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INNOVATION HABITAT: SUSTAINABLE POSSIBILITIES FOR THE SOCIETY

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ABSTRACT

Contemporary society is moving in the core of a reality in which sustainability needs to be thought out and inserted through practices carried out in different dimensions of society, such as organizations, public and private institutions. This paper aims to identify the contribution of innovation habitats (IH) for sustainability in society. The methodology used was systematic review of scientific literature in one online database. As a result, it was identified: 47 scientific papers publicated since 2000, but more frequently in the last year, 2014, with 10 publications, without providing a reference author in the area. There was also a high number of papers about management and social sciences. It was noticed a short number of publications, empirical and theoretical, about practices to promote sustainable actions in the society, so this indicates the need of research on this kind of practices, with innovation environment as the driver.

Keywords: Eco-Innovation, Habitat innovation, Sustainable Society, Innovative Practices, Technological Parks.

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INTRODUCTION

In the current world scenario, there are big and intense changes in the economic, social, cultural and environmental areas. The impact of technological innovations in all of these areas converge to a predominant factor: knowledge as intangible wealth. Organizations have redesigned their actions, seeking to achieve the best investment on the knowledge factor. Nevertheless, Brazil features in this scenario with the organization and implementation, for example, of technological parks, incubators and tech innovation habitats (IH).

These organizations, in addition to supporting innovative practices, plan for sustainability, ensuring to surrounding populations development opportunities, upgrading and production of goods and services of impact to society in its social context, economic and even cultural. According to Van Bellen (2002), there are multiple levels of sustainability, which leads to the question of the interrelationship between the members of this scenario.

For the author, one can see sustainability from subsystems such as a local community or an industrial enterprise, so it should be recognized that there are interdependencies and factors that cannot be controlled within the borders of these smaller systems (VAN BELLEN, 2002).

The implementations of innovative practices should be based on the principles of sustainability for the community involved. In a knowledge-based economy, innovation plays a central role, in which competitiveness widens proportionally and directly linked to new technologies, needs and enterprises. Until recently, the innovation processes were not discussed so often; studies in recent years have enabled the debate and deepen the theme, though one can see the incipiency of the discussion in the Brazilian scenario.

On a macro level of observation, innovation is considered dominant in the economic context for a sustainable society. On a micro level, one can see that it is related to the area of research and development (R&D), which is still new for many companies. In this sense, innovation has become the structural condition to survive in a positive way in the new scenario. One of the greatest challenges in the context of innovation is to create a structure for new companies and even for existing ones to contribute with the development of the society in their surroundings. Thus, this article sought to answer the question: **What is the contribution of innovation habitats for sustainability in the contemporary society?**

To answer this problem, this article was organized into four items. In this first – introduction – we present the motivational context of the discussion as well as the guiding question for the development of the research. Right after, in the second item, we explain the methodology used to respond the problem of the study, which is a systematic search in literature. In the third item, we describe the intersection identified from the research conducted on online database about innovation habitats and sustainability in the context of contemporary society.

And, finally, on the fourth item, the submission of final thoughts, that lead to reflection on possibilities and needs of in-depth studies in the light of the problems of this research.

METHODOLOGICAL PROCEDURES

The method used to perform this work is based on a proposal of exploratory research, of descriptive and interdisciplinary character because, as Vergara (2010) points out, we seek the advancement of knowledge in the area based on research on innovation habitats, at the heart of discussions about sustainability. To this end, this research was developed from a systematic search to explore the level of scientific development of the theme, allowing the internalization of the concept for a better familiarity among researchers (MARCONI; LAKATOS, 2010).

This search mode of literature contributes to the systematic display of the state of the art on the topic in research and its timeline in production level by area, avoiding minimizations or repetition of studies, or even tendentious biases when looking for a particular theme. For this analysis, the research was organized in three distinct steps, namely: planning, gathering, and result, actions that converge to answer the research question that guides this study. These steps do not happen isolated, but in an integrated manner, converging to answer the question: **What is the contribution of innovation habitats for sustainability in the contemporary society?**

First, at the **planning phase,** were defined some criteria for selection of research, such as the delimitation of the search base. It was decided to work with the electronic database Scopus (www.scopus.com), considered relevant due to the

amount of abstracts and indexed references in it with peer review, in addition to its impact on the academic field within interdisciplinary study, which is the area of study in this research.

Considering the problem-question, the second step of the planning phase was to define the terms or expressions for the search: "innovation environment" or "innovation habitat" or "innovation system" and "society" and "sustainability" or "sustainable". As the database is international, the search was also carried out in English. “innovation environment" or "innovation habitat" or "innovation system" and "society" and "sustainability" or "sustainable". Using the Boolean operator OR and the truncate asterisk (*) we aimed to include the largest possible number of relevant studies that address the topic of interest in this research.

The variations of the expressions adopted to search feature in a larger context, in the same proposal, because a concept depends on the context to which it is related and of its historical trajectory and conceptual analysis. As a basic principle for the search, it was decided to insert the terms and expressions in the fields "Title", "Abstract" and "Keyword". Another demarcation was to select only articles as a result of the research, by considering the impact and the criticality of the evaluation reviewed by peers. There was no time restriction, language and area of expertise or other any other that could limit the search.

In the second phase, the **data collection phase**, based on previously defined criteria, a total of 47 indexed articles were found. The first record is dated to the year 2000 and there are publications until March 2015, period of research. In this period, except in the years of 2003 and 2006, the publications were constant, ranging an average of two to five publications a year. However, recently, in 2014, publications in the area gained emphasis, with 10 articles indexed on that year.

The analysis of the results showed that they were written by 118 authors, linked to 76 institutions, from 25 different countries. Of these countries, number one is Netherlands, with the publication of six articles. In second, China, Finland, Italy and Spain, with five publications each. Brazil occupies the eleventh place, with two publications in the area. Other countries are also on the list, but less relevant, showing one publication in the area. Another important observation is that there was not a reference author: publications vary between one and two by researcher.

Still at the phase of data collection, the publication areas were analyzed. They were divided into 17 areas of knowledge, such as: management (17 publications), social sciences (15 articles), environmental science (14 publications) and engineering (12 articles). Another criterion adopted at this phase was the appropriateness of the title of the article with the topic of this research, through which was possible to select 35 articles.

Then the reading of abstracts was done, selecting so 17 articles to be fully read according to the online search and open access articles, with the goal of building the intersection between innovation habitats and sustainability. **Table 1** presents the results of data collection, which subsidizes the construction of systematic analysis resulting from this research.

Total of articles found	**47**
Articles selected after reading the title	**35**
Articles selected after reading the abstract	**28**
Articles selected for full reading	**17**

Table 1 - articles selected in the data collection phase
Source: Prepared by the authors (2015).

In the third phase of the systematic search, the articles were fully read. After this analysis, of the 17 works previously selected, only 11 of them were the subject of this research, as shown in **table 2**.

Year	Author	Original Title	Title translated into Portuguese
2002		Innovation studies in the 21st century: questions from a user's perspective	*Estudos de inovação no século XXI: questões do ponto de vista do usuário*
2010	Anttonen, M.	Greening from the front to the back door? A typology of chemical and resource management services	*Enverdecimento da linha de frente para a porta dos fundos? A tipologia de serviços e gestão de recursos químicos*
2010	Carrillo-Hermosilla, J.;Del Río, P.;Könnölä, T.	Diversity of eco-innovations: reflections from selected case studies	*Diversidade de ecoinovações: reflexões a partir de estudos de caso selecionados*
2011		Foresight tackling societal challenges: impacts and implications on policy-making	*Visão do futuro no enfrentamento de desafios sociais: impactos e implicações na formulação de políticas*
2012	Coenen, L.;Benneworth, P.;Truffer, B.	Toward a spatial perspective on sustainability transitions	*Rumo a uma perspectiva espacial em transições de sustentabilidade*
2012	Sims, B.G.;Thierfelder, C.;Kienzle, J.;Friedrich, T.;Kassam, A.	Development of the conservation agriculture equipment industry in sub-Saharan Africa	*Desenvolvimento da indústria de equipamentos de conservação da agricultura na África Subsaariana*
2013		Learning networks with involvement of higher education institutions	*Redes de aprendizado com a participação de instituições de ensino superior*
2013	Moreddu, C.;Van Tongeren, F.	Improving agricultural productivity sustainably at global level: the role of agricultural innovation policies	*Melhoria na produtividade agrícola de forma sustentável em nível global: o papel das políticas de inovação agrícola*
2014	Avolio, G.;Blasi, E.;Cicatiello, C.;Franco, S.	The drivers of innovation diffusion in agriculture: evidence from Italian census data	*Os condutores de difusão da inovação na agricultura: evidência do censo italiano*
2014	Costa, F. A.	The moment, the challenges and opportunities of the economic-territorial analysis for planning national development	*O momento, os desafios e as possibilidades da análise econômico-territorial para o planejamento do desenvolvimento nacional*
2014	Dudin, M. N.;Frolova, E. E.;Gryzunova, N. V.;Shuvalova, E. B.	The triple helix model as a mechanism for partnership between the state, business, and the scientific-educational community in the area of organizing national innovation development	*O modelo da tríplice hélice como um mecanismo de parceria entre o Estado, as empresas ea comunidade científico-educacional na área de desenvolvimento nacional de organização da inovação*
2014	Hinojosa-Pareja, E. F.;Arenas-Ortiz, M.;Carmen López-López, M.	The Earth Charter in compulsory education from an international perspective	*A Carta da Terra no ensino obrigatório a partir de uma perspectiva internacional*

Table 2 - Articles selected for full reading
Source: Prepared by the authors (2015).

Based on this sample of literature, the conceptual discussion as follows was built, with the conceptual intersection of this work.

CONCEPTUAL INTERSECTION OF THE ANALYSIS

Due to the complexity of the current environment of knowledge-based society, the debate on innovation is gaining prominence day by day. The result of the systematic search of this study points out the need to innovate in different areas of knowledge, which demands creative and innovative individuals and companies for growth through actions geared towards sustainability. Sustainability, according to Oliveira, Martins and Lima (2010), can happen in different aspects such as social, economic and/or environmental. Innovate involves generating a new idea, a new product, a new action that contributes to a new result. You can innovate from a present reality through the improvement of a process, from an action or from the search for a solution. In this sense, it is considered that innovation is a sustainable action for the development of the knowledge society.

Innovation vision emphasizes the importance of the transfer and diffusion of ideas, skills, knowledge, information and signs of various types(OCDE, 2005). Innovation, in a broad context, given the complexity of the process itself, can be characterized as: organizational innovation; process innovation; product innovation; service innovation; or technological innovation. Innovation can be an action that occurs in national or international level, in different areas. Usually, innovation is driven by the economy from a market opportunity or a knowledge base, a radical proposal or maybe just an incremental change of a process that already exists (OCDE, 2005). However, regardless of the feature, innovation is above all an action that happens in shared mode, and not in isolation. Innovation implies a new positioning to achieve a goal.

In this context, one can see that there are multiple environments that favour innovation, as the so-called innovation habitats, also described as innovation systems or innovation spaces. That is, spaces that are able to mediate the relationship between innovation provider and innovation receiver. In this system or innovation habitat, there are different relationships, such as: core of technological innovation, incubators, pre-incubators, technology parks, innovative cities. Based on this research, the innovation habitats may act according to different interests of the society, from the scientific-technological scenario to the base application for agriculture, thus contributing to sustainability. In this topic was noticed a space for more discussion on the theme.

According to Smits (2002), the contribution of innovation (this appears on notebooks with the name "innovation systems") for sustainability is potentially empirical, with few actually proven research. For the author, studies dealing with the relationship between innovation and sustainability are still incipient, and this area of research may be considered at the stage of "scientific childhood", name given by Smits himself (2002).

For the author, it is essential to consider a few questions when thinking about innovation systems' contribution to the shaping of a more sustainable society, among which stand out information and communication technologies (ICT) and knowledge networks. These networks are seen in this study, as the intersection between ICTs, which - when connected - form the knowledge society. Before knowledge was individual, today is collective, which makes it critical to innovation systems, knowledge connected through ICT networks.

Another relevant issue is that to have innovative changes, it is necessary for universities to invest in science as a knowledge factor and in science applied to research, assigning management of knowledge for sustainability in the society. This allows to infer that innovation is directly related to practice, so it must act transversely to the practice developed in the academy.

In the context of innovation, in a society based on sustainable benefits, an innovative management is necessary for chemical resources tied to innovations in business. According to Anttonen (2010), the connections between environmental policy and product systems, service, sustainability and business innovation need to be more studied to ensure sustainable development. Innovative actions and practices in the use of chemical resources are fundamental, since today a large part of the population is affected by lack of knowledge or lack of innovative initiatives in the chemical area, mainly in agriculture, as can be seen in the studies analysed in this research.

Anttonen (2010), Carrillo-Hermosilla, Rio and Könnölä (2010) and Könnölä *et al.* (2011) also highlight the theme eco-innovation and its dimensions in the society. Eco-innovation may be classified in many ways, which implies varied roles for agents with regard to sustainable development in a society. For the authors, eco-innovation presents four main dimensions: design, user, product service and governance. Thus, eco-innovations often involve a combination of elements that belong to many dimensions in a scenario of innovation. They can contribute to the emergence of new businesses and

to the transformation of the knowledge society in a sustainable knowledge society. These benefits are directly related to the interaction of dimensions of the society involved with those interested in the process of innovation, which strengthens a network performance, not isolated. Knowledge happens in network, change occurs in network, so innovation requires a network performance. In this sense, one can infer that society is the basis for sustainable development and innovation habitats leverage this action.

In society, innovation can happen through eco-innovation, as defined by Carrillo-Hermosilla, Rio and Könnölä (2010). Innovation is able to bring profitability for the market. In this context, production, assimilation and exploitation of a product must be reconsidered, and the process of production, supply of services or management or business method becomes novelty for the organization. The use of innovative resource promotes environmental risk reduction, pollution and other negative impacts, including energy and equipment costs, among others.

Therefore, in the eco-innovation scenario, we have sustainable innovation as a process in which considerations of sustainability (environmental, social, financial) are integrated to systems that generate business ideas for companies, by means of research into products, services and technologies, as well as in new business and organizational models.

Carrillo-Hermosilla, Rio and Könnölä (2010) corroborate with the discussion by presenting the concepts of eco-innovation, in order to generate new ideas for companies, as shown **in table 4**.

ECO-INNOVATION: definition	Author
Involves any form of innovation directed to significant and demonstrable progresses to the goal of sustainable development, with the means of reducing impacts on the environment or of a more responsible and effective use of natural resources, including energy.	European Commission, 2007
It is the creation of new and competitive prices of goods, processes, systems, services and procedures designed to satisfy human needs and provide a better quality of life for all, with a minimum life cycle use of natural resources (materials, including energy and surface area) for a minimal release of toxic substances.	Europe INNOVA, 2006
It is the process of developing new products, processes or services that provide valued business to the customer, aiming to reduce significantly the environmental impact.	Fussler and James, 1996
It is innovation that is able to attract green profit to the market.	Andersen, 2002
It is a sustainability-oriented innovation related to the creation of new market spaces, products and services or education-oriented social processes, environmental issues or sustainability.	Little, 2005
It is a process of innovation in which considerations of sustainability (environmental, social, financial) are integrated to systems that generate business ideas for companies through research and development (R&D) and marketing. Applies to products, services and technologies, as well as new business and organizational models.	Charter e Clark, 2007
It is the production, assimilation and exploitation of a product, production process, service or management or business method that is new to the organization (in development or that will be adopted) and that results, throughout its lifecycle, in an environmental risk reduction, pollution and other negative impacts of resource use (including energy use) in comparison with relevant alternatives.	Kemp and Pearson, 2008
Innovation processes for sustainable development. Environmental innovations are measures of relevant actors (companies, households, private), that develop new ideas, behavior, products and processes, or that apply to run them, contributing to a reduction in environmental burdens, or that have specified sustainability targets.	Rennings, 2000
Are measures of some sectors of society (companies, politicians, trade unions, associations, churches, private) for the development of new ideas, new behaviors, products and processes, or for the introduction of factors that contribute to a reduction of environmental damage, or for the establishment of ecological sustainability goals.	Klemmer et al., 1999

Table 4 – concepts of eco-innovation: a synthesis
Source: Adapted Carrillo-Hermosilla, Rio and Könnölä (2010).

Eco-geography Coenen,Benneworth and Truffer (2012) is of paramount importance for the sustainable development of the society, because, when inserted in the innovation systems, we can see that economic and social activity cannot be explained disconnected from other activities; must be understood along with the involvement of broader structures of social, economic and political development, as well as procedures and conventions.

In bringing together the concepts of innovation habitats and sustainability, Carrillo-Hermosilla and Del Rio (2010) also bring the concept of environmental innovation as being innovative practices that contribute to the environment and to society that it inhabits. Environmental innovation is still related to the factor of diagnosis and monitoring of potential environmental problems. Regardless of area, the act of innovating, when well executed, based on research and development mainly, may intervene in an integrated manner in products, services and technologies, as well as in new business and organizational models that act in the interests of society.

Among the contributions of innovation habitats for the development of sustainability, is also technology. In this context, technology goes far beyond the known concepts. It is not limited to computer science, but involves a set of scientific and technical knowledge. Agricultural technology, for example, allows and contributes to food production in the country to be made differently regarding production and crop, based on new scientific knowledge and technological innovations(SIMS *et al*., 2012;MOREDDU; VAN TONGER, 2013; AVOLIO *et al*., 2014; HINOJOSA-PAREJA; ARENAS-ORTIZO, 2014). Actions directed to agriculture have contributed as propulsion lever for a sustainable society and potentially facing its own development.

By reading the articles, it was also possible to notice that universities, through innovation in teaching methods, themes, and course projects and educational environment (now with network-connected students), can promote eco-cooperation communication skills for sustainability practices that contribute to a sustainable development DLOUHÁ; MACHÁČKOVÁ-HENDERSON; DLOUHÝ, 2013).

As for sustainability in the society, another issue is innovation based on the triple helix model (State, universities and enterprises). In this model, when knowledge is transformed into capital, the members of the institutional sphere can be potential entrepreneurs or founders of companies. Dudin *et al.* (2014) explains that the three institutions that compose the triple helix should aspire to a partnership. There for, innovation is not initiated through the vertical State, but through the interaction of University-State-Enterprise. In addition to traditional functions, each of the three elements of the system partially assume the role of the other. Institutions capable of performing non-traditional functions are considered a significant source of innovation and progress.

The knowledge-based society is characterized by an increase in the role of universities in the interaction with industry and Government, which can contribute to a sustainable society. Könnölä (2011) corroborates with this idea, showing the importance of the creation of new public policies for innovation that promotes sustainability in the contemporary society. We see, therefore, that innovation operates in different segments and innovation habitats are spaces that contribute to this training and for a market trend in which networks of knowledge are the primary resource for sustainability.

FINAL CONSIDERATIONS

Some considerations worth mentioning when it comes to a systematic search performed in literature, from an interdisciplinary database, online, which provides an overview of the state of the art of a theme. The selected studies point to the need to innovate in different areas of knowledge, which demands creative and innovative individuals and companies when thinking of growth through actions geared towards sustainability. It may be noted that the theme is very relevant regarding innovation to generate sustainability. It was also noted the need for in-depth studies in the areas of agriculture, economical geography, eco-innovation and also the construction of the triple helix (State, universities and enterprises) for the generation of innovative solutions aimed at the transformation of the current society in a sustainable society.

Due to the need to put innovation in a broader context, both conceptually and databases, it was realized that it is difficult to establish absolute and precise guidelines to deal with innovation habitats and their contribution to the sustainable development of the society, which requires the expansion of studies in this area. The theme also requires further empirical research on services and innovation practices that contribute to sustainability.

Based on this research, it may be conclude that the subject is relevant, but still in its infancy, especially when searching a reading of the reality in Brazil, which still generates many interpretations.

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