbound open innovation.

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 actually open to external collaborations (innovation phase variety). The open innovation models are:

- **Open Innovators**: corresponds to companies that are really able to manage a wide set of technological relationships, that impact on the whole innovation funnel and involve a broad set of different partners;
- **Closed Innovators**: corresponds to companies that access external sources of knowledge only for a specific, single phase of the innovation funnel and typically in dyadic collaborations;
- **Integrated Collaborators**: corresponds to companies that open their whole innovation funnel but only to contributions coming from a few types of partners and;
- **Specialized Collaborators**: corresponds to companies that are able to work with many different partners but concentrate their collaborations at a single stage of the innovation funnel.

Carvalho et al. (2016) point studies about open innovation in startups are a gap in literature. Startups are a kind of company which is expected a more prominent entrepreneurial behavior. But, what makes a firm entrepreneurial, and how do we distinguish entrepreneurial firms from those more conservatively managed?

2.2 Entrepreneurial Orientation

The previous section closes with a question. According to Anderson et al. (2015) the foundational paper of Miller (1983) provided much needed clarity regarding this fundamental issue to management scholars. The objective of the research of Miller (1983) was to discover the chief determinants of entrepreneurship, the process by which organizations renew themselves and their markets by pioneering, innovation, and risk taking. The first constructs of entrepreneurial orientation rely on three dimensions identified by Miller (1983): innovativeness, proactiveness and risk taking. Later, Lumpkin and Dess (1996) identified more two dimensions of entrepreneurial orientation: autonomy and competitive aggressiveness. Autonomy is defined by Lumpkin and Dess (2001) as 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; DESS, 2001). Innovativeness reflects, according to Lumpkin and Dess (1996), 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. 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; DESS, 1996). Risk taking is defined by Lumpkin and Dess (2001) 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.

According to Anderson et al. (2015) despite the burgeoning scholarly interest in this area, a number of ontological questions persist in the Entrepreneurial Orientation literature, between them there are ongoing conversations regarding the dimensionality of Entrepreneurial Orientation. For example, there are works that adopt four dimensions, such as Covin and Covin (1990): innovativeness, proactiveness, risk taking and competitive aggressiveness. There are works that competitive aggressiveness in proactiveness dimension or as synonymous, such as Covin and Slevin (1989) and Covin and Slevin (1991). Other example is Mello and Leão (2005), that identified a sixth dimension in high-tech enterprises in Brazil called networks. According to them, this dimension was inserted because the entrepreneur must build relationships with partners to become viable the venture. According to Mello and Leão (2005), the key concept to this dimension is network identity. Mello and Leão (2005) concluded that the emergence of this dimension justify the absence of the competitive aggressiveness dimension. Our work

adopts five dimensions: autonomy, innovativeness, proactiveness, risk taking and networks.

We must stress that entrepreneurial orientation is among the main concepts in entrepreneurship studies in the last decades. According to Rauch et al. (2009) and Anderson et al. (2015) entrepreneurial orientation has emerged as a major construct in the strategic management and entrepreneurship literature over the years. Entrepreneurial orientation has been used around the world to measure the level of entrepreneurial behavior of the firms. 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.

3 METHODOLOGY

Given the objective of the study and the hypotheses presented by Carvalho and Sugano (2016), we conducted a case study (EISENHARDT, 1989; YIN, 1994). According to Eisenhardt (1989) the case study is a research strategy which focuses on understanding the dynamics present within single settings. Figure 1 provides a summary of the research steps discussed below.

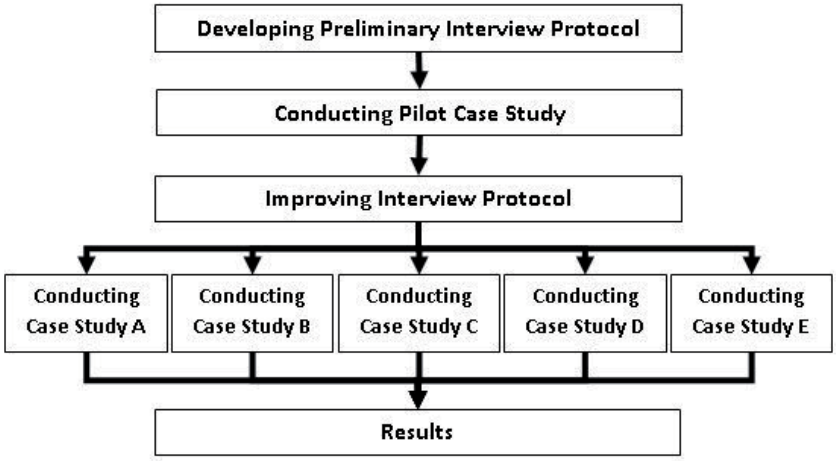

Figure 1 – Research Steps

First, a preliminary interview protocol was developed. The interview protocol and the pilot case study are presented next. Afterward, the interview protocol was improved and the case studies were conducted. At end, the data were analyzed and the results are presented in discussion section.

3.1 Pilot Case Study

The interview protocol to pilot case study was based on the framework proposed by Ndubisi and Iftikhar (2012). Ndubisi and Iftikhar (2012) developed a framework that considers the relationship between entrepreneurship, innovation and quality performance in small and medium-size enterprises. In our framework, innovation is replaced by Open Innovation, divided in outbound open innovation and inbound open innovation. The Entrepreneurial Orientation is used instead of entrepreneurship and has three constructs: risk taking, proactiveness and autonomy. In questionnaire, the risk taking construct has five items, while the proactiveness construct has five items and autonomy construct has three items. The inbound open innovation construct

and outbound open innovation construct are the adopted by Huang et al. (2013). In questionnaire, both the constructs have five items. Firm performance construct used by Huang et al. (2013) was adopted instead of quality performance construct adopted by Ndubisi and Iftikhar (2012). In questionnaire, the firm performance construct has four items and analyzes profit, return on sales, quality of products/services and reliability of products. A single pilot test was performed with an academic that was an entrepreneur too.

The enterprise chosen is a high tech startup that develops solutions in information technology to agribusiness. The firm was chosen, because it was considered in 2012 top 10 between Brazilian startups, according Info (a Brazilian magazine). The firm has two mainly products based in image analysis technology, is situated in Minas Gerais state, in Brazil, and was established in 2008. The firm has 14 employees.

The owner was interviewed and he has knowledge about open innovation and the firm strategy. The interview was conducted in the firm. There were no problems to understand the questions, however other problems are evidenced. First, a structured questionnaire is not adequate to a deep understanding. It is important opened questions to a better understanding. Second, the questions were not adequate to small and medium enterprises. Third, there were problems with translation. The fourth problem is the absence of network dimension. Thus, a new interview protocol must be developed, based in three premises: using preferentially constructs in Portuguese, and/or focused in small and medium enterprises and with opened questions. As precondition the constructs should preferably be derived from studies that applied structural equation modeling, aiming future quantitative studies.

Thus, a new interview protocol was developed. To collect data about Open Innovation we did not find an interview protocol in Portuguese language. However, we defined van de Vrande et al. (2009) as construct because it is the first and the most cited work to analyze Open Innovation in small and medium enterprises. The Entrepreneurial Orientation construct was Li et al. (2009). The construct of Li et al. (2009) was chosen because we did not find a construct in Portuguese language. Two questions were inserted in this construct to analyze hypotheses presented by Carvalho and Sugano (2016). The network dimension was evaluated using the construct provided by Bonner et al. (2005). Again, we did not find a construct in Portuguese language. Yet, to collect information about firm performance was used the construct provided by Fernandes and Santos (2008), because it is in Portuguese Language. However, the firm performance construct is very similar to that used in the pilot case. The degree of agreement toward each item can be categorized into seven levels from "extremely disagree" to "extremely agree". Also, the questionnaire has questions of identification and opened questions about each construct. Because of the need of translations and to verify the understanding of questions 7 pilot test were applied in entrepreneurs and academicians. After each application the questionnaire was changed. There were no problems in the last two applications, and then we considered that the instrument was ready.

The framework was developed, considering the interview protocol and the hypotheses presented by Carvalho and Sugano (2016). Thus, the framework of this research is shown in Figure 2.

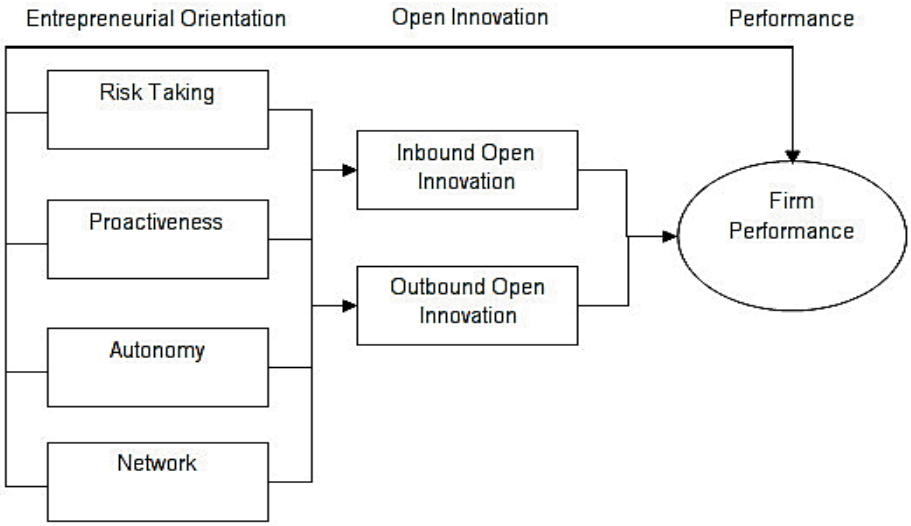

Figure 2 – The proposed conceptual framework.

3.2 The Case Studies

The enterprises were selected to case study not because the easy access reason, but because they are in evidence newspaper clippings. We take care to interview the owner, because reliability issues. All companies are located in Minas Gerais. The companies A, B and E are distant about 129 miles at south from the pilot case. The company C is distant about 115 miles at south from pilot case, while the company D is distant about 149 miles at north from pilot case.

Company A is located at town of Santa Rita do Sapucaí, south of state of Minas Gerais. Before describing the company, it is important to note that the town of Santa Rita do Sapucaí is known as Electronic Valley and it is an important cluster. Because of this, several works (BOTELHO et al., 2013; GARCIA et al., 2015, SOUSA et al., 2015) study the cluster of Santa Rita do Sapucaí and its enterprises. Company A begins its activities in 2010 in Business Incubator Inatel (*Instituto Nacional de Telecomunicações* – National Institute of Telecommunications) and it has 7 employees. Since 2013 the company is working out of business incubator. Company A develops products and provides services in information and communications technologies. The company has a subsidiary in the city of São Paulo (an important Brazilian economic center located 144 miles from the Company A). Company A is winner of MPE Brazil award in 2012, in the category information technology. The MPE Brazil award – a competitiveness award for micro – and small – sized companies – is intended to spread the concepts of the Management Excellence Model (from the Portuguese language acronym MEG – *Modelo de Excelência da Gestão*). Company A may be considered an open innovator, following the criteria provide by Lazzarotti et al. (2011).

Company B is also located at town of Santa Rita do Sapucaí, south of state of Minas Gerais. Company B begins its activities in 2012 in Business Incubator Inatel and it has 22 employees. Company B supplies internet service providers. Its products have electricity concentrator system that provides the Internet service provider the ability to provide broadband via optical fiber, at very low cost. The company has won several awards, such as Startup Session at Futurecom 2013 (largest exhibition of technology in Latin America) and the third place in National Award for Innovative Entrepreneurship provided by Sebrae (Brazilian Service of Support to Micro and Small Enterprises – *Serviço Brasileiro de Apoio às Micro e Pequenas Empresas*) and

Anprotec (National Association of Entities Promoting Innovative Enterprises – *Associação Nacional de Entidades Promotoras de Empreendimentos Inovadores*). Company B may be considered an open innovator.

Company C is located at city of Pouso Alegre, south of state of Minas Gerais. The company begins its activities in 2014 and it has only 2 employees: the owner and the partner. Company C works with mobile software development. The main product is an application to supermarkets. In 2015, the company was chosen to uMov.me Labs project. The uMov.me Labs project is a startup acceleration project created by an enterprise focused in mobile solutions to corporative market. Company C may be considered an open innovator.

Company D is located at town of Santa Rita do Sapucaí, south of state of Minas Gerais. It begins the activities in 2012 in Business Incubator Inatel and it has 4 employees. Company D works with energy solutions. Its main product is a digital electrical switchboard that allows tracking power consumption. The company is in evidence in national media, mainly after national energy crisis. Company D is in internationalization process. Company D may be considered an open innovator.

At end, Company E is located at City of Belo Horizonte, the state capital of Minas Gerais. The company begins its activities in 2015. It has 6 employees and works with smart vehicle systems. The main product is a device to collect information about the vehicle and generates reports to maintenance. The company was conceived inside the Federal University of Minas Gerais and it works in BHTec (Technological Park of Belo Horizonte). Company E has won several awards, such as Startup Farm (largest program of startup acceleration of Latin America), UFMG Challenge and Plano Beta, the last two about business plan. Company E may be considered a specialized collaborator.

4 DISCUSSION

The sources of evidence were three: interviews, direct observations and documentation. The documentation is mainly based in newspaper clippings and other articles appearing in the mass media. By making a field visit to the case study "site", we created the opportunity for direct observations. The interviews have two kinds of questions: opened and closed. The opened questions were applied first. According to Carvalho and Sugano (2016) empirical works should replace the competitive aggressiveness dimension by network dimension or, in case of qualitative studies, consider both dimensions and evaluate that possibility. So, we first analyzed the divergence between network and competitive aggressiveness dimensions. As Mello and Leão (2005), we did not find evidences of competitive aggressiveness. The owner of Company A affirmed they prefer work in network. He even did not know how to compare the situation of the company and the competitors. Company B has proposals to work with competitors. Company C focuses in partnership with other companies, including a big software developer. The owner of Company E affirmed they did not need to use strategies of competitive aggressiveness. In really, he emphasized the mutual help between startups in Belo Horizonte. The main explanation is provided in the speech of owners of Company C and D: theirs products is new, they have no competitors. These enterprises can succeed not by battling competitors, but rather by creating uncontested market space. Other explanation is the importance of partnership, as emphasized by owner of Company C. Startups have few resources and because of this alliances are very important. Thus, we employed network dimension rather competitive aggressiveness dimension.

The first question was: do you know open innovation? The owners of

Company A and Company D knew the term, but they did not know the definition. Others have never heard. After we explain the concept, they affirmed that they have using open innovation activities.

Even not present in framework the innovation dimension was analyzed. Figure 3 shows a graphic that analyzed the entrepreneurial orientation of firms. The standard deviation of innovativeness, risk taking, proactiveness, autonomy and network dimensions were respectively 0.55, 1.95, 2.10, 0.71 and 0.71. Thus, the values of innovativeness, autonomy and network may be considered homogeneous, while the values of risk taking and proactiveness may be considered heterogeneous. Homogeneous values difficult check relationships. Despite of the homogeneity and the broad use of open innovation activities, the values of Innovativeness were the lowest. However, evidences from direct observation and documentation, such as awards and newspaper clippings, show innovativeness enterprises. We cannot discard problems with the interview protocol. Can be open innovation or innovativeness an uneventful something? It is possible. Autonomy, network and risk taking dimensions have the highest values. Thus, the use of network dimension is adequate. The high level of risk taking is coherent, confirming the postulate of the owners of Company C and Company E. According to the owner of Company C "undertake without risk is not entrepreneurship". The owner of Company E said a similar phrase: "startup is risk".

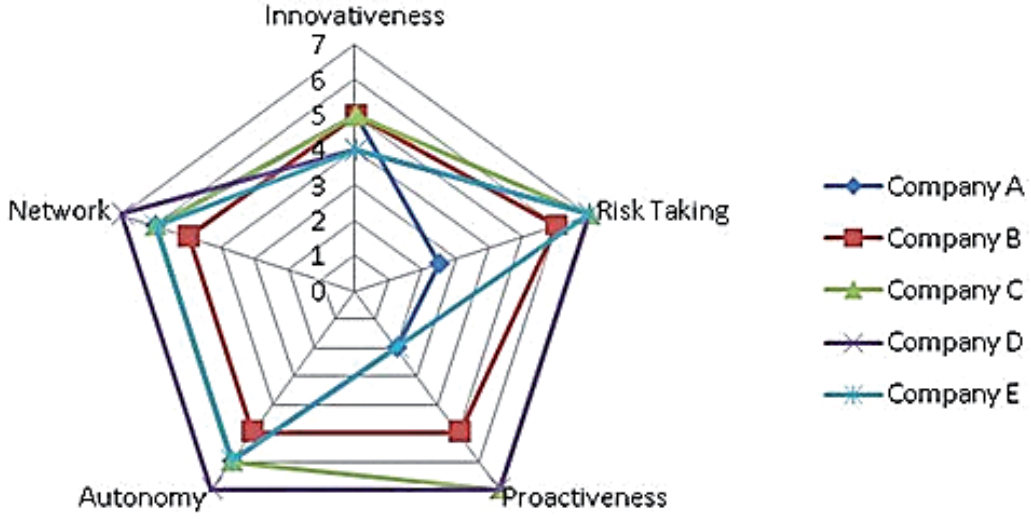

Figure 3 – Entrepreneurial orientation of firms.

Figure 4 shows the Open Innovation activities values. The highest value is from Customer Involvement. This result is compatible with the literature (VAN DE VRANDE et al., 2009; WYNARCZYK, 2013). As van de Vrande et al. (2009) the second mode more used is also External Networking. External Participation, Inward IP Licensing and Outward IP Licensing are the less used activities, which is compatible with the literature (VAN DE VRANDE et al., 2009; WYNARCZYK, 2013).

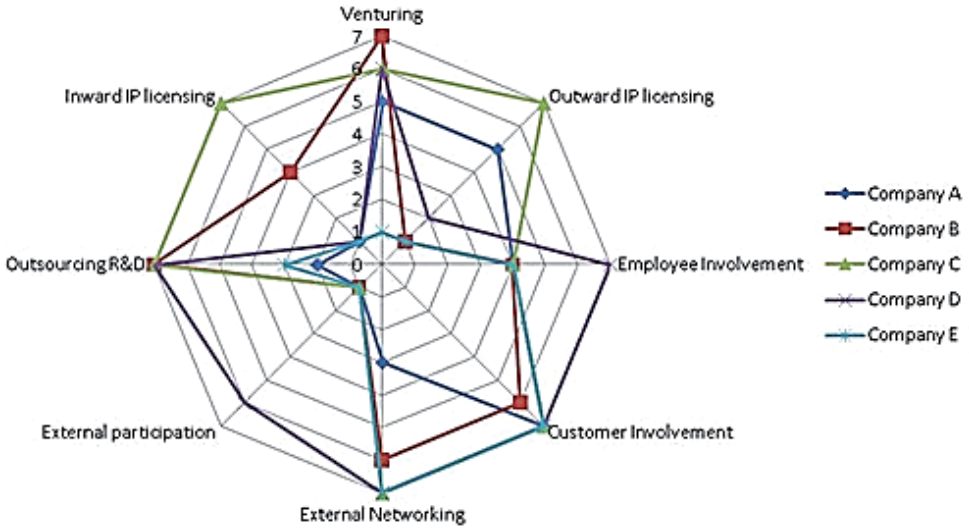

Figure 4 – Open Innovation activities.

The hypotheses were checked. Carvalho and Sugano (2016) presented two hypotheses about the relationship between autonomy dimension and Open Innovation. However the first hypothesis has 5 under hypotheses. The first hypothesis is:

H1. Autonomy has a positive effect on open innovation.

About the first hypothesis we can affirm that there is a positive relationship between autonomy dimension and Open Innovation, but it is no significant. The 5 under hypotheses are:

H1a. The independent action of an individual or a team in bringing forth an idea or a vision and carrying it through to completion has a positive effect on customer involvement.

H1b. Actions free of stifling organizational constraints has a positive effect on customer involvement.

H1c. The independent action of an individual or a team in bringing forth an idea or a vision and carrying it through to completion has a positive effect on open innovation.

H1d. Actions free of stifling organizational constraints has a positive effect on open innovation.

H1e. Autonomy is positively related to outbound open innovation.

The hypothesis H1a can be confirmed. The independent action of an individual or a team in bringing forth an idea or a vision and carrying it through to completion has a positive effect and significant effect on customer involvement. However the hypothesis H1c cannot be confirmed, because the relationship is almost nonexistent. About other hypotheses we can affirm that there is a positive, but not significant, relationship. The second and last hypothesis related to autonomy dimension is:

H2. Open innovation activities benefit from incentives and performance measures that capture open innovation activities at the collective level, and not only individual behavior.

About the second hypothesis we can affirm that there is a positive, but not significant, relationship.

About network dimension Carvalho and Sugano (2016) present only one hypothesis:

H3. Network dimension has a positive effect on open innovation.

Again, there is a weak, not significant and positive relationship. However, we must emphasize the limitation of case study method, because Chesbrough (2006) stresses the role of networks to shape Open Innovation. Thus, a quantitative

study is very important and necessary.

About the relationship between proactiveness dimension and Open Innovation, Carvalho and Sugano (2016) presented only one hypothesis:

H4. Alertness regarding new business opportunities has a positive effect on open innovation.

The evidences suggest that alertness regarding new business opportunities has a positive and strong, but no significant, effect on open innovation. Thus, the systematic search for new markets and business opportunities can make the organization become careful to Open Innovation opportunities. For example, despite of the focus of firm, most owners affirm to be alert to develop new products. It is the case of Company A, which changed the focus in the beginning.

Carvalho and Sugano (2016) presented four hypotheses about the relationship between Risk taking dimension and Open Innovation, to know:

H5. Risk taking has a positive effect on open innovation.

H6. There is a significant relationship between risk taking and outbound open innovation.

H7. Organizations with high-level of risk taking level adopt license, as outbound open innovation, more than organizations with low-level of risk taking.

H8. There is a negative relationship between risk taking and selling as outbound open innovation.

The fifth hypothesis points to a positive effect of risk taking on Open Innovation. We found a positive and moderate relationship between risk taking and Open Innovation. On the other hand, we did not find evidences that support the sixth hypothesis. On the contrary, we found a negative, but not significant relationship between risk taking and outbound open innovation. Carvalho and Sugano (2016) rely on Schroll and Mild (2011), which affirmed that while inbound activities do not include a great risk, outbound activities could be more risk because the firm may lose possibility to capture the created value. The firms may be aware of this problem and not use outbound Open Innovation. The seventh and eighth hypotheses are contradictory. Thus, we expected evidences to support only one. The evidences support the eighth hypothesis.

Our initial proposition is confirmed in part. Some dimensions of Entrepreneurial Orientation are correlated with Open Innovation, but we cannot check the impact of both in the firm performance.

However, some relationships became apparent. Because the values of risk taking and proactiveness dimensions are heterogeneous we can affirm that some relationships are relevant. We found a strong and positive relationship between risk taking and external networking as Open Innovation mode. Other relevant relationship is between proactiveness and outsourcing R&D. So, we present two new hypotheses to future works:

H9. There is a significant relationship between risk taking and external networking.

H10. There is a significant relationship between proactiveness and outsourcing R&D.

We cannot offer a satisfactory explanation to those relationships. We can speculate that working in alliance is a risk and only firms which high levels of risk taking are ready to assume. About the tenth hypothesis is more difficult to speculate, so if this hypothesis is confirmed then we need more exploratory studies.

We also found a positive and significant relationship between proactiveness dimension and Open Innovation and inbound Open Innovation. According to Fernandes et al. (2013), to the extent by which globalisation has advanced and deepened the level and consequences of interdependence between national economies, the business world has become

ever more complex and exponentially more competitive. Fernandes et al. (2013) stressed that this scenario has driven companies to adopt proactive strategies designed to seek out sustainable competitive advantage and innovation has thereby now emerged as one of the core strategic priorities for companies seeking success in their business dealings. Thus, open innovation emerge as strategy to develop innovation. So, we present more hypotheses to future works:

H11. Proactiveness has a positive effect on open innovation.

H11a. Proactiveness has a positive effect on inbound open innovation.

5 FINAL CONSIDERATIONS

Our work aimed to check the hypotheses presented by Carvalho and Sugano (2016). Most hypotheses were confirmed, but only one hypothesis has a significant result. Thus, quantitative works with a wide sample is important. It is import check if Entrepreneurial Orientation is a driver for Open Innovation.

Cheng and Huizingh (2014) concluded that when comparing the three strategic orientations (Entrepreneurial Orientation, market orientation and resource orientation), their findings show that entrepreneurial orientation has the strongest moderation effect on the relation between open innovation and innovation performance. Thus, it makes sense expect Entrepreneurial Orientation as driver of Open Innovation.

Our work does not contribute only with Open Innovation literature, but also it contributes to Entrepreneurial Orientation literature. According to Anderson et al. (2015) a number of ontological questions persist in the Entrepreneurial Orientation literature, between them there are ongoing conversations regarding the dimensionality of Entrepreneurial Orientation. First we confirmed the importance of network dimension presented by Mello and Leão (2005), which justify the absence of the competitive aggressiveness dimension. Second, based in the evidences presented here, we advocate that innovativeness dimension should be replaced by a new dimension: Open Innovation dimension. According to Chaston and Scott (2012) the impact of Open Innovation on firm performance is bigger than the impact of Entrepreneurial Orientation on firma performance. Furthermore, Gündoğdu (2012) coined the term Innopreneurship. According to Gündoğdu (2012) existing traditional entrepreneurs also should turn out as innopreneurs not to face the danger of being isolated outside the system. The innopreneur is an entrepreneur turned for innovation and partnerships. Thus, we suggest the constructs of our framework can be merged into a single tool: Open Innopreneurial Orientation.

Moreover, we contribute with new hypotheses to future works. However, we must advert that our work has limitations. These limitations are the method and the units of analysis. Therefore we cannot generalize the results.

REFERENCES

ANDERSON, Brian S.; KREISER; Patrick M.; KURATKO, Donald F.; HORNSBY, Jeffrey S.; ESHIMA, Yoshihiro. Reconceptualizing entrepreneurial orientation. *Strategic Management Journal* v. 36, n. 10, p. 1579-1596, 2015.

BONNER, Joseph M.; KIM, Daekwan; CAVUSGIL, S. Tamer. Self-perceived strategic network identity and its effects on market performance in alliance relationships. *Journal of Business Research*, v. 58, n. 10, p. 1371-1380, 2005.

BOTELHO, Marisa dos Reis A.; OLIVEIRA, Olga Priscila Alves; CARRIJO, Michelle de Castro. Cooperação e inovação – uma análise evolutiva para empresas de eletroeletrônicos do arranjo produtivo de Santa Rita do Sapucaí (MG). *Revista de Economia e Administração*, São Paulo, v. 12, n. 4, p. 428-455, out./dez. 2013.

CAMPOS, Héctor Montiel; DE LA PARRA, José Pablo Nuño; PARELLADA, Francesc Solé. The entrepreneurial orientation-dominant logic-performance relationship in new ventures: an exploratory quantitative study. *Brazilian Administration Review*, Rio de Janeiro, v. 9, Special Issue, p. 60-77, may 2012.

CARVALHO, Eduardo Gomes; GANDIA, Rodrigo Marçal; FERREIRA, Cassiano de Andrade; GARCIA, Marcelo de Oliveira; SUGANO, Joel Yutaka. Small businesses and large gaps: a meta-analysis of quantitative studies about open innovation. *Espacíos*, Caracas, v. 37, n. 3, 2016.

CARVALHO, Eduardo Gomes; SUGANO, Joel Yutaka. entrepreneurial orientation as driver for open innovation. *Espacíos,* Caracas, v. 37, n. 5, 2016.

CHASTON, Ian; SCOTT, Gregory J. Entrepreneurship and open innovation in an emerging economy. *Management Decision*, v. 50, n. 7, p. 1161-1177, 2012.

CHESBROUGH, Henry W. *Open innovation*: the new imperative for creating and profiting from technology. Boston, MA: Harvard Business School Press, 2003.

_____. *Open Innovation*: Researching a New Paradigm. Oxford: Oxford University Press, 2006.

CHESBROUGH, Henry; BOGERS, Marcel. Explicating open innovation: clarifying an emerging paradigm for understanding innovation. In: CHESBROUGH, Henry; VANHAVERBEKE, Wim; WEST, Joel. *New frontiers in open innovation*. Oxford: Oxford University Press, 2014. p. 3-28

CONBOY, Kieran; MORGAN, Lorraine. Beyond the customer: opening the agile systems development process. *Information and Software Technology,* v. 53, n. 5, p. 535-542, abr. 2011.

COVIN, Jeffrey G.; COVIN, Teresa Joyce. Competitive aggressiveness, environmental context, and small firm performance. *Entrepreneurship:* Theory & Practice, v. 14, n. 4, p. 35-50, 1990.

COVIN, Jeffrey G.; SLEVIN, Dennis P. Strategic management of small firms in hostile and benign environments. *Strategic Management Journal*, v. 10, n. 1, p. 75-87, 1989.

_____. A conceptual model of entrepreneurship as firm behavior. *Entrepreneurship:* Theory & Practice, v. 16, n. 1, p. 7-25, 1991.

DE CLEYN, Sven H.; GIELEN, Frank; COPPENS, Jan. Incubation programs from public research organizations as catalysts for open business ecosystems. *Technology Innovation Management Review*, Ottawa, p. 29-34, apr. 2013.

DRUCKER, Peter F. *Innovation and entrepreneurship*: practice and principles. London: Heinemann, 1994.

EFTEKHARI, Nazanin; BOGERS, Marcel. Open for entrepreneurship: how open innovation can foster new venture creation. *Creativity and Innovation Management*, v. 24, n. 4, p. 574-584, dez. 2015.

EISENHARDT, Kathleen M. Building theories from case study research. *The Academy of Management Review*, v. 14, n. 4, p. 532-550, oct. 1989.

FERNANDES, Daniel Von Der Heyde; SANTOS, Cristiane Pizzuti. Orientação empreendedora: um estudo sobre as conseqüências do empreendedorismo nas organizações. *RAE electrônica*, São Paulo, v. 7, n. 1, jan./june 2008.

GALINDO, Miguel-Ángel; MENDEZ-PICAZO, María-Teresa. Innovation, entrepreneurship and economic growth. *Management Decision*, v. 51, n. 3, p. 501-514, 2013.

GARCIA, Renato; DIEGUES, Antônio Carlos; ROSELINO, José Eduardo; COSTA, Ariana Ribeiro. Desenvolvimento local e desconcentração industrial: uma análise da dinâmica do sistema local de empresas de eletrônica de Santa Rita do Sapucaí e suas implicações de políticas. *Nova Economia*, Belo Horizonte, v. 25, n. 1, p. 105-122, jan./abr. 2015.

GASSMANN, Oliver; ENKEL, Ellen. Towards a theory of open innovation: three core process archetypes. In: R&D MANAGEMENT CONFERENCE, 6 july 2004, Lisabon. *Anais…*, Portugal: RADMA, 2004. p. 1-18.

GÜNDOĞDU, Mehmet Çağrı. Re-thinking entrepreneurship, intrapreneurship, and innovation: a multi-concept perspective. *Procedia* - Social and Behavioral Sciences, v. 41, p. 296-303, 2012.

HOSSAIN, Mokter. Open innovation: so far and a way forward. *World Journal of Science, Technology and Sustainable Development*, v. 10, n. 1, p. 30-41, 2013.

HUANG, Hao-Chen; LAI, Mei-Chi; LIN, Lee-Hsuan; CHEN, Chien-Tsai. Overcoming organizational inertia to strengthen business model innovation: an open innovation perspective. *Journal of Organizational Change Management*, v. 26, n. 6, p. 977-1002, 2013.

HUIZINGH, Eelko K. R. E. Open innovation: state of the art and future perspectives. *Technovation,* v. 31, p. 2-9, 2011.

IAKOVLEVA, Tatiana. Open innovation at the root of entrepreneurial strategy: a case from the norwegian oil industry, *Technology Innovation Management Review*, p. 17-22, april 2013.

LAZZAROTTI, Valentina; MANZINI, Raffaella, PELLEGRINI, Luisa. Firm-specific factors and the openness degree: a survey of Italian firms. *European Journal of Innovation Management*, v. 14, n. 4, p. 412-434, 2011.

LI, Yong-Hui; HUANG, Jing-Wen; TSAI, Ming-Tien. Entrepreneurial orientation and firm performance: the role of knowledge creation process. *Industrial Marketing Management,* v. 38, n. 4, p. 440-449, 2009.

LUMPKIN, G. T.; DESS, Gregory G. Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review*, v. 21, n. 1, p. 135-172, 1996.

LUMPKIN, G. T.; DESS, Gregory. Linking two dimensions of entrepreneurial orientation to firm performance: the moderating role environment and industry life cycle. *Journal of Business Venturing*, v. 16, n. 5, p. 429-451, 2001.

MELLO, Sérgio Carvalho Benício de; LEÃO, André Luiz Maranhão de Souza. Compreendendo a orientação empreendedora de empresas de alta tecnologia. In: SOUZA, Eda Castro Lucas; GUIMARÃES, Tomás de Aquino. *Empreendedorismo além do plano de negócios*. São Paulo: Editora Atlas, 2005. p. 162-178.

MILLER, Danny. The correlates of entrepreneurship in three types of firms. *Management Science*, v. 29, n. 7, p. 770-791, 1983.

NDUBISI, Nelson Oly; IFTIKHAR, Khurram. Relationship between entrepreneurship, innovation and performance: comparing small and medium-size enterprises. *Journal of Research in Marketing and Entrepreneurship*, v. 14, n. 2, p. 214-236, 2012.

RAUCH, Andreas; WIKLUND, Johan; LUMPKIN, G. T.; FRESE, Michael. Entrepreneurial orientation and business performance: an assessment of past research and suggestions for the future. *Entrepreneurship Theory and Practice*, United States, v. 33, n. 3, p. 761-787, may 2009.

SAEBI, Tina; FOSS, Nicolai J. Business models for open innovation: matching heterogeneous open innovation strategies with business model dimensions. *European Management Journal*, v. 33, n. 3, p. 201-213, june 2015.

SCHROLL, Alexander; MILD, Andreas. Open innovation modes and the role of internal R&D: an empirical study on open innovation adoption in Europe. *European Journal of Innovation Management*, v. 14, n. 4, p. 475-495, 2011.

SCHUMPETER, Joseph. *The theory of economic development*. Boston, MA: Harvard University Press, 1934.

SEGERS, Jean-Pierre. Strategic Partnerships and open innovation in the biotechnology industry in Belgium. *Technology Innovation Management Review,* p. 23-28, april 2013.

SOLESVIK, Marina Z.; GULBRANDSEN, Magnus. Partner selection for open innovation. *Technology Innovation Management Review*, p. 11-16, april 2013.

SOUSA, Ana Rosa de.; BRITO, Mozar José, SILVA, Paulo José; ARAÚJO, Uajará Pessoa. Cooperação no APL de Santa Rita do Sapucaí. *Revista de Administração Mackenzie*, São Paulo, v. 16, n. 1, p. 157-187, 2015.

SWAMI, Sanjeev; PORWAL, Rajesh. Entrepreneurship, innovation and marketing: conceptualization of critical linkages. *Journal of advances in management research*, v. 2, n. 2, p. 54-69, 2005.

VAN DE VRANDE, Vareska; JONG, Jeroen P. J.; VANHAVERBEKE, Wim; ROCHEMONT, Maurice. Open innovation in SMEs: trends, motives and management challenges. *Technovation,* Zoetermeer, v. 29, p. 423-437, 2009.

VANHAVERBEKE, Wim. Rethinking open innovation beyond the innovation funnel. *Technology Innovation Management Review*, p. 6-10, april 2013.

WEST, Joel; SALTER, Ammon; VANHAVERBEKE, Wim; CHESBROUGH, Henry. Open innovation: the next decade. *Research Policy*, v. 43, n. 5, p. 805-811, 2014.

WYNARCZYK, Pooran. Open innovation in SMEs: a dynamic approach to modern entrepreneurship in the twenty-first century. *Journal of Small Business and Enterprise Development*, v. 20, n. 2, p. 258-278, 2013.

YIN, Robert K. *Case study research*: design and methods. Thousand Oaks: Sage Publications, 1994.

ZHAO, Fang. Exploring the synergy between entrepreneurship and innovation. *International Journal of Entrepreneurial Behaviour & Research*, v. 11, n. 1, p. 25-41, 2005.

Sobre os autores:

Eduardo Gomes Carvalho: Graduado em Sistemas de Informação pelo Centro Universitário de Itajubá, Mestre em Engenharia de Produção pela Universidade Federal de Itajubá. Centro Federal de Educação Tecnológica de Minas Gerais, Departamento de Computação e Engenharia Civil – Unidade Varginha.
E-mail: eduardo@varginha.cefetmg.br

Joel Yutaka Sugano: Graduado em Zootecnia pela Universidade Federal de Lavras. Mestre em Administração pela Universidade Federal de Lavras. Doutor em Doctoral Program in Japanese Economy and Business – Osaka University e Pós-Doutorado pela Wageningen University – The Netherlands. Universidade Federal de Lavras, Departamento de Administração e Economia. **E-mail**: joel.sugano@dae.ufla.br