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INOVAÇÃO SOCIAL ABERTA EM LIVING LABS

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Abstract

In this paper, a qualitative case study, we investigated in two Brazilian living labs how open social innovation can explain the development of social innovations. The findings broaden the understanding of open social innovation and explain the process of developing social innovation through the adoption of three open innovation strategies: outside-in or inbound, inside-out or outbound, and coupled that involves bidirectional flows and interactive and colaborative flows, similar to co-creation. We identified three dimensions for co-creating social innovations in living labs: governance of the collaboration process, interaction platform and other tools and openness of attitudes, structure and processes.

Keywords: Open innovation. Social innovation. Co-creation. Living labs

Resumo

Neste artigo, um estudo de caso qualitativo, investigamos em dois *living labs* brasileiros como a inovação social aberta pode explicar o desenvolvimento das inovações sociais. Os resultados ampliam o entendimento sobre inovação social aberta e o processo de desenvolvimento de inovações sociais por meio da adoção de três estratégias de inovação aberta: de fora para dentro, de dentro para fora, e acoplada que envolve fluxos bidirecionais, interativos e colaborativos semelhantes a co-criação. Identificamos três dimensões para a co-criação de inovações sociais nos *living labs*: governança do processo de colaboração, plataforma de interação e outras ferramentas e abertura de atitudes, estrutura e processos.

Palavras-chave: Inovação aberta. Inovação social. Cocriação. *Living labs*.

Introduction

Research on the role of innovation in technological and social change has grown in recent years in the social sciences but also in multidisciplinary studies (Fagerberg, 2005). When it involves the social theme, it is significantly fueled by the studies on social innovation (Van Der Have & Rubalcaba, 2016, Tracey & Stott, 2017, Edwards-Schachter & Wallace, 2017; Silveira & Zilber, 2017; Pacheco, Santos & Silva, 2018; Moulaert & Mehmood, 2019). It presents several theoretical and empirical challenges and for its analysis it is crucial, according to Battisti (2012), to consider literature on open innovation to deal with user needs and the necessary collaboration between relevant social groups as active participants in the co-creation of social innovations. However, for Chesbrough et al. (2014) few efforts have been directed at research into the adoption of open innovation strategies and the generation of social impacts.

In this study, we explore the theoretical and empirical evidence that illustrates how the development of social innovations occurs through open innovation strategies in what can be defined as open social innovation according to the concept coined by Chesbrough and Di Minin (2014). We seek to answer the following question: how open social innovation can explain the development of social innovations? To answer this question, we conducted a field study in two Brazilian living labs. Brazil is an opportune place for the development of social innovations, as it has faced increasing poverty and inequality. There are 23.3 million people living below the poverty line totaling about 11.2% of the population. Misery increased by 33% between 2014 and 2018. There are 6.3 million new poor in the country (Neri, 2018).

In this study we discuss living labs as a phenomenon that is reassembled from a European "North" model with open and user-centered innovation for its "southern" application. As one of the results of one of the open innovation movements, Chesbrough et al. (2014) observes that living labs have grown along with ENoLL - European Network of Living Labs as an instrument of innovation policy for Europe in a new paradigm called Open Innovation 2.0 - OI2 (Rayna & Striukova, 2015) and that has expanded to different parts of the world, including Brazil.

In order to answer the research question, we structured this article as follows: first, we present theories about social innovation, open innovation strategies and, in particular, about the concept of open social innovation associated to the understanding of living labs as a particular type of innovation network. Following, we present the methodology adopted for the research. Then, we performed the analysis and discussion of the results obtained. Finally, we present the theoretical and managerial implications of this study, its limitations and recommendations for future research and the references adopted.

Theoretical Reference

Social Innovation and Living Labs

Social innovation in an advance of Crozier & Friedberg's (1995) work by Howaldt & Kopp (2012) can be interpreted as "the process of collective creation, in the course of which the members of the particular total population learn, i.e. invent and establish, new ways of playing the social game of collaboration and conflict, in a word a new social practice, and in the course of which they acquire the necessary... abilities to do this". It has become a prominent theme in organizational studies (Mehmood & Constanza, 2013). Its borders have not yet been completely defined, with untapped opportunities for theoretical and empirical contributions (Cajaiba-Santana, 2014). Indeed, social innovation is not new, but it seems to be in a new phase that is focused on providing solutions not only to localized problems, but to more systemic and structural issues (Nicholls, Simon, & Gabriel, 2015).

The first empirical results of Howaldt, Domanski & Kaletka (2016) global research project "SI-DRIVE: Social Innovation - Driving Force of Social Change" as a result of a global mapping of social innovation

initiatives based on 1,005 innovation initiatives highlighted the wide range of actors involved in the mapped initiatives, confirming the need for a cross-sectoral concept of social innovation. For Howaldt, Domanski & Kaletka (2016), "social innovation deals with a new paradigm of innovation that reflects a new combination of social practices in certain areas of action or social contexts prompted by certain actors or constellations of actors in an intentional targeted manner with the goal of better satisfying or answering needs and problems than is possible on the basis of established practices ".

Social innovation is manifested in a context of distributed innovation, as "the information needed to innovate in important ways is widely distributed" (von Hippel, 2005, p.14). A concept encompassing a variety of contrasting perspectives to be distributed among various stakeholders in a value network, covering not only open innovation but also user involvement processes, such as cumulative innovation, communities or social production and co-creation through collaborative processes aligned with the democratic paradigm, which covers not only the participation of the communities, but also the knowledge produced in them as being of equal merit to the one produced by specialists (Lakhani & Panetta, 2007, Bogor & West, 2012; Richardson, 2018).

Participation is characteristic of social innovations because social needs are better perceived by those who are directly affected by the problems being addressed, and in order to produce results that really matter, ideally they are involved in the design, implementation or adoption of innovations.

For this study, social innovation is interpreted as a distributed process that includes open and user-centered innovation and co-creation in a network that involves various stakeholders in the development of social innovations. In the field of open innovation it relates to studies that have identified examples of sharing for non-pecuniary reasons (Chesbrough, 2006; Dahlander & Gann, 2000). This open innovation network allows the sharing of complementary resources from different stakeholders to develop solutions to the complex and growing social challenges. An example of an innovation network that has these characteristics are some living labs that emphasize the development of social innovations in their scope of activities. For example, Chesbrough et al. (2014) argue that living labs were promoted mainly among European countries and is one of the movements of open innovation. In order to understand the living labs that develop social innovations considering the different conceptual possibilities, we focus on their understanding as open and user-centered innovation networks em que change processes are facilitated by network boosters and "may help to depict and predict short- and long-term relationships, and it may assist them in managing innovation in open environments" (Leminen, Nyström & Westerlund, 2019). The diversity of roles played by users and other stakeholders and the mechanisms by which innovations are developed and the resources provided in the network to share reflect the manifestations of living labs as innovation networks (Dekkers, 2011; Leminen, Westerlund & Nyström, 2012, Leminen, 2013; Nyström et al., 2014, Leminen, 2015; Leminen et al., 2016; Hossain, Leminen & Westerlund, 2019). For example, the study by Nyström et al. (2014) enabled the detection of ten roles played by those who integrate the innovation network such as living labs.

Living labs refer to a peculiar approach to accelerate and increase assertiveness in the development of innovations in collaborative innovation networks (Schäffers & Turkama, 2012). Synthesizing, Schuurman et al. (2013), suggests that living labs connect the innovation capacity of users and different stakeholders by participating in innovation projects in a co-creation process. Indeed, "a living lab is a usage-driven research and open innovation system. Users are at the centre of such an approach as experts of their day-to-day life and co-creators of values in the innovation processes" (Trousse, 2019).

Moreover, this connection between living labs and social innovation can be established in the model of innovation in society that has begun to change with the involvement of user groups with a more prominent involvement of the public sector and civil society with various societal challenges, which are still waiting for solutions such as transportation, energy use and the health of the elderly, as observed in Horizon 2020 (Kuhlmann & Rip, 2014).

The relationship between living labs and social innovation is not new, and four examples can be highlighted in relation to this combined research. The first one refers to the study conducted by Edwards-Schachter, Matti & Alcántara (2012), where it is suggested that living labs are a useful tool for identifying community needs and enhancing local development support and integrating technological and social innovations into local governance policies and processes. The second is the study by Battisti (2014), which argues that the fields of organizational innovation and innovation centered on the user can build an understanding of living labs and the development of social innovations from the proposition of a process model at the micro level indicating that the interaction between organizations and users can be ensured by ambidexterity, learning, collaboration and empowerment. The third is the work of Battisti (2019) that analysed four living labs, in particular focusing on understanding the role of key people in the social innovation process. The fourth example is the study of Silva and Bitencourt (2019) that investigates the processes and specific actions, called "orchestrating of innovation networks" constituted around the concept of living lab for the development of social innovations, however, associated with a new field process, called co-creation management.

In the relationship between living labs and social innovation, there is a theoretical gap about how social innovations are developed. A view that is aligned with the new frontiers of social innovation research, as Nicholls, Simon, & Gabriel (2015) emphasize in discussing the use of networks to build results in the social sphere, and particularly by Sonne (2015) to highlight the usefulness of networks in the development of social innovations through the argument that "actors within the social enterprise ecosystem - the individuals or groups of individuals who are able to influence outcomes and cause change" affect the performance of social innovations through their sharing of knowledge in the network.

Thus, it becomes necessary to look at how open social innovation explains the social innovations development. To this end, the innovation networks identified here as living labs are taken as the unit of analysis.

The following are the references that define open social innovation and its strategies.

Open Social Innovation

Open innovation involves openness to various internal and external actors who participate in a collaborative way in the innovation process by engaging in different types of partnerships, acquisition of ideas and resources from the external environment (Chesbrough, 2003) and " [...] has emerged as an important concept in both academic research and industrial practice, and it is now also becoming increasingly important in the public policy domain (Bogers, Chesbrough, & Moedas, 2018).

Initially focused on the private sector, the notion of open innovation has been used in different ways (Huizingh & Eelko, 2011, West & Bogers, 2017, Bogers, Chesbrough, & Moedas, 2018) and also in the social area from the concept of open social innovation (Lucke, 2014; Raffl, 2014; Chesbrough & Di Minin, 2014; Martins & Bermejo, 2015; Tardivo, Santoro, & Ferraris, 2017). For Chesbrough and Di Minin (2014) open social innovation proposes "to be the application of either inbound or outbound open innovation strategies, along with innovations in the associated business model of the organization, to social challenges". In the inbound (outside-in) open innovation strategy knowledge is integrated throughout the innovation process, as it refers to social needs and their possible solutions expressed by those directly involved in their identification, as well as affected by the results obtained. In the outbound (inside-out) open innovation strategy the fertilization of innovations is sought by making the developments available to society, ensuring the joint ownership of knowledge. The business model sustains the developments by emphasizing the adoption of forms for their adaptation and reconfiguration to the identified needs and desired solutions.

Not discussed by Chesbrough and Di Minin (2014), we identify the idea of a third open social innovation strategy called the coupled open innovation strategy described initially by Gassmann (2006) and Enkel,

Gassmann & Chesbrough (2009) applicable to the social innovations development through networks of collaborators (Vanhaverbeke, 2006) and collaboration with voluntary communities (West & Lakhani, 2008).

It involves bidirectionals and interactives flows of innovative knowledge from the combination of inbound (outside-in) and outbound (inside-out) open innovation strategies (Dąbrowska, Fiegenbaum & Kutvonen, 2013; West & Bogers, 2014). For Ramaswamy and Ozcan (2014) the coupled model of open innovation would be able to lead to value creation. However, specifically, studied coupled models of open innovation distinguishing them between interactive coupled where each involved leads their own innovation and interactive coupled in which the outputs of innovation are created collaboratively by all involved, linking the co-creation only to the last.

According to West & Gallagher (2006), Diener & Piller (2009) and West & Bogers (2014), the process model for open innovation projects would involve four activities: defining, finding participants, collaborating and leveraging. The key value creation activity in the Piller & West (2014) model is the interactive collaboration that creates new innovation. Piller & West (2014) consider the existence of a gap of research on the collaboration activity of coupled open innovation that can be translated, according to Piller & West (2014), in three important dimensions: governance of the collaboration process, interaction platform and other tools and openness of attitudes, structure and processes.

About governance of the collaboration process, Piller & West (2014) highlight that "the co-creation literature covers more explicitly the activity of joint collaboration between firms and individuals, suggesting structures and processes that allow the firm to stir, monitor, and police its value creation through collaborative efforts with external partners". Regarding the tools and collaboration infrastructures, Piller & West (2014) describe that "software tools play an important role enabling a broad collaboration with customers and other individuals at low transaction cost ... have been discussed extensively from a technology perspective in the information systems literature and, to a smaller extent, in the co-creation literature". And, for Piller & West (2014) "openness of attitudes, structure and processes, assume that is willing to open itself to the external partners: the risk of leakage of internal firm insights must be weighted against the new insights gained by empowering external collaborators".

Originated in the seminal work of Prahalad & Ramaswamy (2004) on value creation and considered an emerging paradigm in management (Ramaswamy & Ozcan, 2014), it refers to an active, creative and collaborative process between an organization and individuals during the process of development of a product / service in which participants contribute to the task initiated and facilitated by this organization (Roser et al., 2009). In the social field there is associated mobilization of forces to spawn new ways of engaging and collectively creating value (Ramaswamy & Ozcan 2014b). This perception is in line with Battisti (2012) on the need to adopt a new model for the analysis of social innovation, to deal with the user needs and the necessary collaboration between relevant social groups as active participants in the co-solution of complex problems and social rights. The co-creation in living labs is an emerging theme and has been studied in different fronts, such as the role of user characteristics in innovation contribution (Schuurman et al., 2015), the connections between interested parties in the development of innovations (Greve, Martinez & Neely, 2017) instruments to support co-creation and user involvement (Beutel, Jonas & Moeslein, 2017; Haukipuro, Väinämö & Hyrkäs, 2018).

However, co-creation must be interpreted in relation to the social context in which it occurs, since the value itself must be considered as part of the collective social context (Edvardsson et al., 2011). It is an open and integrated innovation process that occurs in a specific local and institutional context (Bekkers, Edelenbos, & Steijn, 2011). This implies that it is important to recognize the specific environment in which innovation processes occur. This is why Castells (1996: 3) mentions "a *milieu* of innovation that connects with the conception that a living lab is a user-centric innovation *milieu* built on everyday practice and research, with an approach that facilitates user influence in open and distributed innovation processes

engaging all relevant partners in real-life contexts, aim to create sustainable values" (Bergvall-Kåreborn et al., 2009).

Thus, according to the framework proposed by Chesbrough & Di Minin (2014), it is necessary to investigate how the living labs develop social innovations through inbound (out-in) and outbound (inside-out) open innovation strategies and, additionally the coupled open innovation strategy that involves bidirectional and interactive flows, being these able to lead the co-creation of value.

In the next section, we will present the methodology adopted for the research, as well as the procedures for collecting and analyzing the empirical evidence.

Methodological Procedures

This research involves a qualitative case study (Yin, 2017). We selected two living labs in Brazil. The selection took into account three criteria: (1) having a link with ENoLL - European Network of Living Labs; (2) focusing on the development of social innovations and (3) the regularity of its activities.

The first was Habitat Living Lab (HLL, 2018), recognized by EnoLL, located in Vitória, Espírito Santo (Brazilian municipality, Espírito Santo state capital, in the Southeastern Region of the country). A collaborative innovation network that aims to develope technological and eco-friendly solutions to help improve urban and rural housing conditions of low-income populations, supported by environmental education and community participation in a special social interest area in Vitória, Espírito Santo, self-proclaimed "Território do Bem" (name given to Poligonal 1 in Vitória, Espírito Santo that integrates eight peripheral districts of the municipality of Vitória, Espírito Santo: Itararé, Penha, São Benedito, Jaburu, Floresta, Bonfim, Consolation and Engenharia).

The second one was the Corais (PC, 2018), linked to the Instituto Ambiente em Movimento - IAM, recognized by EnoLL, established in the city of Curitiba, Paraná (Brazilian municipality, Paraná state capital, in the Southern Region of the country). Refers to an open innovation platform for the development of free design projects.

Data collection focused on the work of each corresponding living lab and occurred in two stages. The first stage of recognition and exploration occurred through an approximation with the managers responsible for these living labs. In this stage, we seek to understand the main characteristics of living labs and the ways in which the conceptual framework can be expressed around the definition of open social innovation proposed by Chesbrough and Di Minin (2014) and, additionally, by the coupled models of open innovation studied by Piller & West (2014). This definition integrates the definition of the business model necessary for the development of social innovations and of the inbound (outside-in), outbound (inside-out) and coupled open innovation strategies, that involves bidirectional and interactive flows, being these able to lead the co-creation of value. For each of these strategies we derived specific topics that defined the research roadmap. The second stage involved the collection of data through 11 semi-structured interviews (Merriam, 2009), with those responsible for the management of the living labs studied and their main leaders and leading users. These interviews were conducted in person or by skype with an average duration of one hour and recorded with audio recording equipment.

We have adopted the triangulation method (Flick, 2013), by which we tried to take different views about how open social innovation explains the social innovations development, combining several sources of evidence under a theoretical approach and producing a additional knowledge about what would be possible if a single perspective were adopted. Following the classification proposed by Denzin (2005), we conducted the triangulation of data sources, without using different methods. In this case, the different sources of evidence that we used to proceed to triangulation included: documents, access to different

media and interviews. These sources were sufficiently robust to confer reliability to the results obtained, since they generated redudence in the responses by their repetition.

We obtained evidence from different sources. Two publications that discuss the experiences of selected cases: a) Collaboration Networks for Innovation: the Living Lab Habitat experience (Pinto, 2014) and b) Coralizing: a collaboration guide for the creative economy (van Amstel, 2015). Electronic addresses of the living labs studied. In Habitat Living Lab the address http://web3.ufes.br/habitat/index.php, or in the addresses of Laboratory for Support to Innovation Networks - LabTAR http://www.labtar.net.br/site/ and the "Ateliê de Ideias" Association http://www.ateliedeideias.org.br/ that form the management nucleus of Habitat Living Lab. In the Corais Platform the address http://corais.org/. Interviews conducted with people with different perspectives at different times and places, which allowed the comparison and cross-checking of the data collected.

We transcribe the recorded interviews, later interpreted through the technique of content analysis (Bardin, 1977) in which we construct a knowledge analyzing the "discourse", the disposition and the terms used by the speakers in front of the strategies of open innovation. We constructed the narrative structure from several narratives that sought to describe individually and to associate the evidence obtained to each of the living labs studied (intra-case analysis) and to analyze the cross-evidence (inter-case analysis).

Finally, we compare the results of the analysis with the reference literature on open social innovation (Chesbrough and Di Minin, 2014) and complement by Piller & West (2014) and the correct references explored in this study in topic 2.2. Open Social Innovation. The first contributed to building internal validity, raising the theoretical level of established relationships and refining the construction of final definitions. The second one has improved the analytical generalization and also contributed to the theoretical level of established relationships and to the basis of the new insights obtained.

In order to ensure the quality of the study, we submitted each of the cases for review by the interviewees in order to corroborate the integrity of the report obtained.

As for confidentiality in the final essay, no conditions of anonymity or confidentiality were required, allowing future study readers to be able to identify the living labs studied.

Presentation and Discussion of Findings

In this section, we analyze and discuss the results of this study in which we obtained evidence of the adoption of open innovation strategies in the living labs studied (intra-case analysis). Initially, the Living Lab Habitat is presented. Following the Corais Living Lab. In addition, we conducted a discussion of the results obtained from the cross-evidence analysis (inter-case analysis).

Findings (intra-case analysis)

Open Social Innovation in the Living Lab Habitat

Living Lab Habitat began in 2003 when the Non-Governmental Organization - NGO Association "Ateliê de Ideias" was created with the purpose of producing social technologies and solutions to promote local development in urban areas, focusing on the Special Interest Area Social of Vitória, polygonal region 1 of the municipality, also known "Território do Bem" (name given to Poligonal 1 of Vitória - ES that integrates eight peripheral districts of the municipality of Vitória, Espírito Santo).

The "Ateliê de Ideias" Association has the mission of developing creative solutions, mobilizing and empowering local vocations, to generate the development of the communities served. It turns to

organized communities capable of conducting their development, productively articulating their actors, focusing on public policies and determining the direction of local governance. Its work has allowed the identification of solutions to problems diagnosed, enabling the development of a community bank, a residents' forum, an incubator of solidarity economic enterprises and a housing program that includes housing credit, technical assistance in construction, construction of villas with clean technologies, such as: ecological bricks, handmade floors with reused materials, low cost solar heater and wastewater reuse system.

In 2006, the demand for specific knowledge in the areas of Civil Engineering and Architecture and Urbanism needed to promote the housing program generated a first project integrating representations of the "Território do Bem", through the "Ateliê de Ideias" Association and the academic community of the Federal University of Espírito Santo - UFES, represented by the Architecture and Civil Engineering courses. As a result of the approach, architectural projects were elaborated, guidelines for the construction of houses were carried out and tests of soil granulation, resistance and water absorption by the Construction Materials Laboratory - LEMAC on the ecological bricks used in the constructions and produced in the "Território do bem" by workers of the solidarity economy that integrate the "Bem Morar" (initiative for the production of ecological bricks).

In 2008, a new connection was established with the Production Engineering course that added technical knowledge to improve the organization of production in the ecological brick factory.

In this context, several low-cost technological solutions aimed at improving housing units in the "Território do Bem" were developed: soil-cement bricks manufactured by members of the community and used in the construction of local housing units; manufacture of handmade floor with recycled material of the construction; study on wastewater reuse; and installation of low-cost solar heaters to heat bath water, reduce the electricity consumption of residents and help reduce clandestine energy connections that are associated with various accidents.

This situation led the members of the Ateliê Ideas Association, community representatives and members of the academic community to seek new alternatives that culminated in a common interest in studying the feasibility of installing photovoltaic solar panels in local housing units without the use of batteries for energy solar accumulation. At that time, a collaborative network was formed around the photovoltaic solar panel project that became Living Lab Habitat.

Then, in October 2009, those involved in the collaboration network were aware of the existence of the Living Labs movement and the Living Labs European Network, which culminated in the incorporation of Living Lab Habitat and its adhesion to ENoLL at the 4th wave in 2010 .The intention was to legitimize the established collaboration network and gain access to innovation funds from the European Commission and to programs jointly financed by the European Union and the Brazilian Federal Government in the research, development and application of technologies focused on citizens and their well-being from the perspective of developing a more just and sustainable society.

Furthermore, Living Lab Habitat members recognize that there is an area of related interests that forms part of their field of action, but there are initiatives that are specific to each of the members and, due to this characteristic, there is a need to create an entity to represent and respond to the Living Lab. In August 2010, LabTAR emerged from a strategic project with resources from the Foundation for Support to Research and Innovation of Espírito Santo - FAPES that aims to promote Science, Technology and Innovation actions for generation and diffusion of knowledge in the State of Espírito Santo and the Federal University of Espírito Santo - UFES.

Its activities in the first two years were directed towards the support of Living Lab functioning as a subsystem responsible for integrating existing projects based on their specific skills and purposes.

Currently, LabTAR develops its own actions not limited to the scope of Living Lab Habitat, as well as the "Ateliê de Ideias" Association and all other involved in the Living Lab.

At the Living Lab Habitat, communities are organized into forums or other action groups to discuss topics of common interest that enable them to be involved, from planning to implementing initiatives and their subsequent evaluation. For example, the "Bem Maior" Forum, whose community leaders come together to discuss and propose solutions to their problems and demands, and mobilize people to improve the quality of life in the region. One of its actions, together with several partners, was the realization of a research called "Saberes, fazeres e perfil dos moradores do "Território do Bem" that served as a subsidy for the "Projeto Comunitário Coletivo", a strategic planning process that consolidated the " Plano Bem Maior" that guides the political action of the Forum during this period, and which identified good ideas and effective solutions to the demands presented from the continuous interaction with local and strategic partners. Thus, the actions of Living Lab Habitat originate from the needs of users capable of exposing their interests.

The leaders and residents that make up the "Território do Bem"; are those that have the best possibility of practical judgment of the solutions presented from the results, successes and failures of previous interventions (Pinto, 2017). In addition, the so-called "Projeto Mosaico", now known as the "Plataforma Conecte Ideias", is a social platform for collective construction of solutions. It is the result of a technological and social innovation project developed by LabTAR in partnership with the Ateliê Ideias Association, technology company Prosperi and the community of Território do Bem, with financial support from the FAPES. The participation of the community in the development of the project happened through dynamics, interviews, trainings and meetings. The Platform created an environment that allowed mobilization for the construction of ideas through the debate and action of people who wish to be agents of transformation of their community through leadership, exemplary action or following an idea of interest.

In addition, Habitat Living Lab has the "Sistema Trama 1.0" which is intended to mediate the collaboration of the participants of the Network, among them, the members of LabTAR. It aggregates groupware tools that are software intended for group work as well as a file system that allows users to store the documents of use for the collaborative work. "Trama 1.0" is the first solution developed in LabTAR to manage the knowledge of Habitat Living Lab, since the system allows not only documents used or resulting from collaborative work to be maintained, but also records and stores the content of the interactions between the members of the Network.

In this way, Living Lab Habitat combines participatory and collaborative processes, supported by the way it reacts in an organized way to the needs identified through detection mechanisms, mobilizing the network around common projects.

The open social innovation strategy adopted by Living Lab Habitat combines inbound (outside-in) and outbound (inside-out) open innovation strategies to create conditions in which the different actors that connect in this collaborative network for innovation can promote the reciprocal exchange of knowledge for development of social innovations. From inbound (outside-in) it works on the identification, assimilation and exploitation of knowledge through the Forums. From the outbound (inside-out) creates a breeding ground for innovation and flexibility and engages the best efforts of network members in empowering the building of Living Lab Habitat initiatives. It results in an coupled open innovation strategy in which there is reciprocal exchange of knowledge for the development of social innovations in a bidirectional flow; and in the combination of participatory and collaborative processes, supported by the way it orchestrates the response to the needs identified in the interactive flow. In this flow, the effective participation of different actors and, in particular, residents of the "Território do Bem" is established through a collaborative process coordinated by Living Lab Habitat in which they are involved in processes of co-creative innovation. The role played by Living Lab Habitat in network relationship management is essential for effective implementation of open social innovation strategies adopted.

The coupled open innovation strategy that involves bidirectional and interactive flows is evidenced in the Habitat Living Lab by a networks of collaborators and community leaders that aims to develope technological and eco-friendly solutions to help improve urban and rural housing conditions of low-income populations. The solutions proposed and implemented are the result, first of all, of the knowledge derived from the research: "Saberes, fazeres e perfil dos moradores do Território do Bem", of the "Bem Maior" (from the "Projeto Comunitário Coletivo", a strategic planning process that consolidated the plan) of the "Território do Bem", and the work carried out in the "Bem Maior" Forum (whose community leaders meet to discuss and propose solutions to their problems and demands, and mobilize people to improve the quality of life in the region). In addition to allowing the participation of several actors, it also creates a collaborative and open process aimed at the creation of a Plan that is managed by all the community members who work in the Forum, through their formal and informal leadership.

Open Social Innovation in the Corais Platform

The Corais Platform or also called the Corais (http://corais.org/) website is a platform for the development of collaborative projects. Just as a coral reef provides infrastructure suitable for different forms of marine life, Coral offers the basic innovation architecture for the proliferation of collaborative projects that contribute to the common good or what is shared and beneficial to all or most members of a particular community or, alternatively, what is achieved by citizenship, collective action and active participation in the field of politics and public service. The projects are classified into five types: open and public project, moderate and public project, closed and public project, private project and community bank.

Each hosted project is considered alive as long as people are collaborating. When it becomes inactive, the discussions and documents generated can be used for new projects. This dynamic of collaboration is analogous to coral reefs, which use dead structures as the basis for their development. At Corais, everything posted on the system is available to the project participants and also to anyone who is logged in. It creates, with this condition, a public knowledge base for consultations regarding the project under development or as a reference for others that can be developed.

People outside the project can interact or join existing projects, not just by limiting consultation. With each update in the project, group members receive an email notification, maintaining a communication that ensures that everyone is informed about what is happening.

There are several other similar tools on the market, but they do not promote the formation of open and collaborative communities as proposed by Corais, because through them it is possible to meet new people and their experiences. In addition, as the source code is free, new tools are constantly being developed by the users themselves and / or supporters willing to contribute.

Corais can be used as a collaborative social network, constituting an environment for the development of collective works, enhancing creativity through the stimulation of collaboration, as well as encouraging individuals' autonomy in self-management or shared management of projects. These forms of management refer to a management model of collaborative work. It assumes that people working together and aligned, with common sense and responsibility, do not need centralized management. In this direction, everyone participates in management while everyone is managing themselves.

Corais also allows projects to happen even if the people involved can not meet in person and even if there are no financial resources available. The tasks can be managed horizontally from the tools available, without a person having to take direct control of the project in development. One of the tools, the social currency, allows creating a solidarity economy among the participants of a project. In short, Corais is made for projects that generate or strengthen a community.

Corais is a combination of several modules of Drupal, a modular framework and a CMS system (acronym for Content Management System) that aims to facilitate the creation, edition, publication and distribution of information. It is written in PHP (a recursive acronym for PHP: Hypertext Preprocessor), a widely used, and especially suitable for web development that can be embedded within HTML (a markup language used in building web pages).

As other developers join the Corais team, you can enhance the platform in a proprietary Drupal distribution, which allows you to create and organize content, manipulate appearance, automate administrative tasks, and set permissions and roles for users and collaborators. For now, only a list of all modules used and raw source code is available on GitHub, a Shared Hosting Service for projects using Git versioning control, a version control (or versioning) system.

Corais has its origins in the "Instituto Faber-Ludens de Design de Interação", a nonprofit entity that promotes the development of Design and Technology in Brazil through the integration between market and academia. He created Corais in 2011 to support the development of any class of open projects in other organizations, without necessarily having formal connections with the Institute.

In 2012 Corais became independent from the "Instituto Faber-Ludens de Design de Interação" and in 2013 moved to "Instituto Ambiente em Movimento – IAM", a non-profit association that aims at environmental awareness from the individual to the collective sphere. In the IAM, the platform is developed by Frederick van Amstel, with open participation to any user in the metadesign project, which aims to develop the platform itself (that is, Corais itself is a Corais project). It is based on a design modality that precedes the project itself, in which it is possible to construct instruments that amplify the Corais has become a Living Lab affiliated to ENoLL in 2012 because it believes that it is a space for the development of projects shared by people and organizations that wish to collaborate to innovate together.

Corais involve labs, classrooms, communities and startups who believe in learning by doing. It has several public projects that integrate members from different regions of Brazil.

Corais provides its users with a variety of groupware tools, software for the work of collaborative groups that can be enabled in the environments of the platform projects.

At Corais anyone can create a collaborative project (Open and Public Project, Moderate and Public Project, Closed and Public Project, Private Project and Community Bank). The Creative Commons license defines how the contents of the project can be used by other projects whether in or out of Corais. Creative Commons licenses and copyright and related rights instruments strike a balance in the traditional "all rights reserved", providing all creators with a standardized way of assigning copyright and related rights authorizations to their creative works.

In addition to the projects, there is a continuous learning environment, through the Tree of Knowledge in which are stored available knowledge to execute projects, in a collaborative way, as in a wiki, a type of collaborative software that allows the collective editing of documents using a system that does not require the content to be reviewed prior to its publication.

Collaborative construction depends on how project participants use the tools available. In projects, collaboration occurs in different ways according to the way users work. There are those who prefer to collaborate through real-time texts, others who prefer posts and comments, others who focus on the distribution of tasks, and others who exchange images and videos. It all depends on the ability of participants to use the tool, since the platform does not impose a specific way for collaboration.

At Corais it is possible to share what you know and learn what other projects have shared besides creating a task in a project from a knowledge. Corais enables everyone to contribute and expand community knowledge by adding or correcting available information as well as creating new knowledge. The wiki format allows for the mapping, self and co-management of collective traditions, even if a project is over. When you use one of the tree methods in a project, a link is created that adds the method as a reference in the project. Users choose between "I'm studying", "I've studied", or "I'm a specialist" options.

An example of using the Knowledge Tree developed by the design community is the UX Cards, a knowledge card deck for designing user experiences (UX). The cards have practical validation and are visible in the profiles, composing the cognitive identity of individuals and groups, valuing their knowledge and the potential to collaborate. Being public, the projects on the platform become a kind of online portfolio for the participants, exposing the works quickly. The great differential of this portfolio generated by Corais is that the entire creative process of a project is displayed, creating a base of examples for each of the methods available in the Tree of Knowledge, giving greater support to research and conceptions made during the work, where everything is documented automatically.

The open social innovation strategy adopted by Corais combines inbound (outside-in) and outbound (inside-out) open innovation strategies at different levels to create conditions in which the different actors that connect in this platform can collaborate on innovative projects and each other. At a first level, from the Platform and its tooling. On a second level by the self-organization of users. From inbound (outside-in) on sharing and building knowledge like a wiki. From the outbound (inside-out) acts in the promotion and maintenance of its philosophy of work based on free design; and the creation of an environment based on trust and openness, which translates into the availability of tools that enable the implementation of channels for monitoring the collective, as well as participation in decision-making. It results in an open innovation strategy in which Corais has taken on a coordinating role in specifying and providing a set of tools that can be applied in everyday situations of its users in order to improve collaboration within the innovation process. It enables users to share knowledge in a two-way flow by opening up their knowledge and then jointly develop projects together within the collective and between them in the interactive flow. The role played by the platform in generating conditions for leadership and control distributed among users is crucial to the effective implementation of their open social innovation strategies.

In Corais coupled open innovation strategy that involves bidirectional and interactive flows occurs by the voluntary communities who use the platform that offers the basic innovation architecture for the proliferation of collaborative projects that contribute to the common good. The solutions to the common problems and new ideas for the improvements of the existing projects, or even the creation of new projects, are accepted in the platform that is used as a social network aimed at the development of collective works, potentializing the creativity through the stimulation to the collaboration between people and their participation.

Findings (inter-case analysis)

Summarizing, in the living labs studied, there is the evidence of the adoption of open innovation strategies. Includes inbound (outside-in), outbound (inside-out) and coupled open innovation strategy that involves bidirectional and interactive flows, as can be seen in Table 1.

The combination of this open innovation strategies expressed summarizes how open social innovation can explain the development of social innovations in the living labs studied.

Table 1. Open Social Innovation in Living Labs

Open Innovation Etrategies		Living Labs	
Strategy		**Living Lab Habitat**	**Corais**
outbound (inside-out)		- Creating a breeding ground for innovation and flexibility; and - Engaging the best efforts of network members.	- Promotion and maintenance of work philosophy based on free design; and - Creation of an environment based on trust and openness.
inbound (outside-in)		- Identification, assimilation and exploitation of knowledge through Forums.	- Sharing and building knowledge as a wiki.
coupled	**bidirectional coupled**	- Creation of formal and informal connections between networks of collaborators organized in forums or other forms of representation.	- Characterization of the Platform as a free and community servisse; and - Collaboration with voluntary communities.
	interactive coupled	- Combination of participatory and collaborative processes, supported by how Living Lab Habitat responds to a need identified through detection mechanisms such as the "Bem Maior" and others Forums, mobilizing the network when the idea is feasible and aligned with its purpose.	- Knowledge sharing between projects; - Maintenance of openness to anyone who wants to seek new insights from the experiences made available; and - Creation of collectivities on the platform that collaborate with each other.

The adoption of coupled open innovation strategy in the living labs researched involves bidirectional and interactive flows. They are the result of the combination of inbound (out-in) and outbound (inside-out) open innovation. In particular interactive coupled leads to value creation through interactive collaboration between all stakeholders in the development of social innovations, both in their creation and implementation, especially through the involvement of those who are directly affected by the issues addressed. The value is perceived differently among the laboratories studied alive, being understood in the collective social context in which the social innovations are developed. So, the contours of the co-creative social innovations from open social innovation, arising from interactives flows of innovative knowledge defines the living labs studied the organizations purposefully designed to jointly create and involves value with individual stakeholding. It acts in the engagement of stakeholders around their real-life needs and problems by the development of social innovations to generate more mutually valuable outcomes.

Additionally, we recognize the occurrence of the three important dimensions for co-creation in the living labs studied: governance of the collaboration process, interaction platform and other tools and openness of attitudes, structure and processes.

As for the governance of the collaboration process, the living labs studied have structures and processes that allow the management of collaborative efforts with all stakeholders in the development of social innovations. Such efforts emerge from stakeholders to respond to their real-life needs and problems in an approach that encourages everyone to share knowledge and other resources. Therefore, the governance of the collaborative process goes through the adoption of interactive coupled strategies. The living labs studied have tools and dedicated infrastructures facilitating this activities that act as the guiding thread of co-creation. Guided by the design of innovation networks, they articulate various stakeholders in the development of social innovations that at times act as intermediaries. Also, softwares or platforms facilitate collaboration, functioning as tools for connection and exchange among all that integrate the network, moderating the adoption of interactive coupled strategies. We identify and openness of attitudes, structure and processes. Through the orchestrator, in which they exert a type of leadership by

influence in the network of innovation. By integrating knowledge and resources becoming reference without creating centrality in the network. And by co-creation, in which it creates, promotes and actively participates in situations of collaborative interaction among those interested in the development of social innovations.

Conclusions and Final Remarks

In this study we investigate how open social innovation explains the development of social innovations. We conducted a qualitative case study with two living labs in Brazil: Habitat Living Lab and Corais Living Lab.

We explain the social innovations development by the adoption of interactive open social innovation that leads to the creation of value through the key process of interactive collaboration that happens among all those interested in the development of social innovations, in their creation and implantation, especially through involvement of those who are directly affected by the problems identified and the innovations created.

The findings suggest that open social innovation explains social innovations development through the adoption of three open innovation strategies. The Inbound (outside-in) open innovation strategy. The outbound (inside-out) open innovation strategy. The coupled open innovation strategy that involves bidirectional and interactive flows. The bidirectionals and interactives flows of innovative knowledge from the combination of inbound (outside-in) and outbound (inside-out) open innovation strategies are able to lead to value creation, linking the co-creation only to the last.

The contours of the co-creative social innovations from open social innovation, arising from interactives flows of knowledge define the role of living labs studied. It acts in the engagement of stakeholders by the development of social innovations to generate more mutually valuable outcomes.

As a main theoretical implication, we broaden the notion of open social innovation initially proposed by Chesbrough and Di Minin (2014) through the inclusion of coupled open innovation strategy first described by Gassmann (2006) and Enkel, Gassmann & Chesbrough (2009) and explored later, for example by Piller & West (2014).

We have identified two managerial implications examining how open social innovation explains the social innovations development. First, we can highlight its implications for public policies in support of social innovations. In this direction the understanding of the adoption of three open innovation strategies create vectors for the *policy formulators and policy* implementors to accelerate and increase the assertiveness in the development of social innovations. Second, recommendations for improving the managerial practices of those responsible for living labs aimed at the development of social innovations that work in the development of social innovations. It makes possible to obtain new insights, starting with the adoption of the three open innovation strategies and the established link with the value creation, establishing a management model for open social innovation.

The results broaden the understanding of open social innovation about the theoretical framework of open social innovation from the inside-out and outside-in strategies. The insertion of coupled open innovation strategy in the theoretical framework expands the power of explaining the development of social innovations through the lens of open social innovation. With regard to the development of social innovations, both bidirectional flows and interactive and collaborative flows, similar to co-creation, constitute the effective contribution of the research findings to the area in question, for at least three reasons. Two associated with the notion of social innovation adopted in this study and one related the understanding of the effectiveness of living lab approach to the development of social innovations. First, as the cases shown in this article suggest, through co-creation, actors who collaboratively participate in the process of social innovation learn and, in the course of their development, acquire and improve their

skills needed to do so. Secondly, shared knowledge streams allow for better satisfying or answering needs and problems than are possible on the basis of established practices aimed at the development of social innovations or even supported only by application of either inbound or outbound open innovation strategies, along with innovations in the associated business model of the organization, to social challenges. Third, the living labs approach catalyzes both bidirectional flows and interactive and collaborative flows, similar to co-creation for acceleration and increase assertiveness in the development of social innovations in collaborative innovation networks as a *milieu* of innovation in which its approach facilitates user influence on open and distributed innovation. It allows to connect the innovation capacity of different actors by participating in innovation projects in the co-creation process in different ways.

We identified three dimensions for co-creating social innovations in living labs: governance of the collaboration process, interaction platform and other tools and openness of attitudes, structure and processes. These dimensions represent a type of key process for leveraging interactive collaboration for the development of social innovations.

The main limitation of the study refers to the dynamics of livings labs transformations in Brazil. It is an empirical field in development. Throughout the research, some projects ceased operations, when their funding went extinct, or discontinued their activities because of changes in the governance of the organizations that maintained them. Or because of the evasion of the people who led them. Or even simply by shifting focus in your area of expertise. Thus, the research was limited to two labs of a total of twelve ENoLL members who were already in operation in the country.

Future research in this field of research could emerge from new incursions that attempt to understand open social innovation through the adoption of three open innovation strategies in other situations, such as social enterprises, nongovernmental organizations or even companies that promote social innovation. In this way, generalization power could be achieved, including the possibility of comparative studies between different types of organizations aimed at the social innovations development in Brazil and in the world.

Special attention should be given to future studies in two aspects. First, on the value that is co-created, due to being different among the living labs studied, being understood in the collective social context in which social innovations are developed What social forces shape co-creation? How and what knowledge and other resources become valuable in your action context? How are mutual gains in collaborative interactions obtained? How are these types of transactions characterized? What is the dynamics of the stakeholder roles in the development of social innovations? Second, on co-creation in the development of social innovations from the interactive coupled in which the outputs of innovation are created collaboratively by all involved. How to manage co-creation in this context? What are its conditioning factors? How does it occur through networks of collaborators and voluntary communities? What is the role and importance of those directly affected by the social innovations in their development? What are the appropriate methods, methodologies, techniques and tools?

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