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Social Innovation: A Study of International Scientific Publication through Network Analysis

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ABSTRACT

Research on social innovation has grown significantly in the last decade. The objective of this study is to map the international scientific production on social innovation, in order to identify and cluster the variables of social innovation, through network analysis. The database used was Scopus, for the period ranging between 2010 and 2020. Through the analysis of the keywords of the articles, 35 categories were grouped, having as a criterion nature and the conceptual similarity, through the Node XL Software. The results demonstrate a network with four clusters: (1) Social Entrepreneurship, Social Value, and Innovation; (2) Co-creation, Technology, and Sustainability; (3) Social Innovation, Organizational Aspects, and Business Model; and (4) the Non-profit Sector, Strategy, and Learning. The most cited categories, beyond social innovation, were social entrepreneurship and organizational aspects, whose focus of analysis takes place at the organizational level, i.e., resources and capabilities needed for the process of developing social innovation. Also, research gaps have been identified, as networks of actors, community, and social innovation ecosystems.

KEYWORDS:

Social innovation, Network Analysis, Future Research

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1. INTRODUCTION

Innovation has been considered key to economic and technological growth. This indication had already been discussed by Schumpeter (1982), understanding innovation as the engine of economic development, breaking the static mode of the economy through dynamic paths. As explained in the Oslo Manual (OCDE, 2004), at the macro level, innovation is the most important factor in national economic development and international trade standards. At the micro level, that is, within companies, innovation through research and development, is seen as a source of assimilation and use of new knowledge of all kinds, not just technological. Such thinking corroborates Schumpeter's (1982), by stating that innovation is deeply linked to a company's internal competencies, providing competitive advantage and differential for their survival and greater profitability.

However, it is well known that economic growth alone is not sufficient. The clash between economic growth and social and environmental development in recent decades has highlighted the inadequacy of existing structures and policies in addressing some of today's most pressing issues, such as social inequality, poverty reduction, and climate change, among others. Despite several advances, numerous socioeconomic and environmental challenges need to be addressed (Banerjee & Duflo, 2014; Murray; Caulier-Grice & Mulgan, 2010).

In this context, it is necessary to search for innovations that are not only linked to the economic-financial return and whose purpose is related to social changes. Social innovations seek to provide solutions to specific societal problems and groups that do not have sufficient capacity or resources to help themselves (Boons & Lüdeke-Freund, 2013). Although social innovation is related to other types of innovation (product, organizational, process and marketing), its concept and purpose, notably, are oriented towards solutions that meet a social need and generate value for society, rather than just private individuals (Lévesque, 2014; Cajaiba-Santana, 2014).

In view of the still fragmented theoretical discussion between the various areas of knowledge, new perspectives of study in this theme become relevant. The study by Van der Have and Rubalcaba (2016), Souza, Segatto and Silva (2017), Agostini et al. (2017) and Silveira and Zilber (2017) presents a systematic review of articles about social innovation, which demonstrate that the theme has entered the agenda of international academic works. However, this present work advances the analyzes, by mapping the international scientific production on social innovation, in order to identify and cluster the variables of social innovation, through network analysis. In addition, it is possible to contribute with new study possibilities and future research agenda, specifically in the area of management and business. Previous studies do not provide an overview of the variables addressed in research. Furthermore, the network analysis takes place from the grouped categories, using the nature and conceptual similarity of the keywords as criteria, thus differentiating itself from other systematic review studies.

The goal, therefore, is to map international scientific production on social innovation – in the business area – in order to identify and group the variables of social innovation and to find possible theoretical relationships, through network analysis. For this, we carried out some steps: (1) to search for articles about social innovation published in the database Scopus, covering the period between 2010 and 2020; (2) to identify variables related to social innovation; (3) to cluster of variables through network analysis; (4) to analyze the clusters and possible theoretical relationships; (5) to identify gaps to be studied in a future research agenda. Based on network analysis techniques, the study brings significant contributions to the discussions of social innovation, showing which

variables are more interconnected (e.g. social innovation and social entrepreneurship) as well which research gaps can be filled (e.g. actor-networks, community, and social innovation ecosystems). In this sense, this research is justified for academic reasons since it advances the discussion on the theme through network analysis.

Regarding the theoretical contribution to the field of management, this study helps to consolidate and systematize the research on SI, since it refers to a new object of study, which is demanding for more discussions. Furthermore, as practical contributions, this article reveals perspectives to answer different social problems faced by society, which can inspire public policies and social entrepreneurs.

2. SOCIAL INNOVATION

Social Innovation (SI), as a field of study, can be considered emerging given the substantial growth of scientific publications only in recent years (Silveira & Zilber, 2017; Cajaiba-Santana, 2014). Although the term "social innovation" has its first records at the end of the 19th century, the concept was not widely used in this period (Ayob, 2016). In the 1960s and early 70s, the term came to be used by the student and worker´s social movements, from European and American cities, as a kind of 'common denominator' for different types of collective actions aiming at greater inclusion, and social participation (Moulaert et al., 2010).

One of the first scientific mentions of the term was used by Taylor (1970), as being improved actions, or new ways of doing things. However, it is from the 1990s onwards that the understanding of SI emerges in the sense currently granted to it, influenced in part by the growing socio-economic challenges of society (Nicholls, Simon & Gabriel, 2015). The scientific interest in the subject has become more sensitive in recent decades through the exponential growth of publications, as well as the consolidation of SI research centers (Adams & Hess, 2010; Lettice & Parekh, 2010; Van der Have & Rubalcaba, 2016). In the theoretical domain of SI, one criticism is made about the multifaceted discussions, needing further elaboration (Fossati, Degavre, & Nyssens, 2017; Cajaiba-Santana, 2014).

Despite the diversity of definitions of SI, there is a consensus that this innovation model refers to new solutions given in response to social challenges, in addition to meeting needs, promoting new relationships and social practices (Mulgan, Tucker, Ali & Sunders, 2007; Murray et al., 2010; Cajaiba-Santana, 2014). In this sense, two orientations are clearly perceived in the definition of SI: (1) social outcomes; and (2) the new social processes established. The first emphasizes meeting unmet social and environmental needs and responding to market failures (Phills, Deiglmeier & Miller, 2008; Pol & Ville, 2008). The second emphasizes the changes in social relations, often focusing on the rebalancing of inequalities of power, and the increase of society's ability to act (Mumford, 2002; Westley & Antadze, 2012; Murray et al., 2010).

Such emphases are aligned with the academic literature on innovation, which reveal two main aspects: the social and organizational process through which innovation is produced and the result achieved, through new products, services, or production methods (Phills et al., 2008). Thus, SI can be understood as both new social outcomes – through the new solutions generated – as new social processes – through new relationships, new social practices, new capabilities, and the empowerment of social actors (Nicholls & Murdock, 2011; Cajaiba-Santana, 2014; Jaeger-Erben, Rückert-John & Schäfer, 2015).

An instrumental definition of social innovation, restricting itself to "social" results, could be reductionist and somewhat mistaken, since the result of this innovation model cannot be restricted to just a solution to a given social problem, nor even to a material dimension, as occurs with technological innovations (Cajaiba-Santana, 2014). The nature of the SI highlights a 'non-material' dimension, which is reflected in the process by which social innovation takes place, including new social practices (Moulaert et al., 2013). In this sense, the SI must be understood as a social process, and not simply as a technologicalapplication.

Therefore, this study adopts a definition of social innovation built from concepts presented by the main authors in the field. Thus, the SI is defined as a new response or social intervention that simultaneously satisfies a social need (new solution) and creates new social relationships (process), proposing new socio-cultural orientations and/or increasing the socio-political capacity of social actors, and access to resources (Lévesque, 2014; Mulgan, 2006; Murray et al., 2010; Moulaert, Martinelli, Swyngedouw, & Gonzalez, 2010; Phills et al., 2008; Cajaiba-Santana, 2014). In addition, it meets the criteria necessary for any innovation, in the sense of "novelty" and "improvement" (regardless of magnitude, if radical or incremental) and in the sense of diffusion or adoption of the innovation (Phills et al., 2008). In the aspect of adoption and diffusion of social innovation, an important parameter may be related to its institutionalization, involving the dissemination of similar initiatives outside their place of origin, in other communities or even in other countries. In addition, institutionalization may be related to changes in behavior and the adoption of new social practicesby a substantial number of people (Cajaiba-Santana, 2014; Groot & Dankbaar, 2014).

In general, studies on innovation have traditionally been developed from the perspective of technological innovation and economic theory (Schumpeter, 1982). Thus, traditional innovations have been evaluated based on economic value generation and competitive advantage (Tidd & Bessant, 2018). Although technological and social innovations are somewhat related, and sometimes have overlapping results, it should be emphasized that the purpose of both is fundamentally different. While technological innovation, in the "Schumpeterian" perspective, is concerned with economic outcomes and greater profitability, SI is evidently interested in social issues (Bignetti, 2011; Cajaiba-Santana, 2014). It is not just about introducing new types of products or exploring new markets themselves, but about meeting unmet market needs and/or creating new forms of social inclusion (OCDE, 2011). Thus, new products and technologies can be seen as possible effects, but not as a necessary conditions.

In the business area, SI can be seen as a new agenda related to the purpose of innovations and business in society (Nicholls et al., 2015). In addition, the growing interest of entrepreneurship and management in social issues has driven research in this direction (Cajaiba-Santana, 2014), several empirical studies are being conducted in the context of social entrepreneurship, social enterprises, and/or social impact businesses. Social innovations are, in this perspective, defined as alternative practices or new variations in practices (Jaeger-Erben et al., 2015), as well as new ideas, new products, or new services that will promote a significant social change (Groot & Dankbaar, 2014).

However, although many studies have been conducted in the context of social entrepreneurship, IS has been taking place in different sectors and organizational formats, including the public sector, governments, the non-profit sector, and also the private enterprises (Groot & Dankbaar,

2014). Social innovation is also not limited to aspects of social inclusion and, according to Groot and Dankbaar (2014), may be concerned with environmental issues, sustainable development, and mental health, among other challenges.

Since the theme is a broad field of study, this present paper focuses on management and business, bringing specific contributions to the area. And, differently from the works that reviewed the literature on SI (Van der Have & Rubalcaba, 2016; Agostini et al., 2017; Silveira & Zilber, 2017), this paper use network analysis in order to develop this discussion. Furthermore, recent studies were contemplated, showing that the last three years were the most significant in the number of publications in the field. From the analyzed publications, four clusters could be identified: (1) Social Entrepreneurship, Social Value, and Innovation; (2) Co-creation, Technology, and Sustainability; (3) Social Innovation, Organizational Aspects, and Business Model; and (4) The Non-profit Sector, Strategy, and Learning. Further debate is mentioned in the discussion and results section in order to outline the scenario surrounding the research field.

3. RESEARCH METHOD

The systematic review starts from previous studies to assess the contributions in a given area andsynthesize their findings and evidence, in order to conclude what is known and unknown (Denyer & Tranfield, 2009). In combination with the systematic review, network analysis is a powerful tool for visually demonstrating the relationships between themes or variables, facilitating the achievement of the objective of synthesizing and evaluating a topic or theory. In addition, the network analysis allows the representation of a field of study through the formation of clusters (grouping of variables) thus obtaining a more detailed understanding of the sub-areas of the studied subject. The network analysis provides a rich statistical detail, which indicates the positioning and relevance of a variable (vertex) in its relations in the formation of the network.

The fundamental elements in a network are the vertices and edges. The vertices can be designed by geometric shapes or images. Edges are represented by lines that connect the vertices. In this work, the vertices constitute the variables classified from the keywords. Basically, network studies are focused on searching for connection patterns on the most diverse phenomena (Wasserman & Faust, 1994; Hansen, Shneiderman & Smith, 2010; Hansen, 2011).

This research was carried out in 10 steps (Figure 1). Initially, the theme and context to be explored were determined: social innovation in the business area. Then, the database and journals were selected. The Scopus database was chosen because it allows access to a representative number of important business journals (ranking Q1 and Q2). In the search for articles, the period of the last decade (2010 to 2020) was considered. In the third stage, the search terms were defined, which were “social innovation” and “social innovat*” (with an asterisk to consider variations of the expression). Subsequently, articles in the database that did not mention indexed keywords were deleted. In the sixth stage, after the final selection of the articles, the keywords were then evaluated to avoid disagreements with the study theme.

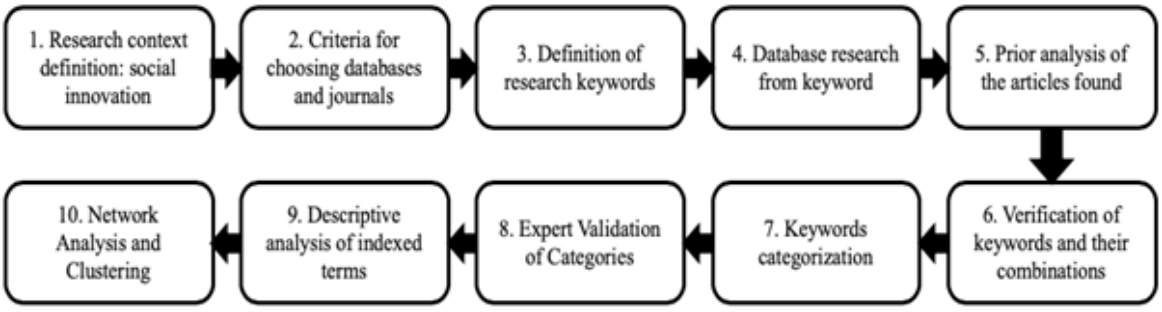

Figure 1. Research Stages.
Source: Authors of this study.

In the seventh stage, categories were formed based on the conceptual similarity of the keywords, and then (eighth stage) two specialists on the subject being studied validated the categories formed. These categories represent the vertices of the network. In step nine, the indexed terms (journal and year of publication) were analyzed to contextualize the field of study. The last stage corresponded to the formation of the network and its groupings with the aid of the NodeXL software (version 1.0.1.361), which allows, through the import of data, the design of the network, provision of statistical data, and graphic visualization of the network (Hansen, 2011; Harman, Koohang & Palinzkiewicz, 2014).

4. DATA ANALYSIS

Business studies on SI between 2010 and 2020 total 332 Scopus publications, being present in 148 journals, specifically in business and management areas. The papers on this subject were found mainly at the Journal of Social Entrepreneurship (29), Innovation (15), Voluntas (15), Journal of Business Research (11). In the last 5 years the number of publications corresponding to 72.3% of total, reaching in 2019 the mark of 61 articles published.

Next, Figure 2 shows the network graph generated with the aid of NodeXL software. The layout of the chart chosen was Fruchterman-Reingo, of the non-directional type. The proposed network contains 35 vertices and 93 unique edges.

By simply viewing the network it is possible to identify which vertices have the most combinations (vertex size), the relationships between them and the positioning of each according to location, centrality, and proximity in the network. Table 1 below shows the data from each vertex, increasing the comprehension about the network.

The 332 articles published accounted for 1111 different (unique) keywords, which were classified into 35 categories. For the formation of this type of network, it is necessary to make combinations between the keywords, as well as, counting the repetitions of the terms, a total frequency of 8760 words was obtained. For example, the category (vertex) "Social Innovation" has 24 different words.

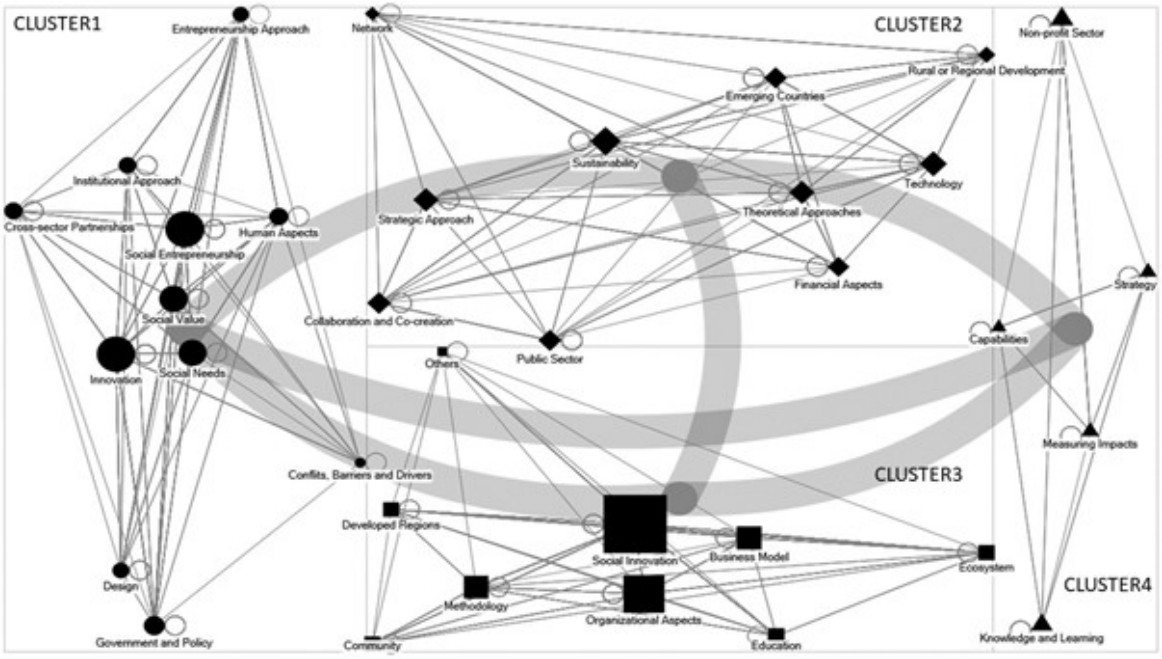

Figure 2. Social Innovation Variable Network.
Source: Research data

Table 1
Description of network vertex data

Categories	Keywords	Degree	Betweenness Centrality	Closeness Centrality	Clustering Coefficient
Business Model	36	35	6,05	0,03	0,80
Capabilities	11	21	0,93	0,02	0,88
Collaboration and Co-creation	30	33	4,70	0,03	0,82
Community	19	23	1,32	0,02	0,88
Conflits, Barriers and Drivers	16	18	0,30	0,02	0,94
Cross-sector Partnerships	28	25	1,28	0,02	0,90
Design	20	26	1,34	0,02	0,90
Developed Regions	17	25	2,22	0,02	0,84
Ecosystem	20	23	1,83	0,02	0,83
Education	17	27	2,65	0,02	0,84
Emerging Countries	24	33	4,13	0,03	0,83
Entrepreneurship Approach	12	28	3,76	0,02	0,81
Financial Aspects	37	30	3,37	0,03	0,83
Government and Policy	36	31	3,78	0,03	0,83
Human Aspects	24	29	3,09	0,02	0,84
Innovation	59	33	4,82	0,03	0,82
Institutional Approach	25	29	2,70	0,02	0,85
Knowledge and Learning	30	26	1,88	0,02	0,87
Measuring Impacts	26	28	2,89	0,02	0,84
Methodology	38	34	6,08	0,03	0,79

Table 1
Cont.

Categories	Keywords	Degree	Betweenness Centrality	Closeness Centrality	Clustering Coefficient
Network	14	25	1,43	0,02	0,89
Non-profit Sector	33	33	5,65	0,03	0,79
Organizational Aspects	113	36	7,05	0,03	0,78
Others	9	20	1,10	0,02	0,86
Public Sector	46	29	3,32	0,02	0,83
Rural or Regional Development	18	27	1,80	0,02	0,88
Social Entrepreneurship	27	35	5,92	0,03	0,80
Social Innovation	24	36	7,05	0,03	0,78
Social Needs	57	35	6,22	0,03	0,80
Social Value	52	34	5,41	0,03	0,81
Strategic Approach	25	30	3,60	0,03	0,83
Strategy	26	27	2,38	0,02	0,85
Sustainability	57	31	3,64	0,03	0,83
Technology	48	32	3,35	0,03	0,85
Theoretical Approaches	37	31	3,98	0,03	0,83
Sum	1111				
Mean	31,74	29,09	3,46	0,02	0,84
Standard Deviation	19,53	4,73	1,86	0,00	0,04

Note 1: "KW" is short for "Key Word"; Note 2: Chart density: 0.53; Average geodetic distance: 1.42
Source: Research Data

From the relationships between the categories, 4329 edges (lines) were obtained in the graph. The strongest relationships (combination of words within the category) are between "Social Innovation" and "Social Entrepreneurship", "Organization Aspects" and "Social Innovation" and "Social Innovation" and "Innovation" with recurrence of 136, 136 and 104 word combinations respectively (Appendix). Following is a brief conceptualization of the indices and the results obtained, as shown in table 1.

The **degree** of a vertex (node) represents the total number of lines connected to the respective vertex (Hansen et al., 2010). In this study, the minimum number of degrees (18) is found in the Conflicts, Barriers, and Drivers vertex and the maximum number of degrees (36) belongs to the "Social Innovation" and "Organizational Aspects" vertices since these vertices are linked everyone else. The average degree of the network is 29.09 (SD: 4.73), which demonstrates a high interrelation between the vertices.

The **graph density** is the indication of possible lines in a network. A network would be considered complete if all possible lines were present (Wasserman & Faust, 1994). The density of the graph is measured on a scale of 0 to 1. The closer the value approaches 1, the greater the unit between the vertices of a network. In this network, there is high connectivity between the vertices, as the density is 0.80.

The **geodesic distance** represents the diameter of the network when indicating the length of the paths between the nodes (Wasserman & Faust, 1994). In this network the average value of

the diameter between the vertices is 1.17, that is, on average, between two nodes there is only one node that separates them.

The **betweenness centrality** is considered a measure of proximity and indicates which vertices are most characterized as bridges in the formation of the network (Harman et al., 2014). In this Social Innovation network, the Conflits, Barriers, and Drivers vertex has the lowest value of betweenness centrality (0.30). On the other hand, the vertices "Social Innovation" (7.05), "Organizational Aspects" (7.05), and "Social Needs" (6.22) have the highest indexes. The average of this index is 3.46 (S.D .: 1.86).

The **closeness centrality** is calculated from the average of the smallest distances between the vertices. In this way, the highest indexes of this measure are attributed to the most central vertices in a network (Hansen et al., 2010). In this network, 17 vertices have a measure of proximity centrality equal to 0.03 (central vertices), while the others, obtained an index of 0.02 (marginal vertices).

The **clustering coefficient** indicates how closely the closest vertices in a network are actually connected (Hansen et al., 2010). In this network, the lowest values are the vertices of Social Innovation and Organizational Aspects, as they are the vertices with the largest number of existing connections. The average of this index is reasonably high (0.84) and indicates a high potential for grouping between vertices.

With the aid of the NodeXL software, clusters can be identified based on algorithms that analyze the structure of the network and the position of the vertices. It is worth mentioning that the number of clusters has not been previously defined, thus leaving the network algorithms in charge of forming the appropriate number of clusters that best represent the vertex similarity. In this network, the most prominent (wide) lines, which connect the clusters, indicate the relationships between them, because, although the vertices are grouped separately, they are not isolated from other vertices belonging to other clusters. Thus, between CL1 and CL2 there are 928 connections, followed by CL2 and CL3 with 724 connections and CL1 and CL3 with 498 connections. Another outstanding measure is modularity, which represents the quality of the groupings. It can be said that when there are strong and exclusive relationships between the vertices within a cluster, then there is a high rate of modularity. On the other hand, a lower modularity value indicates that the vertices of a cluster are also highly connected with vertices of other clusters. In this network, the modularity of the graph is 0.03, indicating a high interaction between the vertices of different groups.

5. DISCUSSION OF RESULTS

Cluster 1 [circle], called "Social Entrepreneurship, Social Value and Innovation", has 11 vertices and 484 relationships (single and duplicate). It is a grouping that portrays social entrepreneurship (vertex degree 35), social needs (35), social value (34), innovation (33), government and policy (31), design (26), cross-sector partnerships (25), human aspects (29), institutional approach (29), entrepreneurship approach (28) and conflicts, barriers and drivers (18). Cluster 1's strongest relationship weights fall into the following categories: "Social Entrepreneurship" x "Social Need" (22) and "Social Entrepreneurship" x "Social Value" (21).

Of the top four vertices, the social entrepreneurship category refers to social enterprises, social businesses and/or impact businesses (e.g., Dees, 2012; Phillips, Lee, Ghobadian, & O'Regan, 2015). The social value category involves aspects related to social inclusion, empowerment, social change, social practices, social justice, and well-being (e.g., Molnár, 2017; Alexandre-Leclair, 2017).

The social needs category refers to the challenges faced by SI, for example poverty, minorities, inequality, corruption and others (e.g., Morais-da-Silva, Segatto & Bezerra-de-Sousa, 2019).

The studies showed a strong orientation in the context of social entrepreneurship (SE). Part of the mutual interest between SI and SE is because both offer a different point of view than the classic notions of entrepreneurship and innovation that make up the dominant model of for-profit companies (Phillips et al., 2015; Roundy & Bonnal, 2017). Studies in this direction share a vision focused on identifying innovative opportunities for the solution of social imbalances, prioritizing social value creation over economic value accumulation (Dees, Battle Anderson & Wei-Skillern, 2004; Bjärsholm, 2017). Tracey and Sttot (2017) point out three different processes of SE, through which SI can occur, being: i) social entrepreneurship – where the motivation is to face social challenges and generate change from the creation of an organization; ii) social intrapreneurship – that seeks change from the resources and capabilities of established organizations, thus faces social challenges from within established organizations; iii) and interorganizational entrepreneurship – which aims for change by combining ideas, people, places, resources, and collective effort within and between organizations. Criticism in this field is that, despite the theoretical advances in recent years, this area still lacks a more robust conceptual basis (Bruin & Lewis, 2015).

Regarding the category innovation, the articles discuss technological innovation, product innovation, service innovation, process innovation, innovation systems, innovation management, and open innovation. Many studies address the theoretical perspective innovation to understand how SI is developed, implemented and disseminated at the organizational or societal level (for example, Mihci, 2019; Tidd & Bessant, 2018).

Cluster 2 [rhombus], entitled "Co-creation, Technology and Sustainability", has ten vertices and adds 311 relationships between nodes. It is a group that presents discussions about collaboration and co-creation (33), emerging countries (33) technology (32), sustainability (31), theoretical approaches (31), strategic approach (30), financial aspects (30), public sector (29), rural or regional development (27) and network (25). In this cluster, the most significant weight ratio was between the categories "Collaboration and Co-creation x Public Sector" (15) and "Emerging Countries x Technology" (13). The category collaboration and co-creation refers to the participation the various actors and stakeholders of an organization in the development of SI (e.g., Martin & Upham, 2016; Shin, 2016). The category technology discusses how technologies can facilitate access to knowledge and resources and address basic social needs. This cluster highlights the technological relationship with emerging countries. Some studies discuss the role of technology in the development of different target groups and the major barriers in access to technology, mainly in rural areas (e.g., Prieto Mejia, Montes & Taborda, 2019; Roomi & Bhatt, 2016).

Another aspect to be highlighted concerns collaboration and co-creation relationship with the public sector (Voorberg Bekkers, & Tummers, 2015; Shier & Handy, 2015; Shin, 2016). In some studies, there is an emphasis on governance aspects, especially in the public sector, through community involvement and local actors as well as civic participation (Flemig, Osborne & Kinder, 2016; Lévesque, 2014). Among the most cited articles is that by Voorberg et al. (2015), where the authors discuss SI in the public sector, understanding it as social outcomes that fundamentally change the relationships, positions and rules among stakeholders through end-user participation and collaboration. The discussion is based on the importance of co-creation and co-production of users in the process of SI. From this perspective, SI can be seen with enormous potential for public management as it goes beyond organizational structures, aiming at a reconfiguration in local governance structures (Adams & Hess, 2010). It implies not only the implementation of

new ideas, but structural changes, the corresponding infrastructures and social environments, so that alternative social meanings are established (Bouchard, 2012; Cajaiba-Santana, 2014). Studies in this direction have discussed IS based on "theoretical approaches" outside the mainstream of management and innovation. In addition, the sustainability category involves various studies about the relationship between sustainability and social innovation, very prominently present in discussions on the transition towards sustainability, mainly in the rural development and public sector (e.g., Wolfram, 2018).

Cluster 3 [square], called "Social Innovation, Organizational Aspects, and Business Model", has nine vertices and a total of 538 relationships between nodes. It is a cluster that portrays social innovation (vertex degree 36), organizational aspects (36), business model (35), methodology (34), education (27), developed regions (25), ecosystem (23), community (23) and others (20). The weights of the strongest relationships are among the categories: "Social Innovation" x "Organizational Aspects" (136); "Social Innovation" x "Business Model" (48); "Social Innovation" x "Education" (21); and "Social Innovation" x "Ecosystem" (20).

This cluster highlights the relationship of SI with organizational aspects and business model. The category of organizational aspects is related to organizational characteristics such as structure, process, teamwork, satisfaction at work, performance and organizational capacity. In addition, there are discussions around the new organizational forms that emerge from innovative reconfigurations and new business models (for example, Misener & Misener, 2017).

Some studies seek to understand how organizations develop capabilities to combine user knowledge and technology flows, during the process of SI. That is, it is the ability of a company to recognize the value of new external information – similar to what happens in open innovation (Chesbrough, 2003) – assimilate and apply them for commercial purposes. Capacity in this sense is a key feature of innovative companies. Other studies address the satisfaction and well-being of employees involved in social innovation (Casini et al., 2018), and also in teamwork, focusing on democratic aspects and greater employee participation and autonomy (Lapointe & Cucumel, 2015). The business model category includes studies about how social entrepreneurs can achieve the desired impact-based model of business (Zebryte & Jorquera, 2017).

The education category includes studies on socio-educational practices related to social problems, as well as initiatives involving universities (e.g., Bennett, Cassim, & Van der Merwe, 2017). The ecosystem category refers to networks composed by the association of multiple actors that mobilize around problematic situations, involving accelerators, incubators, financiers, universities, companies, and government (e.g., Pel, Wittmayer, Dorland, & Jorgensen, 2018).

Cluster 4 [triangle], entitled "Non-profit Sector, Strategy and Learning", has five vertices and adds 64 relationships between nodes. It is a group that presents discussions about non-profit sector (33), measuring impacts (28), strategy (27), knowledge and learning (26), and capabilities (21). In this cluster, the categories obtained equal weights, with no more significant weight ratio between categories. Concerning the category non-profit sector, some studies highlight the cooperation networks and solidarity movement (e.g., Tello-Rozas, 2016). Furthermore, call attention to the strategic partnership and alliances between public, private, and non-profit actors for the development and practice of SI (e.g., Manning & Roessler, 2014) as well the use of strategic tools to understand and manage social innovations (Witkamp, Raven, & Royakkers, 2011)

Regarding knowledge and learning, Mirvis et. al. (2016) check how companies learn to develop successful social innovations by acquiring tacit knowledge from outside. Complementarily, Godói-de-Sousa and Valadão Júnior (2011) indicate challenges along the way to foster dynamic learning. There should be the generation of knowledge from the socialization of collective

experiences. However, what is still observed is the lack of joint discussion and the predominance of individualized learning actions. More discussions are needed about learning in social movements, where collective learning creates shared identity and solidarity, motivating people to participate in social change processes (Bennett & McWhorter, 2019).

The most significant weight ratio between the categories of different clusters include: "SI" and "Social Entrepreneurship" (136); "SI" and "Organizational Aspects" (136); "SI" and "Innovation" (104); "SI" and Social Value" (72); and "SI" and "Sustainability" (68). The strong relationship between SI and SE corroborates the growing number of studies that have investigated SI from this entrepreneurship model, whose purpose is the creation of social value (Boons & Lüdeke-Freund, 2013). The focus of studies analysis has been on an organizational level, that is, in the organizational capacities, resources, and competencies necessary for the process of generation, development, and implementation of social innovation, as well as the role of the entrepreneur in this context (e.g., Phillips et al., 2015). Other focus concentrations of studies are innovation and sustainability.

6. FINAL CONSIDERATIONS

The main objective of the research was to map international scientific production about SI, to identify relevant theoretical constructs and clusters based on network analysis. The main contributions of this work were to analyze, through the networks formed by clusters, how themes related to SI have developed, and to verify which are more strongly connected. Based on the clusters formed and the most cited categories, some main axes could be identified, with emphasis mainly on SE, organizational aspects, innovation, and social value. Such axes can represent a theoretical orientation in the discussions. In addition, it was possible to identify the topics that still need further study, visualizing new research opportunities. The network analysis allowed us to verify beyond the strong relationships, the categories not connected to each other, that is, the possible search gaps. Appendix presents some gaps that may significantly aid future studies. Among the several possibilities presented in the table, it is worth highlighting some main themes, in view of the orientation in previous studies and also the need for further study. One example is the actor-networks that emerge in the development of SI. Unlike the mainstream of the SE and innovation literature, where individual entrepreneurs are highlighted, SI occurs through collaborative networks involving various actors (Toivonen, 2016). Understanding how networks are formed, what are the ties and strength of relationships between actors, can contribute to advances in the area. Theoretical approaches to the new economic sociology, as well as network analysis, can make important contributions.

The community also deserves attention for future research and possible investigations arise, for example, on local embedding, local context, shared identities, as well as practices to create social cohesion and resilience of the community (Pel et al., 2019). Such studies raise the need to broaden the understanding of SI from local experiences, seeking to understand them as a process, spatially embedding and inserted in territories (Citroni, 2015). Theoretical approaches relationship to local development, new economic sociology, and sustainable development can advance in this direction.

The ecosystem is one more subject that needs further study. The social innovation ecosystems (SIE), the capacities of the different actors that build these networks, and drivers that facilitate or inhibit SIE are aspects of understanding. A deeper understanding of SIE is relevant, especially about the actor-networks that make up this ecosystem. Other aspects little considered in the

current debate about SIE, are the multi-scale dynamics of social innovation and its territorial and socio-historical inscription (Alijani, Luna, Castro-Spila, & Unceta, 2017; Pel et al., 2019).

Another contribution of this study refers to the methodological aspect since the study advances in discussions by bringing the network analysis tool. The use of new approaches is necessary to expand and deepen the discussion of the theme. Future research could combine different research methods, either qualitative or quantitative, in order to measure the impacts generated by SI, as suggested by Voorberg et al. (2015).

Despite the detailed observation in network analysis, some limitations may be pointed out in this study. One is that the research was conducted only through the Scopus database, in the area of management and business. Publications from other bases or areas were not analyzed, which could bring different perceptions on the topic. Another limitation is the definition of the keyword used to filter the articles. The term chosen for the study was "social innovation" and "social innovat*"; however, other similar terms could be included to broaden the variables to be studied. Along these lines, social innovation-like concepts could have been used for a better understanding of the phenomenon.

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AUTHOR'S CONTRIBUTION

JCB – contribution in the research: Conceptualization; Data curation; Formal analysis; Methodology; Validation; Writing-original draft; Writing-review & editing.
ES – contribution in the research: Data curation; Formal analysis; Methodology; Software; Writing-review & editing.
ACVC – contribution in the research: Formal analysis; Validation; Writing-original draft; Writing-review & editing.
MP – contribution in the research: Formal analysis; Writing-review & editing.

CONFLICTS OF INTEREST

No potential conflict of interest was reported by the authors.

APPENDIX

Weight of relationships between categories.

Categories	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Business Model (1)	8	0	7	4	1	4	3	6	8	2	11	6	2	3	3	29	3	5	4	1	1	2	10	1	5	4	10	48	6	5	9	2	10	6	4	233
Capabilities (2)		8	1	0	0	3	0	0	0	2	0	1	1	0	0	6	0	2	2	2	0	1	16	0	0	0	2	18	5	5	6	5	1	0	1	88
Collaboration and Co-creation (3)			7	6	0	5	1	0	4	3	2	2	1	4	4	16	1	4	0	7	2	3	31	1	15	1	8	44	6	9	6	2	6	4	1	206
Community (4)				6	0	0	0	1	2	0	2	1	4	1	0	2	0	0	0	7	1	2	7	1	0	2	7	19	3	0	0	0	1	5	10	84
Conflits, Barriers and Drivers (5)					2	0	0	0	0	0	0	1	0	1	2	7	1	0	3	1	0	4	2	0	2	0	2	11	1	3	0	0	0	0	1	44
Cross-sector Partnerships (6)						5	1	0	0	0	1	1	2	1	2	7	3	0	0	0	3	5	13	0	2	2	10	31	5	4	13	0	1	3	0	115
Design (7)							13	1	0	3	2	1	0	2	2	10	2	2	1	5	0	2	6	0	1	2	4	26	4	2	1	0	0	6	0	98
Developed Regions (8)								4	5	1	5	0	5	8	0	0	2	1	1	3	0	1	11	1	0	0	5	18	1	3	4	3	1	0	4	87
Ecosystem (9)									7	3	0	4	3	3	0	4	0	0	0	2	2	0	6	1	0	1	9	20	0	0	2	4	5	1	1	78
Education (10)										2	2	0	2	1	1	0	3	11	3	7	0	1	6	1	2	0	5	21	9	4	0	0	4	2	1	88
Emerging Countries (11)											9	2	4	3	5	5	2	3	2	3	2	5	10	1	1	8	23	41	5	10	1	2	9	13	5	174
Entrepreneurship Approach (12)												1	2	1	7	5	5	2	0	2	0	2	3	1	0	0	13	22	3	5	1	0	5	5	0	85
Financial Aspects (13)													14	7	4	15	1	0	9	0	2	4	9	0	1	0	7	40	2	1	8	2	6	3	13	148
Government and Policy (14)														10	2	14	3	3	1	1	0	3	11	0	8	1	5	38	4	11	0	0	3	4	5	127
Human Aspects (15)															3	7	1	2	0	1	0	2	7	2	0	1	10	32	10	5	1	4	4	8	4	104
Innovation (16)																80	6	13	11	7	6	1	22	0	5	1	6	104	13	12	11	3	37	21	6	365
Institutional Approach (17)																	8	1	1	4	0	0	5	0	3	4	5	30	1	7	0	1	2	5	7	84
Knowledge and Learning (18)																		10	1	13	2	2	20	0	5	0	10	34	12	8	0	2	0	8	0	127
Measuring Impacts (19)																			5	5	1	5	5	0	0	2	10	28	6	1	3	2	3	2	4	82
Methodology (20)																				5	3	3	13	1	4	7	21	55	9	11	5	1	5	4	11	158
Network (21)																					2	4	7	0	2	5	9	17	3	3	2	0	4	1	3	62
Non-profit Sector (22)																						15	10	3	4	9	21	42	13	10	2	1	0	7	5	142
Organizational Aspects (23)																							55	1	11	5	40	136	13	20	23	9	22	15	13	363
Others (24)																								3	1	0	0	8	1	3	1	1	0	0	0	18
Public Sector (25)																									23	1	5	48	11	13	2	2	3	6	1	115
Rural or Regional Development (26)																										4	6	27	4	1	3	0	9	5	6	65
Social Entrepreneurship (27)																											41	136	22	21	28	7	22	3	13	293
Social Innovation (28)																												21	62	72	59	27	68	54	48	411
Social Needs (29)																													12	18	6	3	7	11	11	68
Social Value (30)																														8	7	3	11	7	8	44
Strategic Approach (31)																															9	12	10	1	6	38
Strategy (32)																																6	3	3	4	16
Sustainability (33)																																	48	9	6	63
Technology (34)																																		30	6	36
Theoretical Approaches (35)																																			20	20
Total	8	8	15	16	3	17	18	12	26	16	34	20	40	45	35	207	41	59	44	76	27	67	285	18	95	60	294	1115	246	275	213	104	310	252	228	4329

Source: Research Data