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Dot Idea (.IDEA): A New Concept for an Incubation Program and Open Innovation Based on User Needs

Luís Felipe Maldaner[1☆], Luísa Simon[2], Carlos Eduardo de Souza Aranha[3]

[1] Director of the Innovation and Technology Center at Unisinos University and CEO of Tecnosinos Tech Park, Brazil

[2] Assistant Manager of Unitec Incubator, Unisinos University, Brazil

[3] Coordinator of Unitec Incubator, Unisinos University, Brazil

Abstract

This paper discussed the application process of the *Dot Idea* program. The *Dot Idea* program is an incubation and open innovation program co-created by Unitec, an incubator at Tecnosinos Tech Park, and an SAP innovation team. The main objective of this study was to cover an existing gap in the literature regarding the practical application of an open innovation methodology. Many companies seek interaction with external parties to enable advancement toward identified innovation opportunities. Technology clusters, parks, and incubators have played an important role in promoting connections and interaction. Consequently, the *Dot Idea* program emerged as a result of a joint effort to create a program using a design science research methodology aiming to foster new businesses and strengthen Brazil and Latin America as a hub to develop new solutions for traditional organizations. In regards to lessons learned, the *Dot.health* trial had some success but also experienced difficulties; these related to the relationships between startups and a hospital's internal teams, and startups' needs to be funded from the beginning in order to be fully dedicated to a project.

Keywords

Open innovation, Incubation program, Challenges, Startups, SMEs

I. INTRODUCTION

In an innovation-driven global age where knowledge-based economies are designed to minimize or remove entry barriers, smaller players are advancing in new or traditional market segments due to their flexibility and response agility. Additionally, it is possible to keep pace with the growing movements of traditional companies that, following their tendencies or even intrinsic needs for sustainability, have been allocating continuous resources for innovation aimed at the revision of business models, products, and processes.

In this regard, this paper aims to cover an existing gap in the literature by discussing the practical application of an open innovation methodology, the *Dot Idea* methodology. This methodology is unique in its conception because it was designed under the Design Science Research model, a joint project between a Unitec incubator team based at Tecnosinos Tech Park, and an SAP innovation team, a German company that has established its Latin America Laboratory inside Tecnosinos Tech Park. The main goal of this study is to comprehensively examine a real case of open innovation.

The purpose of this study is to test this designed methodology in a practical way. The pilot project was developed at

☆Correspondence to : Luis Felipe Maldaner
Director of the Innovation and Technology Center at Unisinos University and CEO of Tecnosinos Tech Park, Brazil
E-mail: FMALDANER@unisinos.br

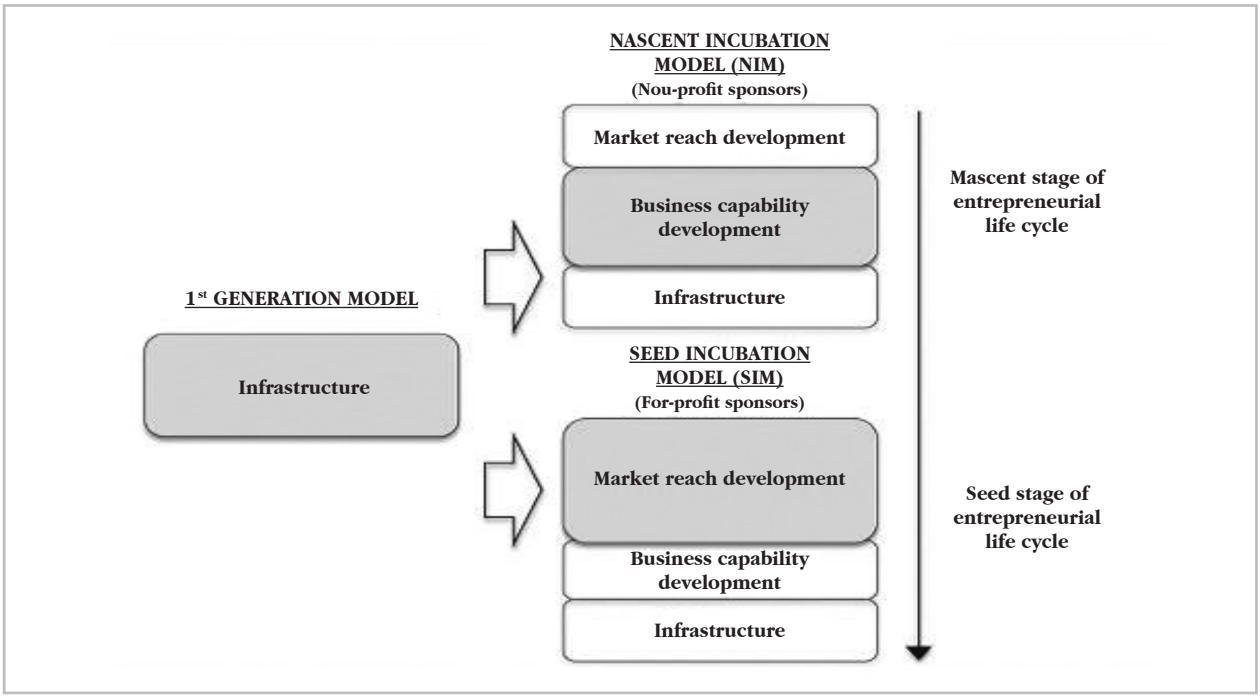

Fig. 1. A conceptual framework of an incubation model in developing countries.

Source: Mrkajic (2017, p.52)

Santa Casa de Misericordia Hospital in Porto Alegre, the capital city of Rio Grande do Sul State, in the south of Brazil. The project started in February 2017 and the MVP (Minimum Viable Product) Demo Day was held in March 2018.

In the early 2000s, Chesbrough and Rosenbloom (2002) pointed out that firms are more likely to face difficulties managing innovations unrelated to the scope of their organizational core business. Christensen (2001) highlighted that aligning identified opportunities or challenges to an organization's profile, based on an analysis of its competencies, is the key factor for innovation success.

Many companies have been seeking interaction with external parties to identify innovation opportunities. Areas of innovation, such as technology clusters, parks, and incubators, have influenced an important part of the world's technological development. For large organizations pursuing collaborative networks to drive innovation, these environments have played an important role in promoting connections. Thus, the main objective of this study is to answer the following question: Is it possible to develop a singular open innovation methodology, integrated with an incubator, that can help traditional industries be innovative?

II. LITERATURE REVIEW

In this section, the literature regarding technological parks and areas of innovation will be reviewed. In addition, SMEs' recent open innovation tendencies and innovation management will be examined. It is important to mention that SAP and Unitec incubator teams designed the *Dot Idea* methodology, and the theory that gave support to this program was especially related to open innovation and to the innovation activities of SMEs.

2.1 Technological Parks and Areas of Innovation

The International Association of Science Parks and Area of Innovation (IASP, 2017) defines science and technology parks as organizations managed by specialized professionals, whose main aim is to increase the wealth of a community by promoting the culture of innovation and the competitiveness of associated businesses and knowledge-based institutions. Additionally, science parks engender the flow of knowledge and technology among universities, R&D institutions, and companies. Furthermore, according to IASP (2017), the creation and growth of innovation-based companies through

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incubation and spin-off processes is facilitated, and additional value-added services together with high-quality space and facilities are provided.

Science parks play a key role in the economic development of their environments. Through a dynamic and innovative mix of policies, programs, quality space and facilities, and high value-added services, they:

- stimulate and manage the flow of knowledge and technology between universities and companies;
- facilitate communication between companies, entrepreneurs, and technicians;
- provide environments that enhance a culture of innovation, creativity, and quality;
- focus on companies and research institutions as well as on people: the entrepreneurs and 'knowledge workers';
- facilitate the creation of new businesses via incubation and spin-off mechanisms, and accelerate the growth of small and medium-sized companies;
- work in a global network that connects thousands of innovative companies and research institutions throughout the world, facilitating the internationalization of their resident companies (IASP, 2017).

On the other hand, an incubator is an organization that aims to support entrepreneurs in order to enable them to develop innovative ideas and establish a successful business (Audy et al., 2017). Incubators typically offer a range of services covering infrastructure, and capacitating and management support in order to increase the chances of success for new businesses. Such collaboration also increases the opportunities for establishing connections among all of the entrepreneurs of an incubator.

Mrkajic (2017) studied an incubator system in Egypt. He describes two different models of incubation, a nascent incubation model (NIM) and a seed incubation model (SIM), as shown in Figure 1. The difference between the two models is the stage of intervention in terms of incubated firms' development stages, through the services they provide and by the goals they have. The initial model focused on infrastructural support, including business capabilities support for entrepreneurs. The latter model focused on the market orientation of new ventures (Mrkajic, 2017).

In the case of technology-based startups, entrepreneurs have the opportunity to connect with universities and research centers which an incubator has established relations. This is key to mitigating risks and reducing costs in the innovation process because entrepreneurs can access equipment and laboratories that are very expensive to acquire.

2.2 Open Innovation

Even if an organization has an entrepreneurial culture based on innovation, this may not guarantee business sustainability. Many companies with such a characteristic collapse before technological breakthroughs change market structures and when innovation possibilities do not align properly with the internal competencies of an organization (Christensen, 2001).

Innovations that are not within the scope of an organizational core business are more likely to face difficulties regarding management because previous experiences do not apply to the challenges and potential risks that arise (Chesbrough and Rosenbloom, 2002).

Managing an organization strategically imposes the need for prioritizing effort allocation. Distance from a company's core business can result in unexploited projects becoming market opportunities. The creation of a spin-off is considered an external corporate venturing opportunity, in which a company is able to capitalize on internal projects effectively (Luc et al., 2002).

Schumpeter (1942) describes innovation as a process that introduces a new product or service to the market. At the same time, innovation is a cumulative process because it can be radical or disruptive (Christensen, 1997) and incremental. Disruptive innovation can be caused by a cumulative and collaborative process, especially in current times where all information is available to everyone through the internet.

Pittaway et al. (2004) undertook research to identify the relationship between networking and innovation. Their paper presents a systematic review of research linking the networking behavior of firms with their innovative capacity. They found that the principal benefits of networking, as identified in the literature, include: risk sharing; obtaining access to new markets and technologies; expediting a product to market; pooling complementary skills; safeguarding property rights when complete or contingent contracts are unavailable; acting as a key vehicle for obtaining access to external knowledge.

The study by Pittaway et al. (2004) demonstrates that collaborative networking is very important to the innovation process, not only for small or startup companies but also for large companies. May (2017) pointed out that corporate entrepreneurship is especially crucial for large companies, enabling these organizations—that are traditionally averse to risk-taking—to innovate, driving leaders and teams toward an in-

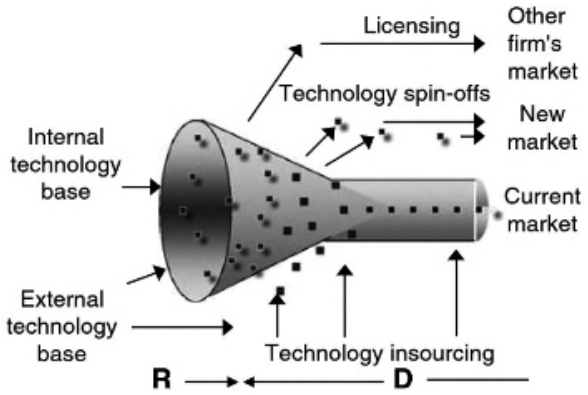

Fig. 2. An open innovation paradigm.

Source: Chesbrough et al. (2006, p.3)

creased level of corporate enterprising. In addition to the obvious benefits obtained through innovation, this approach also provides the organizational benefit of setting the stage for leadership continuity.

In order to have access to new technology and to have access to the market, networking is very important for startups, especially early-stage startups. Typically, startups require advice regarding how to enter a market with new products or services, or how a market will recognize what innovations are being introduced. At the same time, speed is paramount. Expediting a product to market is an admirable goal, and there are many valid reasons that cycle-time reduction should be a priority (Cooper, 2011).

The main question addressed in Nowacki and Bachnik's (2016) study was related to knowledge management in terms of a company's innovative capacity. Knowledge can be strengthened inside a company or it can be acquired externally. In the opinion of Nowacki and Bachnik, there is a gap between a company's recognition of the need for a knowledge management system and the capability to provide one.

According to Huizingh (2011), extending beyond the obvious consequences of lower costs, a shorter product to market time, or increased sales, there is another subject to consider when studying open innovation. This is a multi-dimensional construct that takes into account effectiveness, and financial and nonfinancial benefits to be gained from an open innovation project. Bogersa et al. (2018) undertook a study that revealed a positive correlation between the diverse educational backgrounds of a firm's employees and the firm's use of external knowledge. This means that hiring employees from different backgrounds helps in terms of innovation initiatives. Thus, human capital is essential for open innovation.

It is also important to take into consideration the relationship between knowledge-oriented leadership and open innovation. In this regard, Naqshbandi and Jasimuddin (2018) conducted a study using data collected from 172 subsidiaries of MNEs (Multinational Enterprises) based in France. "The results indicate that higher levels of knowledge-oriented leadership can lead to enhanced knowledge management (KM) capability and improved open innovation outcomes (p. 701)." The findings from this study indicate that there is a direct and positive impact of knowledge-oriented leadership on KM capability and open innovation. Additionally, Naqshbandi and Jasimuddin's research offers useful insights for managers who want to commence work using an open innovation methodology. Similarly, Donate and Sánchez de Pablo (2015) pointed out that KM has a significant relationship with knowledge-oriented leadership.

On the other hand, De Silva et al. (2018) studied the effects of knowledge sharing in terms of gains inside a company and relationships with clients when the subject is innovation. The results of the study showed that the most significant effects of value creation remained on the intermediaries' staff, especially in terms of knowledge capitalization.

According to Chesbrough and Rosenbloom (2002), companies find it more difficult to innovate when products or ideas are unrelated to their core business. The capacity to innovate could be related to being part of an innovative environment,

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such as a technological park or an innovation ecosystem. Moreover, Edquist (2001) pointed out that companies innovate most of the time as a result of interactions with other companies in a special environmental virtuous circle of learning. Hodgson (1999) mentioned that knowledge is acquired from not only an individual's intellectual capacity but also from interactions with other people and partners in physical or virtual environments. Chesbrough et al. (2006) presented a model of open innovation including interactions with external input, as shown in Figure 2.

In this model, the external technology base can be realized by startups, as Edquist (2001) pointed out. Ideas, solutions or even new products can be developed through a joint project between the internal technology base, which includes internal R&D departments and engineering, and startups, which are, in general, more flexible and normally provide rapid solutions when necessary. In a recent article, Chesbrough (2017, p.35) described open innovation "as a distributed innovation process that relies on purposively managed knowledge flows across organizational boundaries, using pecuniary and nonpecuniary mechanisms in line with the organization's business model to guide and motivate knowledge sharing."

Fabrício Jr. et al. (2015) conducted a study that aimed to discover the relationship between the R&D center of a Chinese multinational subsidized in Brazil and other companies, universities, and research institutes in Brazil. It was concluded that the R&D center could be a hub that attracts startups and develops a business model that can generate innovative ideas for multinational products.

Cooperation is also key, both from internal and external perspectives. A study based on service sector firms found that cooperation is important for collaborative innovation and firms must engage actively with others. Only then can firms benefit from knowledge spillovers (Mention, 2011).

On the other hand, Knudsen and Mortensen (2011) highlighted that new product development performances indicate that a firm's own strategies produce better results than collaborative strategies. They also found that the degree of openness concerning product development may make final production slower and more costly than the industry average. These findings justify some of the criticism leveled at practicing open innovation in the market.

In opposition to this finding, Chiaroni et al. (2011) undertook a study on a mature asset-intensive industry firm which had adapted its organizational and managerial systems to the open innovation paradigm. Their findings confirmed that outside sourcing plays an important role in innovation development within a company, helping to minimize risks by utilizing existing technology. At the same time, they highlighted that internal organization is the starting point of an open innovation system.

According to Singh (2005), the overall evidence is consistent with the view that interpersonal networks are important in determining observed patterns of knowledge diffusion. In addition, Silverberg et al. (1988, p.253) stated that "the diffusion of new products and new processes of production within and between business enterprises is clearly one of the fundamental aspects of the growth and transformation of contemporary economies." It is possible to extend this opinion to the relationship between incubators and accelerators as part of the innovation process and creation of startups because people are the main capital of those kinds of small companies.

2.3. Innovation in SMEs

There is much literature regarding the subject of innovation, and several models describing its nature have been suggested. These are as follows: radical innovation and incremental innovation; systemic innovation and component innovation; technology-push and market-pull; and, more recently, closed innovation and open innovation. Models can also be classified according to their innovation processes, such as linear models, or according to their appropriateness for developed or developing countries (European Commission and Eurostat, 2005).

Vrandea et al. (2009) conducted research using a survey database of 605 innovative SMEs in the Netherlands. In their study, they concluded that open innovation was being practiced extensively among those small companies, and they found that those companies were faced with several different barriers to open innovation. Some of these were related to corporate organization and culture, no matter which type of open innovation was being pursued.

In a different study, Fernández-Olmos and Ramírez-Alesón (2017) undertook research using 44,885 observations of SMEs made between 2003–2013. Their findings "confirm the importance of the inclusion of three factors: the macroeconomic cycle (macro-level), the industry lifecycle (industry-level), and the age of the firm (firm-level) since they influence the TCN (Technology Collaboration Network) and the innovation performance relationship (p.16)."

It is possible that SMEs are capable of innovation because their flexibility and specificity can be advantageous for acceler-

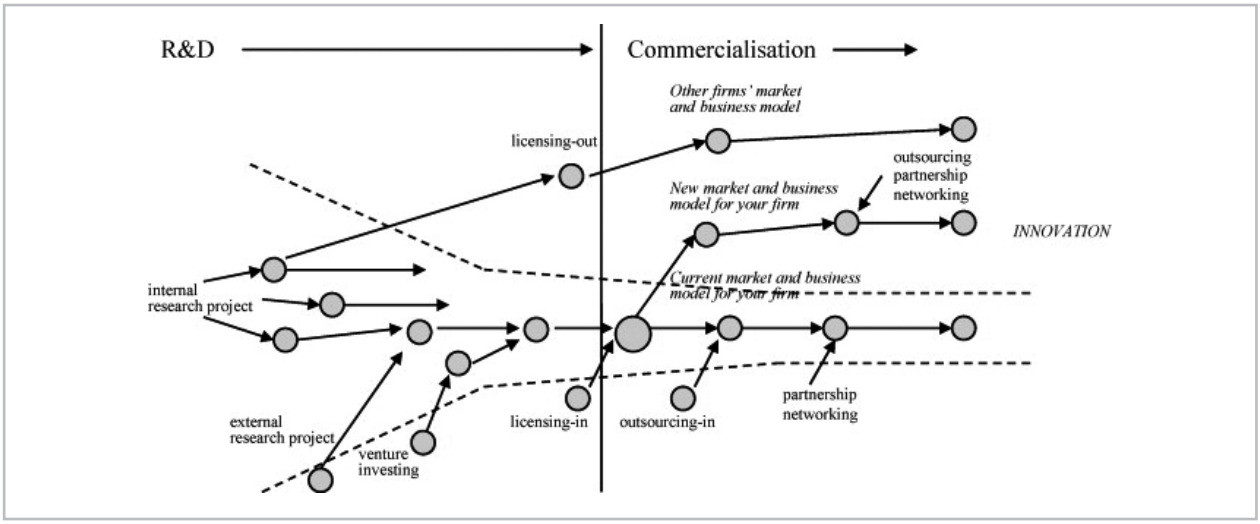

Fig. 3. An open innovation model for SMEs.

Source: Lee et al. (2010)

ating innovation. At the same time, this background can manage the whole process or the integration process together with large companies in the process of open innovation (Edwards et al., 2005).

Another important point is that SMEs typically play a key role in terms of regional development, and encouraging innovation in such firms is central to development policies (Jones and Tilley, 2003). The main question raised, then, is how can SMEs be encouraged to become innovative. It is important to provide some instruments and mechanisms that small firms can utilize to initiate innovation. In this sense, for small firms or startups, being part of an innovation ecosystem, such as an incubator or a technological park, is important for innovation initiative or projects (Audy et al., 2017).

Despite the importance of being part of an incubator, it is clear that this is not the only condition that needs to be satisfied in order for startups to become innovative. The question that arises is what mechanisms must be provided in order to facilitate innovation in SMEs, i.e., it is necessary to discover what factors contribute to the success of innovation efforts. Currently, technology can become too complex for a sole startup to handle by itself, and as knowledge is ever-more distributed across several firms, collaboration is an important factor of success. Indeed, SMEs have been engaging in various modes of collaboration (Kleinknecht and Reijnem, 1992).

It is important to mention that common collaboration modes are based on bi-firm networks and include alliances with and outsourcing to other firms. According to Mangematin et al. (2003), in the field of biotechnology, SMEs typically enter into contracts with big industrial groups or run small projects, manufacturing and marketing their own products. For example, in Tecnosinos, a startup that invented a drone for pulverization in agriculture has been working on a joint project with a big chemical multinational company, utilizing a complementary innovative system.

An additional point resulting from the capabilities or conditions of startups to innovate is the networking between small firms or with a large company (Narula, 2004); the success of startups in comparison to their large competitors is based on their capacity to utilize external networks more efficiently (Rothwell and Dodgson, 1994). Collaborative projects have some risks, for example, concerning ownership of the rights to the technology resulting from this kind of project. SMEs have been noted to use external resources to (among other things) shorten innovation time, reduce risks and costs, and increase the flexibility of their operations (Hagedoorn, 1993); however, collaboration must be carefully considered in strategic terms, as inter-firm collaboration can also lead to new risks and threats as well as increased transaction costs. Nevertheless, inter-firm collaboration is particularly important for SMEs with limited complementary assets needing to leverage their technology externally (Lichtenthaler, 2005).

It is necessary to state here that in this article the main argument concerns the innovation in small firms and special start-

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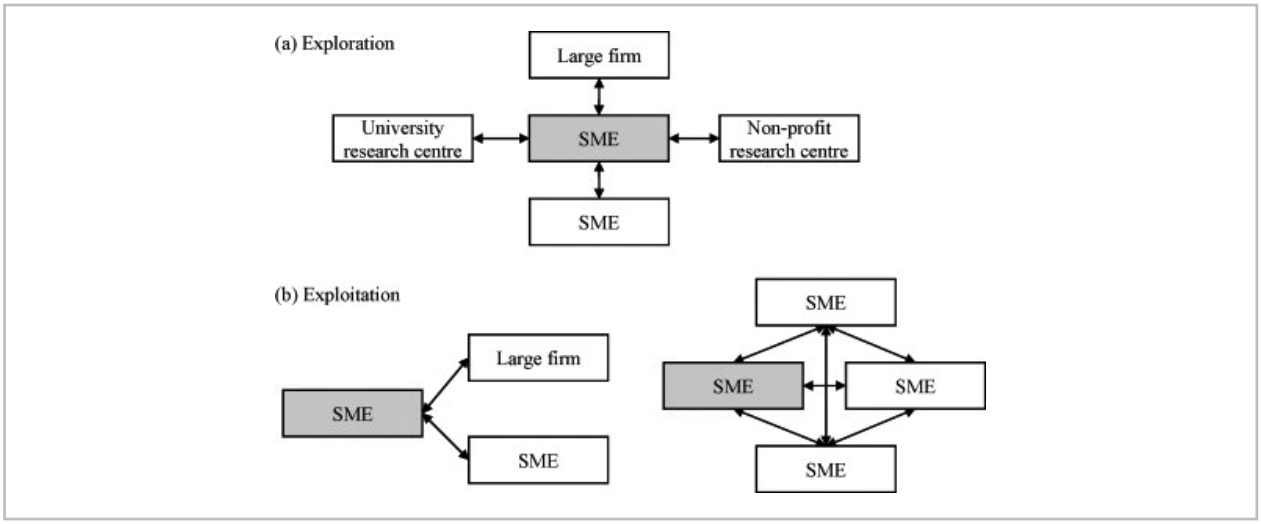

Fig. 4. Possible models for open innovation with SMEs.

Source: Lee et al. (2010)

ups, and the aim is to illustrate how open innovation is embedded in those firms. The model of open innovation seen in SMEs will be different from that seen in larger firms because both processes are different (Vossen, 1998). It is clear that for big companies, open innovation is a means of reducing time consumption and saving resources; however, the reality when it is applied to the day-by-day life of a company is completely different. This is the main challenge that Tecnosinos is facing in terms of utilizing an open innovation methodology.

2.4. The Concept of Open Innovation in SMEs

Open innovation is a concept applicable much more to larger companies than to small and medium-sized companies. That is why the literature on this subject is related to larger companies. According to Chesbrough et al. (2006), open innovation is an emerging paradigm based on the assumption that it is possible to obtain valuable ideas from outside a company, and such ideas can help companies to be innovative.

In the case of SMEs, external ideas typically assist companies in terms of commercialization. On the contrary, in large companies, external ideas are implemented for R&D efforts because, in terms of inventions or innovative ideas, small companies are more flexible and active than larger ones, and they often lack the commercialization capacity (Narula, 2004).

Parida et al. (2012) carried out research in order to investigate the existing gap regarding open innovation for SMEs. For that purpose, they worked with data obtained from 252 high-tech SMEs. The results of their research show that "the empirical findings have highlighted that the adoption and utilization of open innovation activities can positively influence the innovative performance of SMEs (p.300)."

Lee et al. (2010) suggest that the open innovation model utilized by SMEs should place more emphasis on the latter part of the conventional open innovation model describing open innovation for SMEs, as shown in Figure 3. The main point for small companies is connections with the market. In some sense, those companies require a strong marketing structure in order to have an adequate approach to the market. It is important to clarify that simply using an external marketing agency does not mean open innovation at the market stage. Open innovation in the commercialization stage only occurs for SMEs when a firm works with another firm specialized in marketing, taking in mind that collaboration is a contribution to the innovation process through market exploitation or a new development of customer relationships. Another point of open innovation is a kind of collaboration in terms of distribution that comes from a partner that has developed a new system.

If the innovation process can be divided into two parts such as exploitation and exploration, by considering that the first part covers market opportunities, and the second part covers technology opportunities (Rothaermel and Deeds, 2004), it is possible to argue that the second part should be addressed more by SMEs. Figure 4 shows this model, based on Lee et al.

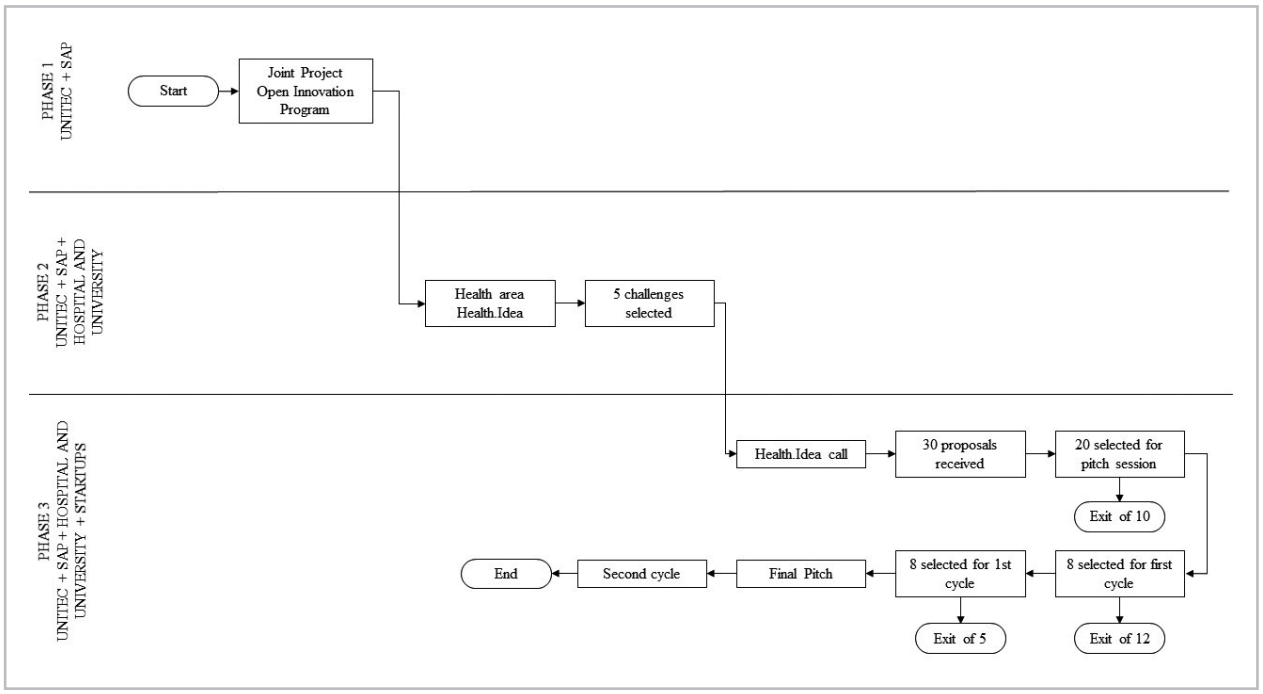

Fig. 5. The Dot.Idea methodology.

Source: The authors.

(2010). Regarding exploration, SMEs can be connected with university research centers and large firms, or even other SMEs.

Regarding exploitation, SMEs can be connected with large firms and other SMEs in order to realize innovation. At the same time, it is possible for this connection to occur only among SMEs from a collaborative perspective of open innovation methods and techniques. It is important to note that open innovation exclusively among SMEs is infrequent. Indeed, at Tecnosinos, open innovation tends to occur more between large companies and SMEs.

2.5 Open Innovation Management

According to Gambardella and Panico (2014), open innovation is suitable for technology markets, and technology markets can co-exist with open innovation. Their study explored the pharmaceutical field, a field in which property rights are a fundamental issue. In terms of open innovation in a traditional industry, taking into consideration the process in which there is a large company working on a joint project with a startup, property rights or industrial property must be discussed at the commencement of the project. This is a key issue in the pre-agreement phase.

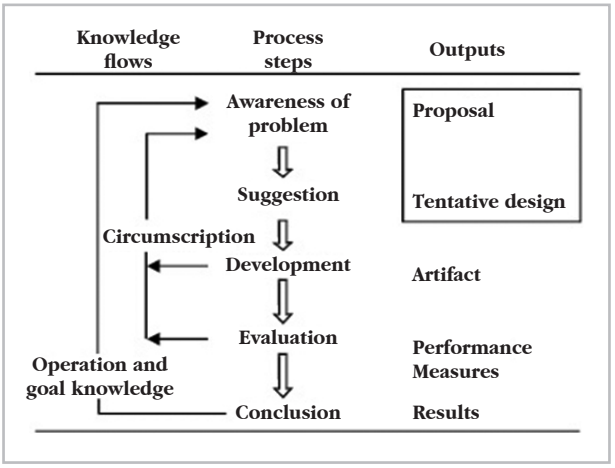

Fig. 6. The General Methodology of Design Research.

Source: Adapted from Dresch et al. (2015)

Furthermore, according to those authors, there is a second natural extension to a multi-party setting, in which several agents participate in the production of a common outcome while maintaining their own objectives. Competition is a third

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extension. Though a startup is participating in a collaborative project, each participant in the project is a competitor, as stated by Gambardella and Panico (2014). All of these issues need a special kind of management in order to achieve a successful outcome.

Another point to consider in terms of open innovation management is the strong links to resource-based firms, and, at the same time, to related dynamic capabilities, as Teece (2007) pointed out by connecting capabilities to market opportunities. Other authors have mentioned the connection between open innovation and absorptive capacity (Spithoven et al., 2011; West and Bogers, 2014) because such projects normally receive the strong participation of internal company members' R&D departments.

III. METHODOLOGY

Dot Idea is a methodology that was developed in three different phases. The first phase involved a joint project between a Unitec team and an SAP team aiming to develop and design the program. In the second phase, initial challenges were chosen for examination within the healthcare industry, called *Health.Idea*. In the third and final phase, startups were invited to participate in the program and submit proposals. Figure 5 presents the *Dot.Idea* methodology.

In the first phase, the design science research methodology was used. According to Peffers et al. (2014), DS is of importance in a discipline oriented to the creation of successful artifacts. Besides, according to Peffers et al., the DS process comprises six steps: problem identification and motivation, defining objectives for a solution, design and development, demonstration, evaluation, and communication.

When the objective of a study is the construction of a new method (artifact), or when research is conducted with a focus on problem-solving, the traditional sciences can be limited. In such cases, then, design science is appropriate, realizing a new epistemological paradigm to develop research (Dresch et al., 2015).

The articulation of knowledge eventually dispersed to develop artifacts that perform a specific function and satisfy a necessity is likely to be of paramount importance (Dresch et al., 2015), as shown in Figure 6. Simon (1996) defends the necessity of a science that dedicates itself to proposing means to create (build and evaluate) artifacts that have certain properties. It is the science of the project-design science.

Simon (1996, p.114) states that "to the project matters what and how the things should be, the conception of artifacts that accomplish goals." Design science is a science that deals with the project. Therefore, it is unconcerned with finding natural or universal laws that explain certain behaviors of the objects that are being studied. In fact, design science is the science that develops solutions to improve existing systems or creates new artifacts that contribute to improving human activity. The nature of such research is usually pragmatic and solution-oriented (Dresch et al., 2015).

At the end of this phase, the *Dot Idea* program was designed to be implemented as an open innovation methodology in large companies, as Shown in Figure 8. The first challenge was launched within the healthcare industry, in partnership with Santa Casa de Misericórdia in Porto Alegre, the largest hospital in Rio Grande do Sul, and Federal University of Science and Health in Porto Alegre. After consulting leaders and identifying one hundred innovation opportunities, Santa Casa selected five areas to assess the *Health.Idea*, which included relationships with patients and physicians, nursing, bed management, surgical block time allocation, and bedside collection of patient information.

For two weeks, a *Dot Idea* call was open on Gust, receiving more than 30 proposals. Following an initial evaluation by the technical staff responsible for the program, 20 proposals were selected for a face-to-face pitch session. This step resulted in the selection of eight startups that were chosen to participate in the first cycle of the *Dot Idea* program. Subsequently, those startups commenced work on an MVP (Minimal Viable Product); however, five of the startups decided to withdraw from the program. Thus, the remaining three startups attended the Santa Casa Demo Day, held on March 28, 2018. This event provided the startups with an opportunity to pitch their ideas in front of a committee, a panel of design science research experts. The results of this event will be presented in the next section.

IV. DOT IDEA AS A NEW WAY FOR OPEN INNOVATION

4.1 The Role of AOI in establishing Startup-Industry Connections

Since its founding in the 1990s, Tecnosinos has traditionally

made incubation calls with the purpose of identifying technology-based businesses to house its development and support its structure. Over several decades, the evolution of the technology market and the knowledge economy has been observed simultaneously with the movements of the traditional economy or with low interaction.

Access to a qualified network that enables optimizing the market is one of the most important values that a startup seeks when being connected with an innovation ecosystem. On the other hand, over the years, the incubator has witnessed the failure of some of the startups it has hosted due to a disconnection with the target market.

Based on 20 years of experience supporting the development of new businesses in southern Brazil, Tecnosinos considers alignment with a target market as one of the most critical factors determining a startup's success. For this reason, market trends are the driver of the actions fostering innovation entrepreneurship at Tecnosinos.

Similarly, the movement of traditional industries approaching the ecosystem of innovation has been in evidence at Tecnosinos for more than 10 years. The park has promoted timely connections between traditional industries and startups. Specialists have observed that traditional industry-startup connections trends have become an increasing need at Tecnosinos over the last 2 years.

In the early 2000s, meeting the value proposition of the park, the global leader in management software, SAP, chose the park to establish its Latin American development laboratory. Since its implementation, the company's operations have gradually been expanded in this unit.

Over the years, SAP and Tecnosinos have supported each other in the promotion of actions that converge purposes and by maintaining constant dialogue on the possible opportunities for joint action. From this effort emerged the *Dot Idea* program: an incubation program co-created by Unitec, an incubator at Tecnosinos, and SAP, to foster new businesses and strengthen Brazil and Latin America as a hub of the Internet of Things solutions development.

4.2 The Dot Idea Program

Dot Idea is a program designed to promote innovation entrepreneurship. It is based on real market demands and is supported by the incubation process of one of the main incubators in Brazil besides the mentoring technology and global vision of the world leader in management software.

The program proposes to reverse the order of traditional calls for incubation and development of innovation projects. Instead of supporting the development of nascent projects, the program identifies and points out market demands and seeks entrepreneurs able to propose technological solutions.

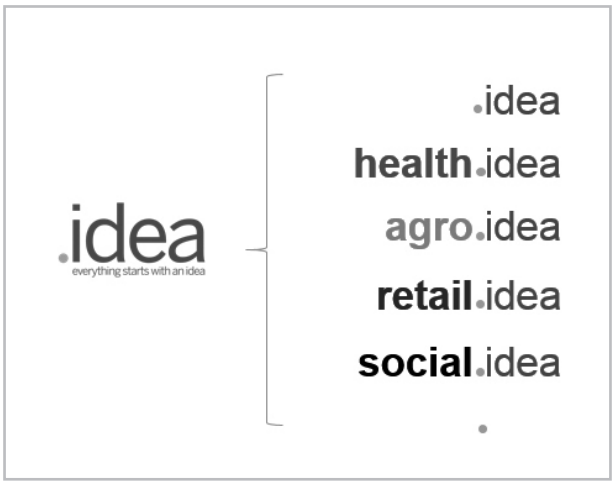

Fig. 7. Market segments indicate each cycle of the .idea program.

Source: Unitec/SAP registers of the program, 2017.

Considering the real demands approach, each *Dot Idea* cycle is focused on specific market segment challenges (see Figure 7). Each call indicates through its name the specific field that is being focused on. The first calls included the variables *health.idea, agro.idea, retail.idea* and *social.idea*.

Based on each segment cycle, an SAP client or partner is invited to join the program to point out the demands that will be the central scope of the call. Besides pointing out market needs, the partner company participates in the program by providing experience throughout developments proposed by startups, playing the role of a potential early adopter of the new technology as well, as shown in Figure 8.

The *Dot Idea* program is structured to involve a 5-stage cycle spread over 14 months as follows: 1. Challenge survey; 2. Call and selection; 3. Concept validation; 4. Development and technological validation; 5. Market validation and investment potential.

4.3 Case and Results

The pilot project, as has already been mentioned in this article, was trialed at Santa Casa de Misericordia Hospital, located in Porto Alegre city. The hospital team selected five challenges to be addressed in this *Dot Idea* program. These were as follows:

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Fig. 8. Program partners

Source: The authors

1) The collection of patient information at a hospital bed: Currently, this information is collected manually every day. The data is then input sequentially into the PEP (electronic patient information) on a PC in the nurse's station located in the center of each floor. There is an interval between the collection and the digitalization of the data, and there is a risk of human error during the digitalization process, too. The challenge being addressed here was to collect this data using digital technology in order to provide information in real time, thereby reducing the risk of mistakes.

2) Management of beds and operating theaters: The adequate management of beds is fundamental to the efficient management of operating theaters. With respect to hospital beds, there is a dispute concerning preoperative patients and postoperative patients. There are patients who need to be given priority, but there is no system to facilitate such prioritizing. This makes the efficient functioning of operating theaters an arduous task. The challenge here was to provide a digital tool enabling the allocation of surgery in the appropriate operating theater, taking into consideration the needs of patients to be given priority.

3) Nursing staff dimensioning: Santa Casa is a high complexity hospital, meaning that the effective management of nursing assistance is crucial to the whole operation. An internal system is emlpoyed to determine nurse's working hours, but there is no digital tool enabling the allocation of working hours in a dynamic way. The challenge was, therefore, to provide a digital tool to address this.

4) Relationships with doctors: This hospital has a medical staff of approximately three thousand professional residents. What is necessary is an electronic system where all of the tasks relating to the hospital and staff can be completed, such as setting agendas, establishing a patient database, enabling documents and orders to be signed electronically, etc.

5) Relationship with patients: Santa Casa is visited by more than six million people for examinations, medical procedures, surgeries, and doctor consultations, and fifty thousand people are hospitalized. A focal point is required to manage the relationships with patients where they can a) make consultation appointments; b) pick up exam reports (already in operation); c) check-in; d) provide feedback; e) patient information is made available to patients' relatives. For this challenge, no solutions were suggested by the startups.

These challenges were posted on Gust, and twenty startups were selected from the 35 that submitted proposals. Eight of these were then chosen to participate in the program. During a period of six months, in which the startups worked on the MVP, five of them withdrew, leaving three to proceed with the final stage. The three startups presented their solutions in a pitch to the Santa Casa Demo Day committee on March 28, 2018. Two of them were approved (Startup B and C) and one (Startup A) was allocated extra time in order to enhance its solution. The solutions presented on the demo day are shown in Figure 9:

1) Startup A: This startup addressed the challenge regarding patients internal management, and its MVP was a wearable device that made it possible to monitor patients' vital signs. However, the committee identified several important points to consider to improve the MVP, such as focusing more on the essential vital signs, thereby making it more viable for implementation in a large hospital.

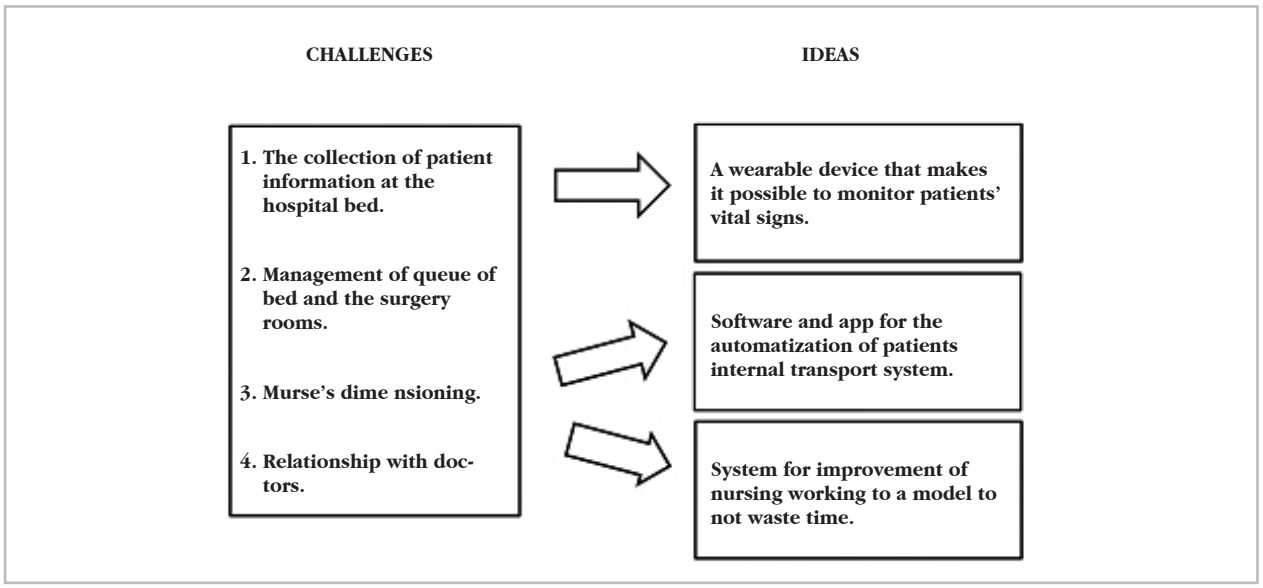

Fig. 9. Challenges and solutions.

Source: The authors.

2) Startup B: This startup also offered a solution to the nursing staff dimensioning challenge. The MVP was an improvement to the current system of allocating work to nurses, resulting in a system that prevented wasting nurses' time and reduced the amount of overtime paid to nurses, meaning that costs were being reduced overall.

3) Startup C: This startup proposed a solution to the nursing staff dimensioning challenge. Its MVP included software and an application for an automatized internal patient transport system. It was approved, and the key issue became the timing for implementation.

In order to summarize this section, it is important to mention that the starting point of this project was to understand the methodology provided by the SAP and Unitec teams. After that, the Santa Casa Hospital held an internal discussion to define the five challenges described above, which were then open on Gust. From thirty proposals, twenty projects were selected for the pitch phase, in which eight startups were selected to commence the project in the hospital. During the period working inside the hospital, five startups withdrew for reasons that will be mentioned below. Three startups successfully presented a final pitch to the hospital's high-level committee.

V. DISCUSSION

This was the first application of the *Dot Idea* methodology in a traditional organization, Santa Casa de Misericórdia Hospital in Porto Alegre, the capital city of Rio Grande do Sul State, in the South of Brazil. This was a great opportunity to observe in a practical way how it is possible to implement this methodology in reality. As identified in previous research, some of the findings were related to the people involved in the process, the internal staff of the organization and the entrepreneurs of the startups (Gambardella and Panico, 2014; Chesbrough and Rosenbloom, 2002; Pittaway et al., 2004).

Other points that support the findings in the literature were related to knowledge management. Within the organization, there were different kinds of tacit knowledge that could not be found in a prescriptive manual, and sometimes people were unwilling to share knowledge with a member from outside, such as an entrepreneur from a startup working on a joint project (Gambardella and Panico, 2014; Teece, 2007; Spithoven et al., 2011; West and Bogers, 2014; Mention, 2011).

Additionally, it was unexpected that five startups would withdraw from the project alleging that it was too challenging to work inside a big organization and that their solutions were unlikely to satisfy the objectives of the project. The authors tried to discover why they quit the project. Some mentioned

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that it was too difficult to deal with the culture inside the organization and that they would find it too difficult to propose a final solution. They stated that the hospital was unprepared for that kind of open innovation methodology. The hospital teams' opinions differed to the startups' opinions. They pointed out that some of the startups thought that from the beginning they would be providing services to the hospital, selling products or solutions in order to raise money initially. This problem has not been comprehensively described in the literature; however, some researchers (Lee et al., 2010; Rothaermel and Deeds, 2004) have mentioned that innovation inside SMEs involves certain characteristics that must receive special attention during open innovation joint projects.

Finally, it is important to mention the main findings in this work. The collaborative project (Knudsen and Mortensen, 2011; Chesbrough, 2017) positively influenced the results presented by the three remaining startups, and the hospital's administration approved two of the proposed solutions and requested that improvements be made to the third solution, as described above.

For Tecnosinos and Unitec, the program accomplishes its main mission: to strengthen the ecosystem of innovative entrepreneurship focused on the development of the knowledge economy in the region while increasing the success rate of nascent enterprises.

This program has demonstrated to the Unitec and the SAP teams that open innovation in a big company is a difficult task. Some difficulties were identified, such as problems concerning the relationships between startups and the hospital's internal teams—doctors and nurses—and problems related to the time required for the activities, which were not taken into account during the planning phase. It was discovered that from the beginning it is important to have a person inside a company who is responsible for making connections and to have the commitment of the working people in order to test and to work with startups during the project.

Another point that was determined is that startups need funding from the beginning in order to be fully dedicated to a project. At the same time, initial choices are critical in order to avoid startups withdrawing, as happened in this project.

VI. FINAL REMARKS

Technological parks and incubators have the opportunity to play a strategic role in the promotion of network connections by acting as a bridge between the challenges faced by consolidated organizations and the technological innovation capacity of startups.

The challenge is to consolidate a systematic and continuous model of information flow that is capable of identifying complementarity between businesses and technology, balancing interests, and connecting markets in order to promote virtuous and sustainable interaction between the parties involved.

Dot Idea emerged as a result of a joint effort to co-create a program that supports the development of new businesses that converge the interests of different actors in an integrated value chain. The impacts of the *Dot Idea* program have indicated a strong alignment with the need for a connection between traditional industries and innovation entrepreneurial ecosystems. In terms of the findings presented in this paper, it is possible to state that the *Dot Idea* program is an adequate response to the question regarding the possibility of having a singular methodology for open innovation ruled out in the organization of traditional industries.

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